

# ***Sportwerks™ Turmoil™ RTR Assembly and Tuning Manual***

**Length:**

19.4 in (492mm)

**Width:**

12.2 in (310mm)

**Track:**

Front: Adjustable  
10.6 in–12.2 in  
(270mm–310mm)

Rear 12.2 in (310mm)

**Wheelbase: Adjustable**

12.8 in–13.0 in (325mm–330mm)

**Weight:**

7.6 lb (3447 grams)

**Gear Ratio:**

10.86 to 1

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## Introduction

Thanks for your purchase of the Turmoil™ RTR. Hang on—you're about to discover just how much fun trying to tame an overpowered 1/8-scale nitro buggy can be. In just minutes you'll be ripping up the dirt, at speeds over 40 mph.

The Turmoil chassis is based on the race winning design of the Sportwerks™ Turmoil Pro racing buggy. Professionally built and hand assembled by the Sportwerks team. The shocks and differentials are pre-filled with the correct lubes for optimum handling and performance. The Turmoil RTR comes assembled with radio, engine, and exhaust installed. All you need to make it race-ready is to install a 6-cell pack in the handheld starter and 12 AA batteries in the transmitter and receiver.

The front section of this manual features a 6-step quick start guide that will take you from box to race-ready in about 15 minutes. Also included are exploded view isometric drawings, with part numbers and parts listings which are helpful when disassembling your Turmoil for repair or maintenance. For those who want to feel the thrill of competition at a local track, the Sportwerks team has a baseline setup sheet available online at [www.sportwerksrc.com](http://www.sportwerksrc.com). A blank version is also provided at the back of the manual to help you record your own race settings. The last page also includes helpful information and specifications for your Turmoil.

Good luck, have fun and enjoy the fun of R/C with your new Turmoil ST.

## Warranty Information

### Safety, Precautions, and Warnings

This model is controlled by a radio signal that is subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is advisable to always keep a safe distance in all directions around your model, as this margin will help to avoid collisions or injury.

- Always operate your model in an open area away from cars, traffic, or people.
- Avoid running your model in the street where injury or damage can occur.
- Never run the model out into the street or populated areas for any reason.
- Never run your model with low transmitter batteries.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.
- Keep all chemicals, small parts and anything electrical out of the reach of children.
- Moisture causes damage to electronics. Avoid water exposure to all equipment not specifically designed and protected for this purpose.

### Limited Warranty Period

Horizon Hobby, Inc. guarantees this product to be free from defects in both material and workmanship at the date of purchase.

### Limited Warranty & Limits of Liability

Pursuant to this Limited Warranty, Horizon Hobby, Inc. will, at its option, (i) repair or (ii) replace, any product determined by Horizon Hobby, Inc. to be defective. In the event of a defect, these are your exclusive remedies.

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than an authorized Horizon Hobby, Inc. service center. This warranty is limited to the original purchaser and is not transferable. In no case shall Horizon Hobby's liability exceed the original cost of the purchased product and will not cover consequential, incidental or collateral damage. Horizon Hobby, Inc. reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon Hobby, Inc. Further, Horizon Hobby reserves the right to change or modify this warranty without notice.

REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HORIZON HOBBY, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

As Horizon Hobby, Inc. has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the purchaser or user are not prepared to accept the liability associated with the use of this product, you are advised to return this product immediately in new and unused condition to the place of purchase.

### Safety Precautions

This is a sophisticated hobby product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision.

The product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

### Questions, Assistance, and Repairs

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the product has been started, you must contact Horizon Hobby, Inc. directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance.

For questions or assistance, please direct your email to [productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com), or call 877.504.0233 toll free to speak to a service technician.

### Inspection or Repairs

If your product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon Hobby, Inc. is not responsible for merchandise until it arrives and is accepted at our facility. Include your complete name, address, phone number where you can be reached during business days, RMA number, and a brief summary of the problem. Be sure your name, address, and RMA number are clearly written on the shipping carton.

### Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Providing warranty conditions have been met, your product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

### Non-Warranty Repairs

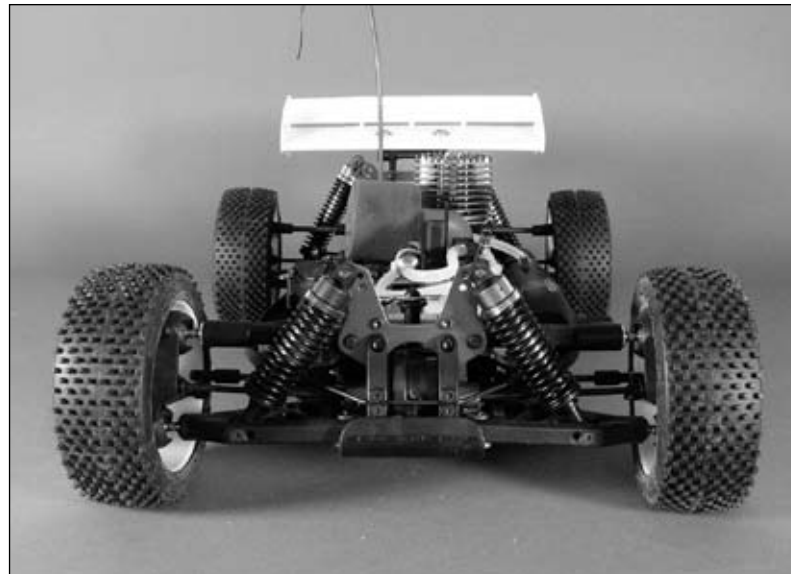
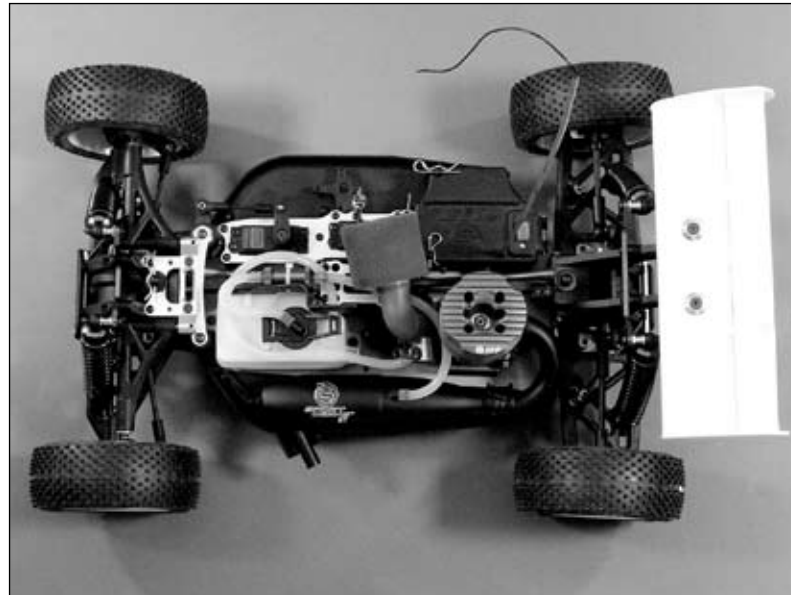
Should your repair not be covered by warranty and the expense exceeds 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. You will be billed for any return freight for non-warranty repairs. Please advise us of your preferred method of payment. Horizon Hobby accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly.

Electronics and engines requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Service Center  
4105 Fieldstone Road  
Champaign, Illinois 61822

All other products requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Product Support  
4105 Fieldstone Road  
Champaign, Illinois 61822



### Recommended Tools

SWK9920  
Metric Allen Driver Set  
SWK9912  
3 in 1 Tuning Screwdriver  
SWK9910  
EZ-On Clutch Spring Tool  
SWK9911  
Header Spring Tool  
SWK9914  
1/8 Scale Turnbuckle Wrench  
DYN2828  
#1 Phillips Screwdriver  
DYN2511  
Curved Lexan Scissors

### Recommended Items

DYN1000  
Dyna-Sport 7.2 1500mAh Battery  
DYN2502  
Air Filter Oil  
DYN2320  
Blue Thunder Sport Fuel 20%  
DYN2003  
500cc Fuel Bottle

### Tools You Will Find Handy

In addition to the tools included in this kit, you will find the following items useful when performing maintenance or repair to your Turmoil.

- 1.5mm hex wrench
- 2mm hex wrench
- 2.5mm hex wrench
- 3mm hex wrench
- 5.5 mm nut driver
- #2 flat screwdriver
- #1 Phillips screwdriver
- Needle-nose pliers
- Scissors
- Servo tape
- Clutch spring tool
- Header spring tool
- Piston lock or crank lock tool
- 10mm deep socket wrench



### Additional Items Needed to Operate

- 6-cell 7.2 volt car pack (DYN1000 recommended)
- 12 "AA" Alkaline batteries
- 1 "C" Alkaline battery (for glow igniter)
- Air filter oil
- Car fuel
- Fuel bottle



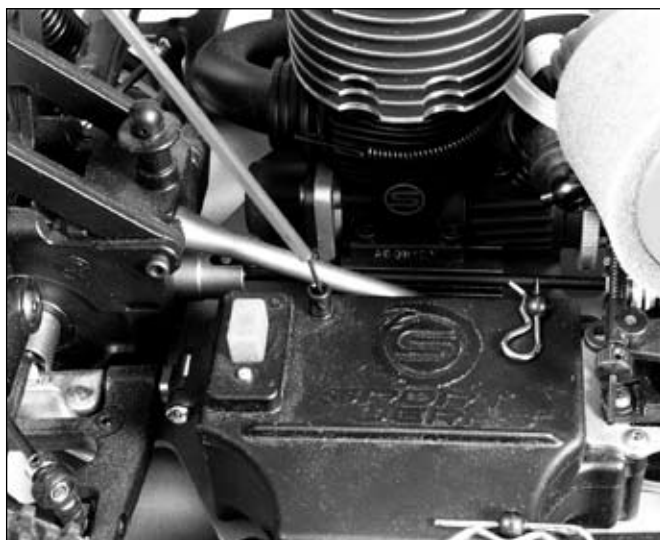
## Quick Start



1. Install 8 "AA" batteries in the transmitter noting the proper direction of each cell.



2. Open the radio box and install 4 "AA" batteries in the battery holder noting the proper direction of each cell.



3. Insert the antenna tube in the top of the radio box. Feed the receiver antenna through the tube until several inches extend out the top. Install the antenna tip.



4. Install a charged 6-cell 7.2-volt battery in the starter and attach the plug.





5. Turn on the transmitter and then the receiver. Check to make sure the servos are operating correctly and that the carburetor closes when the throttle trigger is released.



6. Apply air filter oil (not included) and spread the oil uniformly onto the air filter allowing it to saturate the foam element.

**Congratulations—your Turmoil is ready to rip!**

## The Sportwerks Carburetor

The Sportwerks™ .26 v2 engine features a slide-valve carburetor and includes two inserts of varying diameters. The carburetor inserts are used to change the power curve and response of the engine. The two inserts included have the following effect:

7.5mm – Develops good mid-range power; easier to control than the 9mm insert; best for medium traction conditions.

