2014 AUDI R18 LMP1 RS-LM
Instruction Manual

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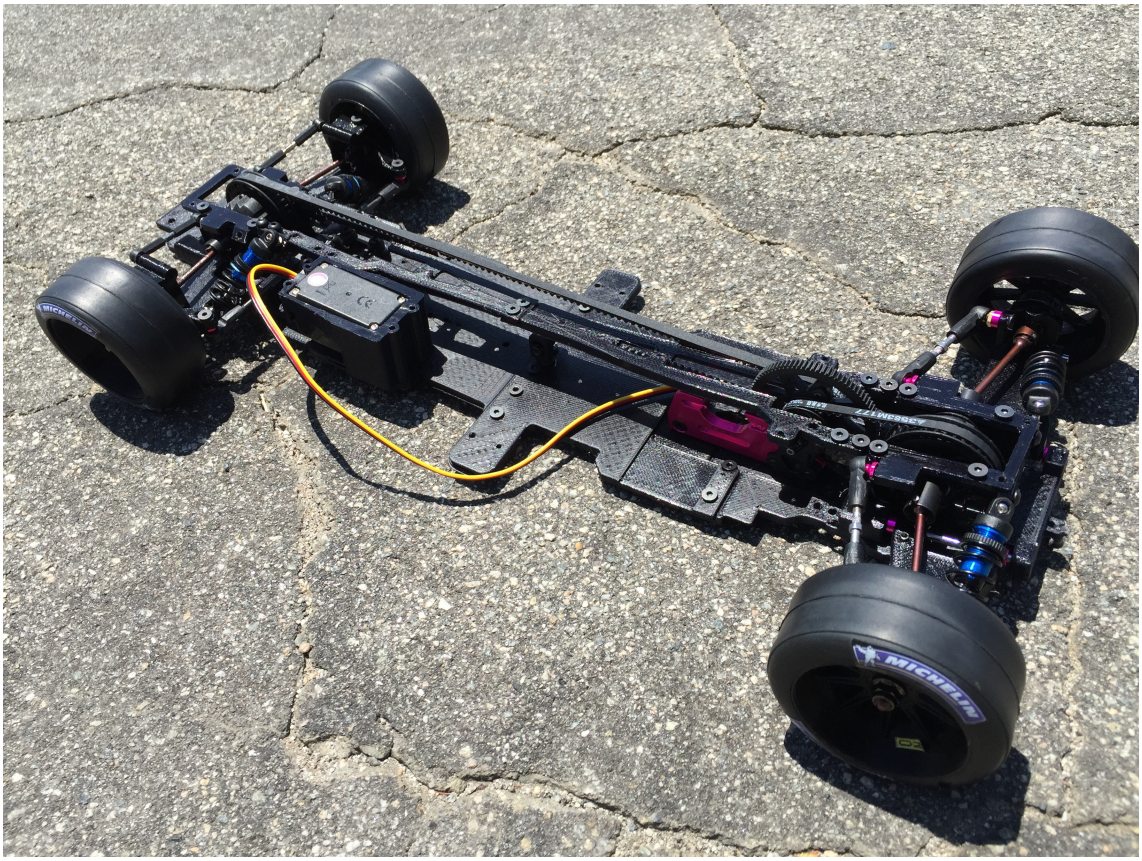
The RS-LM is a 3d printed Lemans RC car chassis that uses off the shelf RC parts for its drivetrain. The reason why I choose to use RC gears, is because they are readily available, and they are manufactured to better specifications that your printer can make printed gears. Also it allows anyone to build the car and its performance is not based on how well you calibrated your machine. The chassis has many parts that can be interchanged with plastic parts that can be ordered in either plastic or metal, so it makes this chassis upgradable.



1. GEAR DIFFERENTIAL/SOLID FRONT AXLE

The car can use either 2 differentials, front and rear or Solid Axle in the front.

Other differentials may work with the car. I used 3racing differentials from the Sakura XI Touring car kit.

PARTS NEEDED

Differential

Differential: 3Racing (SAK-XS110) (2 if not using solid front axle)

for solid front axle

Solid Axle: 3Racing (SAK-D134)

38T Pulley: 3Racing (SAK-D135)

Bearing Holder

(4 total) 3racing Bearing Housing for Sakura D4 XI Ultimate CS Sport Advance 2016 (SAK-X07)

Differential manual comes with the differential that you buy. I will include a link to the Sakura XI touring car kit if you do not have the manual for how to assemble your differential.

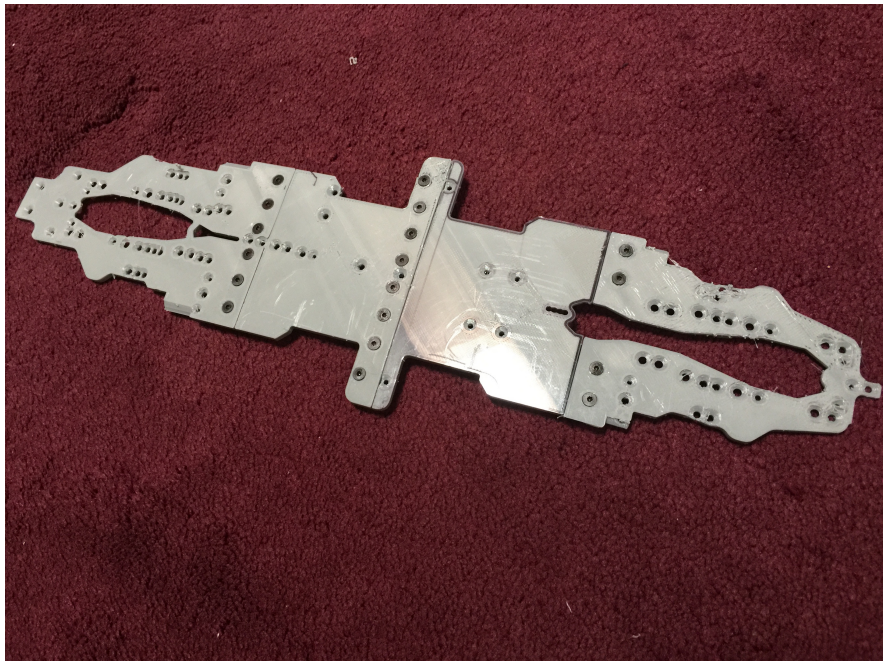
http://www.tqrcracing.com/forum/files/manual/xisport_manual.pdf

The car can use either 2 differentials, front and rear or Solid Axle in the front.

Other differentials may work with the car. I used 3racing differentials from the Sakura XI Touring car kit.

After differentials are assembled set them aside.

2. ASSEMBLE CHASSIS DECK



Printed Parts:

Front deck
Center deck (part 2)
Center deck (part 1)
Rear deck
Chassis deck motor brace

Metal Parts:

M3 x 5 flat screws
M3 x 1.0 x .5 flat nuts
(4) M3 x 8 flat screws

a. Remove any support material from the printed parts.
b. Drill the joining holes with 2.4 mm drill bit.
c. Press in M3 x 1.0 x .5 flat nuts into he nut holders
d. screw in m3 x 5 flat screws
e. repeat until all sections of the deck are attached.
f. Position Chassis deck motor brace.
g. screw it in with m3 x 8 flat nuts and tighten with m3 flat nuts.

