

# XRAY 1/12 PAN CAR

# XRAY

# 2017



EUROPEAN  
CHAMPION  
4x

EUROPEAN  
JUNIOR CHAMPION  
4x

USA  
CHAMPION  
3x

MADE IN  
EUROPE

UK BRCA  
CHAMPION  
5x

iic  
CHAMPION

SNOWBIRD  
CHAMPION  
5x

# INSTRUCTION MANUAL

## BEFORE YOU START

The X12 is a high-competition, high-quality, 1/12 pan car intended for persons aged 16 years and older with previous experience building and operating RC model racing cars. This is not a toy; it is a precision racing model. This model racing car is not intended for use by beginners, inexperienced customers, or by children without direct supervision of a responsible, knowledgeable adult. If you do not fulfill these requirements, please return the kit in unused and unassembled form back to the shop where you have purchased it.

Before building and operating your X12, **YOU MUST** read through all of the operating instructions and instruction manual and fully understand them to get

## CUSTOMER SUPPORT

We have made every effort to make these instructions as easy to understand as possible. However, if you have any difficulties, problems, or questions, please do not hesitate to contact the XRAY support team at [info@teamxray.com](mailto:info@teamxray.com). Also, please visit our Web site at [www.teamxray.com](http://www.teamxray.com) to find the latest updates, set-up information, option parts, and many other goodies. We pride ourselves on taking excellent care of our customers.

You can join thousands of XRAY fans and enthusiasts in our online community at:

[www.teamxray.com](http://www.teamxray.com)

**Failure to follow these instructions will be considered as abuse and/or neglect.**

## SAFETY PRECAUTIONS

Contains:

LEAD (CAS 7439-92-1) ANTIMONY (CAS 7440-36-0)

**WARNING:** This product contains a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

**CAUTION: CANCER HAZARD**

Contains lead, a listed carcinogen. Lead is harmful if ingested. Wash thoroughly after using. **DO NOT** use product while eating, drinking or using tobacco products. May cause chronic effects to gastrointestinal tract, CNS, kidneys, and blood. **MAY CAUSE BIRTH DEFECTS.**

When building, using and/or operating this model always wear protective glasses and gloves.

Take appropriate safety precautions prior to operating this model. You are responsible for this model's assembly and safe operation! Please read the instruction manual before building and operating this model and follow all safety precautions. Always keep the instruction manual at hand for quick reference, even after completing the assembly. Use only genuine and original authentic XRAY parts for maximum performance. Using any third party parts on this model will void guaranty immediately.

## IMPORTANT NOTES - GENERAL

- This product is not suitable for children under 16 years of age without the direct supervision of a responsible and knowledgeable adult.
- Carefully read all manufacturers warnings and cautions for any parts used in the construction and use of your model.
- Assemble this kit only in places away from the reach of very small children.
- First-time builders and users should seek advice from people who have building experience in order to assemble the model correctly and to allow the model to reach its performance potential.
- Exercise care when using tools and sharp instruments.
- Take care when building, as some parts may have sharp edges.
- Keep small parts out of reach of small children. Children must not be allowed to put any parts in their mouth, or pull vinyl bag over their head.
- Read and follow instructions supplied with paints and/or cement, if used (not included in kit).
- Immediately after using your model, do NOT touch equipment on the model such as the motor and speed controller, because they generate high temperatures. You may seriously burn yourself seriously touching them.
- Follow the operating instructions for the radio equipment at all times.
- Do not put fingers or any objects inside rotating and moving parts, as this may cause damage or serious injury as your finger, hair, clothes, etc. may get caught.
- Be sure that your operating frequency is clear before turning on or running your model, and never share the same frequency with somebody else at the same time. Ensure that others are aware of the operating frequency you are using and when you are using it.
- Use a transmitter designed for ground use with RC cars. Make sure that no one else is using the same frequency as yours in your operating area. Using the same frequency at the same time, whether it is driving, flying or sailing, can cause loss of control of the RC model, resulting in a serious accident.
- Always turn on your transmitter before you turn on the receiver in the car. Always turn off the receiver before turning your transmitter off.
- Keep the wheels of the model off the ground when checking the operation of the radio equipment.
- Disconnect the battery pack before storing your model.
- When learning to operate your model, go to an area that has no obstacles that can damage your model if your model suffers a collision.
- Remove any sand, mud, dirt, grass or water before putting your model away.
- If the model behaves strangely, immediately stop the model, check and clear the problem.
- To prevent any serious personal injury and/or damage to property, be responsible when operating all remote controlled models.
- The model car is not intended for use on public places and roads or areas where its operation can conflict with or disrupt pedestrian or vehicular traffic.
- Because the model car is controlled by radio, it is subject to radio interference from many sources that are beyond your control. Since radio interference can cause momentary loss of control, always allow a safety margin in all directions around the model in order to prevent collisions.
- Do not use your model:
  - Near real cars, animals, or people that are unaware that an RC car is being driven.
  - In places where children and people gather
  - In residential districts and parks
  - In limited indoor spaces
  - In wet conditions
  - In the street
  - In areas where loud noises can disturb others, such as hospitals and residential areas.
  - At night or anytime your line of sight to the model may be obstructed or impaired in any way.

the maximum enjoyment and prevent unnecessary damage. Read carefully and fully understand the instructions before beginning assembly.

Make sure you review this entire manual, download and use set-up book from the web, and examine all details carefully. If for some reason you decide The X12 is not what you wanted or expected, **do not continue any further**. Your hobby dealer cannot accept your X12 kit for return or exchange after it has been partially or fully assembled.

Contents of the box may differ from pictures. In line with our policy of continuous product development, the exact specifications of the kit may vary without prior notice.

### XRAY Europe

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### XRAY USA

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Irving, TX 75062  
USA  
Phone: (214) 744-2400  
Fax: (214) 744-2401  
E-mail: [xray@rcamerica.com](mailto:xray@rcamerica.com)

To prevent any serious personal injury and/or damage to property, please be responsible when operating all remote controlled models.

## **IMPORTANT NOTES - ELECTRICAL**

- Insulate any exposed electrical wiring (using heat shrink tubing or electrical tape) to prevent dangerous short circuits. Take maximum care in wiring, connecting and insulating cables. Make sure cables are always connected securely. Check connectors for if they become loose. And if so, reconnect them securely. Never use R/C models with damaged wires. A damaged wire is extremely dangerous, and can cause short-circuits resulting in fire. Please have wires repaired at your local hobby shop.
- Low battery power will result in loss of control. Loss of control can occur due to a weak battery in either the transmitter or the receiver. Weak running battery may also result in an out of control car if your car's receiver power is supplied by the running battery. Stop operation immediately if the car starts to slow down.
- When not using RC model, always disconnect and remove battery.
- Do not disassemble battery or cut battery cables. If the running battery short-circuits, approximately 300W of electricity can be discharged, leading to fire or burns. Never disassemble battery or cut battery cables.
- Use a recommended charger for the receiver and transmitter batteries and follow the instructions correctly. Over-charging, incorrect charging, or using inferior chargers can cause the batteries to become dangerously hot.

## **R/C & BUILDING TIPS**

- Make sure all fasteners are properly tightened. Check them periodically.
- Make sure that chassis screws do not protrude from the chassis.
- For the best performance, it is very important that great care is taken to ensure the free movement of all parts.
- Clean all ball-bearings so they move very easily and freely.
- Tap or pre-thread the plastic parts when threading screws.
- Self-tapping screws cut threads into the parts when being tightened. Do not use excessive force when tightening the self-tapping screws because you may strip out the thread in the plastic. We recommended you stop tightening a screw when you feel some resistance.
- Ask your local hobby shop for any advice.

## **WARRANTY**

XRAY guarantees this model kit to be free from defects in both material and workmanship within 30 days of purchase. The total monetary value under warranty will in no case exceed the cost of the original kit purchased. This warranty does not cover any components damaged by use or modification or as a result of wear. Part or parts missing from this kit must be reported within 30 days of purchase. No part or parts will be sent under warranty without proof of purchase. Should you find a defective or missing part, contact the local distributor. Service and customer support will be provided through local hobby store where you have purchased the kit, therefore make sure to purchase any XRAY products at your local hobby store. This model racing car is considered to be a high-performance racing vehicle. As such this vehicle will be used in an extreme range of conditions and situations, all which may cause premature wear or failure of any component. XRAY has no control over usage of vehicles once they leave the dealer, therefore XRAY can only offer warranty against all manufacturer's defects in materials, workmanship, and assembly at point of sale and before use. No warranties are expressed or implied that cover damage caused by what is considered normal use, or cover or imply how long any model cars' components or electronic components will last before requiring replacement.

Due to the high performance level of this model car you will need to periodically maintain and replace consumable components. Any and all warranty coverage will not cover replacement of any part or component damaged by neglect, abuse, or improper or unreasonable use. This includes but is not limited to

## **QUALITY CERTIFICATE**

XRAY MODEL RACING CARS uses only the highest quality materials, the best compounds for molded parts and the most sophisticated manufacturing processes of TQM (Total Quality Management). We guarantee that all parts of a newly-purchased kit are manufactured with the highest regard to quality. However, due to the many factors inherent in model racecar competition, we cannot guarantee

Recharge battery when necessary. Continual recharging may damage battery and, in the worst case, could build up heat leading to fire. If battery becomes extremely hot during recharging, please ask your local hobby shop for check and/or repair and/or replacement.

- Regularly check the charger for potential hazards such as damage to the cable, plug, casing or other defects. Ensure that any damage is rectified before using the charger again. Modifying the charger may cause short-circuit or overcharging leading to a serious accident. Therefore do not modify the charger.
- Always unplug charger when recharging is finished.
- Do not recharge battery while battery is still warm. After use, battery retains heat. Wait until it cools down before charging.
- Do not allow any metal part to short circuit the receiver batteries or other electrical/electronic device on the model.
- Immediately stop running if your RC model gets wet as may cause short circuit.
- Please dispose of batteries responsibly. Never put batteries into fire.

Please support your local hobby shop. We at XRAY Model Racing Cars support all local hobby dealers. Therefore we ask you, if at all possible, to purchase XRAY products at your hobby dealer and give them your support like we do. If you have difficulty finding XRAY products, please check out [www.teamxray.com](http://www.teamxray.com) to get advice, or contact us via email at [info@teamxray.com](mailto:info@teamxray.com), or contact the XRAY distributor in your country.

damage from crashing, chemical and/or water damage, excessive moisture, improper or no maintenance, or user modifications which compromise the integrity of components. Warranty will not cover components that are considered consumable on RC vehicles. XRAY does not pay nor refund shipping on any component sent to XRAY or its distributors for warranty. XRAY reserves the right to make the final determination of the warranty status of any component or part.

### **Limitations of Liability**

XRAY makes no other warranties expressed or implied. XRAY shall not be liable for any loss, injury or damages, whether direct, indirect, special, incidental, or consequential, arising from the use, misuse, or abuse of this product and/or any product or accessory required to operate this product. In no case shall XRAY's liability exceed the monetary value of this product.

**Take adequate safety precautions prior to operating this model. You are responsible for this model's assembly and safe operation.**

**Disregard of the any of the above cautions may lead to accidents, personal injury, or property damage. XRAY MODEL RACING CARS assumes no responsibility for any injury, damage, or misuse of this product during assembly or operation, nor any addictions that may arise from the use of this product.**

**All rights reserved.**

any parts once you start racing the car. Products which have been worn out, abused, neglected or improperly operated will not be covered under warranty. We wish you enjoyment of this high-quality and high-performance RC car and wish you best success on the track!

**In line with our policy of continuous product development, the exact specifications of the kit may vary. In the unlikely event of any problems with your new kit, you should contact the model shop where you purchased it, quoting the part number.**

**We do reserve all rights to change any specification without prior notice. All rights reserved.**

# SYMBOLS USED

Detail view	Cut	Assemble in the specified order
Apply oil	Apply CA glue	Optional parts
Apply grease	Assemble left and right sides the same way	Parts bag used
Ensure smooth non-binding movement	Pay attention here	Assembly view
Tighten screw gently	Assemble as many times as specified (here twice)	

# TOOLS REQUIRED

Allen 2.5mm (HUDY TOOLS) 		Combination Pliers (HUDY #189020)		Turnbuckle 3mm (HUDY #181030) Turnbuckle 4mm (HUDY #181040)
Allen 2.0mm (HUDY TOOLS) 				Side Cutters (HUDY #189010)
Allen 1.5mm (HUDY TOOLS) 			Scissors (HUDY #188990)	
Socket 5.5mm (HUDY TOOLS) 				
Arm Reamer 3.0mm 				

# EQUIPMENT INCLUDED

	HUDY Premium Silicone Oil		Diff. Grease (HUDY #106211)
700cSt (HUDY #106371 100ml)			
3000cSt (HUDY #106431 100ml)			

# NOT INCLUDED

To ensure that you always have access to the most up-to-date version of the XRAY Set-up Book, XRAY will now be offering only the digital online version at our website at [www.teamxray.com](http://www.teamxray.com). By offering this online version instead of including a hardcopy printed version in kits, you will always be assured of having the most current updated version. The Set-up Book features the T-bar version of the XII, however the majority of all set-up adjustments and theory are the same. We strongly recommend that you read and understand the Set-up Book before operating your car.

SAMPLE OF OPTIONAL PARTS	
#37XXXX	OPTION 1
#37XXXX	OPTION 2
#37XXXX	OPTION 3

XRAY offers wide range of optional tuning parts which are listed in a table like this. Please refer to the exploded view of each main section to verify which parts are included in the kit; other parts are available as optional parts, and must be purchased separately.