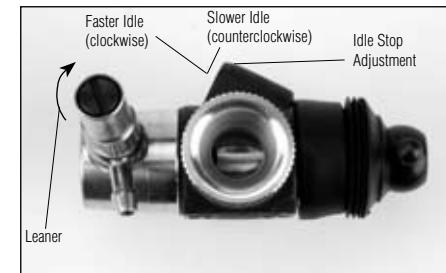
9mm – Offers explosive, sometimes difficult to control, acceleration; uses the most fuel; used only for high traction, or expert drivers.

### Setting the Needles

While the needles are pre-set at the factory, it's a good idea to verify that the needles are properly set slightly rich for break in. The following are the recommended settings for your new engine.

High-Speed Needle: 3 1/2 turns out

Low-Speed Needle: 2 turns out (counterclockwise) from closed.



**Note:** When checking the adjustment of the low-speed needle, it is crucial that the throttle slide is closed completely and that you do not over-tighten the needles. When you feel resistance, immediately stop turning. This is the closed position.

## Engine Starting and Break In

### Your First Runs

If this is your first nitro vehicle, we highly recommend that you have an experienced nitro tuner help during the first startups and runs. He will be able help you properly adjust your engine for reliable performance.

Before attempting to start your new buggy, be sure to read this section and fully understand each step before starting your engine, Pay particular attention to the needle settings recommended for starting and to the break in procedures suggested below. Always use the proper fuel and glow plugs.

### Fuel and Glow Plug

**Note:** Using the proper fuel and glow plug is vital in achieving reliable performance and is a must for long engine life. You must use fuel and glow plugs that are specifically designed for model car use.

**Never use any type of model airplane glow fuel.** We recommend a high-quality car fuel containing 20% nitro methane (Blue Thunder™ 20% Sport Fuel is recommended). A glow plug is included that is ideal for breaking in your new engine. During the break-in process, it's not uncommon to go through one or two glow plugs, as microscopic particles of metal (from the cylinder/piston wearing in) bond themselves to the plug element causing glow plug failure. We recommend the Dynamite® MC-59 Glow Plug (DYN2508) as the best replacement glow plug for this engine.

### Air Filter

A clean properly oiled air filter is a must to keep dirt out of the engine. Use the included air filter and saturate the foam element with oil.

## Starting Your Engine for the First Time

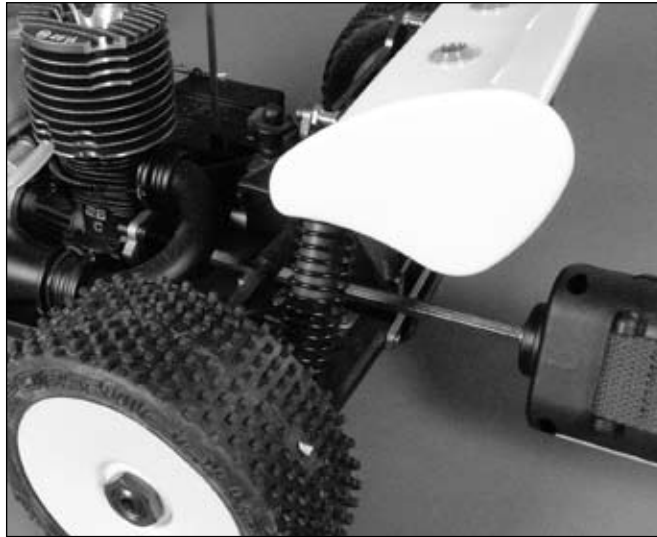
### Break In

The first startups and the first 3 to 4 tanks of fuel while your engine is running is the most critical of its life and, in many ways, dictates how well it will perform and how long it will last.

During the first runs, when the engine starts, the exhaust should emit blue/white smoke indicating that the engine is rich (a good thing during break in). During the first tank of fuel, you may wish to set a higher than normal idle speed in order to keep your engine from stalling. Drive your buggy around while blipping the throttle, and avoid operating the engine at full throttle for more than 2–3 seconds at a time. Run the entire first two tanks of fuel in this manner. After the first two tanks, begin leaning out the high-speed needle valve 1/8 turn at a time. It usually take about 5 or 6 tanks of fuel before you'd want to start leaning your engine for maximum power. Patience will be rewarded after break in with an engine that performs reliably to its maximum power potential. Remember glow plug failure is a common occurrence when breaking in a new engine. To test your plug, let the engine idle at a properly adjusted low-speed setting with the glow igniter attached. Then, remove the igniter. If you hear no appreciable change in engine rpm, the plug is still good. If the engine loads up and the rpm's decrease, it's time to replace the glow plug.

### Starting the Engine

1. Fill the tank with fuel.
2. Turn on the transmitter and receiver and confirm that the radio system is working properly.
3. Attach the glow driver to the glow plug.



4. Fully insert the electric start shaft into the back of the engine. Press the start button for ten seconds then stop. The engine should turn over but likely won't yet start. Continue these ten-second starting attempts several times until the engine starts.

**Note:** Should the engine not turnover when the starter is applied, the engine maybe flooded (hydro-locked). Excess fuel in the combustion chamber can prevent the piston from traveling through its full range of compression, effectively “locking up” the engine. Should this occur, remove the glow plug igniter from the plug and, using a glow plug wrench (DYN2510), remove the glow plug and turn the buggy upside down. Give the starter a few short blips to clear the fuel from the combustion chamber then re-install the glow plug and try again.

You may find it necessary to blip the throttle on the transmitter (applying the throttle on/off) while trying to start the engine, as new engines are harder to start due to the tight piston/cylinder fit. Never start an engine above 1/4 throttle or damage to your engine could occur.

## Adjusting the Carburetor

### Tuning Your Engine

When tuning the needle valves for maximum performance, adjust them in small increments, 1/16 turn at a time. An engine should not be run too lean; doing so will severely shorten the life of the engine. When an engine is set too lean, it will run very strong at first but soon begin to sag and hesitate or stall when accelerating. The best way to tune an engine is by using an infrared temperature gauge, but you can also use water to check the head temperature. (Refer to “Fine Tuning Your Engine”)

### Fine Tuning Your Engine

As you gain experience, you will be able to tune your engine based on its sound and feel during acceleration and at full throttle. Until you've developed this skill, we recommend the following method of engine tuning. Start your engine and drive your buggy aggressively for about two minutes. Place a drop of water on the cylinder head. If the water sizzles away (evaporates immediately), the needle setting is too lean. A correct needle setting will result in the water evaporating slowly, in about 5–10 seconds. If the water does not evaporate, the needle setting is too rich. Lean the high-speed needle 1/8 of a turn and run the engine again, adjusting the needle setting to the desired evaporation rate of 5–10 seconds. Check the temperature each time you change the needle mixture. Do not let the engine overheat, this will damage the engine.

### Tuning the Low-Speed Needle

The low-speed needle (also referred to as the idle mixture or idle needle) should be set after you're satisfied with the high-speed needle setting. After achieving the engine's proper operating temperature, reduce the engine throttle to idle for about 15 seconds. Now pinch the fuel line with your fingers close to the carburetor fuel inlet nipple while carefully listening to the engine rpm. If the engine dies immediately without an increase in rpm, the low speed needle is set too lean. If the rpm's increase dramatically and then the engine dies, the setting is too rich. The ideal setting results in the rpm's increasing a slight amount (about 200rpm's after pinching the fuel line before dying).

## Setting the Idle RPM

The last setting to be made is the idle rpm. Turning the idle stop screw clockwise increases the idle speed. Turning the screw counterclockwise will make the engine idle at a lower rpm. Ideally, the engine should idle just fast enough to give a reliable idle but not engage the clutch and, of course, never flame out.

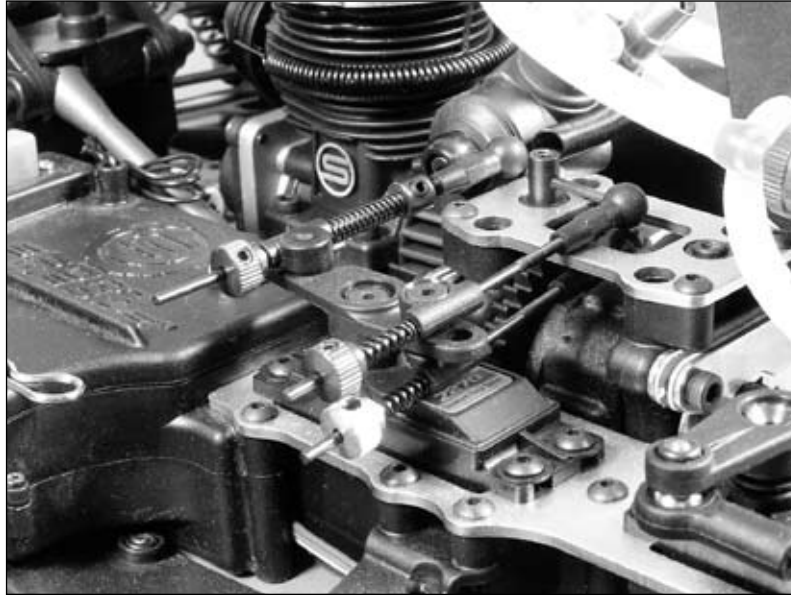
## After Run Engine Maintenance

After you're finished racing for the day, it's important to empty the fuel tanks and run the remaining fuel from the engine. Continue to try and start the engine for several seconds after it will no longer fire to ensure that all fuel is out of the engine. Put several drops of after run oil in the carburetor and turn the engine over with the starter for several seconds to coat the internal engine parts with after run oil.