3. SUSPENSION ARMS

Printed Parts:

Front
suspension front mount (+10mm)
suspension rear mount (left)
suspension rear mount (right)
front suspension arm (left)
front suspension arm (right)
C-hub (left)
C-hub (right)
Front Knuckle (2)

Rear
suspension rear mount
suspension rear mount (+8.4)(right)
suspension rear mount (+8.4)(left)
rear suspension arm (left)
rear suspension arm (right)
Rear Knuckle (left)
Rear Knuckle (right)
***** Print Rear Knuckles at 100% infill (the Upper Control Arm mount needs to be solid) *****

Metal parts:

outer pin m3 x 22.9 pin 3Racing SAK-28
inner pin m3 x 46 pin (4) 3Racing SAK-27
m3 x 6 x 1.0 spacer (4) 3RAC-WF305/PK
m3 x 6 x 2.0 spacer (4) 3RAC-WF320/PK
m3 x 8 flat screw (8)
m3 x10 set screw (10)
(2) 3Racing FGX F1 4mm ball stud M3 x 5 4 pcs (FGX-123)
(2) Yokomo 39.1mm Front Double Joint Universal Driveshaft [YOKBD-010RW] *any 39.1mm double joint shaft can work
(2) Kokomo 40.6mm Front Double Joint Universal Driveshaft [YOKB7-010FW] *any 40.6mm double joint shaft can work

(4) M2 x 10 pin (M2 x 10 shaft B-02-VBC-0020)
King Pin Post for 3racing Sakura Zero (3Racing SAK-42)
Aluminum M3 Countersink Washers (3Racing 3RAC-WC3/PK)

Plastic parts:

Hex adaptor SAK-D123

Bearings:

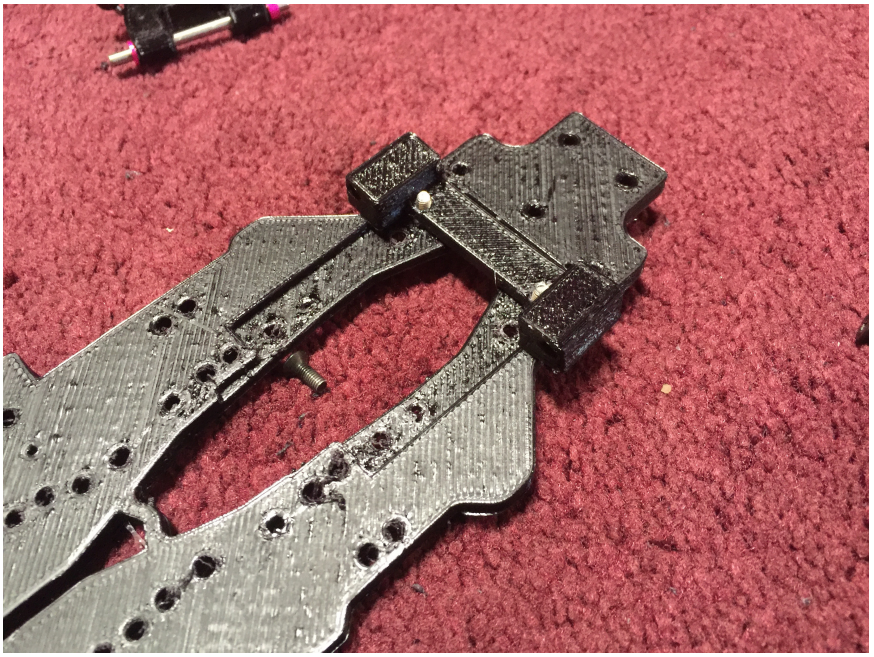
(4) 5x8x2.5 bearings
(4) 10x5x4 bearings

Shocks:

(2) Associated FT Front Aluminum Shock Kit Blue RC18R / FGX 2pcs
with
(2) Rear Damper Spring Set for Sakura FGX 3Racing FGX-303
Shock oil 30 weight (Team associated 5422)

other shocks can work as long as they have a 2mm shaft.

Assemble the shocks with the manual appropriate to the shocks that you bought.

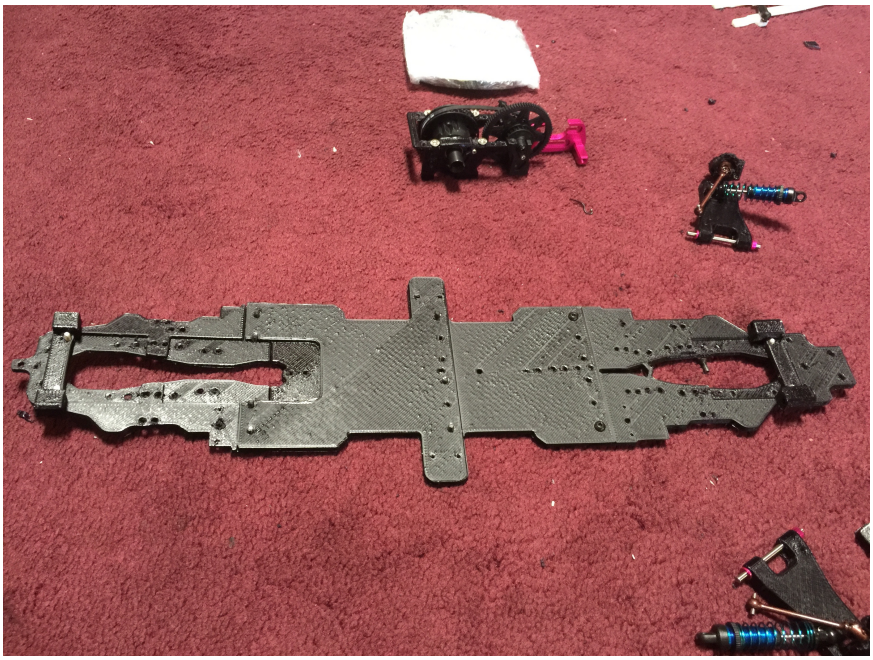


For all holes, tap the hole with a m3 x 1.0 tap before installing bolt.

1. Clean out the front suspension mounts holes that are on the perimeter of the plastic parts with an m3 drill.
2. Tap the bolt holes on the mounts with an m3 x 1.0 tap.
3. Install 10mm front suspension mount onto chassis. (Front of the chassis has two holes at the end, rear has one hole).

4. Install the rear suspension mount onto the rear with two m3 x 8 bolts.

5. Chassis with Front and rear mounts installed.



6. Prepare Front and Rear Suspension arms by drilling out the m3 holes with a m3 x 1.0 drill bit.

7. Tap the suspension mount holes that are on the top of the suspension arm with a m3 x 1.0 tap.

8. Remove the supports from the front and rear knuckles

9. Clean out the m3 holes on both the front knuckles and the rear knuckles with an m3 x 1.0 drill bit.

10. Clean out the bearing holes on the knuckles with an m10 drill bit for the rear and an m8 drill bit for the front. **PLACE THE DRILL IN REVERSE MODE.** The points to clean out the holes of any printed debris, not to cut.

11. For the rear knuckle, tap the hole on the side with an m3 x10 tap. The hole that is farthest from the bottom m3 hole.

Front Suspension

12. Tap the holes on the top of the front knuckles with the m3 x 1.0 tap.

13. Press the (4) 5x8x2.5 bearings into the front knuckles. You may need to use pliers to get them set. For the rear bearing push in with either a large allen wrench or some other flat tool to get the rear bearing set correctly into the knuckle.

13. Insert two front universal joints into the front knuckles

14. Clean the C-hubs m3 hole with the m3 x 1.0 drill bit.

15. Not the direction of the C-hubs in the pictures The extended side of the C-hub should face towards the front of the car.

16. Install the C-hubs into the front arms by using the m3 x 22.9 pin outer pin. Use oil and pliers to press the pins in , if they are snug. Repeat on the other side.

17. Install a 4mm ball stud on each arm, and install the shock with the piston body at the top.

18. Press the inner pin (m3 x 46) into the front suspension arms.

19. Install the long King Pin Post into the bottom of the c-hub and the shorter King Pin Post into the upper hole in the C-post. Slide the Front Knuckles into the C-post, with the Knuckle arm aimed toward the shock.