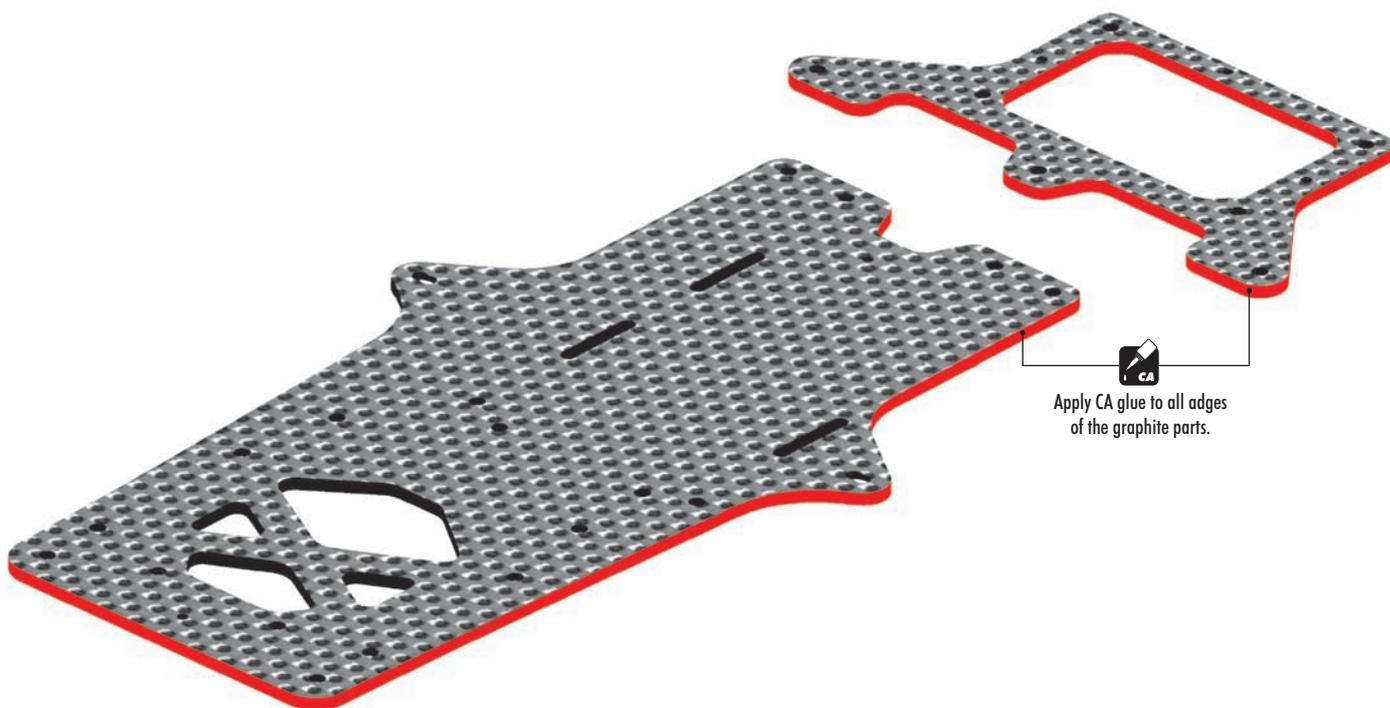
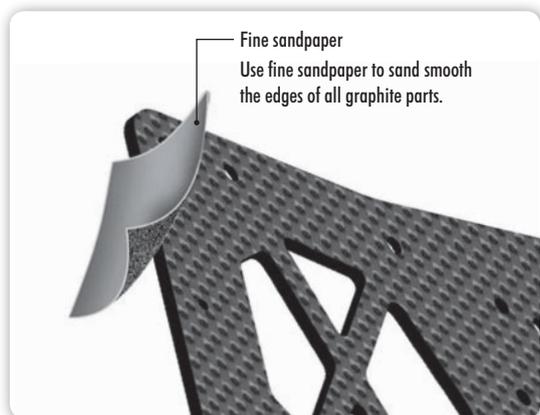
# EQUIPMENT REQUIRED

Transmitter	Pinion Gear and Setscrew	Bearing Oil (HUDY #106230)	Lexan™ Paint
Receiver	Electric Motor	Fibre Tape (HUDY #107870)	Body Shell
Speed Controller	Battery Charger	Double-sided Tape	
Steering Servo	LiPo Battery	Tires	

# GRAPHITE PART PREPARATION

## PREPARE ALL GRAPHITE PARTS

To protect and seal edges of graphite parts, sand edges smooth and then apply CA glue.



# 1. FRONT SUSPENSION



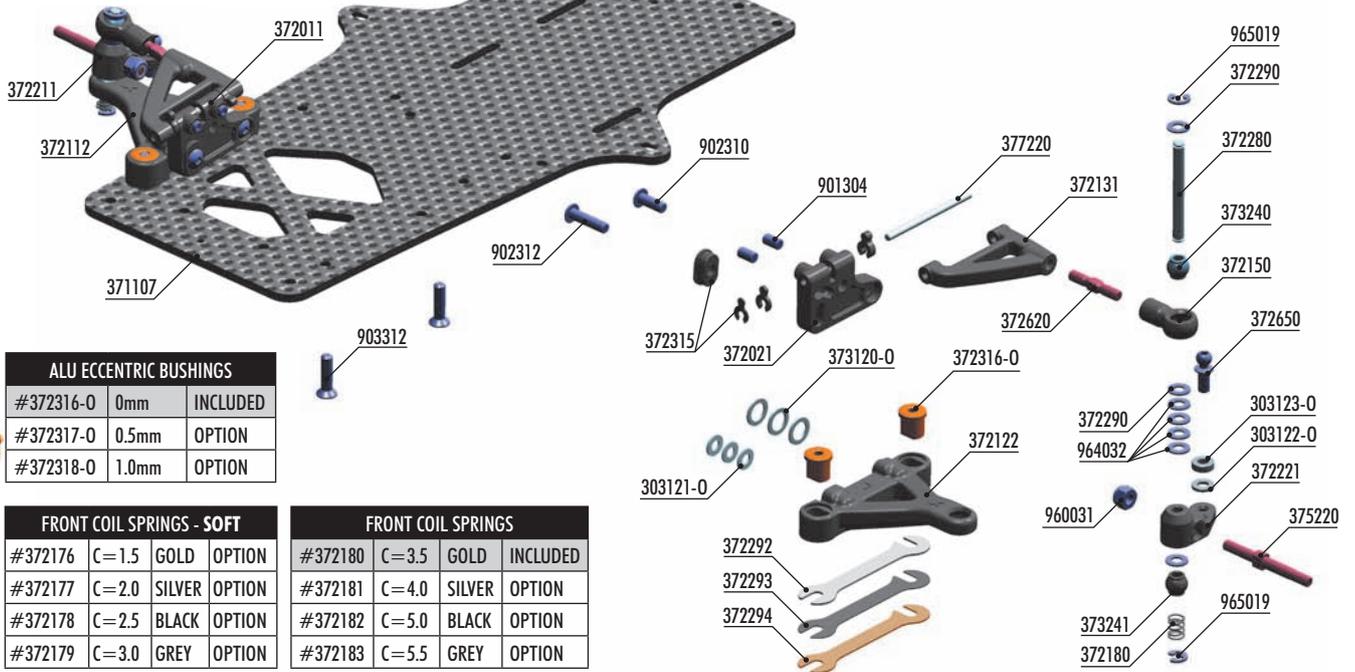
ALU NUTS M3		
#296530-B	ALU BLUE	OPTION
#296530-K	ALU BLACK	OPTION
#296530-O	ALU ORANGE	OPTION
#960031	ALU SILVER	INCLUDED



SUSPENSION ARMS				
#372112	RIGHT	HARD	INCLUDED	
#372113	RIGHT	GRAPHITE	OPTION	
#372122	LEFT	HARD	INCLUDED	
#372123	LEFT	GRAPHITE	OPTION	



UPPER ARM MOUNTS			
#372010	RIGHT	MEDIUM	OPTION
#372011	RIGHT	HARD	INCLUDED
#372012	RIGHT	GRAPHITE	OPTION
#372020	LEFT	MEDIUM	OPTION
#372021	LEFT	HARD	INCLUDED
#372022	LEFT	GRAPHITE	OPTION



ALU ECCENTRIC BUSHINGS		
#372316-0	0mm	INCLUDED
#372317-0	0.5mm	OPTION
#372318-0	1.0mm	OPTION



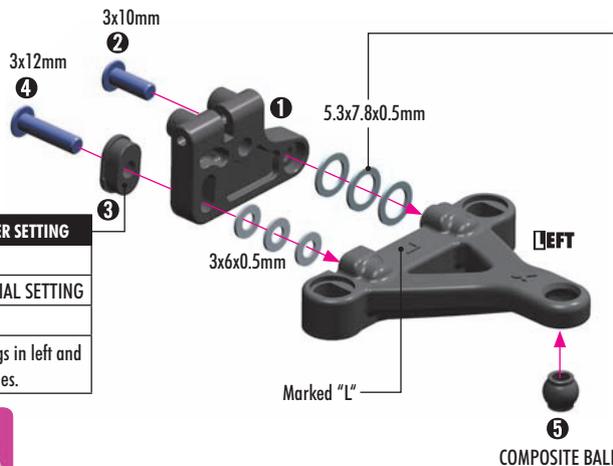
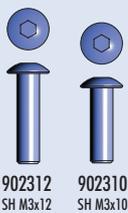
FRONT COIL SPRINGS - SOFT			
#372176	C=1.5	GOLD	OPTION
#372177	C=2.0	SILVER	OPTION
#372178	C=2.5	BLACK	OPTION
#372179	C=3.0	GREY	OPTION

FRONT COIL SPRINGS			
#372180	C=3.5	GOLD	INCLUDED
#372181	C=4.0	SILVER	OPTION
#372182	C=5.0	BLACK	OPTION
#372183	C=5.5	GREY	OPTION

## BAG



- 303121-0 ALU SHIM 3x6x0.5MM - ORANGE (10)
- 303122-0 ALU SHIM 3x6x1.0MM - ORANGE (10)
- 303123-0 ALU SHIM 3x6x2.0MM - ORANGE (10)
- 371107 X12'17 GRAPHITE CHASSIS 2.5MM
- 372011 COMPOSITE FRONT UPPER ARM MOUNT - RIGHT - HARD
- 372021 COMPOSITE FRONT UPPER ARM MOUNT - LEFT - HARD
- 372112 COMPOSITE SUSPENSION ARM FRONT LOWER - RIGHT - HARD
- 372122 COMPOSITE SUSPENSION ARM FRONT LOWER - LEFT - HARD
- 372131 COMPOSITE FRONT UPPER SUSPENSION ARM - HARD
- 372150 COMPOSITE FRONT UPPER BALL JOINT (2)
- 372180 FRONT COIL SPRING 3.6x6x0.5MM; C=3.5 - GOLD (2)
- 372211 COMPOSITE STEERING BLOCK - RIGHT - HARD - V3
- 372221 COMPOSITE STEERING BLOCK - LEFT - HARD - V3
- 372280 KING PIN (2)
- 372290 ALU SHIM 3.2x4.8x0.5 (4)
- 372292 STEEL SHIM 0.2MM - SILVER (2)
- 372293 STEEL SHIM 0.4MM - BLACK (2)
- 372294 STEEL SHIM 0.6MM - GOLD (2)
- 372315 COMPOSITE ECCENTRIC BUSHINGS + CASTER CLIPS (2)
- 372316-0 ALU ECCENTRIC BUSHING 0.0MM - ORANGE (2)
- 372620 ADJ. TURNBUCKLE M3x17 MM - HUDY SPRING STEEL™ (2)
- 372650 BALL-END 4.2MM - THREADED - HUDY SPRING STEEL™ (2)
- 373120-0 ALU SHIM 5.3x7.8x0.5MM - ORANGE (10)
- 373240 PIVOTBALL UNIVERSAL 6.0 MM - HUDY SPRING STEEL™ (2)
- 373241 COMPOSITE PIVOTBALL 6.0 MM - V2 (2)
- 375220 FRONT WHEEL AXLE (2)
- 377220 FRONT UPPER PIVOT PIN 2x31MM (2)
- 901304 HEX SCREW SB M3x4 (10)
- 902310 HEX SCREW SH M3x10 (10)
- 902312 HEX SCREW SH M3x12 (10)
- 903312 HEX SCREW SFH M3x12 (10)
- 960031 ALU NUT M3 (10)
- 964032 WASHER S 3.2 x 4.8 x 0.2 (10)
- 965019 E-CLIP 1.9 (10)



REACTIVE CASTER SETTING	
	= 2.5°
	= 5° INITIAL SETTING
	= 7.5°

Use same bushings in left and right sides.



## UPPER ARM POSITION ADJUSTMENT SHIMS

The shims influence the camber gain change.

**MORE shims** = less camber gain, reduced initial steering, reduced steering sensitivity (less twitchy).

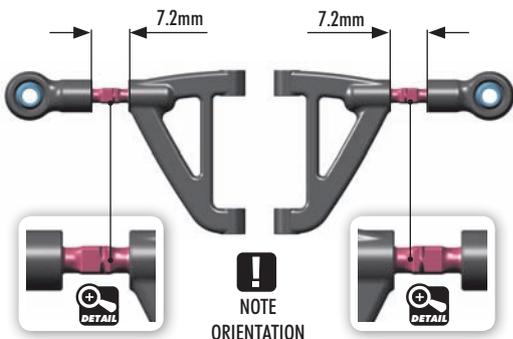
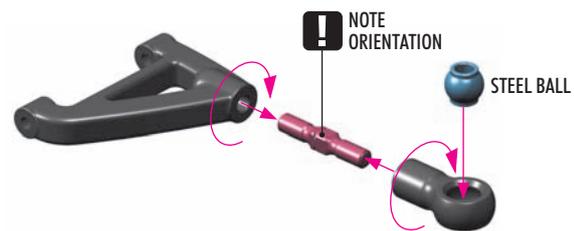
**LESS shims** = more camber gain, increased initial steering, increased steering sensitivity.

Use same shim thickness on both left & right sides.



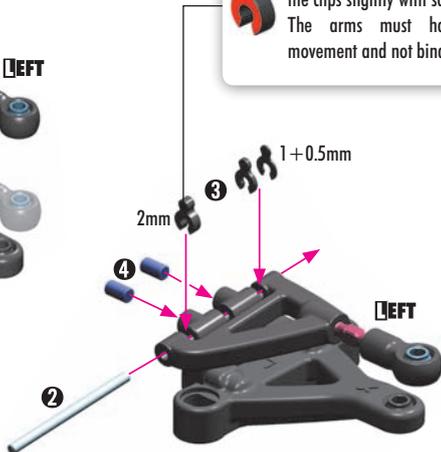
# 1. FRONT SUSPENSION

2x

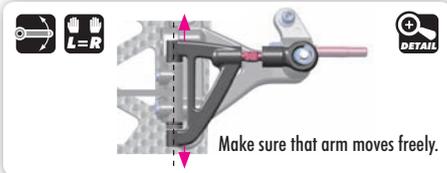


**SET-UP BOOK**  
CAMBER

2x



If the arm does not have enough play, remove the clips and thin the clips slightly with sandpaper. The arms must have free movement and not bind.