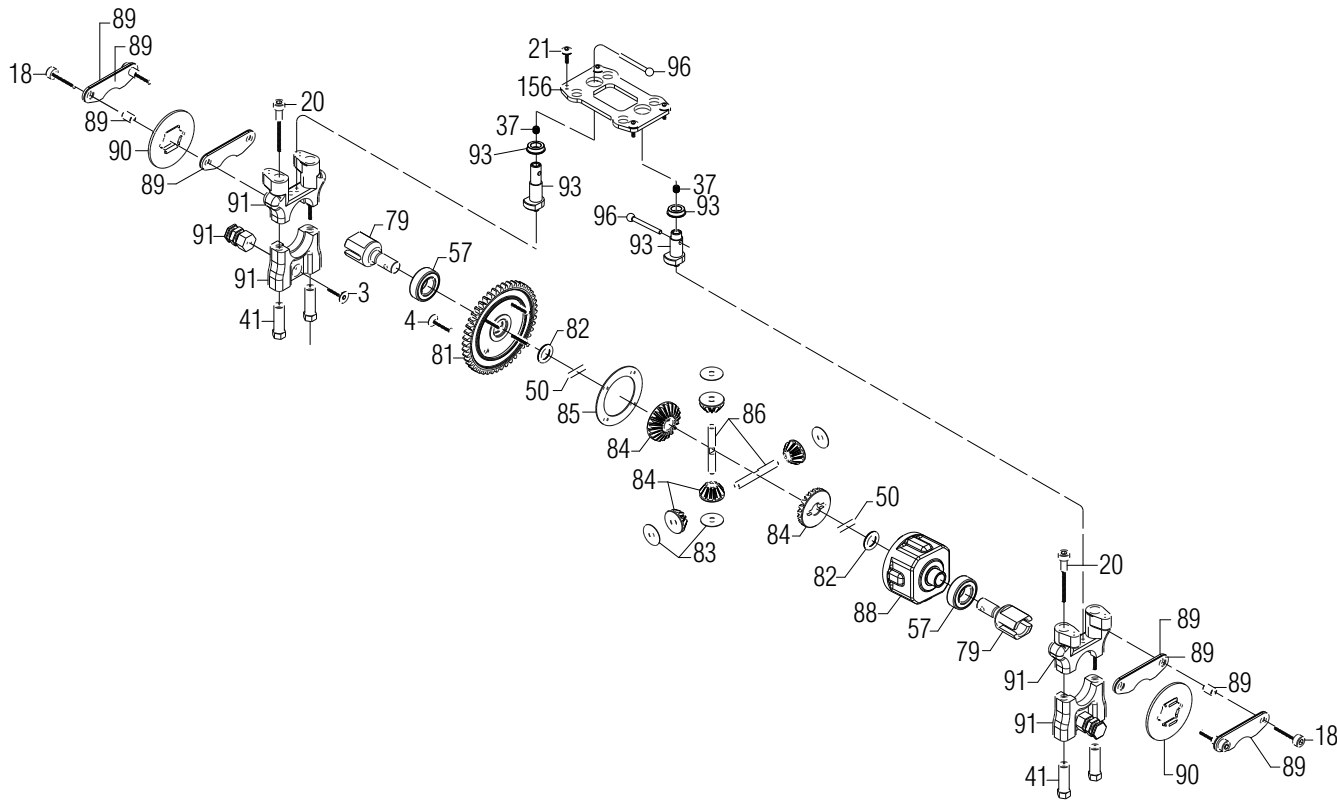
Clean the air filter regularly using warm soapy water, then allowing it to air dry before applying air filter oil. Keeping your air filter clean and oiled is vital to the life of your engine.

## Setting the Brake Linkage



1. Turn on the radio system and adjust the throttle trim to the desired neutral position.
  2. Install the arm with attached linkage on the servo adapter such that the brake linkage will be parallel to the arm with the brake ball links attached.
  3. Be sure the ball links are snapped onto the front and rear brake and on the carburetor.
- Note:** It may be necessary to adjust the position of the throttle return spring to allow the ball link to snap on the ball.
4. Adjust the position of the return spring collar until the correct tension is achieved. With the throttle at neutral, the spring should just close the carburetor barrel with light tension.

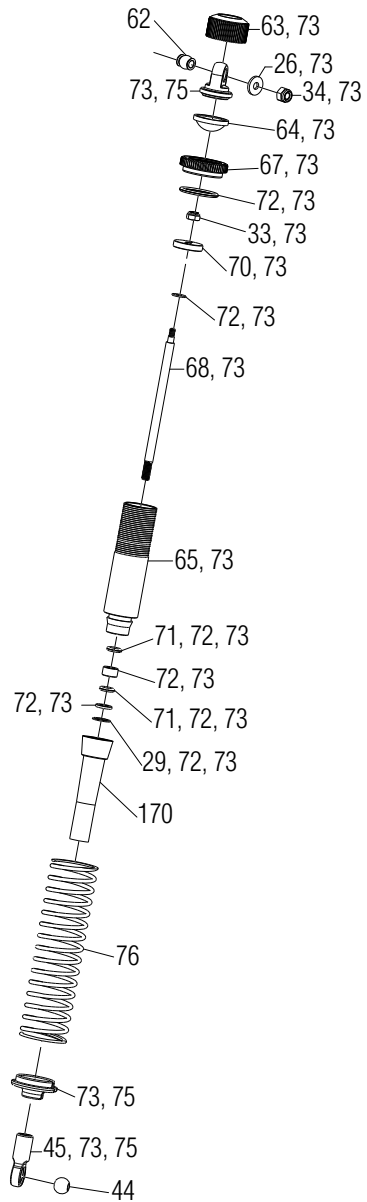
5. Loosen the setscrew in the blue knurled knob and slide the knob such that it just contacts the molded pivot on the arm, then retighten the setscrew.
6. Adjust the full throttle position with the programming in your transmitter such that the carburetor is full open just as the trigger reaches the full throttle position. By rotating the blue throttle knob, you can now precisely adjust the throttle dead band (the amount the throttle moves before the carburetor barrel actually opens) without disturbing the spring preload settings.
7. With the throttle at neutral, pull the front (silver knob) brake linkage through the molded pivot such that the front brakes are slightly applied. Loosen the setscrew on the silver adjusting knob and slide it into position such that it just contacts the molded pivot and retighten the setscrew.
8. With the throttle at neutral, pull the rear (red knob) brake linkage through the molded pivot such that the rear brakes are slightly applied. Loosen the setscrew on the red adjusting knob and slide it into position such that it just contacts the molded pivot and retighten the setscrew.
9. Cut the excess lengths of linkage off to clear the body. By rotating the silver adjusting knob, the front brakes can be accurately adjusted while rotating the red knob will affect the rear brake adjustment.



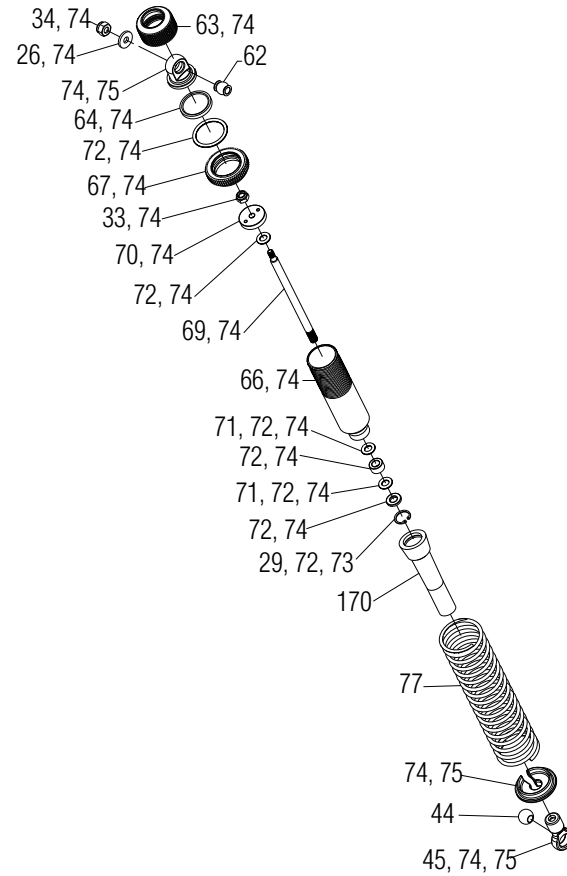
## Center Differential







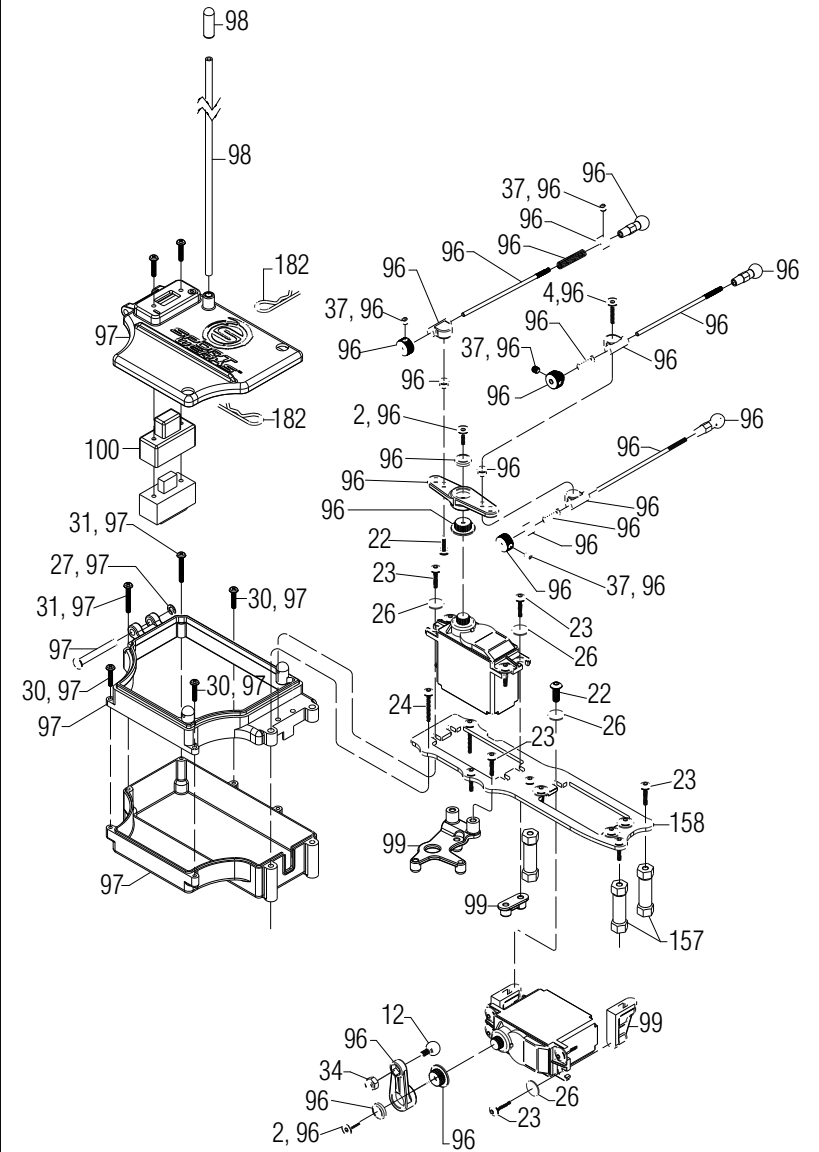
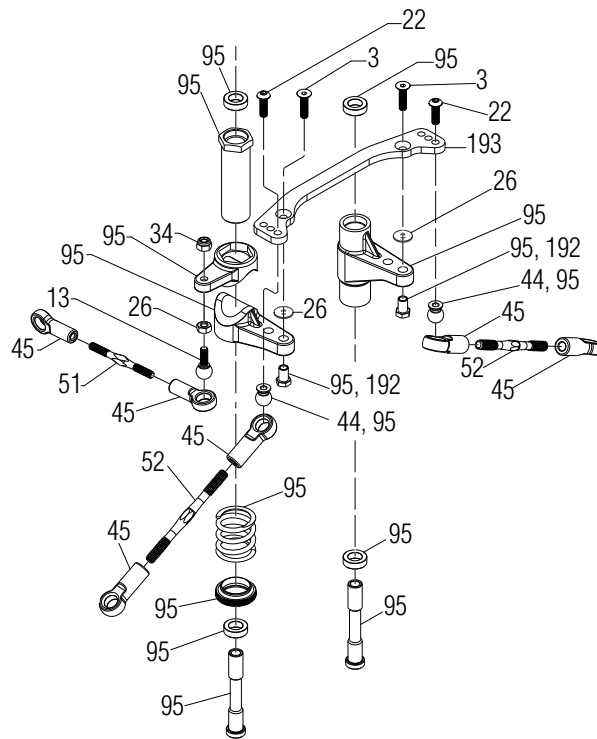
**Front Shock**