20. Install a 3Racing FGX F1 4mm ball stud M3 x 5 4 pcs (FGX-123) on the C-hub in the circle housing on the top of the C-hub, with the 4mm ball stud facing the front of the assembly.

21. Screw in the Front knuckle with an m3 x 12 screw on the bottom, and an m3 x 8 screw with a m3 countersink washer on the top.
Repeat on the other side.

Rear Suspension

20. Clean out the Rear Knuckle bearing holder with a m10 drill. **Remember to run the drill in reverse. The point is to clean, not to cut.**

21. Press the 10x5x4 bearings into the rear knuckles. Make sure that they are seated into the holders.

22. screw in a m3 x 12 into the upper a-arm holder on the rear knuckle. Slide on a m3 x 6 x 2.0 spacer, and install a 4. (spacer is not shown in the picture below)

23. Install the Rear Knuckles into the rear suspension arms with the horizontal panel aiming towards the front of the car.

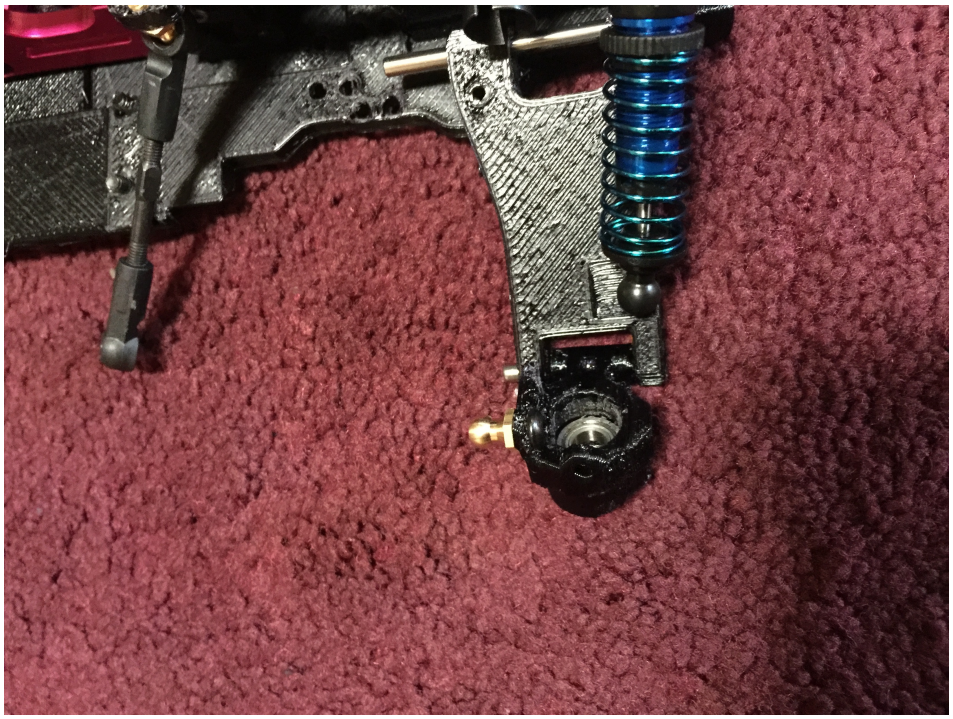
24. Press in the m3 x 22.9 pins, to join the knuckles to the assembly.

25. Install the 4mm ball stud into the shock mount hole.

26. Install the m3 x 44 outer pin into the rear suspension arm.

27. Install the rear shock.

28. Install the universal joint.

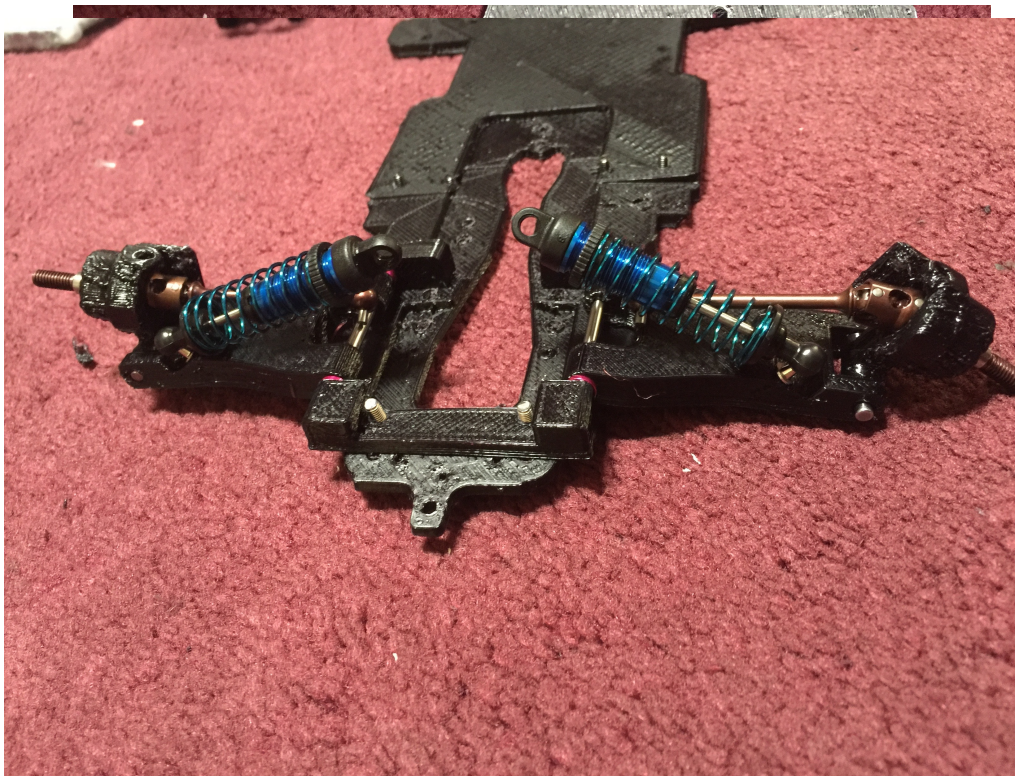


30. Place an m3 x 6 x 2.0 spacer on the outer pin on the front arm assembly facing the front of the car and a m3 x 6 x 1.0 spacer on the rear (towards the rear of the car).

31. Install the front arm assembly onto the chassis by pressing the pin into the front suspension mount.

32. Place the suspension rear mount (left)
suspension rear mount (right) on the end of the outer pin, and press it onto the outer pin.