**SET-UP BOOK**  
CASTER

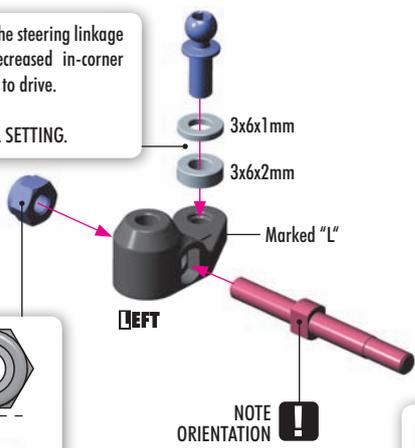
960031  
ALU N M3

303122-0  
SHIM 3x6x1

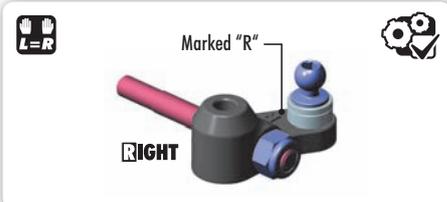
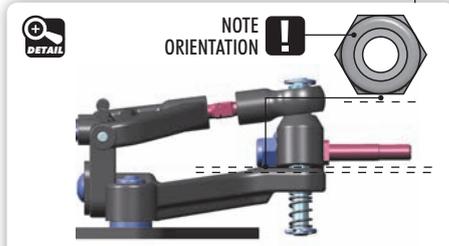
303123-0  
SHIM 3x6x2

2x

The thickness of shims changes the steering linkage angle. Thicker shims gives decreased in-corner steering, but car becomes easier to drive.  
Use 3mm bump steer as INITIAL SETTING.



ALU NUTS M3		
OPTION	#296530-B ALU BLUE	OPTION
	#296530-K ALU BLACK	OPTION
	#296530-O ALU ORANGE	OPTION
	#960031 ALU SILVER	INCLUDED



# 1. FRONT SUSPENSION

372290  
S 3.2x4.8x0.5

964032  
S 3.2x4.8x0.2

965019  
C 1.9

2x L=R

**LOW traction & bumpy track**  
10K cSt (#106511 HUDY 100ml)  
**HIGH traction & smooth track**  
30K cSt (#106531 HUDY 100ml)

use HUDY Silicone Oil

The thickness of shims used affects the ride height of the car, so determine the proper amount of shimming based on tire diameter.

## FRONT RIDE HEIGHT ADJUSTMENT

### INITIAL SETTING

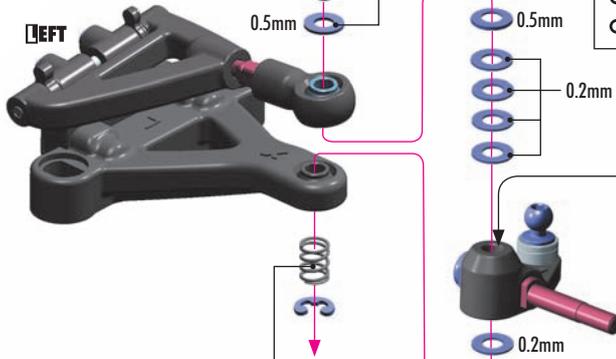
- above upper arm (0.5mm)
- above steering block (1.3mm)
- below steering block (0.2mm)

### TIP

Arm Reamer 3.0mm

3.0 mm

The front suspension parts were updated to eliminate play to ensure better steering performance. The updated holes in the steering blocks may cause a tighter fit of the kingpin in the steering block; it is important that the steering block moves freely but without excessive play. If the kingpin does not insert into the steering block easily, use a 3mm arm reamer to enlarge the hole. Be very careful to remove only enough material so you can insert the kingpin without a lot of force.



OPTION

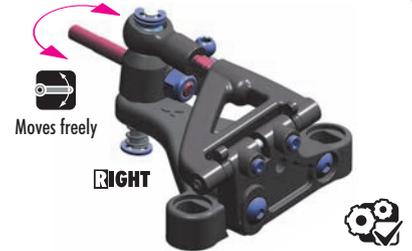
### FRONT COIL SPRINGS - SOFT

#372176	C=1.5	GOLD	OPTION
#372177	C=2.0	SILVER	OPTION
#372178	C=2.5	BLACK	OPTION
#372179	C=3.0	GREY	OPTION

### FRONT COIL SPRINGS

#372180	C=3.5	GOLD	INCLUDED
#372181	C=4.0	SILVER	OPTION
#372182	C=5.0	BLACK	OPTION
#372183	C=5.5	GREY	OPTION

L=R



RIDE HEIGHT



903312  
SFH M3x12

2x L=R

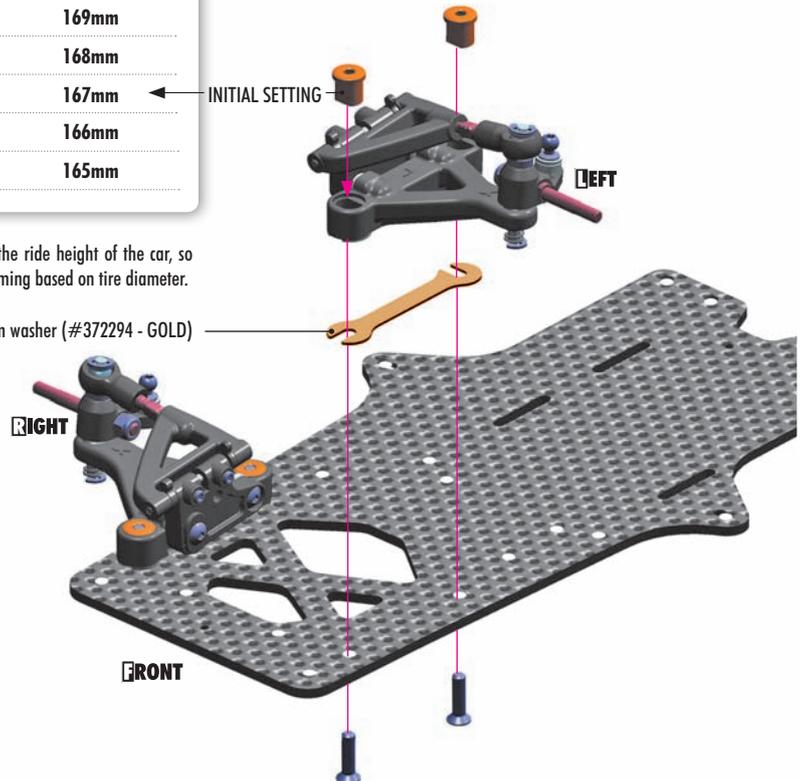
The X12 has adjustable front track-width. There are 3 different bushings - 0mm centric (included in kit), or 0.5mm or 1.0mm eccentric (optional). Use the same bushing in front and rear, and also use the same (mirrored) orientation of the bushing on both right and left sides.

Use the proper matching bushings to achieve the desired front track-width

LEFT	+	RIGHT	=	TRACK-WIDTH
○	-1mm	○		169mm
○	-0.5mm	○		168mm
○	0mm	○		167mm ← INITIAL SETTING
○	+0.5mm	○		166mm
○	+1mm	○		165mm

The number of washers used affects the ride height of the car, so determine the proper amount of shimming based on tire diameter.

INITIAL SETTING = 0.6mm washer (#372294 - GOLD)



OPTION

### ALU ECCENTRIC BUSHINGS

#372316-0	0mm	INCLUDED
#372317-0	0.5mm	OPTION
#372318-0	1.0mm	OPTION



RIDE HEIGHT  
TRACK-WIDTH

# 3. REAR SUSPENSION



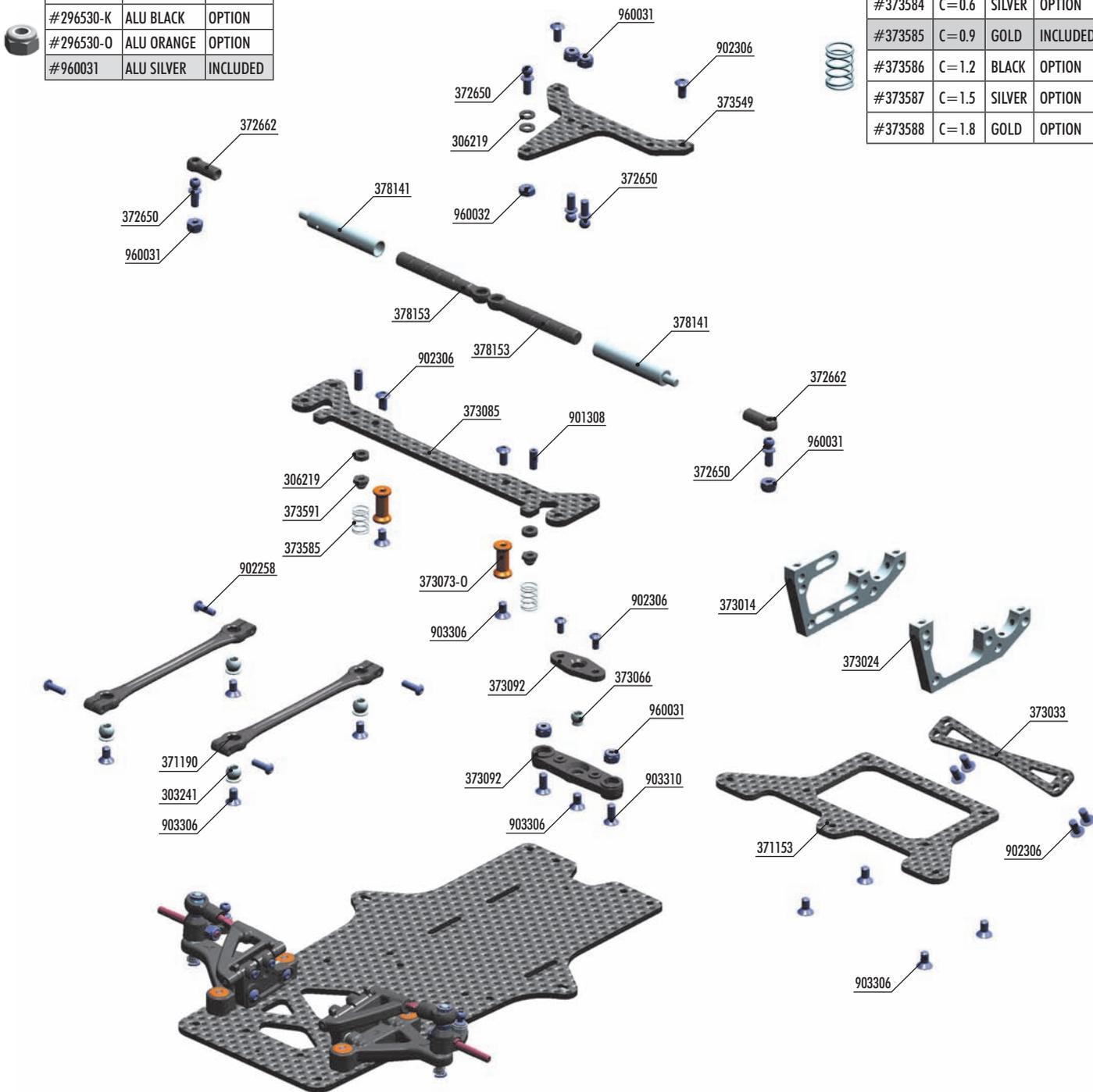
OPTION

ALU NUTS M3			
#296530-B	ALU BLUE	OPTION	
#296530-K	ALU BLACK	OPTION	
#296530-O	ALU ORANGE	OPTION	
#960031	ALU SILVER	INCLUDED	



OPTION

SIDE SPRINGS			
#373584	C=0.6	SILVER	OPTION
#373585	C=0.9	GOLD	INCLUDED
#373586	C=1.2	BLACK	OPTION
#373587	C=1.5	SILVER	OPTION
#373588	C=1.8	GOLD	OPTION



**BAG**

**03**

- |          |   |        |                                  |
|----------|---|--------|----------------------------------|
| 303241   | BALL UNIVERSAL 5.8 MM HEX (4)                         | 373591 | COMPOSITE SIDE SPRING HOLDER (2) |
| 306219   | COMPOSITE SET OF SERVO SHIMS (4)                      | 378141 | ALU SIDE TUBE (2)                |
| 371153   | X12'17 GRAPHITE REAR POD LOWER PLATE 2.5MM            | 378153 | COMPOSITE SIDE TUBE SHAFT (2)    |
| 371190   | COMPOSITE POD LINK (2)                                |        |                                  |
| 372650   | BALL-END 4.2MM THREADED HUDY SPRING STEEL™ (2)        | 901308 | HEX SCREW SB M3x8 (10)           |
| 372662   | COMPOSITE BALL-JOINT 4.2 MM (4)                       | 902258 | HEX SCREW SH M2.5x8 (10)         |
| 373014   | ALU REAR BULKHEAD - MOTOR (RIGHT)                     | 902306 | HEX SCREW SH M3x6 (10)           |
| 373024   | ALU REAR BULKHEAD - LEFT                              | 902310 | HEX SCREW SH M3x10 (10)          |
| 373033   | GRAPHITE REAR BULKHEAD BRACE 2MM                      | 903306 | HEX SCREW SFH M3x6 (10)          |
| 373066   | ALU PIVOT BALL  | 903310 | HEX SCREW SFH M3x10 (10)         |
| 373073-0 | ALU REAR BRACE MOUNT 16MM- ORANGE (2)                 | 960031 | ALU NUT M3 (10)                  |
| 373085   | X12'17 GRAPHITE REAR BRACE 2.5MM                      | 960032 | NUT M3 (10)                      |
| 373092   | COMPOSITE LOWER & UPPER PIVOT BRACE - LOW ROLL-CENTER |        |                                  |
| 373549   | X12'17 GRAPHITE REAR POD UPPER PLATE 2.5MM            |        |                                  |
| 373585   | SIDE SPRING C=0.9 - GOLD (2)                          |        |                                  |