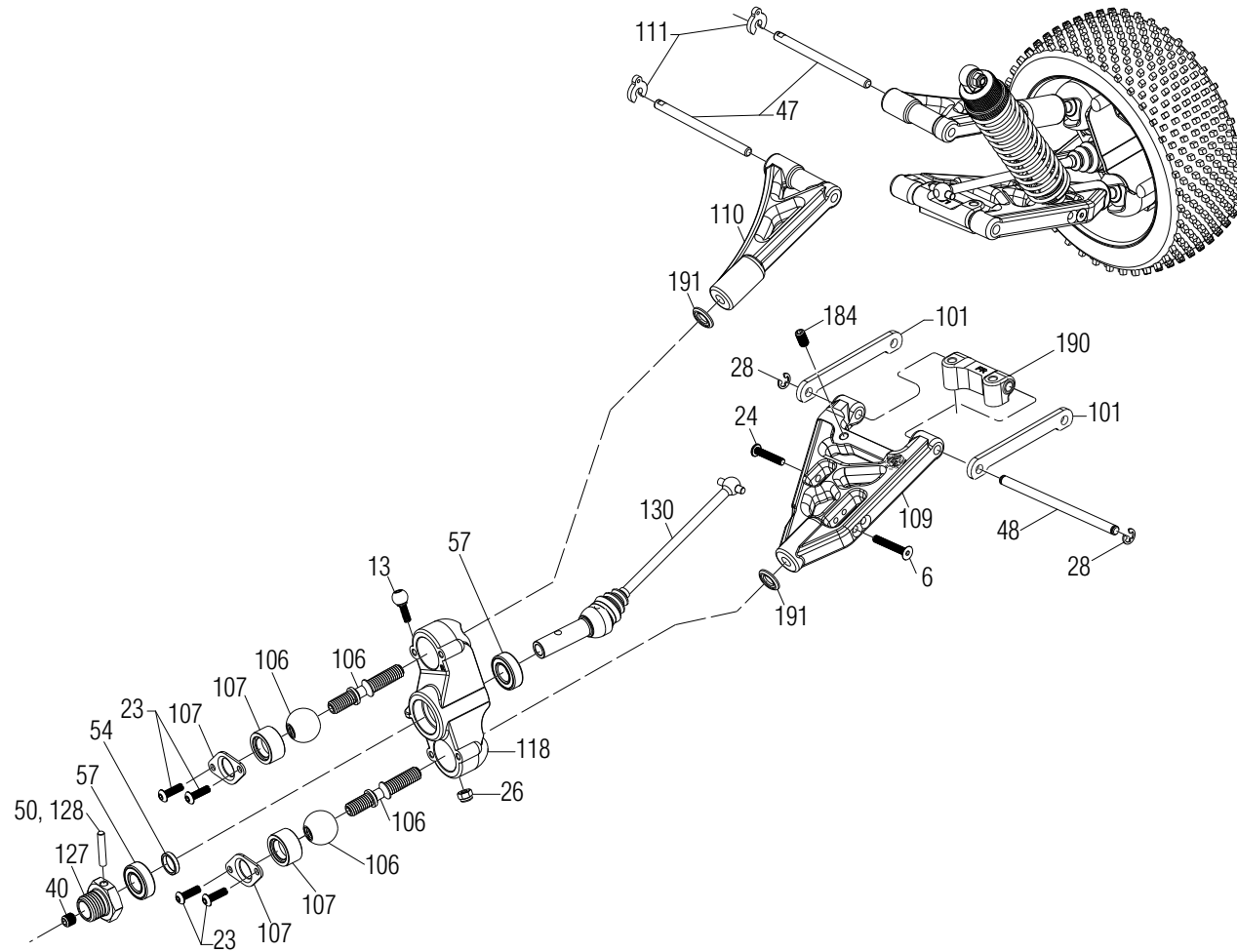


**Rear Shock**

**Front and Rear Shocks**

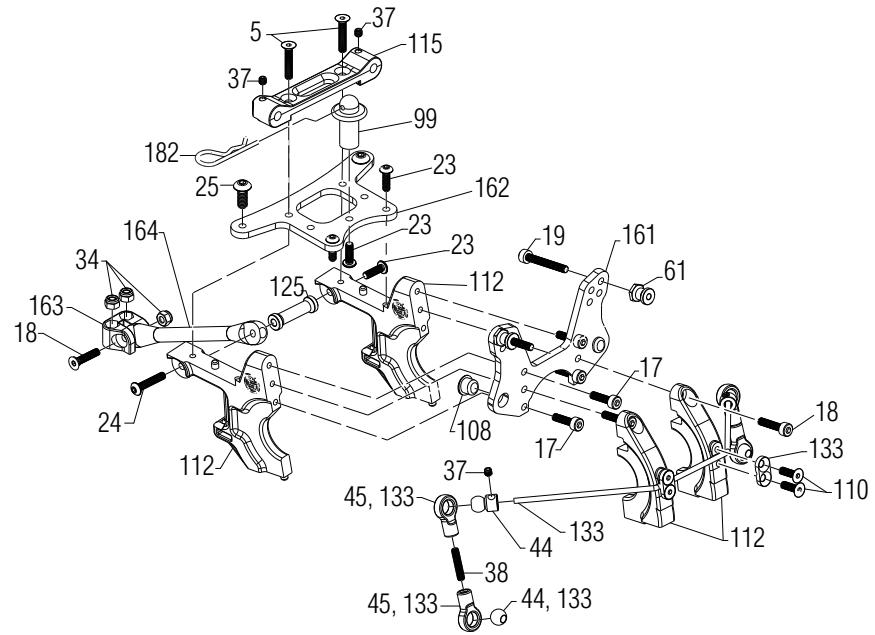
**Steering  
Bellcrank &  
Radio Tray**

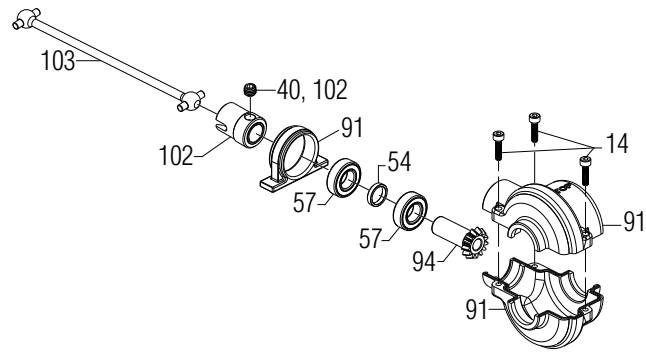




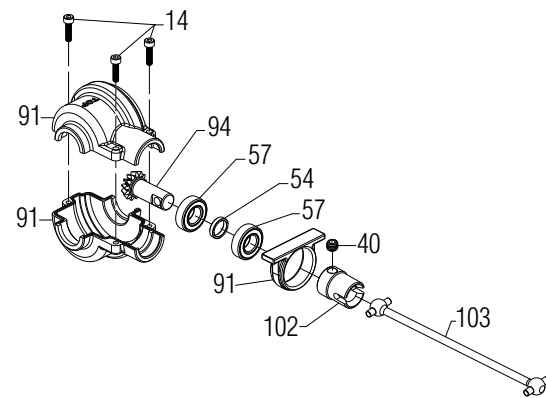
## Front Suspension

**Front Gearbox Mount**





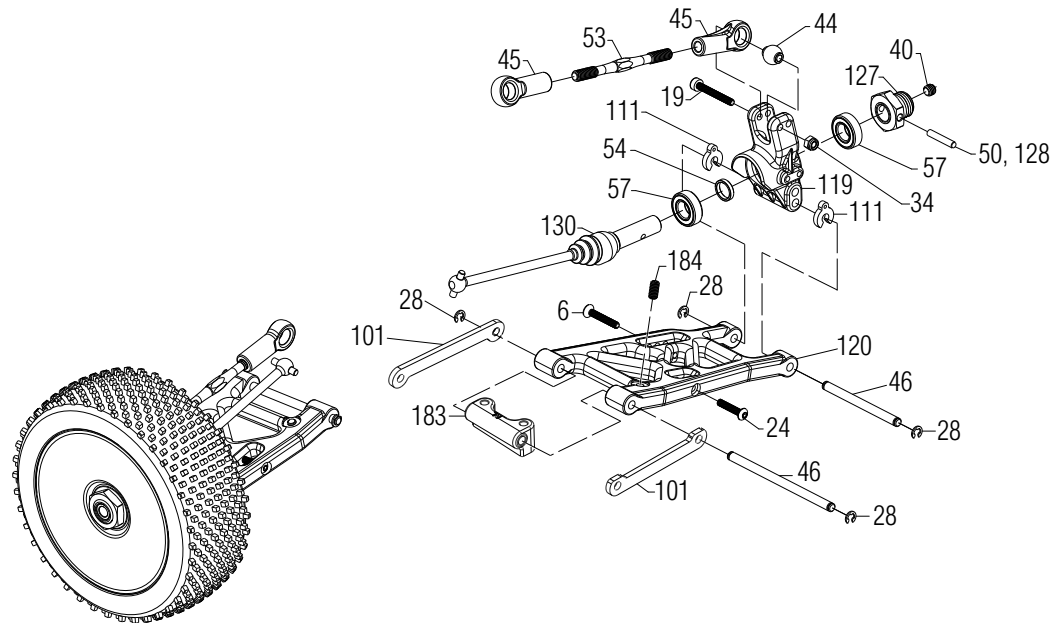
**Front Center Driveshaft**

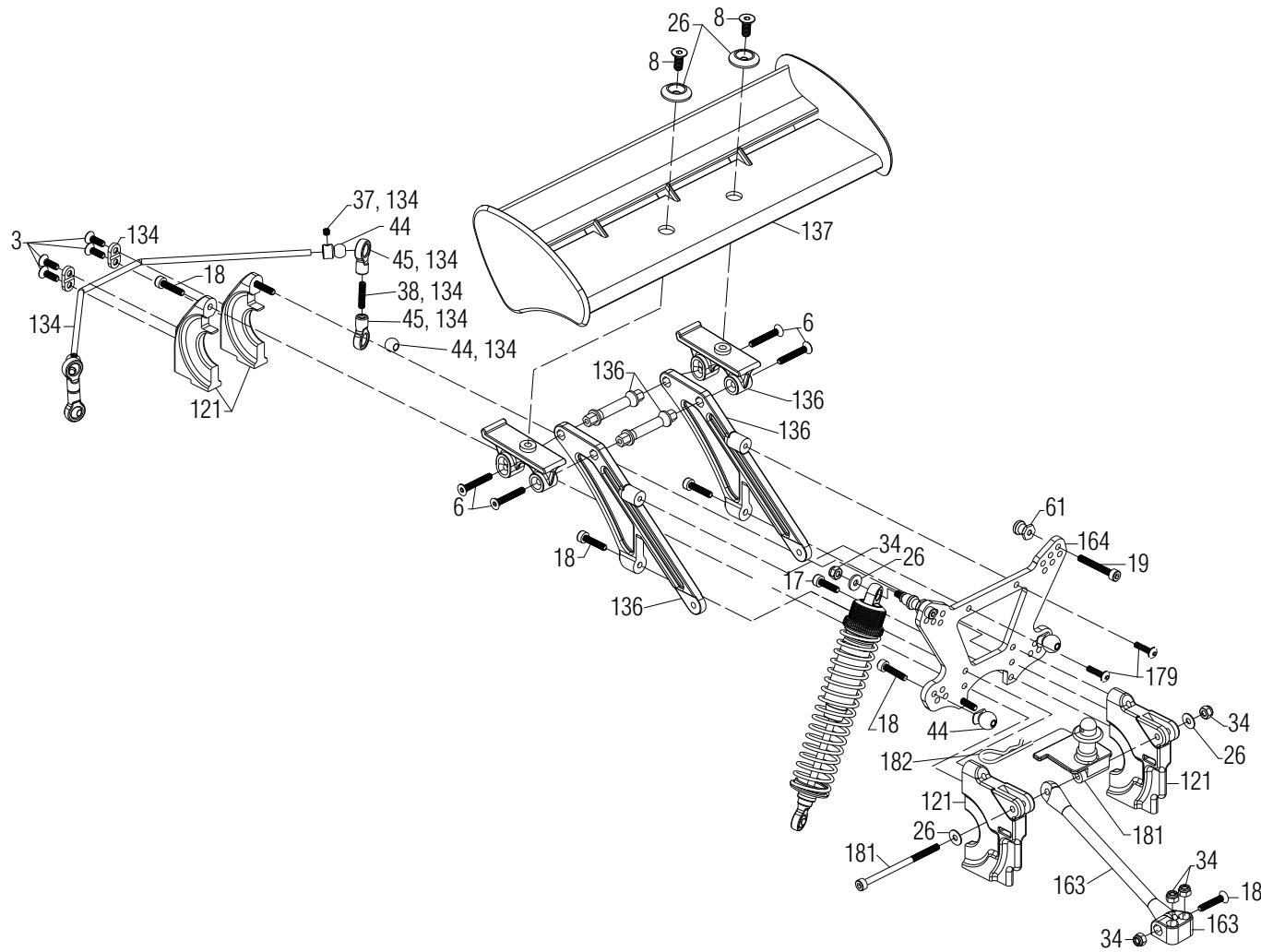