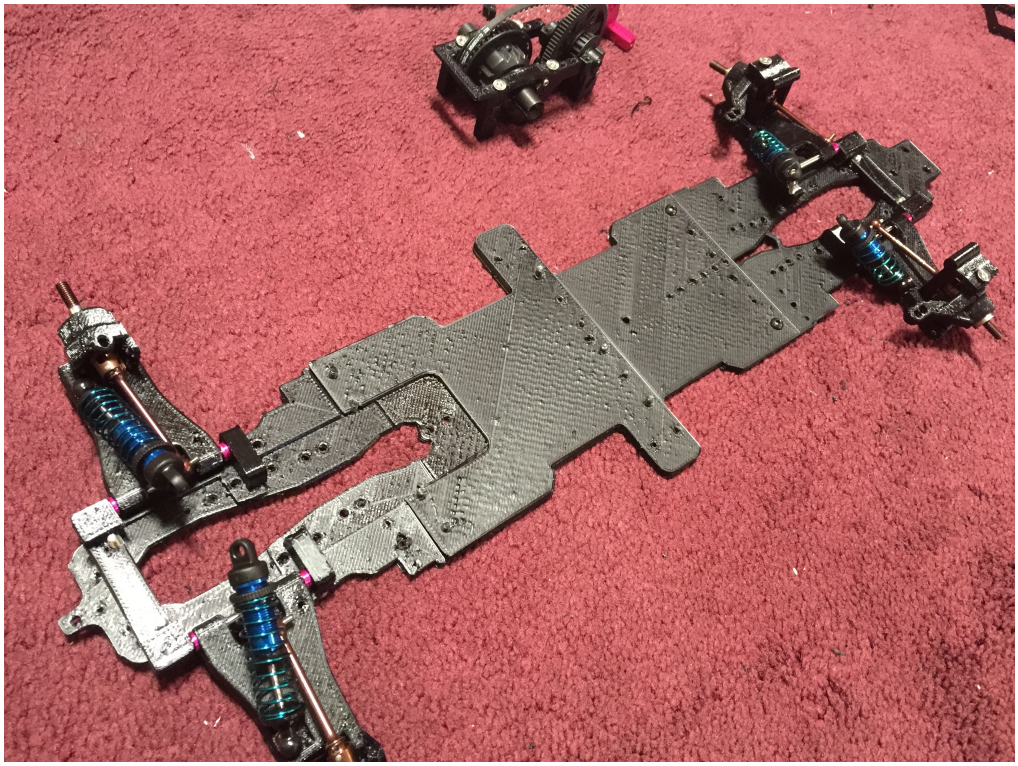
33. Bolt the rear mounts to the chassis with an m3x10 flat screw.



34. Switch to the rear suspension arm. Place an m3 x 6 x 2.0 on to side facing the front of chassis, and a m3 x 6 x 1.0 spacer on the side facing the rear of the chassis.

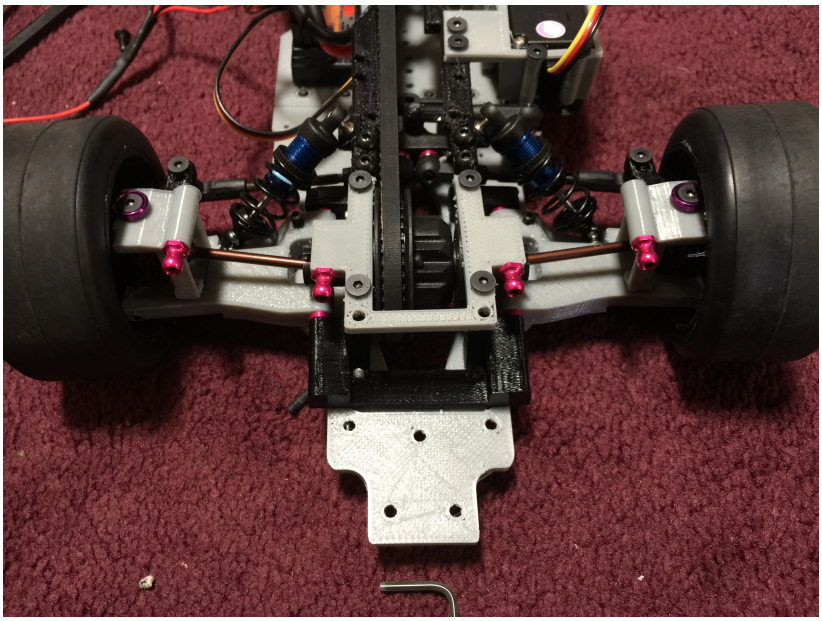
35. Install the suspension rear mount (+8.4)(right) suspension rear mount (+8.4)(left) on to the outer pin and press on.

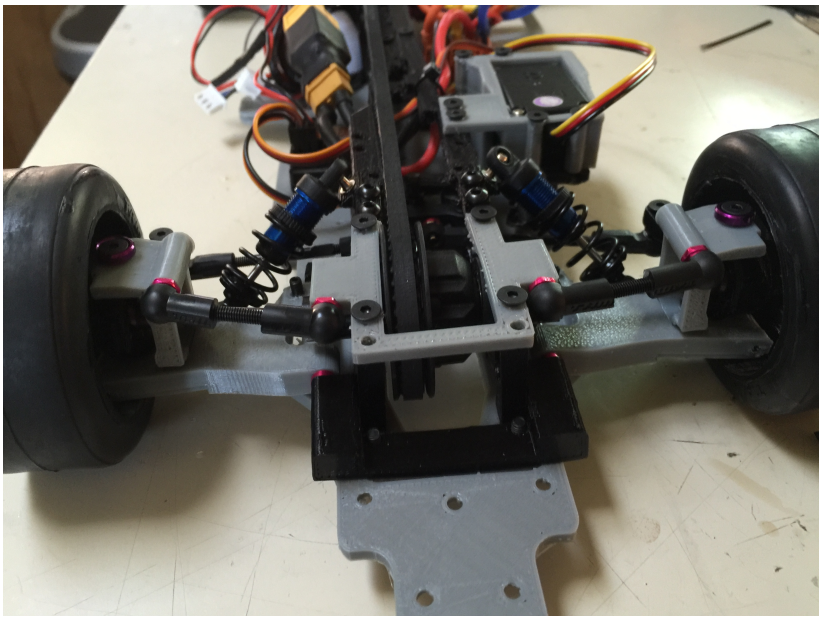
36. Affix the suspension rear mount (+8.4)(right) suspension rear mount (+8.4)(left) to the chassis with m3x10 flat screws.



37. Both arms assembly installed in the car.

Plastic / Metal Parts:





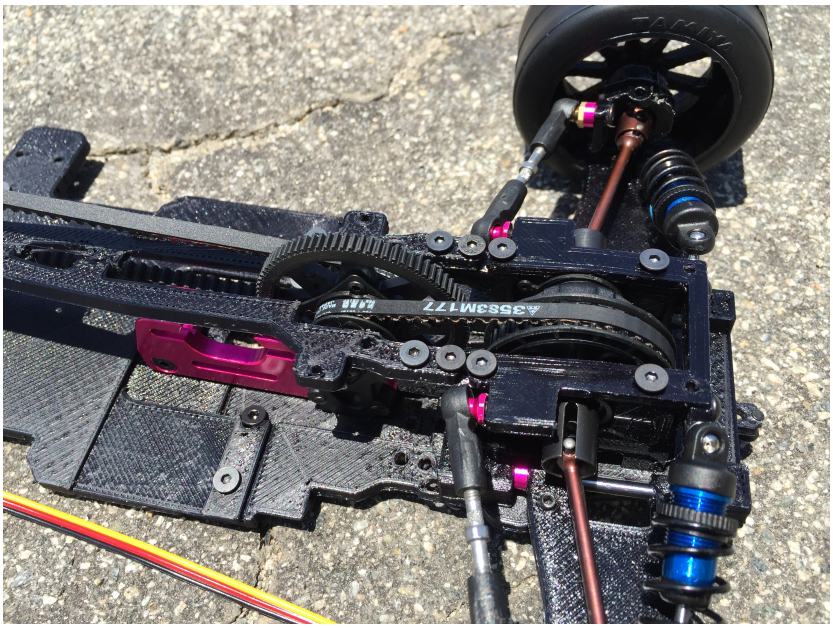
m3 x 16 set screw
(4) ball sockets
(8) 4.8mm ball studs (3Racing 3RAC-BS48H5/PK)

*rear upper arms can use 4.8mm ball studs or ball nuts… front could use 4-4.8mm ball studs.

TO SNAP UPPER SUSPENSION ARMS ONTO BALL STUDS, USE PLIERS TO AVOID BREAKING ANY PARTS.