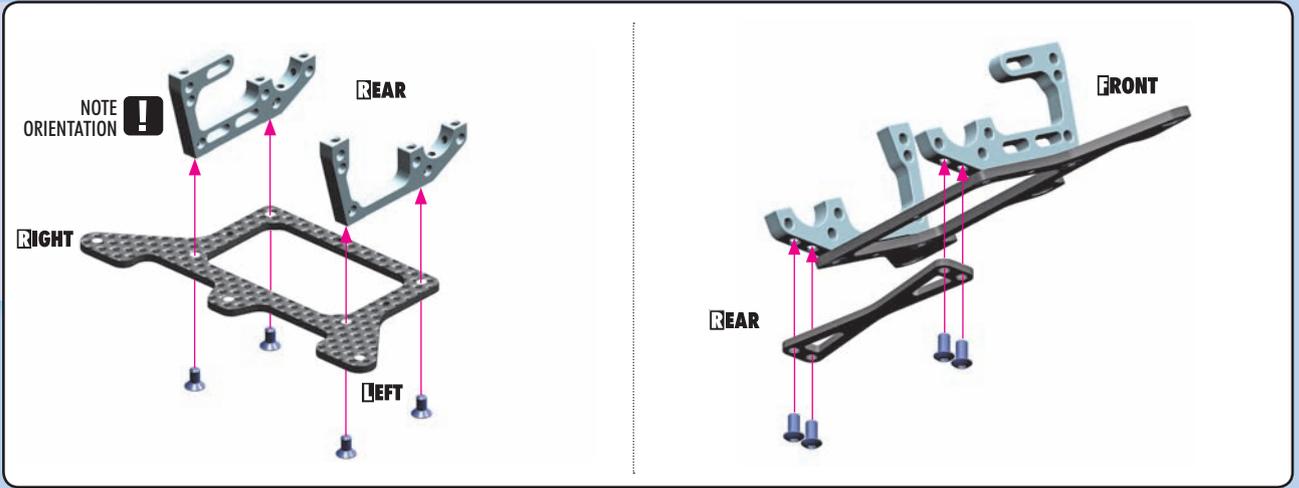
# 3. REAR SUSPENSION



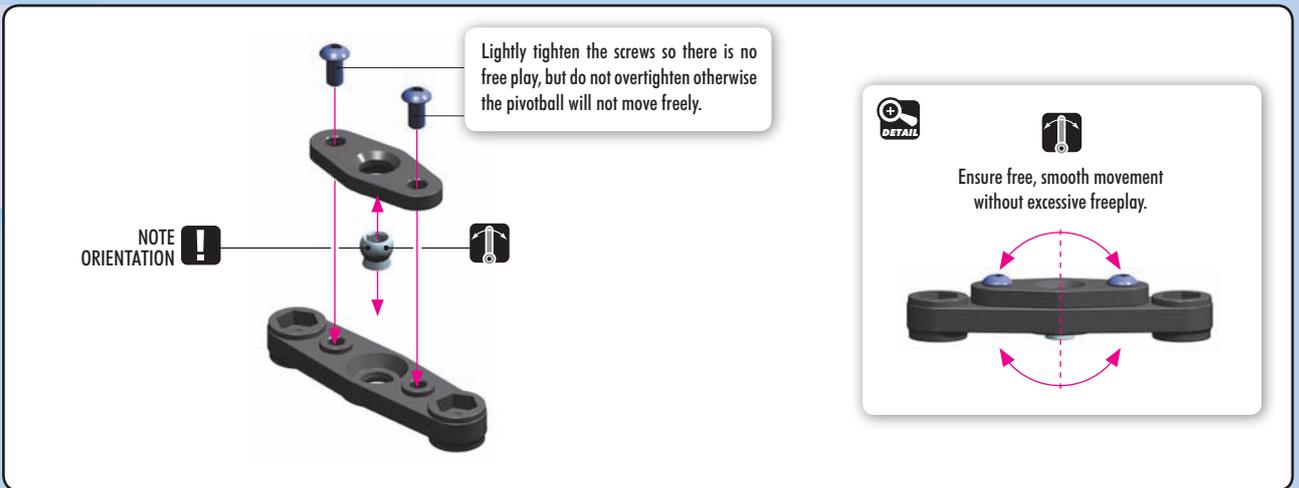
902306  
SH M3x6



903306  
SFH M3x6



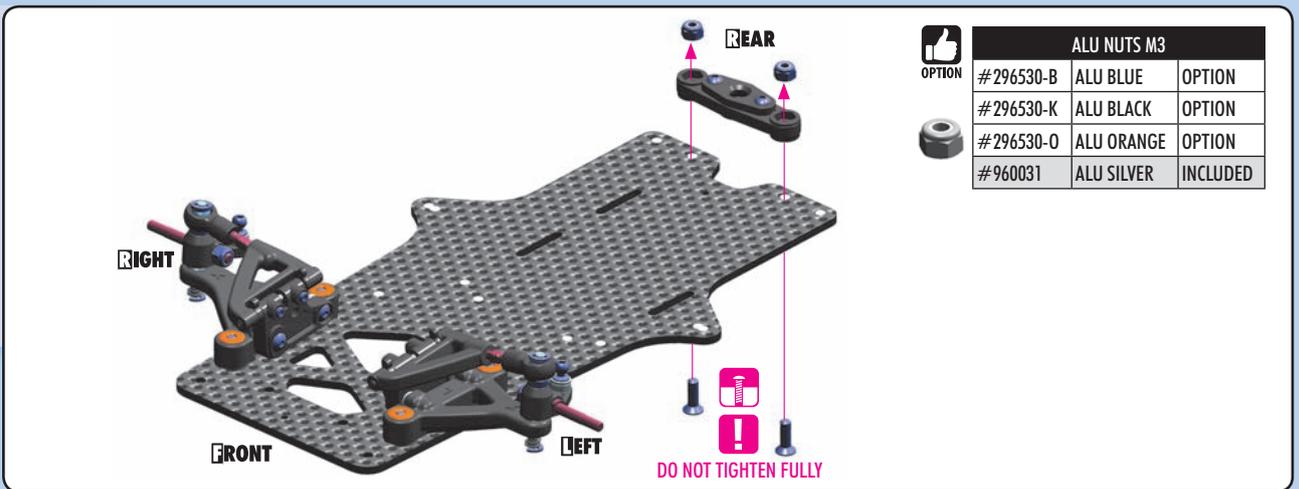
902306  
SH M3x6



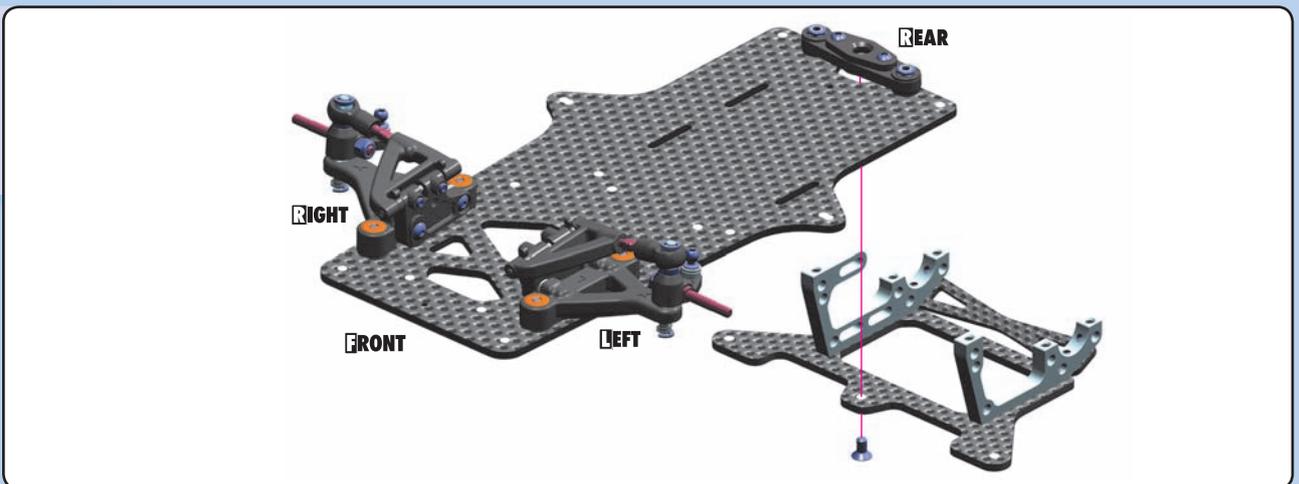
903310  
SFH M3x10



960031  
ALU N M3



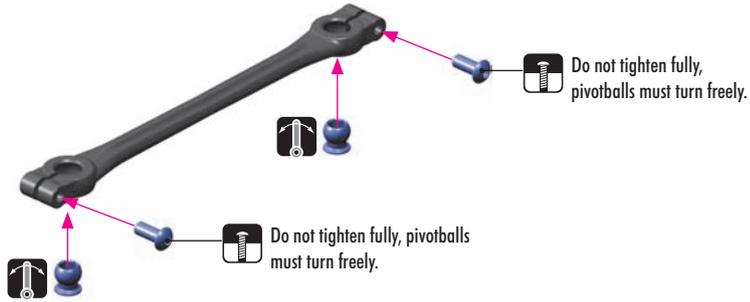
903306  
SFH M3x6



# 3. REAR SUSPENSION

902258  
SH M2.5x8

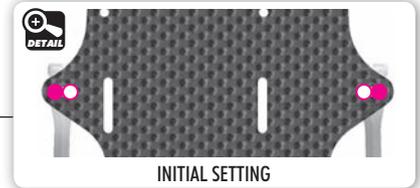
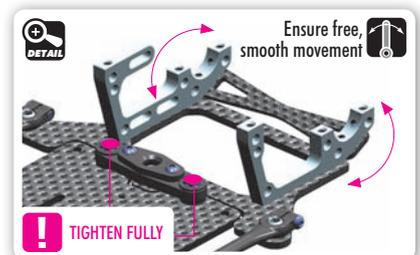
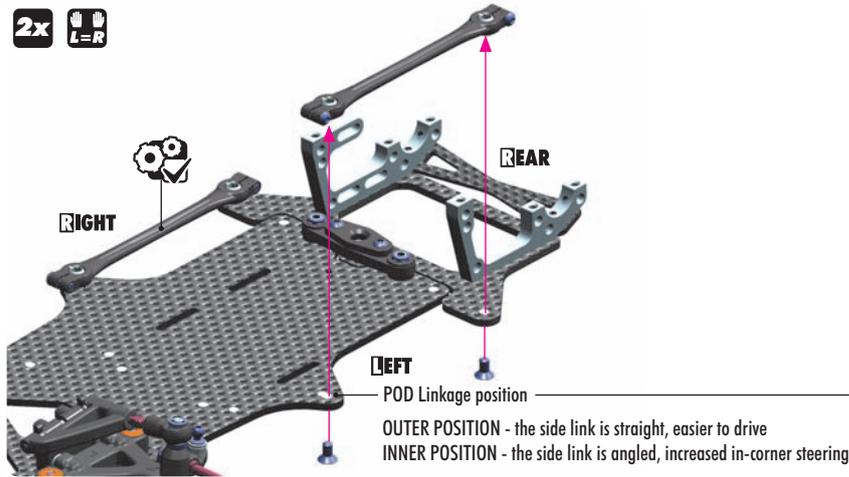
2x



903306  
SFH M3x6

2x

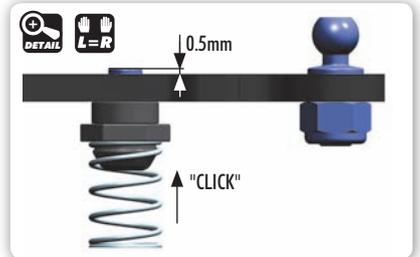
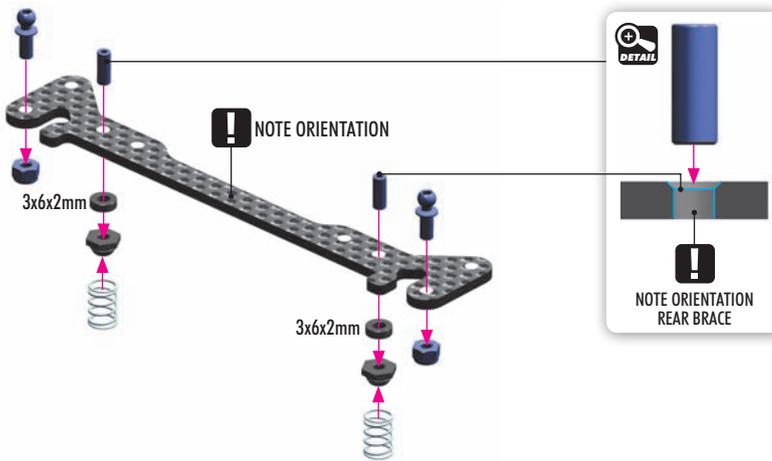
L=R



960031  
ALU N M3

306219  
SHIM 3x6x2

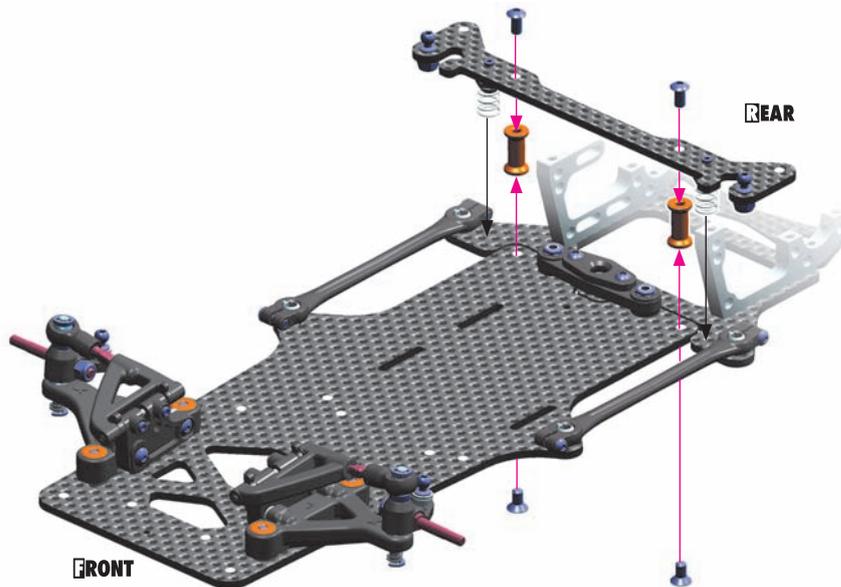
901308  
SB M3x8



OPTION	ALU NUTS M3		
#296530-B	ALU BLUE	OPTION	
#296530-K	ALU BLACK	OPTION	
#296530-O	ALU ORANGE	OPTION	
#960031	ALU SILVER	INCLUDED	

902306  
SH M3x6

903306  
SFH M3x6



# 3. REAR SUSPENSION



960031  
ALU N M3



306219  
SHIM 3x6x1



902306  
SH M3x6



960032  
N M3

ALU NUTS M3		
#296530-B	ALU BLUE	OPTION
#296530-K	ALU BLACK	OPTION
#296530-O	ALU ORANGE	OPTION
#960031	ALU SILVER	INCLUDED

**2x**

Add oil in each slot of the COMPOSITE side tubes.

**NOTE:**  
Add oil only in the slots, not on the whole tube.  
After assembling the side tubes, check for smooth operation.  
It is very important to re-oil the side tubes, at least once per race day.  
You may use different oil thicknesses depending on track conditions.

**TIP**

For HIGH grip	use SOFTER oils
For LOW grip or ASPHALT	use HARDER oils

HUDY OILS 100ml	
#106411	1000cSt
#106421	2000cSt
#106431	3000cSt
#106451	5000cSt
#106461	6000cSt
#106471	7000cSt
#106481	8000cSt
#106511	10000cSt

**TIP** The angle of the side tubes has a fine effect on car performance.

HIGHER angle: stiffer feeling, less roll  
LOWER angle (flatter): softer feeling, more roll

**OPTIONAL SIDE SHOCK**

OPTIONAL Optional side shock can be used to improve traction in low- and medium-grip conditions. The optional side shock replaces the 2 side tubes.