**Rear Center Driveshaft**

**Front/Rear Center Driveshaft**

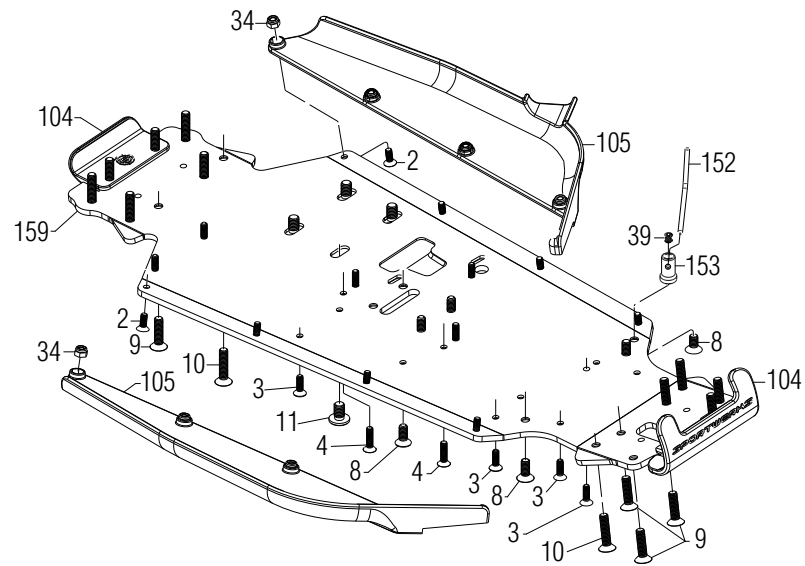
**Rear  
Suspension**



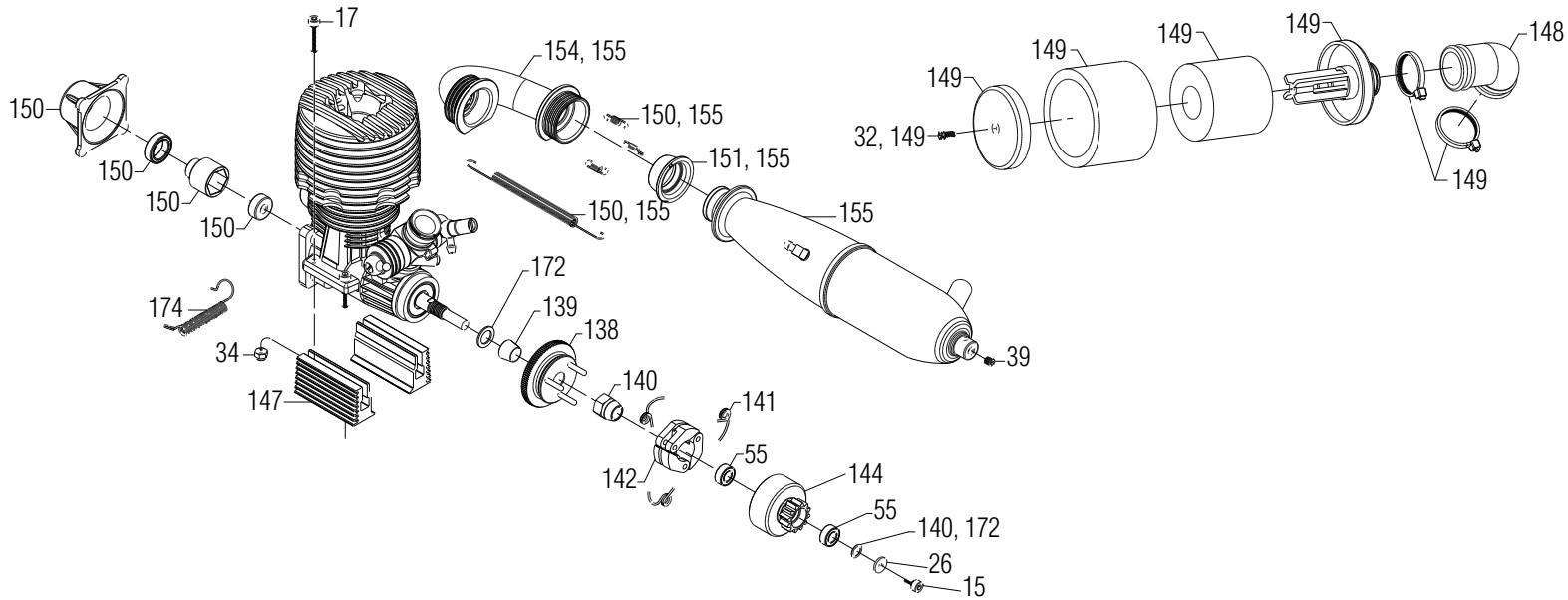


## Rear Gearbox Mount

**Main  
Chassis**

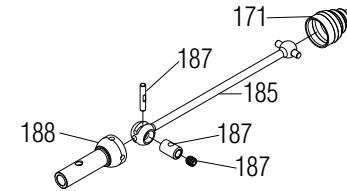
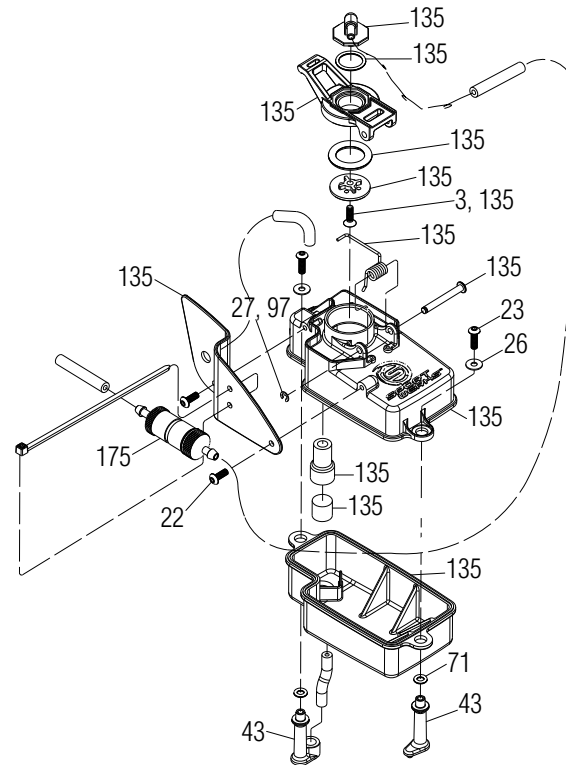


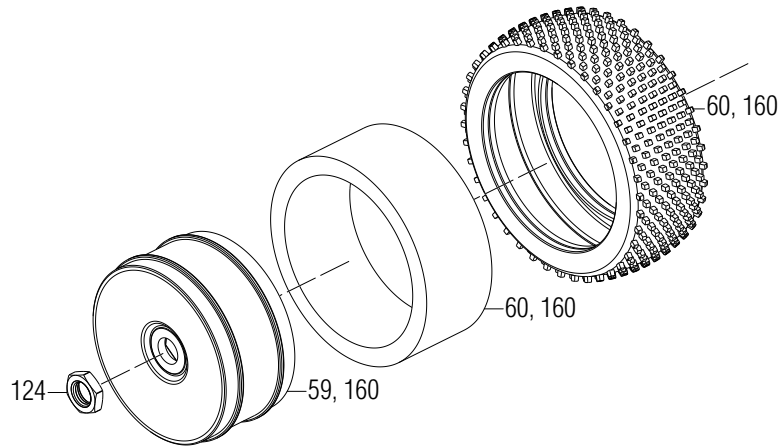




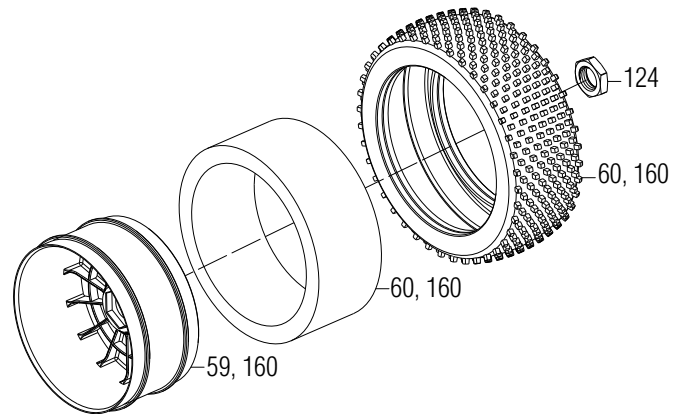
**Engine/Clutch/  
Air Filter Assembly**