1. Insert (2) 4.8mm ball studs into the front base plate, so that they are pointing towards the front of the car.
2. Insert (2) 4.8mm ball studs into the rear base plate so that they are also aiming towards the front of the car.
3. Create your front Upper Suspension Arms by screwing in two ball cups onto a m3 x 16 set screw.
4. Attach the arm to the front suspension assembly by snapping it on to the ball nuts on the C-hub and the front base plate.
5. Assembly the rear upper suspension arms by repeating the step with the m3 x 32mm turnbuckle. Remember it is a turnbuckle, so one with screw on by reversing the rotation.
6. Attach the rear upper suspension arm onto the rear assembly by snapping it on the ball studs on the rear knuckle and rear base plate.
7. Adjust the lengths until you have the desired camber (wheel tilt) that you desire. If you need to take an arm off wedge it off with an allen wrench, by positioning it on the base plates and levering the ball cup off of the ball stud.

4. DRIVETRAIN



Printed Parts:

(4 total) Bulk heads (Left and Right)
Base Plate (Front)
Base Plate (Rear)
Rear shock tower
(2) Bearing Holder
Att

Plastic Parts:

Bearing Holder
Assembled Differential(s) or One Way Axle

Metal parts:

(8) M3 x 8 flat screw
(4) m1.6 x 5 Socket Screw
(2 Aluminum M3 Countersink Washers (3Racing 3RAC-WC3/PK)

Bearing:

(4) M10 x 15 x 4

Belt:

Small belt :

3Racing Low Friction Rear Belt 177 (Bando Belt) [SAK-X09]

Long belt:

3mm pitch (GT2), 210 teeth, 6mm wide Single Sided Neoprene Belt with Fiberglass Cords.

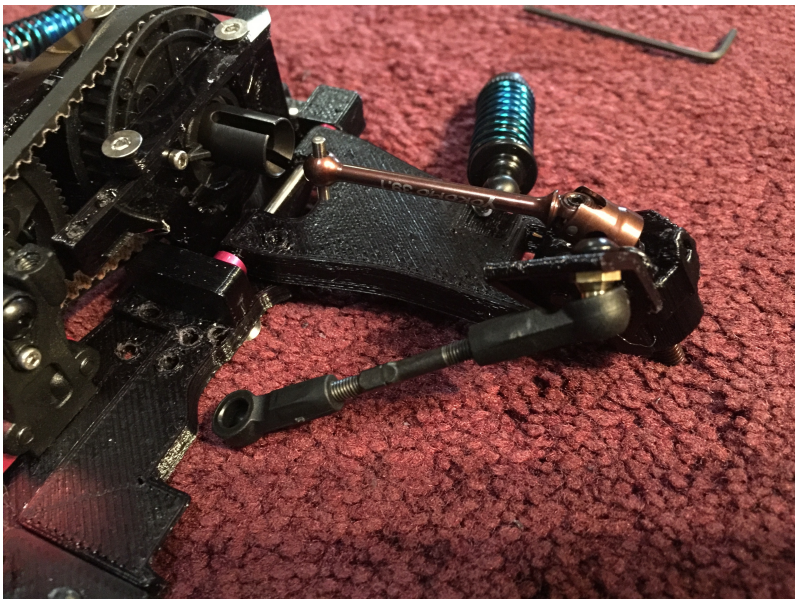
(A 6R53M21060 from sdp-si.com)

Front Differneital

1. Slide an M10 x 15 x 4 bearing onto either side of the differential outer joint.
2. Slide the bearing holder onto the bearing.
3. Place the long belt on the differential (or solid axle)
4. Place the Differential into the bulkhead. The front axle or differential should have the gear on the righthand side of the car. **The bulkhead should have the recessed area pointing inwards towards the differential or straight axle.**
5. Turn the bearing holder so that arrow points toward the top hole on the bulkhead.
6. Screw in the differential into the bulkheads with the m1.6 x 5 socket screw.
7. Place the base plate (front) on top of the front bulkhead assembly and screw it in with four m3 x 8 flat screws.
8. screw the front bulkhead assembly onto the chassis using four m3 x8 flat screws. The bulkhead assembly should be positioned with the base plate bar aiming towards the front of the chassis.
9. Insert the universal shafts into the differential.

Rear Differential

1. Slide an M10 x 15 x 4 bearing onto either side of the differential outer joint.
2. Slide the bearing holder onto the bearing.
3. Place the short belt on the differential
4. Place the Differential into the bulkhead. The front axle or differential should have the gear on the righthand side of the car. **The bulkhead should have the recessed area pointing inwards towards the differential or straight axle.**
5. Turn the bearing holder so that arrow points toward the top hole on the bulkhead.
6. Screw in the differential into the bulkheads with the m1.6 x 5 socket screw.
7. Place the base plate (rear) on top of the front bulkhead assembly and screw it in with four m3 x 8 flat screws.
8. screw the front bulkhead assembly onto the chassis using four m3 x8 flat screws. The bulkhead assembly should be positioned with the base plate bar aiming towards the front of the chassis.
9. Place two 3Racing FGX F1 4mm ball studs into the rear shock tower. One on either slanted side.
10. Screw the rear shock tower into the rear bolt head with two m3 x 8 flat screws with (2) m3 countersink washers.
11. Attach the rear bulkhead to the chassis with four m3 x 8 flat screws.
12. Insert the universal shafts into the differential.
13. Attach the rear shocks upper ball socket to the 3mm ball studs on the rear shock tower.



Steering System

Printed Parts:

Steering Arm (right)
Steering Arm (Left)
Steering link holder
Steering link

Plastic / Metal Parts:

(m8 x 10.5) Steering Post for Sakura XI Sport [3Racing (SAK-XS111)
m3 x 0.2 shim spacer
m5 x 0.2 shim spacer
m3 x 6 x 1.0 spacer (3Racing-WF310/PK)
(3) 4.8mm ball stud
m3 x 8 Flat Screw
m3 x 6 button screw

The steering system can be purchased if you want a metal or plastic alternative.

7075 Aluminum Steering System for 3Racing Sakura Ultimate/ XI Sport (SAK-U113/PK)

or

Aluminum Steering System for 3Racing Sakura Ultimate/ XI Sport (SAK-U113/P_V2)

or

Plastic Motor Mount and Steering System for Sakura XI Sport (SAK-XS101)

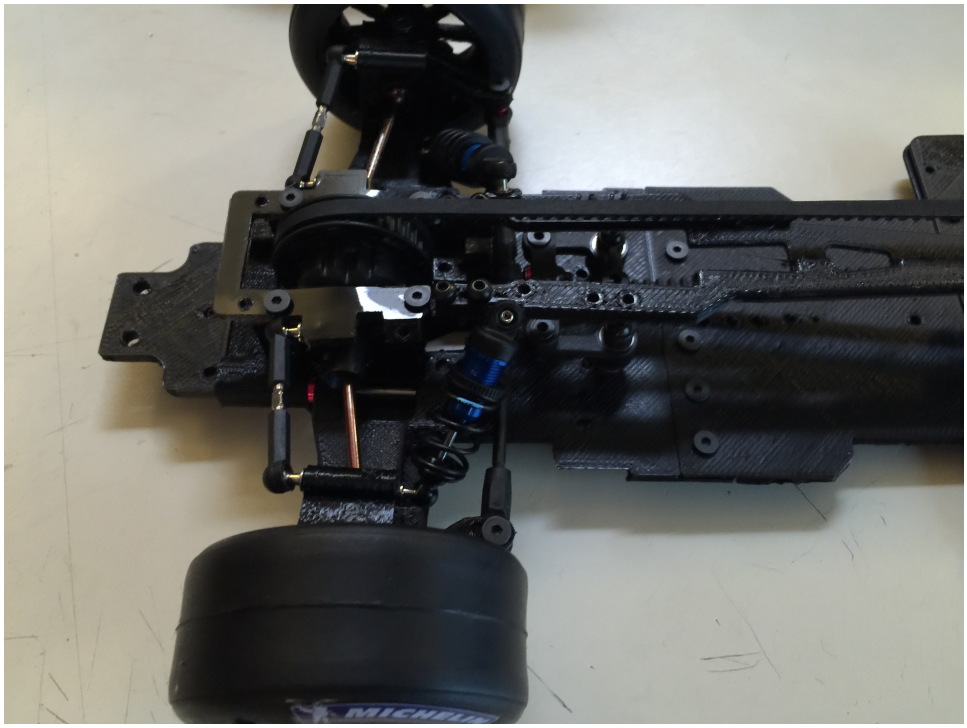
Bearings:

(4) m5 x 8 x2.5
(2) m3 x 6 x 2.5

1. Insert (2) m5 x 8 x2.5 bearings into the Steering Arms, one on the top and one on the bottom.
2. place the m8 x 10.5 steering post into the bottom of the steering arm.
3. Place a m5 x 0.2 shim spacer on top of the bearing on the top steering arms.
4. Place the Steering Link Holder on top and screw it in with (2) m3x6 button screw.
5. Switch to the Steering Link and insert two m3 x 6 x 2.5 bearings into the bearing mounts.
6. Screw in two 4.8mm Ball Studs into the Steering Link with (2) m3 x 6 x1.0 spacers.

7. Install one 4.8mm ball stud on the horizontal hole on top of the Steering Link.
8. Place a m3 x 6 x 0.2 shim spacer on the front holes on both of the Steering Arms.
9. Screw the Steering Linkage to the Steering Arms with (2) m3 x 8 Flat Screws.
10. Attach two 4.8mm hex Ball Studs into the Front Knuckles, screwing them in with an m3 x8 flat screw. The Ball studs should be aimed down.

Once assembled, Place the Steering System into the chassis with the long held traveling UNDER the Steering System.



Center Gear Adaptor

Plastic or Metal Parts:

Spur Gear 48 Pitch - 85T
(2) M5 x 8 x 2.5
19T / Plastic Gear Adaptor (3Racing SAK-XS103)
or
7075 Aluminum Gear Adaptor With 19T Aluminum Pulley and Shaft (3Racing SAK-XS304)

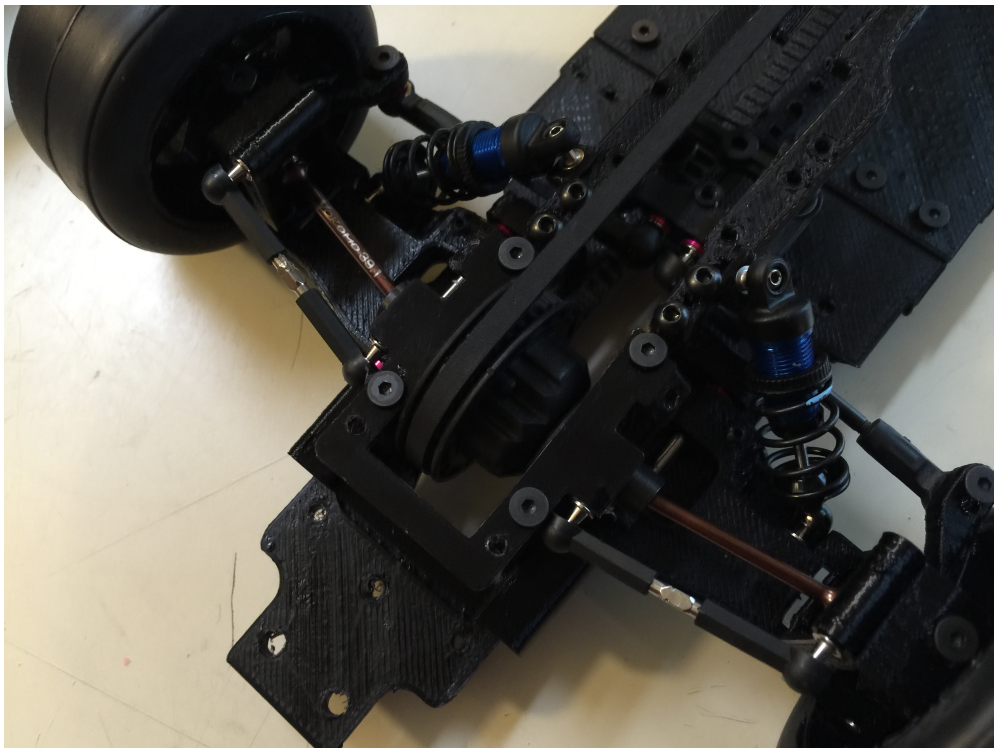
(4) M2 x 5 Flat Screw

Assemble by pressing in an m2 x 5 bearing into each of the Center Pulley/Gear Adaptors. Then placing both Gear adaptor on either side of the Spur Gear. Place the Gear Adaptors on either side of the Spur Gear, line up the holes and then screw in (2) M2 x 5 Flat Screws on either side.

Motor Mount

Printed Parts:

Motor Mount
Motor Mount Arm
Gear Mount (Right)
Gear Mount (Left)
(2) Spur Gear Holder



Plastic / Metal Parts:

(2) M3 x 6 Button Screw
M5 x 25 Post
(2) M5 x 0.2 Shim Spacer
(2) M1.6 x 5 Socket Screw
Alternative parts:

Plastic Motor Mount and Steering System for Sakura XI Sport (SAK-XS101)

Aluminum Motor Plate For Sakura XI Sport (SAK-XS109 / PK)

or

7075 Aluminum Motor Mount (SAK-XS303 / PK)

Battery Holder Plastic Replacement (for Spur Gear Holders) [SAK-U106]

1. Slide the M5 x 25 post into the Spur Gear.
2. Attach a M5 x 0.2 shim on either side of the shaft.
3. Attach a Spur Gear Holder to either side of the shaft and attach it by screwing in an m3 x 6 screw on either side of the shaft.
4. Attach the Gear Mounts to the chassis with m3 x 8 flat screws.
5. Attach the motor mount to the Left Gear Mount and to the Motor Mount Arm. Screw them in with m3 x 6 set screws, and attach it to the chassis with m3 x 8 flat screws.
6. Slide the long belt over the 19T gear mount on one side and the short belt on the other 19T gear mount.
7. Slide the Spur Gear Assembly down into the Gear Mounts.

8. Screw the Assembly into the Gear Mount with two M1.6 x 5 Socket Screws.

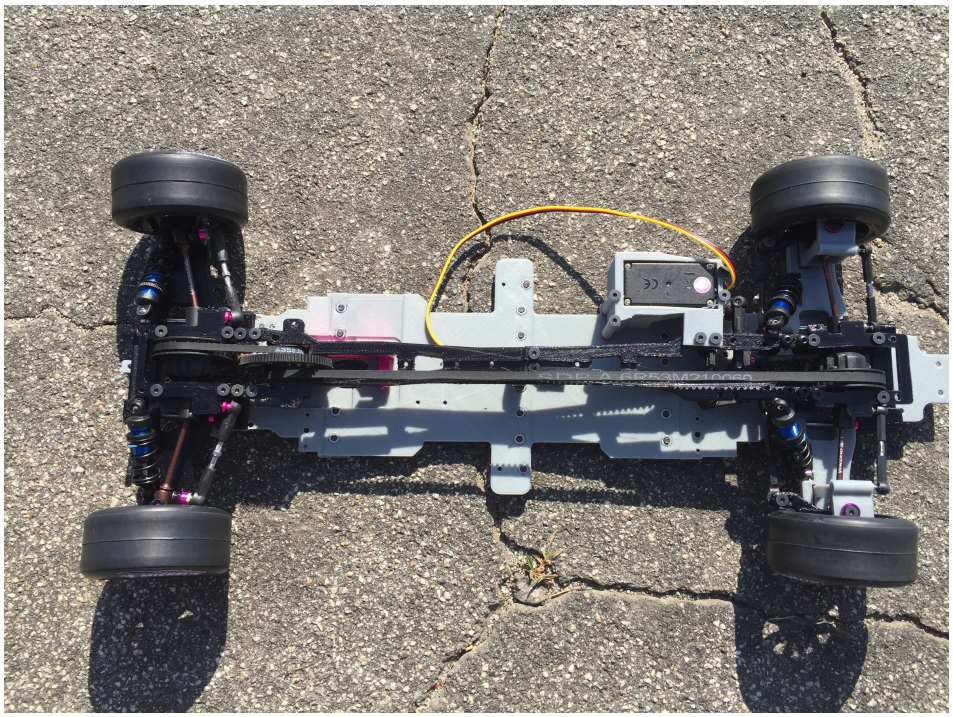
Upper Deck

Printed Parts:

Upper Deck (front)
Upper Deck (rear)

Metal Parts:

(10) M3 x 8 Flat Screw
(2) M3 flat nuts
3Racing FGX F1 4mm ball stud M3 x 5 4 pcs (FGX-123)



1. Connect both the Upper Deck sections together with two m3 x 8 Flat screws, and tightening them with a nut on each screw.
2. Slide the Upper Deck into the long belt so that the belt with pass over the Upper Deck, and set it on the bulkheads.
3. Attach the Upper Deck to the chassis by attaching the front to the bulkhead and screwing it in with (4) m3 x 8 flat screws, and (4) screws attaching the upper deck to the rear bulkhead.

4. Screw in 4mm ball stud into the shock tower mounts on the front Upper Deck.
5. Attach the Front Shocks top mount to those 4mm ball studs.

Belt Tensioner

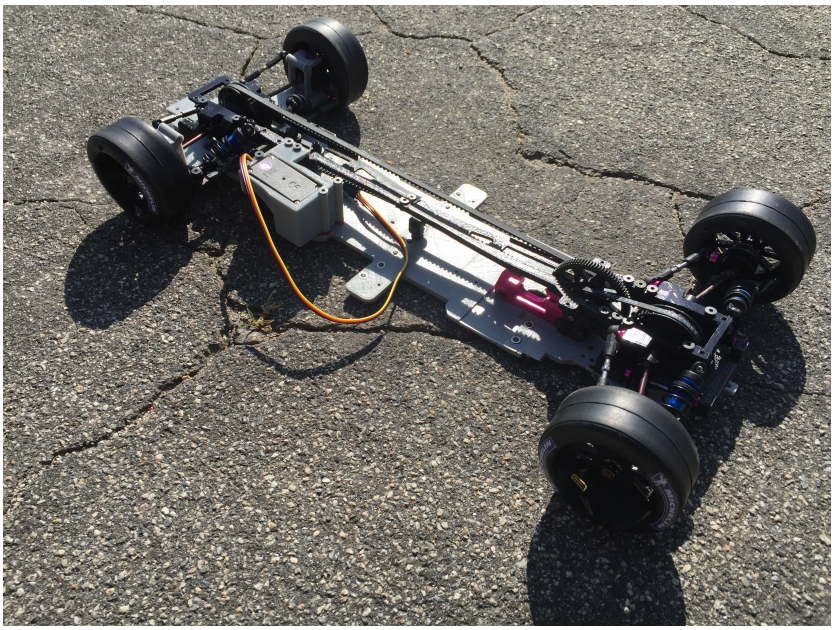
Parts:

Belt Tensioner 3Racing SAK-58/BL

there are many different Belt Tensioners that can work.

1. Assemble the Belt tensioner as per the instructions, and install it into the chassis on the bottom. It should be located where the center chassis sections meet.

Servo and Servo Mount



Printed Parts:

Servo Mount
Servo Mount Top

Plastic / Metal Parts:

Hitec HS-77BB Low Profile Servo
Servo Arm (you can use a long servo 1.5-2” arm I used a servo arm and then made an extension with a piece of carbon)
(2) M3 x 16 flat screws
(10) M3 x 8 flat screw
(2) 2.0mm Aluminum M3 Flat Washer [3RAC-WF320/PK]
(4) 4.8mm ball stud (3RAC-SD48H5/pk)
(1) m3 x 12 bolt
(1) m3 x 3 aluminum washer [3RAC-WF330/PK]
(2) 4.8mm plastic ball cups
(1) m3 x 16 set screw

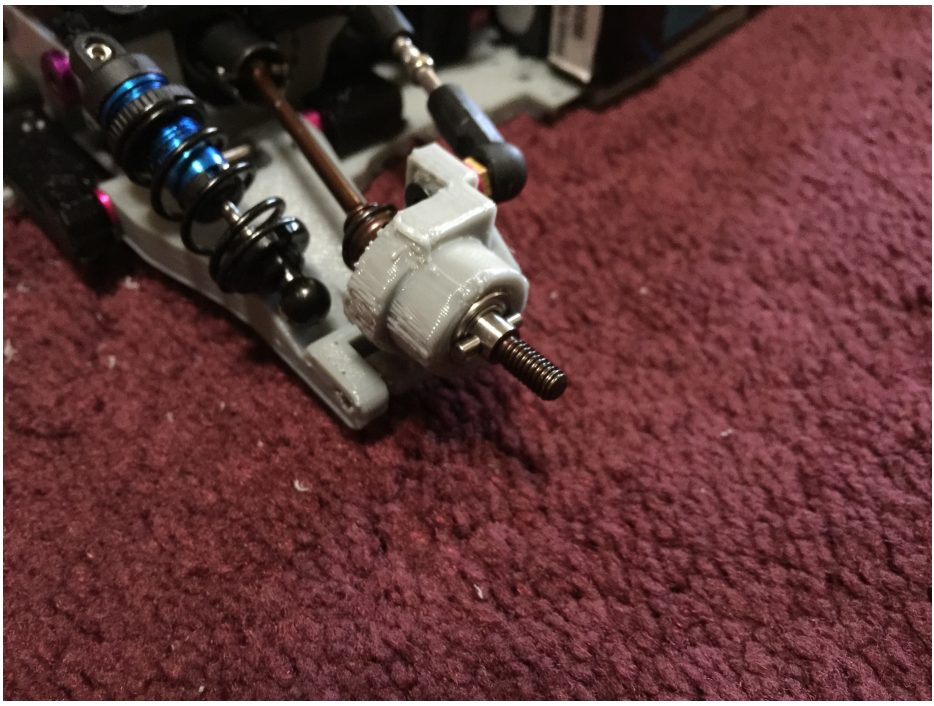
1. Cut off the rear servo bolt mounts on the rear of the servo. The mounts opposite to the wire, and servo arm.
2. Screw the m3 x 12 bolt down through the top of the servo arm so that it pokes out the bottom. (remember, the servo will be mound upside down)
3. Slide on the m3 x 3 aluminum washer, and screw on the 4.8mm ball stud.
4. Install the servo arm onto the servo
5. Slide the servo assembly into the servo mount.
6. Screw the servo into the mount with (2) m3 x 8 flat screws.
7. Attach the Servo top onto the servo mount and screw in with (6) m3 x 8 flat screws. Two screws go though the servo mount and attach it to the upper deck.
8. tap the 4.8mm plastic ball cups with an m3 x 1.0 tap, and screw in the m3 x 16 set screw into one ball cup.
9. attach one ball cup on to the 4.8mm ball stud on the servo, and the other onto the ball stud that is on the steering system.
10. Plug the servo wire into the first slot of your receiver, and plug in the esc. Turn it on and adjust the servo arm making sure that it is aimed straight. Adjust the servo arm if it is not. Adjust the steering linkage so that the wheels are aimed straight in the neutral position by unscrewing one side of the plastic ball cups to lengthen or tighten to shorten. Once you have the position correct, attach the steering linkage to the servo arm so that the steering linkage connects the servo arm to the steering system.