OPTIONAL PARTS (not included)	
#378100	Side Shock Absorber Set
#302654	Ball End 4.9mm with 8mm Thread - V2 (2)
#303120	Set of Alu Shims (0.5mm, 1.5mm, 2.5mm)
#372651	Ball Universal 4.9mm - HUDY Spring Steel™ (2)
#902308	Hex Screw SH M3x8 (10)

# 4. BALL DIFFERENTIAL



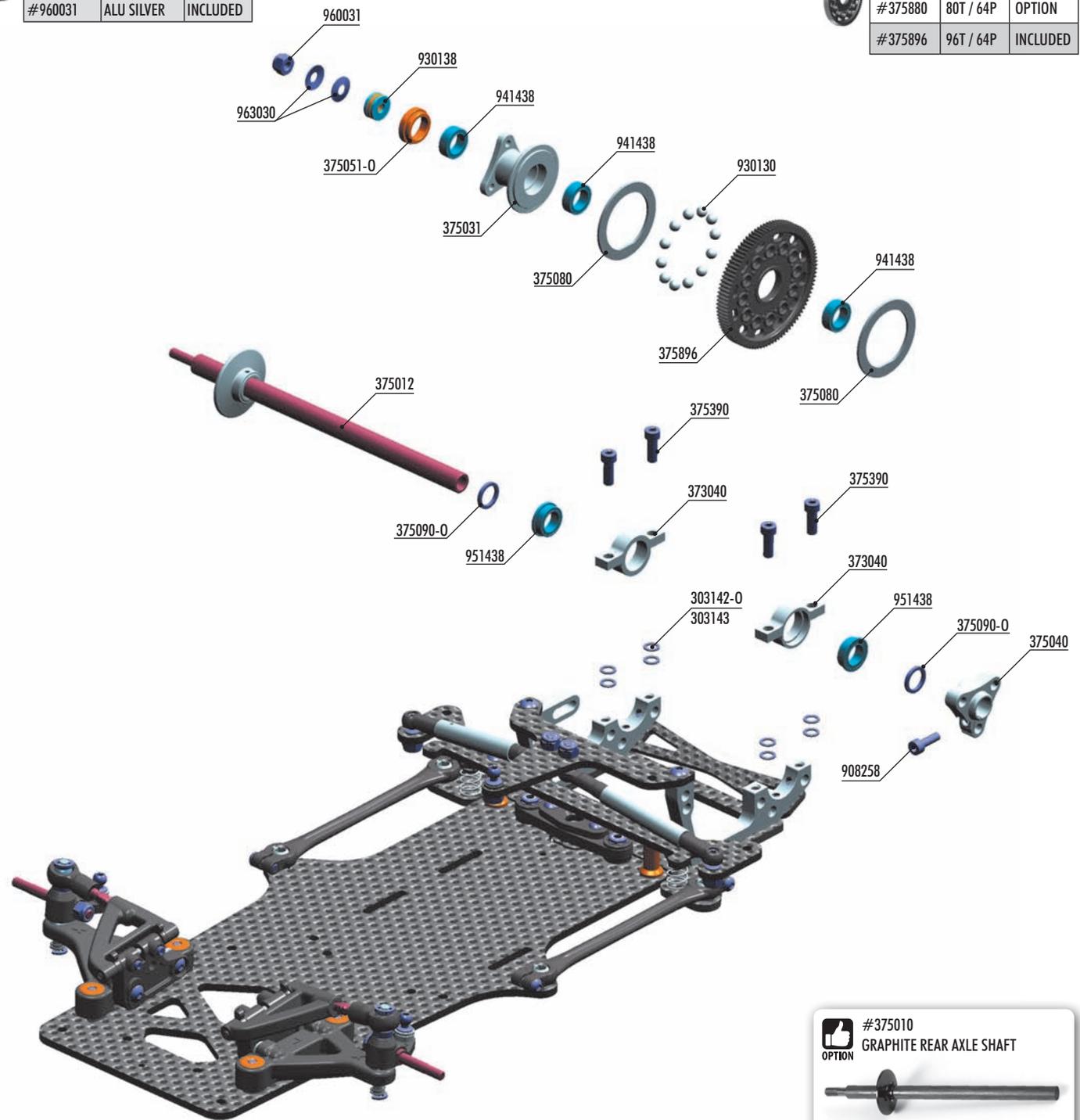
OPTION

ALU NUTS M3		
#296530-B	ALU BLUE	OPTION
#296530-K	ALU BLACK	OPTION
#296530-O	ALU ORANGE	OPTION
#960031	ALU SILVER	INCLUDED



OPTION

SPUR GEARS		
#375876	76T / 64P	OPTION
#375878	78T / 64P	OPTION
#375880	80T / 64P	OPTION
#375896	96T / 64P	INCLUDED



OPTION

#375010 GRAPHITE REAR AXLE SHAFT



The graphite rear axle is 9g lighter for great weight savings and improved acceleration, but it is more fragile.

BAG

04

303142-0	ALU SHIM 3x5x0.5MM - ORANGE (10)	908258	HEX SCREW SOCKET HEAD CAP M2.5x8 (10)
303143	ALU SHIM 3x5x0.25MM (10)	930130	CARBIDE BALL 3.175MM (12)
373040	ALU HEX SCREW M3x8 FOR REAR WHEELS (6)	930138	CARBIDE BALL-BEARING AXIAL F3-8 3x8x3.5
375012	STEEL REAR AXLE SHAFT - HUDY SPRING STEEL™	941438	HIGH-SPEED BALL-BEARING 1/4" x 3/8" x 1/8" RUBBER SEALED (2)
375031	ALU REAR WHEEL HUB - RIGHT	951438	BALL-BEARING 1/4" x 3/8" x 1/8" FLANGED (2)
375040	ALU REAR WHEEL HUB - LEFT	960031	ALU NUT M3 (10)
375051-0	ALU DIFF HUB - ORANGE	963030	CONE WASHER ST 3x8x0.5 (10)
375080	D-LOCK DIFF PLATE (2)		
375090-0	SET OF ALU SHIMS (0.5MM, 1.0MM, 2.0MM) - ORANGE		
375390	ALU HEX SCREW M3x8 FOR REAR WHEELS (6)		
375896	COMPOSITE SPUR GEAR - 96T / 64P		

# 4. BALL DIFFERENTIAL

-  303142-0  
SHIM 3x5x0.5
-  303143  
SHIM 3x5x0.25
-  375390  
ALU SCH M3x8

**SET-UP BOOK**  
RIDE HEIGHT

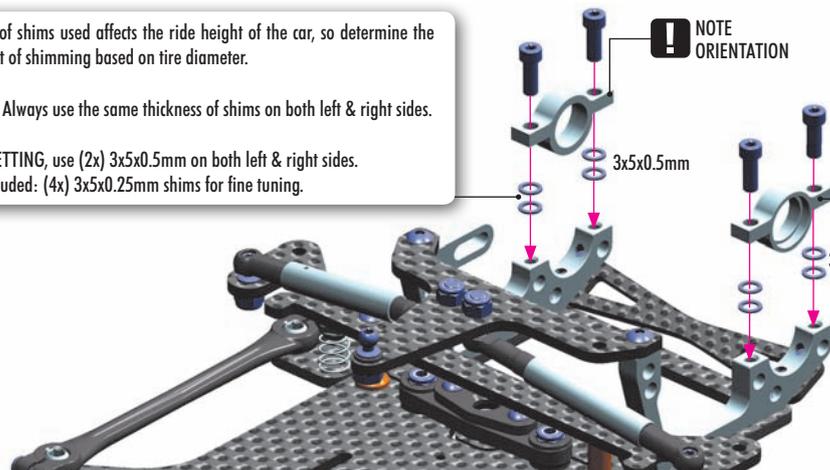
**2x**  **L=R**

The thickness of shims used affects the ride height of the car, so determine the proper amount of shimming based on tire diameter.

**IMPORTANT:** Always use the same thickness of shims on both left & right sides.

For **INITIAL SETTING**, use (2x) 3x5x0.5mm on both left & right sides.  
Optionally included: (4x) 3x5x0.25mm shims for fine tuning.

**NOTE ORIENTATION**



-  375090-0  
6.4x8.4x1.0
-  908258  
SCH M2.5x8
-  951438  
BB 1/4"x3/8"x1/8"

**SET-UP BOOK**  
TRACK-WIDTH

**#375010 GRAPHITE REAR AXLE SHAFT**  
**OPTION**

The graphite rear axle is 9g lighter for great weight savings and improved acceleration, but it is more fragile.

**DETAIL**

To set track-width, use the hole in the carbon pod plate as the centre point; this hole should always be centred between the two rear wheels once overall track-width is set. To set the track-width more easily, set the car on a ruler or use a digital vernier caliper.

Rear track-width is directly affected by wheel offsets, which can vary depending on tire brand.

**LEFT = RIGHT**

6.4x8.4x1mm

Bearing Oil (HUDY #106230)

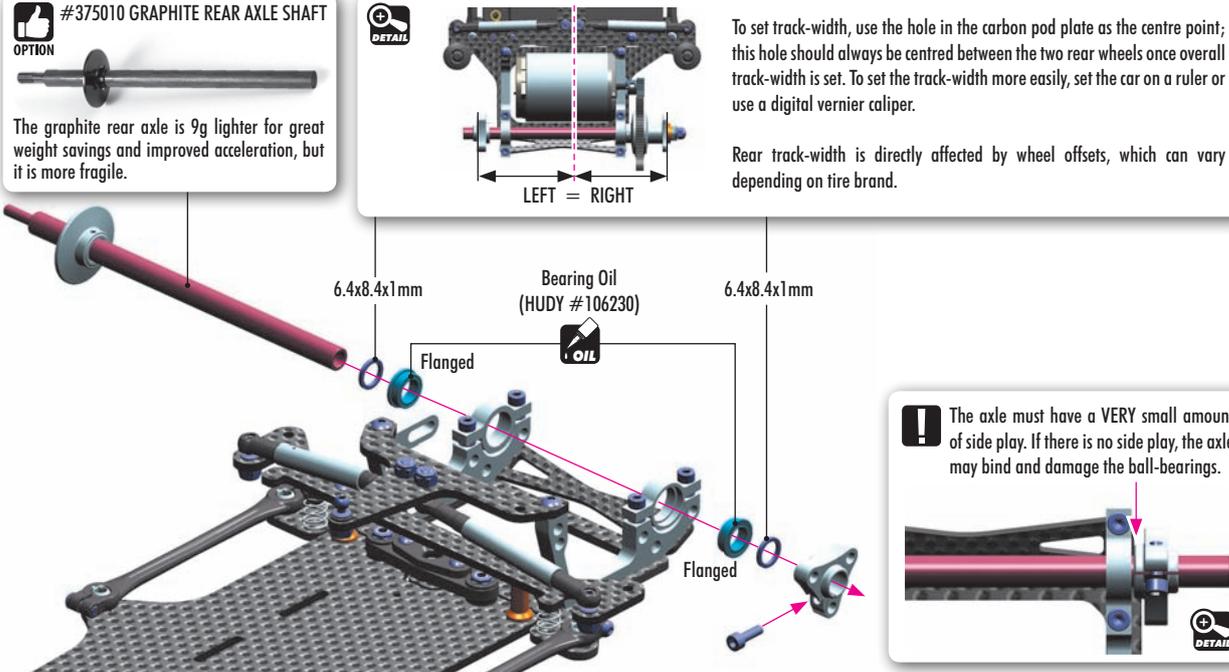
6.4x8.4x1mm

Flanged

Flanged

**NOTE ORIENTATION**

The axle must have a **VERY** small amount of side play. If there is no side play, the axle may bind and damage the ball-bearings.



-  960031  
ALU N M3
-  930130  
B 3.1
-  930138  
BA 3x8
-  941438  
BB 1/4"x3/8"x1/8"
-  963030  
ST 3x8

**SET-UP BOOK**  
DIFFERENTIAL

**REAR**

**NOTE ORIENTATION**

Diff Grease (HUDY #106211)

**NOTE ORIENTATION**

Bearing Oil (HUDY #106230)

Diff Grease (HUDY #106211)

**NOTE ORIENTATION**

Diff Grease (HUDY #106211)

**NOTE ORIENTATION**

Bearing Oil (HUDY #106230)

Diff Grease (HUDY #106211)

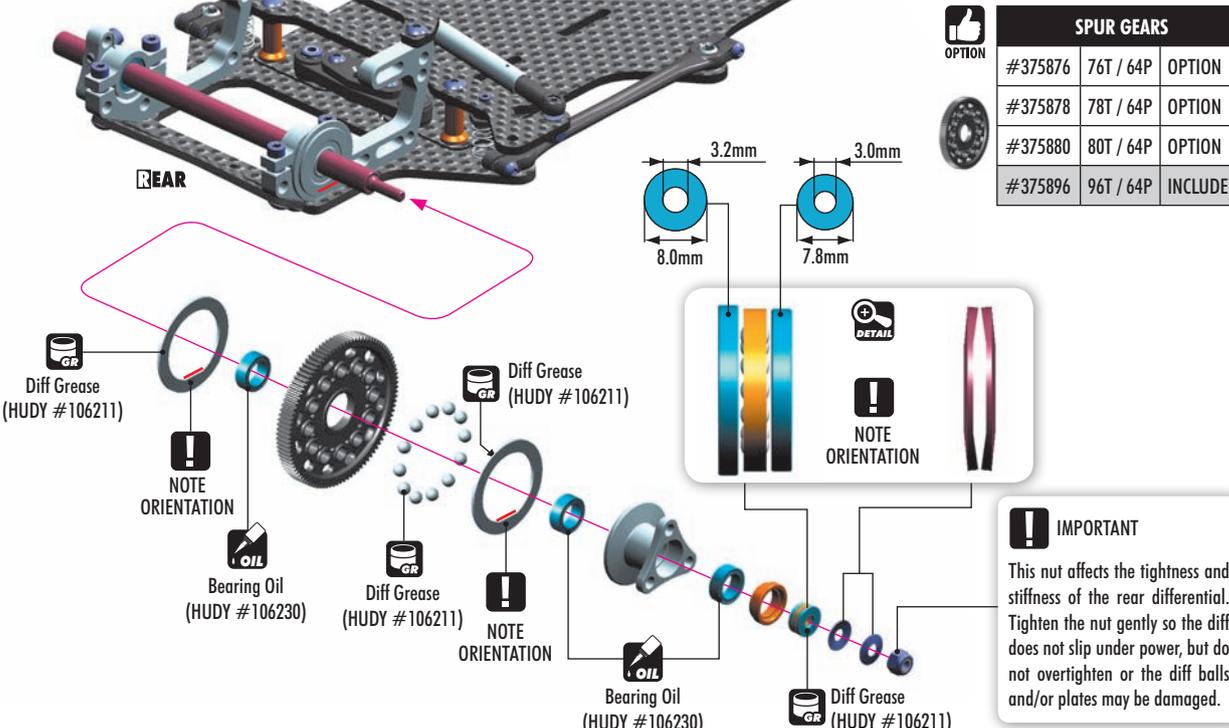
**NOTE ORIENTATION**

**IMPORTANT**

This nut affects the tightness and stiffness of the rear differential. Tighten the nut gently so the diff does not slip under power, but do not over-tighten or the diff balls and/or plates may be damaged.