**Fuel  
Tank/CVD**





**Front Tire/Wheel**



**Rear Tire/Wheel**

**Front & Rear Tire/  
Wheel Assembly**

## Parts Listings

KEY #	PART#	Quantity	Description
1	SWK2022	8	3mm x 6mm Flathead Screw
2	SWK2024	8	3mm x 8mm Flathead Screw
3	SWK2026	8	3mm x 10mm Flathead Screw
4	SWK2028	8	3mm x 12mm Flathead Screw
5	SWK2032	8	3mm x 16mm Flathead Screw
6	SWK2036	8	3mm x 20mm Flathead Screw
8	SWK2056	8	4mm x 10mm Flathead Screw
9	SWK2062	8	4mm x 16mm Flathead Screw
10	SWK2064	8	4mm x 18mm Flathead Screw
11	SWK2074	8	5mm x 8mm Engine Mount Screw
13	SWK2089	8	6.8mm x 14mm Ball Stud
14	SWK2106	8	2.5mm x 10mm Socket Head Cap Screw
15	SWK2122	8	3mm x 6mm Socket Head Cap Screw
17	SWK2128	8	3mm x 12mm Socket Head Cap Screw
18	SWK2130	8	3mm x 14mm Socket Head Cap Screw
19	SWK2139	8	3mm x 23mm Socket Head Cap Screw
20	SWK2141	8	3mm x 25mm socket Head Cap Screw
21	SWK2222	8	3mm x 6mm Button Head Screw
22	SWK2224	8	3mm x 8mm Button Head Screw
23	SWK2226	8	3mm x 10mm Button Head Screw
24	SWK2232	8	3mm x 16mm Button Head Screw
25	SWK2254	8	4mm x 8mm Button Head Screw
<b>26</b>	<b>SWK2282</b>		<b>3mm Washers/Wing Buttons</b>
		8	3mm Washers
		2	Wing Buttons
27	SWK2290	8	1/8 E-Clips
28	SWK2292	8	3mm E-Clips
29	SWK2296	8	7mm Snap Ring
30	SWK2306	8	2mm x 10mm Phillips Head Screw
31	SWK2311	8	2mm x 15mm Phillips Head Screw
32	SWK2324	8	3mm x 10mm Phillips Head Screw
33	SWK2380	8	2.6mm Lock Nuts
34	SWK2382	8	3mm Lock Nuts

KEY #	PART#	Quantity	Description
37	SWK2419	8	3mm x 3mm Setscrew
38	SWK2430	8	3mm x 14mm Setscrew
39	SWK2440	8	4mm x 4mm Setscrew
40	SWK2450	8	5mm x 4mm Setscrew
41	SWK2460	4	Threaded Chassis Inserts
<b>43</b>	<b>SWK2465</b>		<b>Chassis Stand-off Bag</b>
		1	Front Fuel Tank Standoff
		1	Rear Fuel Tank Standoff
		2	Radio Tray Standoff
<b>44</b>	<b>SWK2471</b>		<b>Pivot Ball Bag: Turmoil</b>
		6	6.8mm Pivot Ball
		2	8.8mm Flange Pivot Ball
		2	8.8mm Pivot Ball
		4	6.8mm Flanged Pivot Ball (Anodized)
		2	6.8mm Flanged Pivot Ball
		1	6.8mm x 11mm Threaded Pivot Ball
<b>45</b>	<b>SWK2480</b>		<b>Rod End Bag: Turmoil</b>
		4	6.8mm Short Rod End
		2	6.8mm Medium Rod End
		4	6.8mm Long Rod End
		2	8.8mm Rod End
		4	6.8mm Shock Rod End
46	SWK2500	2	(Rear) Outer Suspension Hinge Pins 50mm
47	SWK2505	2	(Front) Upper Suspension Hinge Pins 56mm
48	SWK2510	2	Inner Suspension Hinge Pins 70mm
<b>50</b>	<b>SWK2520</b>		<b>Pin Bag</b>
		4	Wheel Hub Pins
		2	Outdrive Pins
		2	CVD Coupler Pins

## Parts Listings

## Parts Listings

KEY #	PART#	Quantity	Description
51	SWK2550	1	Steering Link/Turnbuckle 3x36mm
52	SWK2560	2	Tie Rod/Turnbuckle 4x50mm
53	SWK2570	2	Camber Link/Turnbuckle 5x60mm
54	SWK2600	4	Bearing Crush Sleeve
55	SWK2620	2	Clutch Bearings 5x10x4mm
57	SWK2660	4	Rubber Sealed Bearings 8x16x5mm
58	SWK2705	1	Turmoil Painted Body, Orange
59	SWK2740	2	Dish Wheels, White
<b>60</b>	<b>SWK2840</b>		<b>Buggy Tires/Inserts</b>
		2	1/8 Tire Foam Inserts
		2	1/8 Buggy Tires
61	SWK3000	4	Shock Standoff Nuts
62	SWK3002	4	Shock Bushings
63	SWK3004	2	Shock Caps
64	SWK3006	4	Shock Bladders
65	SWK3008	2	Front Shock Body
66	SWK3010	2	Rear Shock Body
67	SWK3012	2	Shock Adjustment Collar
		2	Adjustment Collar O-Ring
68	SWK3016	2	Front Shock Shaft 54mm
69	SWK3018	2	Rear Shock Shaft 64mm
70	SWK3020	4	Shock Piston 2-Hole 1.5mm
71	SWK3022	4	Shock O-Ring
<b>72</b>	<b>SWK3024</b>		<b>Shock Rebuild Kit</b>
		2	Washer 2.5x5mm
		2	Adjustment Collar O-Ring
		4	Shock O-Ring
		2	Shock Shaft Bushing 3.4mm
		2	Shock Shaft Bushing 1mm
		2	Snap Ring 7mm

KEY #	PART#	Quantity	Description
73	SWK3026		<b>Front Shock Set</b>
		2	Shock Bladder
		2	Washer 2.5x5mm
		2	Adjustment Collar O-Ring
		2	Adjustment Collar
		4	Shock O-Ring
		2	Shock Shaft Bushing 3.4mm
		2	Shock Shaft Bushing 1mm
		2	7mm Snap Ring
		2	Shock Cap
		4	1mm Spring Clip
		4	2mm Spring Clip
		4	3mm Spring Clip
		4	4mm Spring Clip
		4	5mm Spring Clip
		4	6.8mm Shock Rod End
		4	Upper Spring Retainer
		4	Lower Spring Retainer
		4	Shock Eyelet
		2	3mm Washer
		2	3mm Lock Nut
		2	Shock Adjustment Collar
		2	2.6mm Lock Nut
		2	Shock Piston 2-Hole 1.2mm
		2	Front Shock Shaft 54mm
		2	Front Shock Body
		2	Front Buggy Spring, Black

## Parts Listings

## Parts Listings

KEY #	PART#	Quantity	Description
74	SWK3028		<b>Rear Shock Set</b>
		2	Shock Bladder
		2	Washer 2.5x5mm
		2	Adjustment Collar O-Ring
		2	Adjustment Collar
		4	Shock O-Ring
		2	Shock Shaft Bushing 3.4mm
		2	Shock Shaft Bushing 1mm
		2	7mm Snap Ring
		2	Shock Cap
		4	1mm Spring Clip
		4	2mm Spring Clip
		4	3mm Spring Clip
		4	4mm Spring Clip
		4	5mm Spring Clip
		4	6.8mm Shock Rod End
		4	Upper Spring Retainer
		4	Lower Spring Retainer
		4	Shock Eyelet
		2	3mm Washer
		2	3mm Lock Nut
		2	Shock Adjustment Collar
		2	2.6mm Lock Nut
		2	Shock Piston 2-Hole 1.2mm
		2	Rear Shock Shaft 64mm
		2	Rear Shock Body
		2	Rear Buggy Spring



KEY #	PART#	Quantity	Description
<b>75</b>	<b>SWK3040</b>		<b>Shock Molded Parts Bag</b>
		4	1mm Spring Clip
		4	2mm Spring Clip
		4	3mm Spring Clip
		4	4mm Spring Clip
		4	5mm Spring Clip
		4	Upper Shock Eyelet
		4	Upper Spring Retainer
		4	Lower Spring Retainer
		4	Shock Rod End 6.8mm
76	SWK3050	2	Front Buggy Springs: Black (Firm)
77	SWK3060	2	Rear Buggy Springs: Black (Firm)
78	SWK3070	2	F/R Diff Output Yoke
79	SWK3072	2	Center Diff Output Yoke
80	SWK3074	1	43T Diff Gear
81	SWK3076	1	46T Steel Spur Gear
82	SWK3078	2	Differential O-Rings
83	SWK3080	4	Spider Gear Shims .25mm
<b>84</b>	<b>SWK3082</b>		<b>Diff Gear Bag</b>
		2	Bevel Gears
		4	Spider Gears

## Parts Listings

## Parts Listings

KEY #	PART#	Quantity	Description
85	SWK3086	1	Differential Gasket
86	SWK3088	2	Differential Cross Pins
87	SWK3090	2	Differential Shims
88	SWK3092	2	Differential Case
<b>89</b>	<b>SWK3094</b>		<b>Brake Pads</b>
		4	Brake Pads
		4	Brake Pad Spacers
90	SWK3096	2	Brake Discs
<b>91</b>	<b>SWK3098</b>		<b>Diff Housing Bag</b>
		1	Lower Diff Housing
		1	Upper Diff Housing
		1	Bearing Support
		1	Center Diff Housing (upper)
		1	Center Diff Housing (lower)
		1	Brake Standoff
<b>93</b>	<b>SWK3104</b>		<b>Brake Cam Bag</b>
		1	Rear Brake Cam
		1	Front Brake Cam
		2	Brake Post Bushings
94	SWK3106	1	13T Differential Pinion