Rims and Tires

Printed Parts:

(4) Rims

Plastic or Metal Parts:



This car uses Tamiya F104 Front Rubber Tires. There are many compounds from different makers. I used Tamiya 51399 Rubber Tires.

CA Tire glue (smells just like super glue… I believe it is just that—high priced super glue.)

(2)M2 x 10 shaft Pin (VBC Racing B-02-VBC-0020)

(4) Wheel adaptor (3Racing 3RAC-WX124/PK)

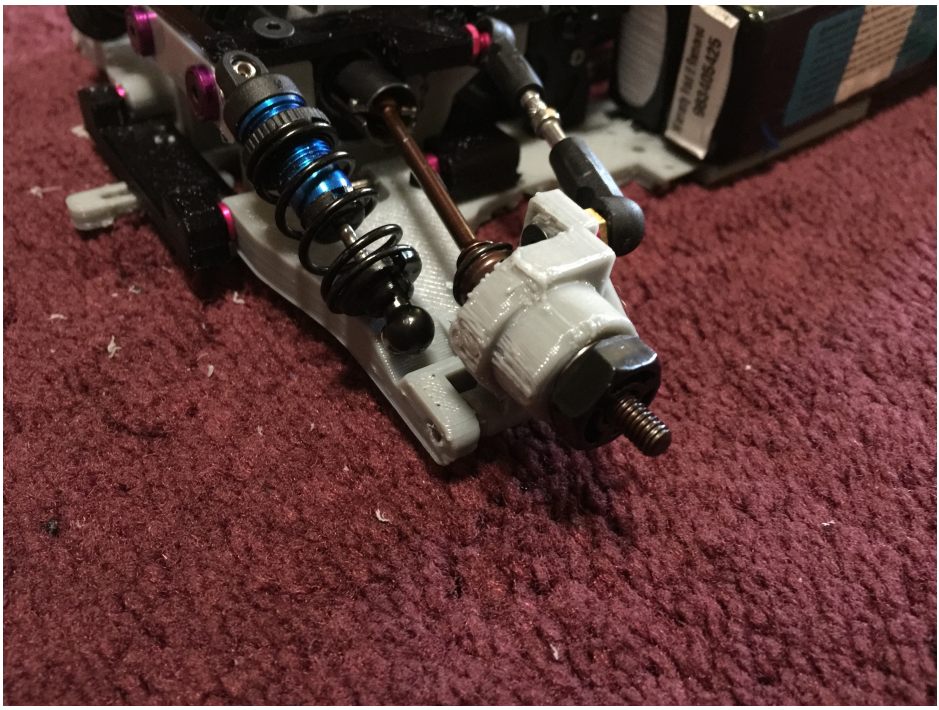
(4) 4mm Aluminum Locknut (Tuning Haus TUH1066)

1. Slip in M2 x 10 shaft pin into the universal joint.
2. Slide a wheel adaptor over the pin. Make sure the pin slides into the grooves of the wheel adaptor.
3. Repeat on every universal joint.

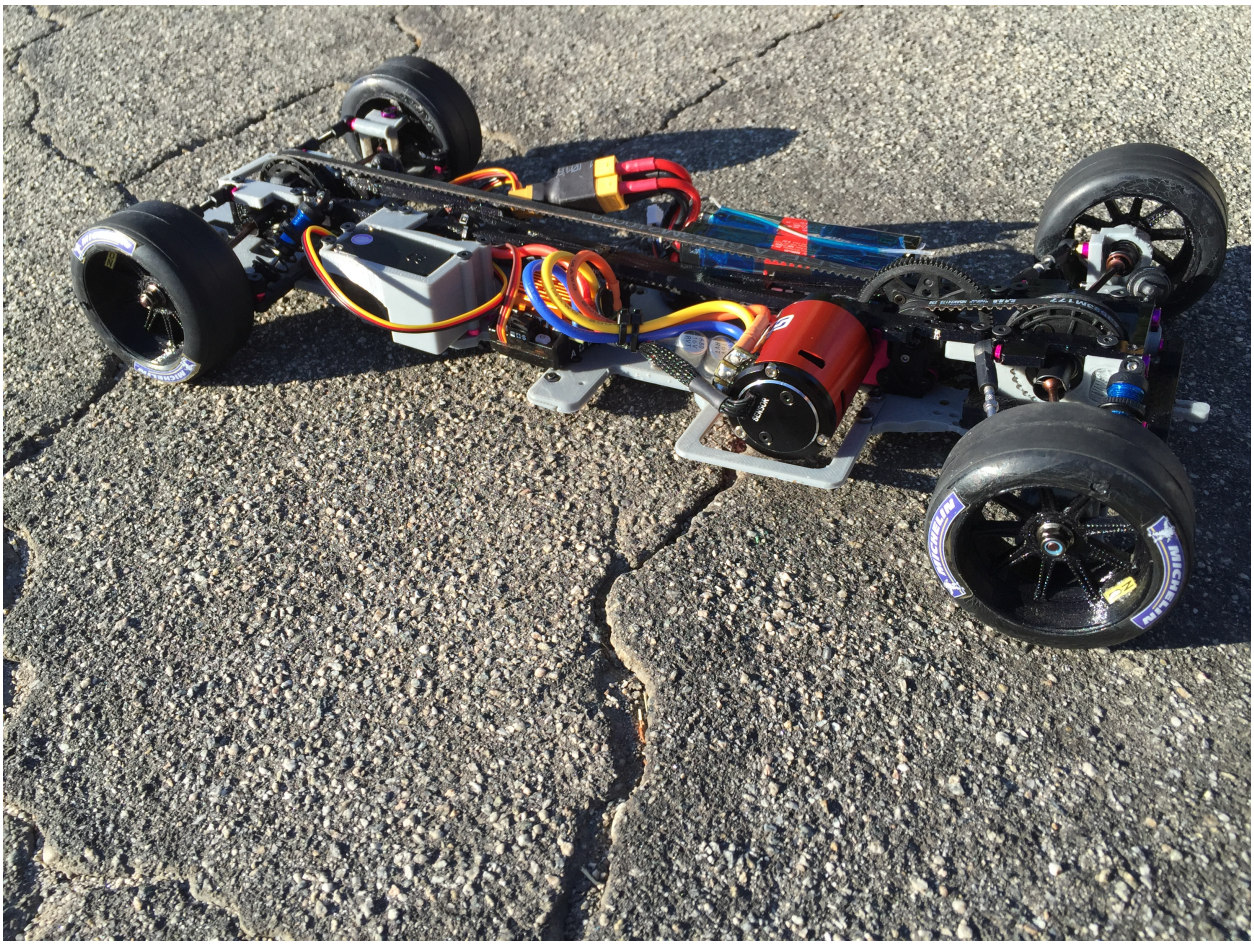
Prepare the tires

1. Slide the tires and foam onto the rims.
2. Readjust the tire foam with your hand to make sure that the tire sets squarely on the rim.
3. work the bead of tire on the rim so that it sits on the rim's edge
4. Take the CA glue or superglue (with gloves), pull the tire back lightly and insert the tip into the gap.

5. Let the glue pour out. It will travel down along 1/3 of the rim. Go around the rim repeating this method until the tire is glued to the rim.
6. Repeat on the opposite side of the rim, working in thirds.
7. Once all rims are glued, attach them to the chassis, affixing a 4mm lock nut on each side.



Motor and Electronics



Battery:

This chassis has a lot of room for a variety of batteries types. I use two 2000mah batteries that are run in parallel with an adaptor. It can run batteries up to 158mm long.

Motor and ESC:

Any size can be used.

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