**SPUR GEARS**

Part #	Size	Status
#375876	76T / 64P	OPTION
#375878	78T / 64P	OPTION
#375880	80T / 64P	OPTION
#375896	96T / 64P	INCLUDED

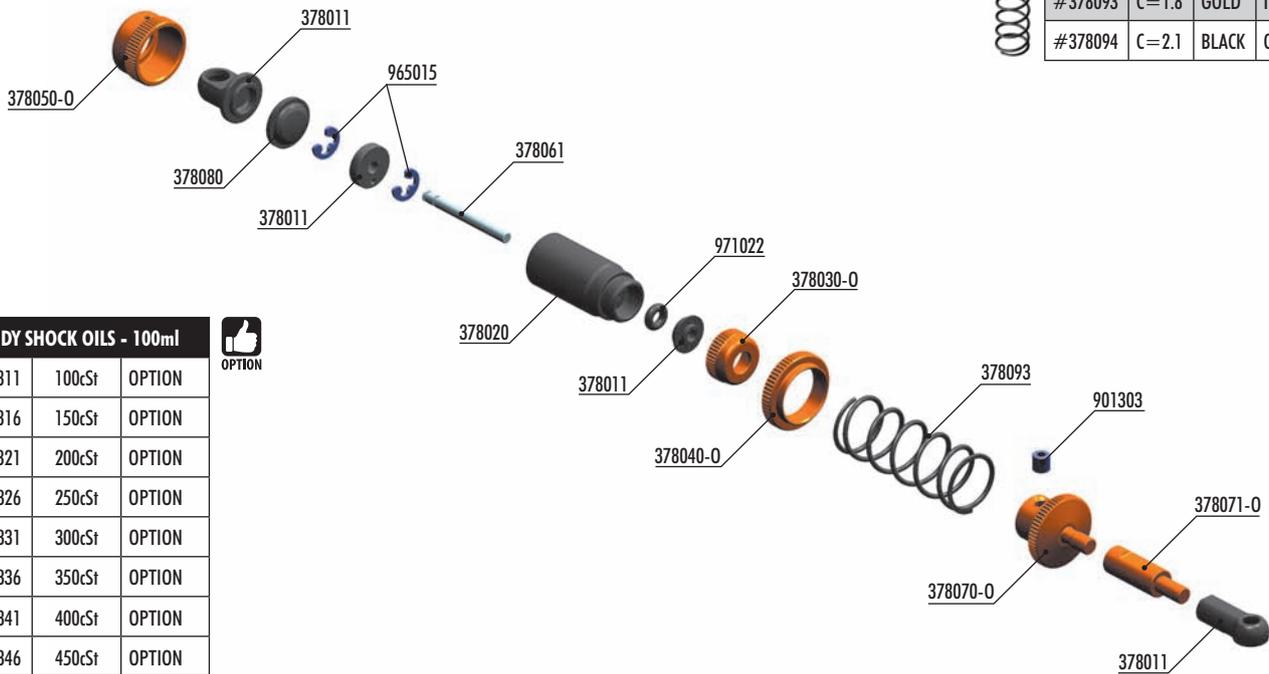


# 5. SHOCK ABSORBER



## SHOCK SPRINGS

#378092	C=1.5	SILVER	OPTION
#378093	C=1.8	GOLD	INCLUDED
#378094	C=2.1	BLACK	OPTION



## HUDY SHOCK OILS - 100ml

#106311	100cSt	OPTION
#106316	150cSt	OPTION
#106321	200cSt	OPTION
#106326	250cSt	OPTION
#106331	300cSt	OPTION
#106336	350cSt	OPTION
#106341	400cSt	OPTION
#106346	450cSt	OPTION
#106351	500cSt	OPTION
#106356	550cSt	OPTION
#106361	600cSt	OPTION
#106366	650cSt	OPTION
#106370	700cSt	INCLUDED
#106376	750cSt	OPTION
#106381	800cSt	OPTION
#106391	900cSt	OPTION
#106411	1000cSt	OPTION
#106421	2000cSt	OPTION



**BAG**

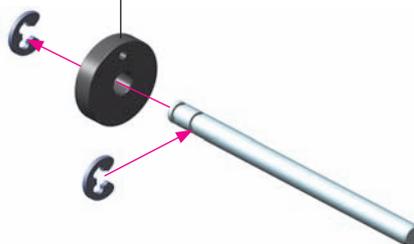


- |          |                                      |          |                            |
|----------|--------------------------------------|----------|----------------------------|
| 378001   | SHOCK ABSORBER SET                   | 378071-0 | ALU SHOCK ADAPTER - ORANGE |
| 378011   | COMPOSITE SHOCK PARTS - FRAME        | 378080   | SHOCK RUBBER MEMBRANE (2)  |
| 378020   | ALU THREADED SHOCK BODY - HARDCOATED | 378093   | SHOCK SPRING - GOLD        |
| 378030-0 | ALU SHOCK BODY CAP - LOWER - ORANGE  | 901303   | HEX SCREW SB M3x3 (10)     |
| 378040-0 | ALU SHOCK ADJUSTABLE COLLAR - ORANGE | 965015   | E-CLIP 1.5 (10)            |
| 378050-0 | ALU SHOCK BODY CAP - UPPER - ORANGE  | 971022   | SILICONE O-RING 2x2 (10)   |
| 378061   | SHOCK SHAFT                          |          |                            |
| 378070-0 | ALU SHOCK SPRING COLLAR - ORANGE     |          |                            |



965015  
C1.5

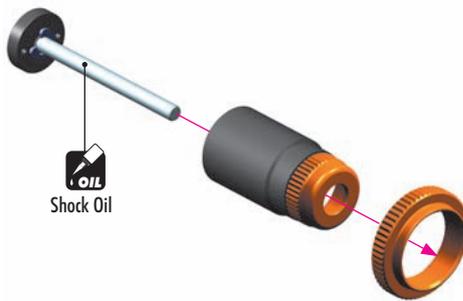
 Carefully remove the shock piston from the frame, and remove all excess plastic flash.



# 5. SHOCK ABSORBERS



971022  
0 2x2



## DEFAULT SHOCK SETTING FOR CENTER SHOCK ABSORBER

Follow the steps below to set the shock.

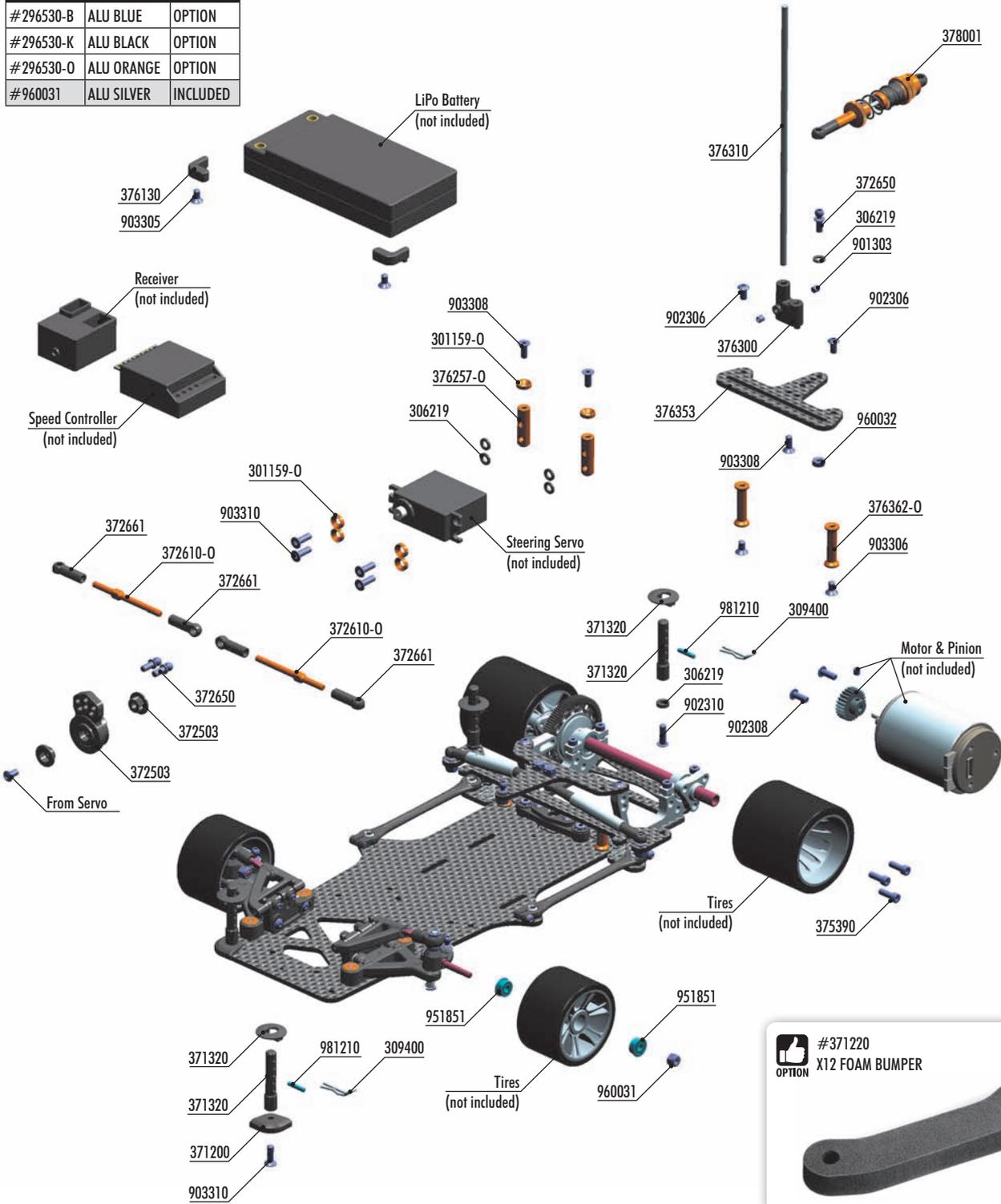
- 1** Extend the shock shaft completely. Fill the shock body with the shock oil.
- 2** Move the shock shaft up and down a few times to release the air bubbles trapped beneath the piston.  
3~5x UP & DOWN
- 3** Orient the filled shock vertically for several minutes with the shock shaft fully extended. The remaining air bubbles will release.
- 4** Install the shock membrane into the groove in the upper shock cap.
- 5** Gently place the shock cap assembly onto the filled shock body. Excess oil will spill from the shock. Screw the shock cap onto the body by only a few turns, approx. 50%. Excess oil will flow through the hole in the shock cap.
- 6** Gently push the shock shaft completely into the shock body. Excess oil will flow through the hole in the shock cap.
- 7** Keep the shock shaft pushed in the shock body and tighten the shock cap completely.  
Tighten the cap fully but do not overtighten or the rubber membrane may be damaged. Make sure that there is no oil leakage after the cap is tightened.

# 6. FINAL ASSEMBLY



OPTION

ALU NUTS M3		
#296530-B	ALU BLUE	OPTION
#296530-K	ALU BLACK	OPTION
#296530-O	ALU ORANGE	OPTION
#960031	ALU SILVER	INCLUDED



**BAG**

**06**

301159-0	ALU COUNTERSUNK SHIM - ORANGE (4)	376362-0	ALU ANTENNA HOLDER MOUNT - ORANGE (2)
305968~306000	PINION GEAR HARDCOATED 18~50T/64P	376310	FIBERGLASS SOLID ANTENNA ROD + CAP
306219	COMPOSITE SET OF SERVO SHIMS (4)	378001	SHOCK ABSORBER SET
309400	BODY CLIP FOR 5MM BODY POST (8)	901303	HEX SCREW SB M3x3 (10)
371200	COMPOSITE CHASSIS PROTECTOR (2)	902306	HEX SCREW SH M3x6 (10)
371320	COMPOSITE BODY POST (2)	902308	HEX SCREW SH M3x8 (10)
372503	COMPOSITE SERVO SAVER - STIFF - SET	902310	HEX SCREW SH M3x10 (10)
372610-0	ALU ADJ. TURNBUCKLE M3x42 MM - ORANGE (2)	903305	HEX SCREW SFH M3x5 (10)
372650	BALL-END 4.2MM - THREADED - HUDY SPRING STEEL™ (2)	903306	HEX SCREW SFH M3x6 (10)
372661	COMPOSITE STEERING BALL-JOINT 4.2 MM OPEN (4)	903308	HEX SCREW SFH M3x8 (10)
375390	ALU HEX SCREW M3x8 FOR REAR WHEELS (6)	903310	HEX SCREW SFH M3x10 (10)
376130	COMPOSITE LiPo BATTERY BACKSTOP (2)	951851	BALL-BEARING 1/8" x 5/16" x 9/64" FLANGED (2)
376257-0	ALU SERVO MOUNT - ORANGE (2)	960031	ALU NUT M3 (10)
376300	COMPOSITE ANTENNA MOUNT	960032	NUT M3 (10)
376353	GRAPHITE PLATE FOR ANTENNA HOLDER	981210	PIN 2x10 (10)

# 6. FINAL ASSEMBLY



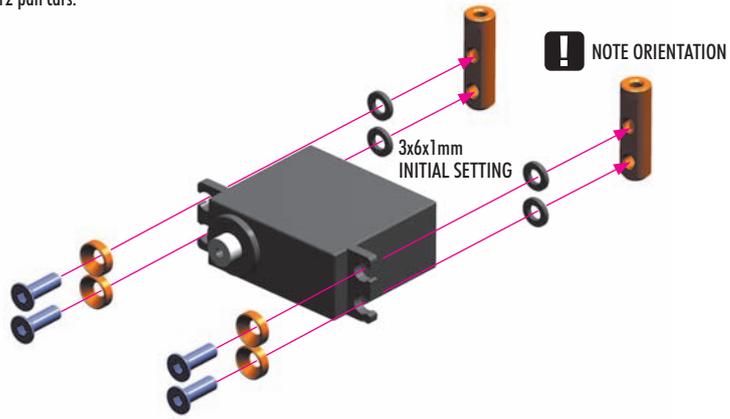
903310  
SFH M3x10



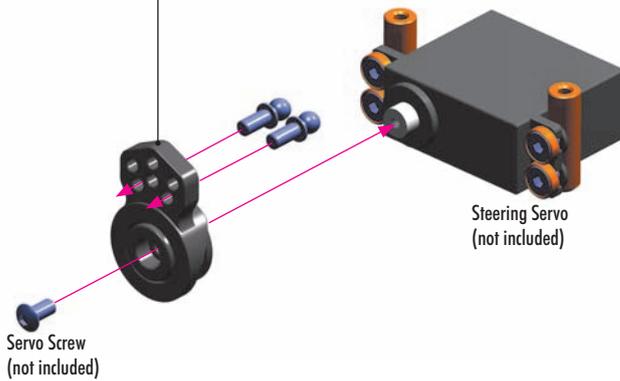
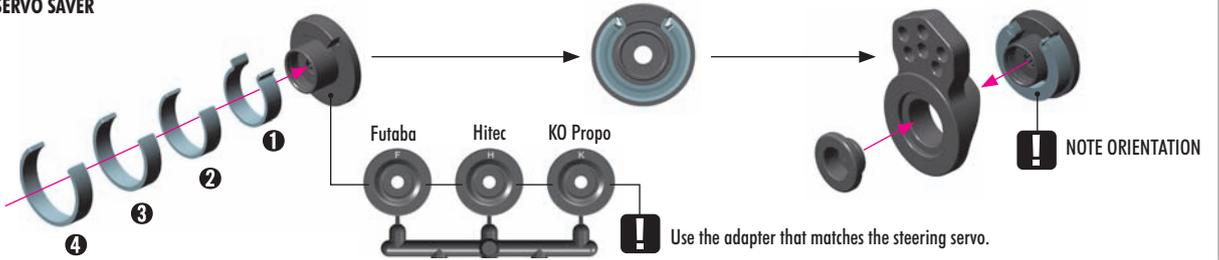
306219  
SHIM 3x6x1