KEY #	PART#	Quantity	Description
95	SWK3109		<b>Steering Servo Saver Bag: Turmoil</b>
		1	Servo Horn Adapter 23T
		1	Servo Horn Adapter 24T
		1	Servo Horn Adapter 25T
		1	Steering Servo Arm
		4	Steering Bellcrank Bushings
		1	Upper Servo Saver
		1	Lower Servo Saver
		1	Steering Bellcrank Left
		1	Ball Cup
		2	Bellcrank Post
		1	Servo Saver Spring Retainer
		1	Servo Saver Spring Retainer
		3	3mm x11mm Ball Stud
		3	3mm Lock Nut
		1	3mm Nut
		2	Drag Link Bushing
		2	3mm x 10mm Flathead Screw
		1	Ackerman Rack (Pro)
		1	Bellcrank Shaft
		1	3mm x 8mm Socket Head Cap Screw
		1	Countersunk Washer
		2	Flanged Pivot Balls

## Parts Listings

**Parts Listings**

KEY #	PART#	Quantity	Description
96	SWK3110		<b>Throttle Linkage Bag</b>
		2	Threaded Servo Arm Guide Pivot
		1	Countersunk Servo Arm Guide Pivot
		1	Servo Horn Adapter 23T
		1	Servo Horn Adapter 24T
		1	Servo Horn Adapter 25T
		1	Throttle/Brake Servo Arm
		1	Linkage Adjuster-Red
		1	Linkage Adjuster-Blue
		1	Linkage Adjuster-Silver
		3	Linkage Wire
		1	Locking Collar
		1	Linkage Spring
		1	Silicone Tubing-Rear Brake
		1	Silicone Tubing-Front Brake
		4	3mm x 3mm Setscrew
		3	Throttle Ball Cup
		2	Ballrod Linkage
		1	3mm x 8mm Socket Head Cap Screw
		1	Countersunk Washer
2	Servo Arm Bushing		
97	SWK3112		<b>Radio Box Bag</b>
		1	Radio Box Bottom
		1	Radio Box Center
		1	Radio Box Top
		1	Hinge Pin
		2	1mm E-Clip
		6	2mm x 10mm Phillips Head Screw
1	2mm x 15mm Phillips Head Screw		

KEY #	PART#	Quantity	Description
98	SWK3114	1	<b>Antenna Bag</b>
		1	Antenna Antenna Cap
99	SWK3116	2	<b>Mount Bag</b>
		2	Servo Mounting Pads
		1	Stand-Up Servo Mounting Pads
		1	Front Body Mount
		1	Rear Body Mount
		1	Transponder Mount
		2	Steering Servo Mounts
100	SWK3118	1	Switch Cover
101	SWK3133	3	<b>Pin Brace Bag</b>
		1	Hinge Pin Brace (RTR) Rear Hinge Pin Brace (RTR)
102	SWK3173	2	Center Drive Cup
103	SWK3169	1	<b>Dogbones (FCG chassis): Turmoil</b>
		1	Rear Dogbone Front Dogbone
104	SWK3126	1	<b>Bumper Bag</b>
		1	Front Bumper Rear Bumper
105	SWK3128	1	<b>Chassis Mud Guard Bag</b>
		1	Mud Guard (Left) Mud Guard (Right)

## Parts Listings

**Parts Listings**

KEY #	PART#	Quantity	Description
106	SWK3130		<b>Pillow Ball Assembly Bag</b>
		4	Pillow Ball 14.6mm
		4	Pillow Ball Insert
		4	Pillow Ball Retainer Plate
		4	Pillow Ball Cap
		8	3mm x 10mm Button Head Screw
107	SWK3132		<b>Retainer Plate/Ball Cap Bag</b>
		4	Pillow Ball Retainer Plate
		4	Pillow Ball Cap
108	SWK3134	2	Hinge Pin Bushings
109	SWK3139	2	Front Lower Suspension Arms: Turmoil
110	SWK3141	2	Front Upper Suspension Arms: Turmoil
111	SWK3138		<b>Caster/Camber Shim Bag</b>
		2	Upper Hinge Pin Bushing
		2	Camber Shim 1mm
		2	Camber Shim 1.5mm
		2	Caster Shim Shim 2mm
		4	Caster Shim 2.5mm
112	SWK3140		<b>Front Bulkhead Bag</b>
		1	Front Bulkhead, F Support
		1	Front Bulkhead, R Support
115	SWK3146	1	Upper Hinge Pin Support
118	SWK3152		<b>Steering Knuckle Bag</b>
		1	Front Left Steering Knuckle
		1	Front Right Steering Knuckle

KEY #	PART#	Quantity	Description
119	SWK3154	1	<b>Rear Hub Bag</b> Left Rear Hub
		1	Right Rear Hub
120	SWK3156	2	Rear Suspension Arms
121	SWK3158	1	<b>Rear Bulkhead Bag</b> Rear Bulkhead, F Support
		1	Rear Bulkhead, R Support
124	SWK3168B	2	17mm Wheel Nuts: Blue
125	SWK3164	1	<b>Bulkhead Brace Bag</b> Front Bulkhead Brace
		1	Rear Bulkhead Brace
127	SWK3170B	2	Wheel Hub: Blue
128	SWK3172	2	Wheel Hub Pin
130	SWK9293		<b>45-Degree Front/Rear CVD's (pr): Turmoil</b>
		2	45-Degree F/R CVD Bone (pr): Turmoil
		2	45-Degree F/R CVD Axle (pr): Turmoil
		2	Coupling
		2	CVD Coupler Pins
	2	4mm Setscrew	
134	SWK3182		<b>Rear Sway Bar Bag</b>
		2	Sway Bar Pivot Ball
		2	3mm x 14mm Setscrew
		4	3mm x 3mm Setscrew
		1	Rear Sway Bar
		2	Sway Bar Mounts
		4	6.8mm Short Rod End
2	6.8mm Pivot Balls		

## Parts Listings

## Parts Listings

KEY #	PART#	Quantity	Description
135	SWK3185		<b>Fuel Tank</b>
		1	Lower Tank Half
		1	Upper Tank Half
		1	Fuel Tank Lid Top
		1	Fuel Tank Lid
		1	Fuel Tank Baffle
		1	Fuel Tank Internals
		1	3mm x 10mm Flathead Screw
		1	Hinge Pin
		2	1mm E-Clip
		1	Cap Spring
		1	Fuel Tank Cap Gasket
		1	Splash Guard
		2	3mm x 8mm Button Head Screw
		1	Tank Lid Top O-Ring
136	SWK3186		<b>Wing Mount Bag</b>
		2	Wing Strut
		2	Wing Brace
		2	Wing Mount
137	SWK3188	1	Wing (White)
138	SWK3190	1	Flywheel
139	SWK3192	1	Collet
140	SWK3194		<b>Clutch Nut Bag</b>
		1	Clutch Nut
		4	Shims
141	SWK3196	3	Clutch Springs
142	SWK3198	3	Clutch Shoes
144	SWK3213	1	13T Clutch Bell
150	SWK3261	1	Electric Start Backplate/One-Way
147	SWK3227	2	Engine Mounts (RTR)
148	SWK3230	1	Air Cleaner Boot



KEY #	PART#	Quantity	Description
<b>149</b>	<b>SWK3232</b>		<b>Air Filter Bag</b>
		1	Air Filter Top
		1	Air Filter Bottom
		1	Foam Filter
		2	Tie Wrap
		1	3mm x 8mm Phillips Head Screw
150	SWK3234	3	Manifold Springs
151	SWK3236	1	Manifold Adapter
152	SWK3238	1	Tuned Pipe Mounting Wire
153	SWK3240	1	Tuned Pipe Mount
154	SWK3243	1	Round Manifold: Turmoil
<b>155</b>	<b>SWK9203</b>		<b>007 High Torque Tuned Pipe</b>
		1	Pipe
		1	Manifold
		3	Pipe Springs
		1	Manifold Seal
		1	Pipe Seal
156	SWK3102	1	Center Diff Support Plate (RTR)
157	SWK3120	3	Servo Tray Standoff (RTR)
158	SWK3122	1	Servo Tray (RTR)
159	SWK3125	1	FCG Chassis (RTR)
160	SWK2850	2	1/8 Mounted Havoc Tire: White
161	SWK9142	1	Front Shock Tower (RTR)
162	SWK3144	1	Top Plate (RTR)
<b>163</b>	<b>SWK9159</b>		<b>Torque Rods (FCG Chassis)</b>
		1	Torque Rod (FCG Front)
		1	Torque Rod (FCG Rear)
164	SWK3162	1	Rear Shock Tower (RTR)
170	SWK9010	4	Rubber Shock Boots (4)
171	SWK9011	6	CVD Rubber Boots (6): Black

## Parts Listings

## Parts Listings

KEY #	PART#	Quantity	Description
172	SWK3195		<b>Clutch Shim Bag</b>
		10	Flywheel Pin Shim
		10	Clutch Bell Shim
		2	Flywheel Shim
174	SWK3233	1	Throttle Return Spring
175	SWK3244	1	Large Fuel Filter (Blue)
179	SWK2228	8	3mm x 12mm Button Head Screw
181	SWK3289		<b>Rear Body Mount: Turmoil</b>
		1	Rear Body Mount
		1	3mm x 25mm Socket Head Cap Screw
		2	3mm Washer
182	SWK3287		<b>Body Pins: Turmoil</b>
		4	Large Body Pin
		4	Medium Body Pin
183	SWK3272		<b>Rear Aluminum Inner Suspension Mount Bag</b>
		1	Rear Left Aluminum Inner Suspension Mounts
		1	Rear Right Aluminum Inner Suspension Mounts
184	SWK2441	8	4mm x 8mm Setscrew
185	SWK9295	2	45-Degree F/R CVD Bone (pr): Turmoil
187	SWK9297		<b>45-Degree Coupling Rebuild Kit</b>
		2	Coupling
		2	CVD Coupler Pins
		2	4mm Setscrew
188	SWK9298	2	45-Degree F/R CVD Axle (pr): Turmoil
190	SWK3270		<b>Front Aluminum Inner Suspension Mount Bag</b>
		1	Front Left Aluminum Inner Suspension Mounts
		1	Front Right Aluminum Inner Suspension Mounts

KEY #	PART#	Quantity	Description
191	SWK9138		<b>Aluminum Camber Shims 1, 1.5, 2mm</b>
		4	1.0mm Camber Shim (Blue)
		4	1.5mm Camber Shim (Silver)
		4	2.0mm Camber Shim (Black)
192	SWK2461	4	Threaded Bell Crank Bushings (4)
193	SWK3277		<b>Ackerman Rack (RTR)</b>
		1	Ackerman Rack (RTR)
		1	Lower Servo Saver
		1	Steering Bellcrank Left
		2	Threaded Bell Crank Bushings
		2	3mm x 10mm Flathead Screw

## Parts Listings

## **Turmoil Specifications and Helpful Information**

### **Brake Knob Color Code**

Red= Rear Brake

Silver= Front brake

Blue= Throttle

### **Chassis Specifications**

Overall Length: 19.4 in (492mm)

Width: 12.2 in (310mm)

Wheelbase-Adjustable: 12.8 in–13.0 in (325mm–330mm)

Caster Angle: Adjustable 17–24 Degrees

Fuel Tank Capacity: 126cc

Internal Gear Ratio: 3.31 to 1

Pinion Gear Included: 13-Tooth

Spur Gear Included: 46-Tooth

Pinion Gear: 13-Tooth

Ring Gear: 43-Tooth

Shock Pistons: 2-hole/1.2 Diameter Holes

Wheel Hub Size: 17mm

### **Ball Bearings**

Transmission: 8x16x5mm

Clutch: 5x10x4mm

Steering: 6x10x3mm

### **Fluids Used in the Turmoil**

Shocks: 30wt Oil Front and Rear

### **Differentials**

Center: 7000wt

Front: 5000wt

Rear: 1000wt

## **ROAR and IFMAR 1/8-Scale Buggy Rules**

Minimum Track Width: 10 ft continuous

Maximum Length: 28.74 in (730mm)

Maximum Width: 12.20 in (310mm)

Maximum Height: 9.84 in (250mm)

Wheelbase: 10.63–12.99 in (270–330mm)

Minimum Weight: 7.05 lb (3200g)

Maximum Wheel Diameter: 1.75 in (44.45mm)

Tire Diameter: 4.30–4.70 in (109.2–119.4mm)

Maximum Tire Width: 1.75 in (46.99mm)

Maximum Engine Displacement: .214 cu in (3.5cc)

Transmission: 1-Speed only

Tires: Rubber only

Race Length: 5-Minute Qualifiers, 5- to 60-Minute Mains

## Differential Fluids

Changing the viscosity of the fluid in the differentials affects the way the car handles and performs. The Turmoil™ differentials come pre-filled with 5000wt in the front and center and 1000wt in the rear. For most conditions, this is a good place to start.