**!** We recommend using a servo for 1/12 pan cars.



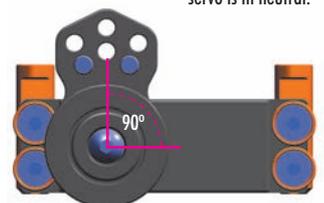
## SERVO SAVER



### INITIAL SETTING



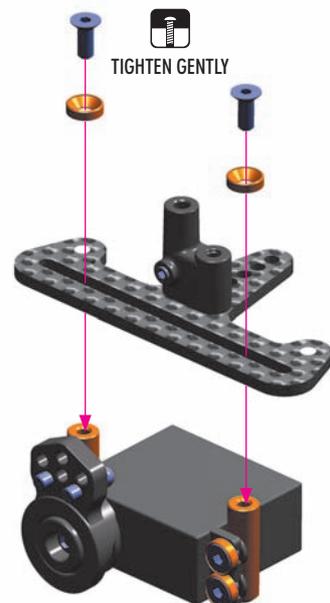
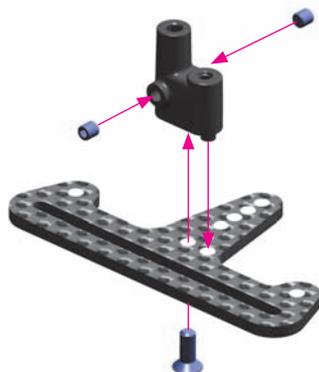
Note the orientation of servo saver when servo is in neutral.



901303  
SB M3x3



903308  
SFH M3x8



# 6. FINAL ASSEMBLY

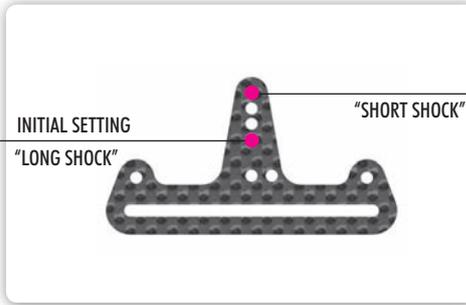


306219  
SHIM 3x6x2

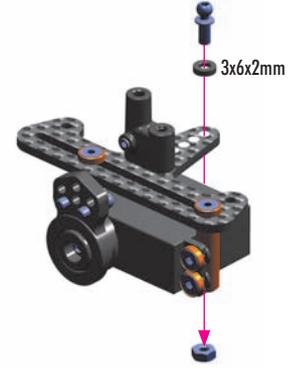


960032  
N M3

## ALTERNATIVE 1 (INITIAL SETTING) LONG SHOCK (FORWARD MOUNT POSITION)



## ALTERNATIVE 2 SHORT SHOCK (REARWARD MOUNT POSITION)

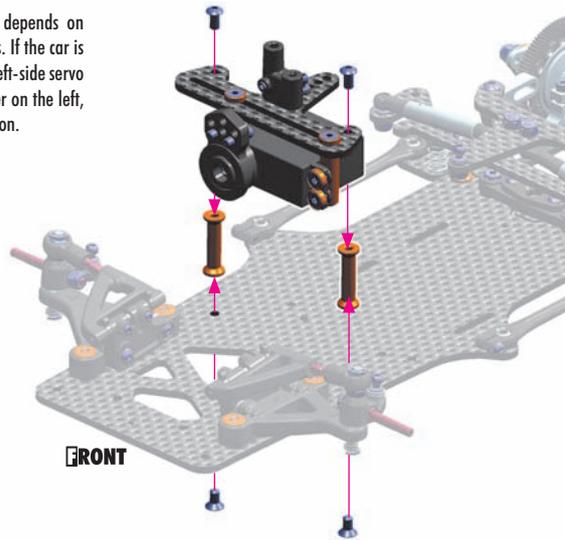


902306  
SH M3x6

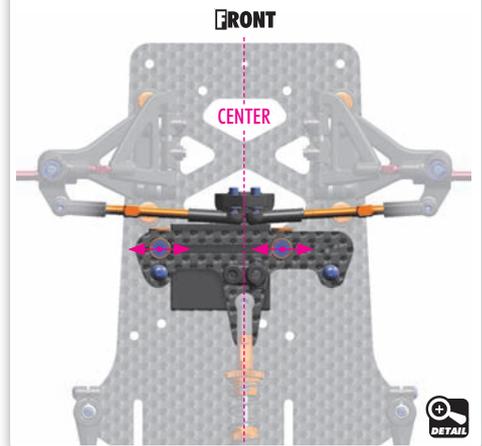


903306  
SFH M3x6

The position of the servo depends on the weight of the electronics. If the car is heavier on the right, use a left-side servo position; if the car is heavier on the left, use a right-side servo position.

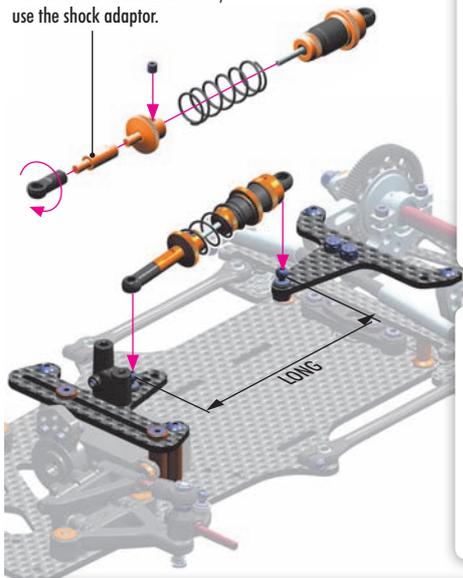


The floating servo mount eliminates unwanted tweak, and also allows you to adjust any 1/12 servo to the centerline of the chassis.



## ALTERNATIVE 1 (INITIAL SETTING) LONG SHOCK

For the LONG shock alternative, use the shock adaptor.



An innovative new feature is to change the center shock length (and front mounting position). By using longer or shorter shock, the damping and steering characteristics can be changed.

**LONG SHOCK (INITIAL SETTING):**  
Shock is built WITH adaptor.  
Front mount is FORWARD.  
Improves driveability over bumps, improves on-power traction.

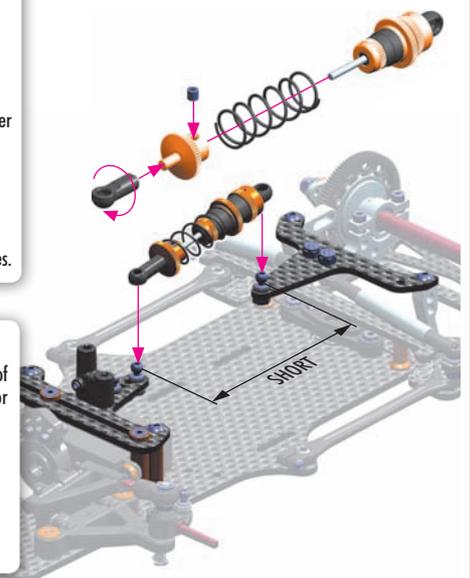
**SHORT SHOCK:**  
Shock is built WITHOUT adaptor.  
Front mount is REARWARD.  
Improves steering response, quicker direction changes.

### DOWNSTOP ADJUSTMENT

The length of the shock absorber affects the amount of rear downstop. To adjust, thread the ball-joint on or off the bottom spring cap or adaptor.

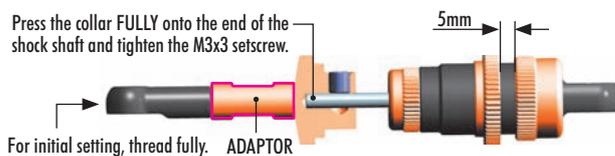


## ALTERNATIVE 2 SHORT SHOCK



### LONG SHOCK (INITIAL SETTING)

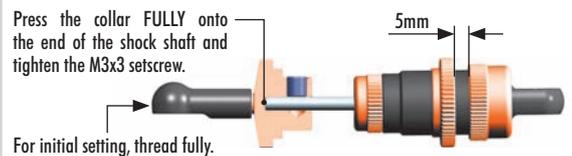
Press the collar FULLY onto the end of the shock shaft and tighten the M3x3 setscrew.



For initial setting, thread fully. ADAPTOR

### SHORT SHOCK

Press the collar FULLY onto the end of the shock shaft and tighten the M3x3 setscrew.



For initial setting, thread fully.

# 6. FINAL ASSEMBLY



**2x** **L=R**

**2x** **L=R**

NOTE ORIENTATION !

**10**

306219  
SHIM 3x6x3

**902310**  
SH M3x10

**981210**  
P 2x10

**2x** **L=R**

**REAR**

3x6x3mm

**RIGHT**

**LEFT**

**903310**  
SFH M3x10

**981210**  
P 2x10

**2x** **L=R**

**REAR**

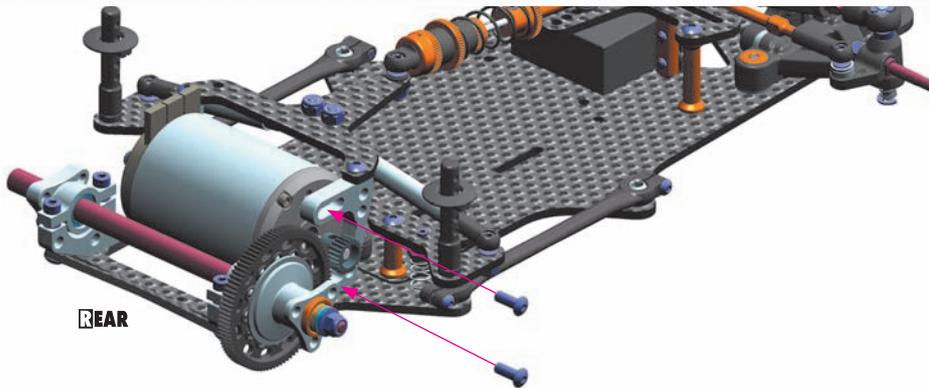
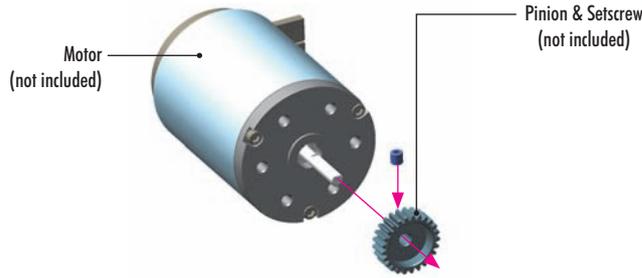
**RIGHT**

**FRONT**

**LEFT**

**#371220**  
OPTION **X12 FOAM BUMPER**

# 6. FINAL ASSEMBLY

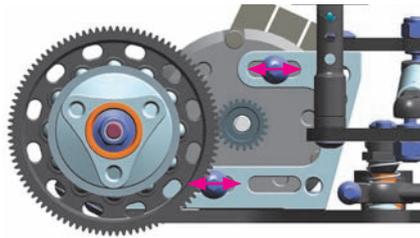


PINION GEARS ALU HARDCOATED		
#305968	18T / 64P	OPTION
#305969	19T / 64P	OPTION
#305970	20T / 64P	OPTION
#305971	21T / 64P	OPTION
#305972	22T / 64P	OPTION
#305973	23T / 64P	OPTION
#305974	24T / 64P	OPTION
#305975	25T / 64P	OPTION
#305976	26T / 64P	OPTION
#305977	27T / 64P	OPTION
#305978	28T / 64P	OPTION
#305979	29T / 64P	OPTION
#305980	30T / 64P	OPTION
#305981	31T / 64P	OPTION
#305982	32T / 64P	OPTION
#305983	33T / 64P	OPTION
#305984	34T / 64P	OPTION
#305985	35T / 64P	OPTION
#305986	36T / 64P	OPTION
#305987	37T / 64P	OPTION
#305988	38T / 64P	OPTION
#305989	39T / 64P	OPTION
#305990	40T / 64P	OPTION
#305991	41T / 64P	OPTION
#305992	42T / 64P	OPTION
#305993	43T / 64P	OPTION
#305994	44T / 64P	OPTION
#305996	46T / 64P	OPTION
#305997	47T / 64P	OPTION
#305998	48T / 64P	OPTION
#306000	50T / 64P	OPTION



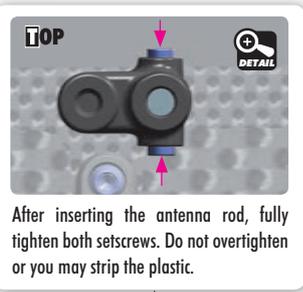
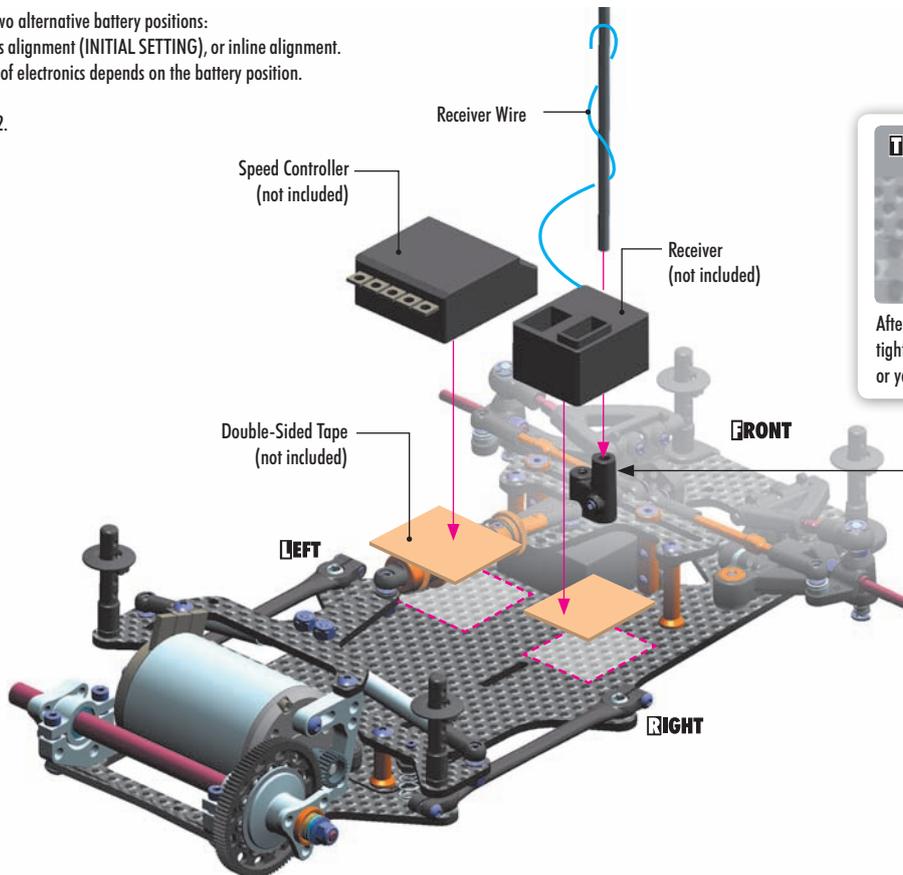
### GEAR MESH

Adjust the gear mesh so there is appropriate space between the spur gear and pinion teeth. There should be a very small amount of freerplay.



There are two alternative battery positions: cross-chassis alignment (INITIAL SETTING), or inline alignment. Positioning of electronics depends on the battery position.

See page 22.



# 6. FINAL ASSEMBLY

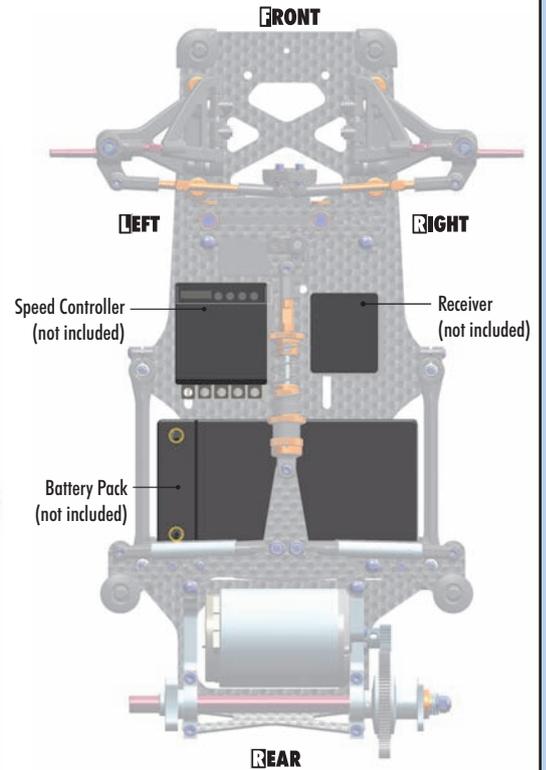
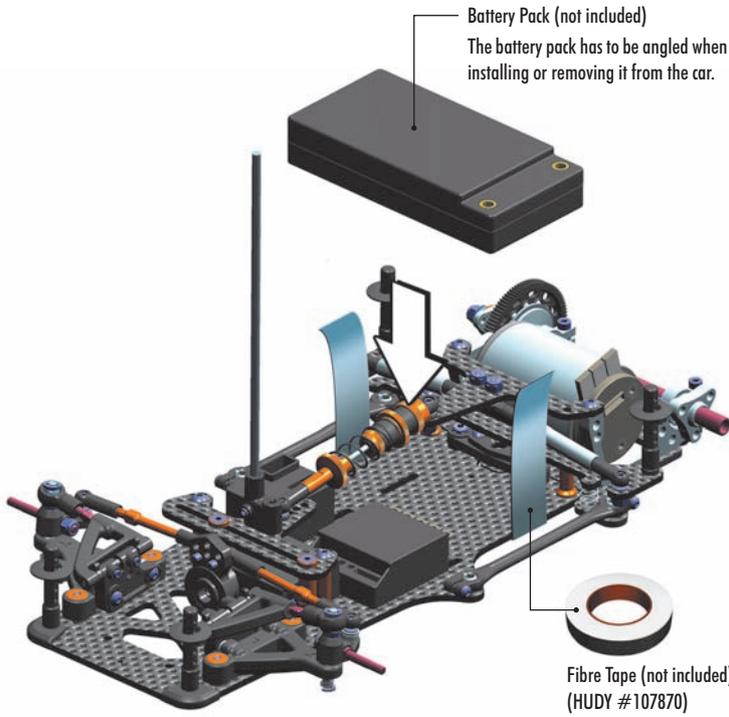


903305  
SFH M3x5

## LIPO BATTERY CONFIGURATION 1 CROSS-CHASSIS ALIGNMENT:

### INITIAL ASSEMBLY

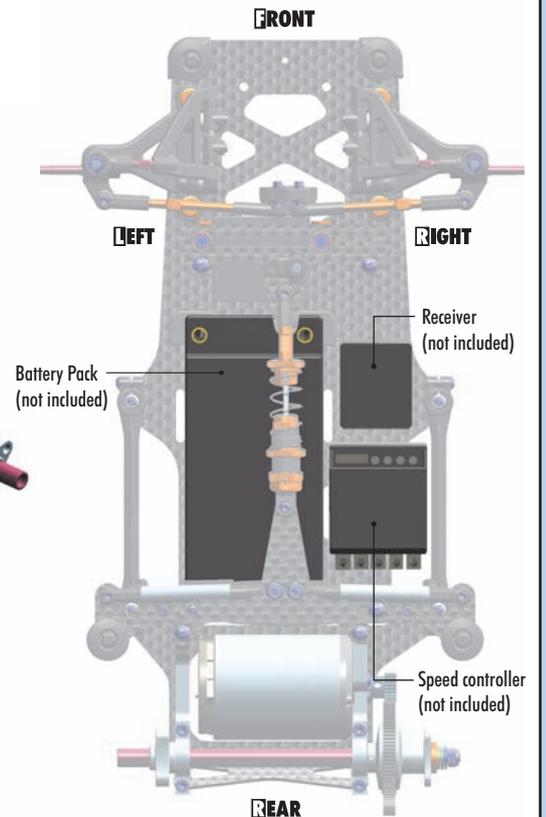
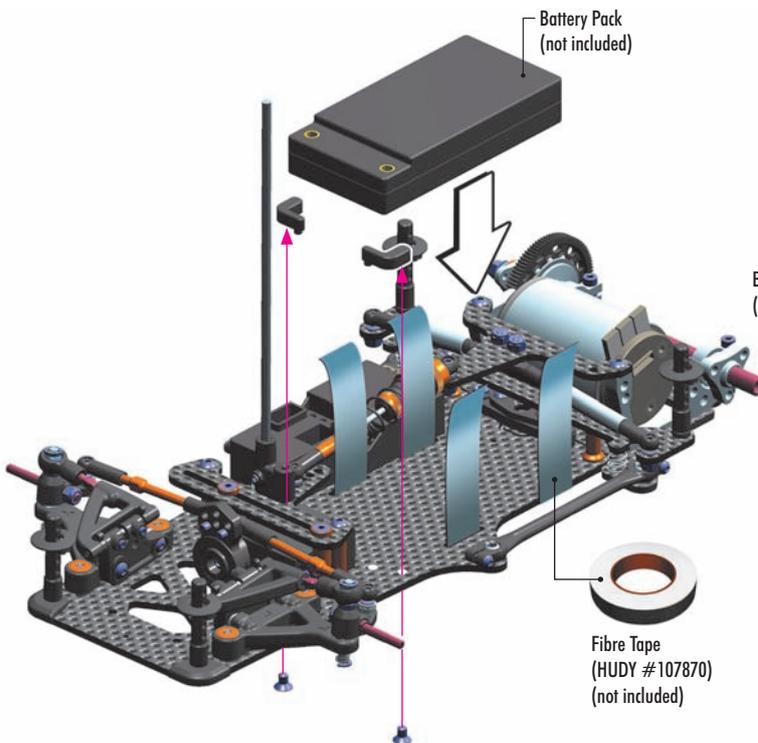
Cross-chassis alignment provides more neutral handling, making the car less sensitive to set-up changes and gives reduced steering responsive. Recommended for low- and medium-traction conditions.



903305  
SFH M3x5

## LIPO BATTERY CONFIGURATION 2 INLINE ALIGNMENT:

Inline battery alignment improves cornering speed and reduces the chance that the rear of the car will "diff out." Recommended for high-traction conditions.



# 6. FINAL ASSEMBLY



960031  
ALU N M3



375390  
ALU SCH M3x8



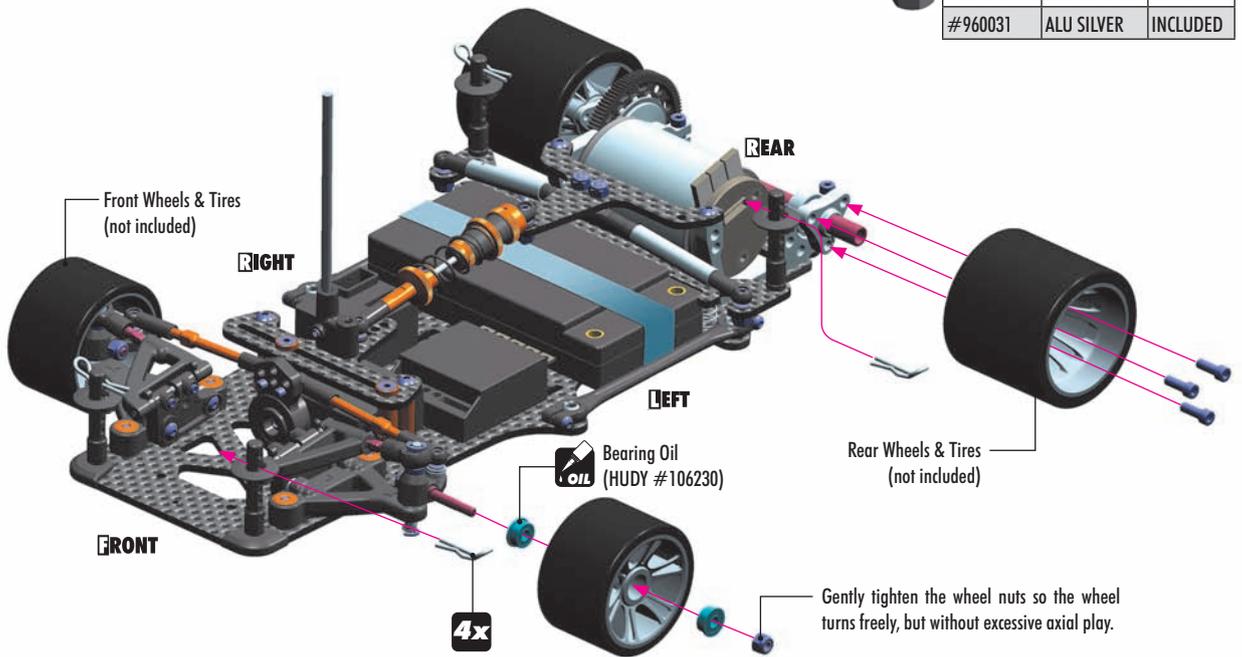
951851  
BB 1/8"x5/16"x9/64"



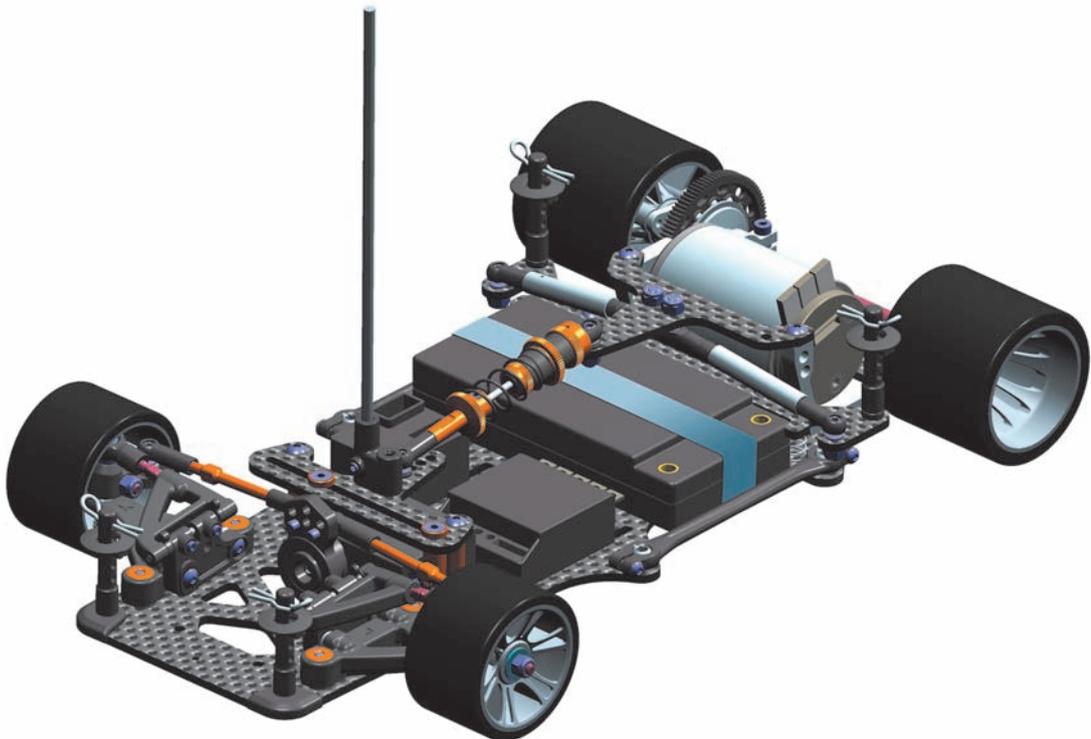
OPTION

### ALU NUTS M3

ALU NUTS M3		
#296530-B	ALU BLUE	OPTION
#296530-K	ALU BLACK	OPTION
#296530-O	ALU ORANGE	OPTION
#960031	ALU SILVER	INCLUDED



FINAL ASSEMBLED VIEW



[www.teamxray.com](http://www.teamxray.com)

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