**Center:** Changing the fluid in the center differential affects the front-to-rear drive. To conceptually understand how the front differential affects handling, think of it as front-wheel vs rear-wheel drive. Heavier diff fluid gives more rear-wheel drive effect, resulting in more acceleration and more on-power steering. Lighter fluids in the front differential allow it to unload during acceleration, giving more front-wheel drive and reducing power-on steering. When your car under-steers during acceleration, try switching to heavier fluid in the center differential. When your car over-steers during acceleration, try switching to lighter weight diff fluid in the center. Typically the optimum center differential fluid is between 3000 to 10,000wt depending on the track conditions (slick surfaces = lighter center diff fluids).

**Front:** The viscosity of the fluid in the front differential affects overall steering authority. Heavier fluid reduces steering while lighter fluid gives more steering. However, if the fluid used in the front diff is too light, the steering can become inconsistent, especially when accelerating from corners. Typically the optimum front diff fluid is between 3000 to 7000wt

**Rear:** The fluid in the rear differential affects cornering traction and overall steering. Lighter fluid in the rear diff gives more cornering traction and more steering, while heavier fluid reduces rear side bite while reducing steering authority. Some racers replace the fluid in the rear differential with thin grease for even greater rear cornering traction. Nearly all racers use 1000wt fluid or light grease in the rear differential to get maximum rear end traction.

## Choosing Tires

The single most important factor affecting the car's handling is tires. Before you begin changing your setup, it's important to choose the best tire for the conditions. While experimenting with various tread designs, compounds and liners is the optimum way to find the best combination, it's time-consuming. If time is limited, find out what tires the fast guys are using and duplicate their selection.

## Caster

The Turmoil™ offers two caster positions: arms forward and arms rearward. Moving the clip in front of or behind the upper front arms easily changes caster position. The rearward position gives slightly more steering in the mid-section and exiting turns, while reducing the steering on entry. The arms forward position gives more steering at corner entry, while slightly reducing the midsection and exit cornering authority.

## Shock Locations

The Turmoil offers 3 lower rear shock positions and 2 lower front positions. Several upper shock locations are available.

## Lower Shock Positions

Moving the lower shock mounting position will change the suspension's mechanical advantage. Moving the mounting position inward has a similar effect as using softer springs and lower weight oil. Moving the lower mounting position outward is similar to stiffening the spring weight and increasing the oil weight. If the suspension is too soft (bottoming out), moving the lower shock outward will increase the rate. If the suspension is too hard (lack of traction), moving the lower suspension mounting position inward will decrease the rate giving more traction. Remember, the optimum setting is a fine balance between the front and rear.

## Upper Shock Positions

Moving the upper shock mounting position inward gives a more progressive spring, and dampening rates increase more quickly. Standing up the shocks "to their outer mounting positions" gives more linear dampening and spring rate.

**Note:** There are two sets of upper mounting positions located on the shock tower. The uppermost holes are used when the shock is positioned in the inner mounting position on the arms. The lower set of holes is used when the shocks are mounted in the outer suspension's arm positions.

## Set Up Tips

# Turmoil Setup Sheet

**Driver** \_\_\_\_\_

**Date** \_\_\_\_\_

**Lap Times** \_\_\_\_\_

**Track Conditions:**

Traction:  Slick  Medium  High

Surface:  Smooth  Bumpy  Rough

Layout:  Tight  Medium  Open

**Front Suspension:**

Track/Width \_\_\_\_\_

Camber Angle \_\_\_\_\_

Caster Position  Forward  Rearward

Toe In \_\_\_\_\_

Droop \_\_\_\_\_

Roll Bar \_\_\_\_\_

Ground Clearance \_\_\_\_\_

**Rear Suspension:**

Track/Width \_\_\_\_\_

Camber Angle \_\_\_\_\_

Toe In \_\_\_\_\_

Droop \_\_\_\_\_

Roll Bar \_\_\_\_\_

Ground Clearance \_\_\_\_\_

Hub Roll Center  Upper  Lower

Hub Position  Front  Mid  Rear

**Gearing:**

Clutch Bell \_\_\_\_\_

Spur Gear \_\_\_\_\_

Clutch Shoe Position \_\_\_\_\_

**Differential Fluids:**

Front \_\_\_\_\_

Center \_\_\_\_\_

Rear \_\_\_\_\_

**Engine:**

Type \_\_\_\_\_

Plug \_\_\_\_\_

Deck Clearance \_\_\_\_\_

Exhaust \_\_\_\_\_

Fuel \_\_\_\_\_

Temperature \_\_\_\_\_

Comments \_\_\_\_\_

**Tires:**

Front

Type \_\_\_\_\_

Compound \_\_\_\_\_

Liner \_\_\_\_\_

Rear

Type \_\_\_\_\_

Compound \_\_\_\_\_

Liner \_\_\_\_\_

**Front Shocks:**

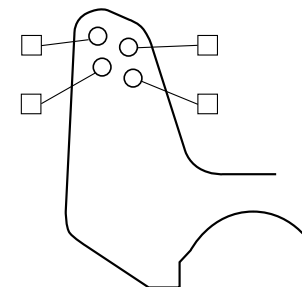
Pistons \_\_\_\_\_

Oil \_\_\_\_\_

Springs \_\_\_\_\_

Lower Mounting Position on Arm:  In  Out

Caster Angle:  17 Degrees  22 Degrees



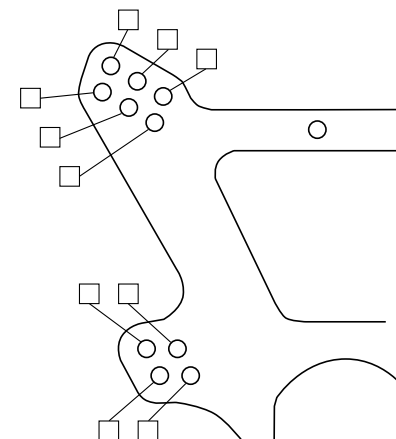
**Rear Shocks:**

Pistons \_\_\_\_\_

Oil \_\_\_\_\_

Springs \_\_\_\_\_

Lower Mounting Position on Arm:  In  Mid  Out



**Driver** \_\_\_\_\_

**Date** \_\_\_\_\_

**Lap Times** \_\_\_\_\_

**Track Conditions:**

Traction:  Slick  Medium  High  
 Surface:  Smooth  Bumpy  Rough  
 Layout:  Tight  Medium  Open

**Front Suspension:**

Track/Width \_\_\_\_\_  
 Camber Angle \_\_\_\_\_  
 Caster Position  Forward  Rearward  
 Toe In \_\_\_\_\_  
 Droop \_\_\_\_\_  
 Roll Bar \_\_\_\_\_  
 Ground Clearance \_\_\_\_\_

**Rear Suspension:**

Track/Width \_\_\_\_\_  
 Camber Angle \_\_\_\_\_  
 Toe In \_\_\_\_\_  
 Droop \_\_\_\_\_  
 Roll Bar \_\_\_\_\_  
 Ground Clearance \_\_\_\_\_  
 Hub Roll Center  Upper  Lower  
 Hub Position  Front  Mid  Rear

**Gearing:**

Clutch Bell \_\_\_\_\_  
 Spur Gear \_\_\_\_\_  
 Clutch Shoe Position \_\_\_\_\_

**Differential Fluids:**

Front \_\_\_\_\_  
 Center \_\_\_\_\_  
 Rear \_\_\_\_\_

**Engine:**

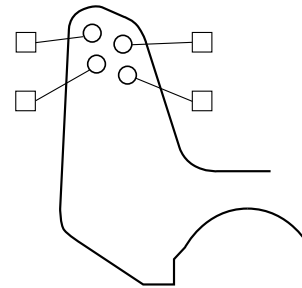
Type \_\_\_\_\_  
 Plug \_\_\_\_\_  
 Deck Clearance \_\_\_\_\_  
 Exhaust \_\_\_\_\_  
 Fuel \_\_\_\_\_  
 Temperature \_\_\_\_\_  
 Comments \_\_\_\_\_

**Tires:**

Front  
 Type \_\_\_\_\_  
 Compound \_\_\_\_\_  
 Liner \_\_\_\_\_  
 Rear  
 Type \_\_\_\_\_  
 Compound \_\_\_\_\_  
 Liner \_\_\_\_\_

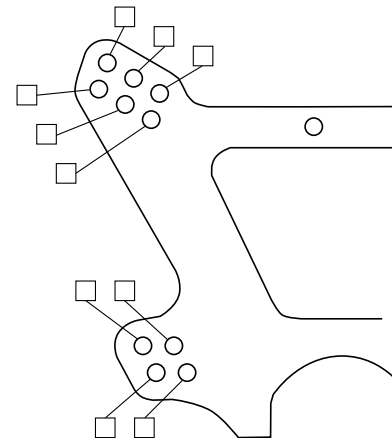
**Front Shocks:**

Pistons \_\_\_\_\_  
 Oil \_\_\_\_\_  
 Springs \_\_\_\_\_  
 Lower Mounting Position on Arm:  In  Out  
 Caster Angle:  17 Degrees  22 Degrees



**Rear Shocks:**

Pistons \_\_\_\_\_  
 Oil \_\_\_\_\_  
 Springs \_\_\_\_\_  
 Lower Mounting Position on Arm:  In  Mid  Out



**Turmoil Setup Sheet**

**HORIZON**  
H O B B Y

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