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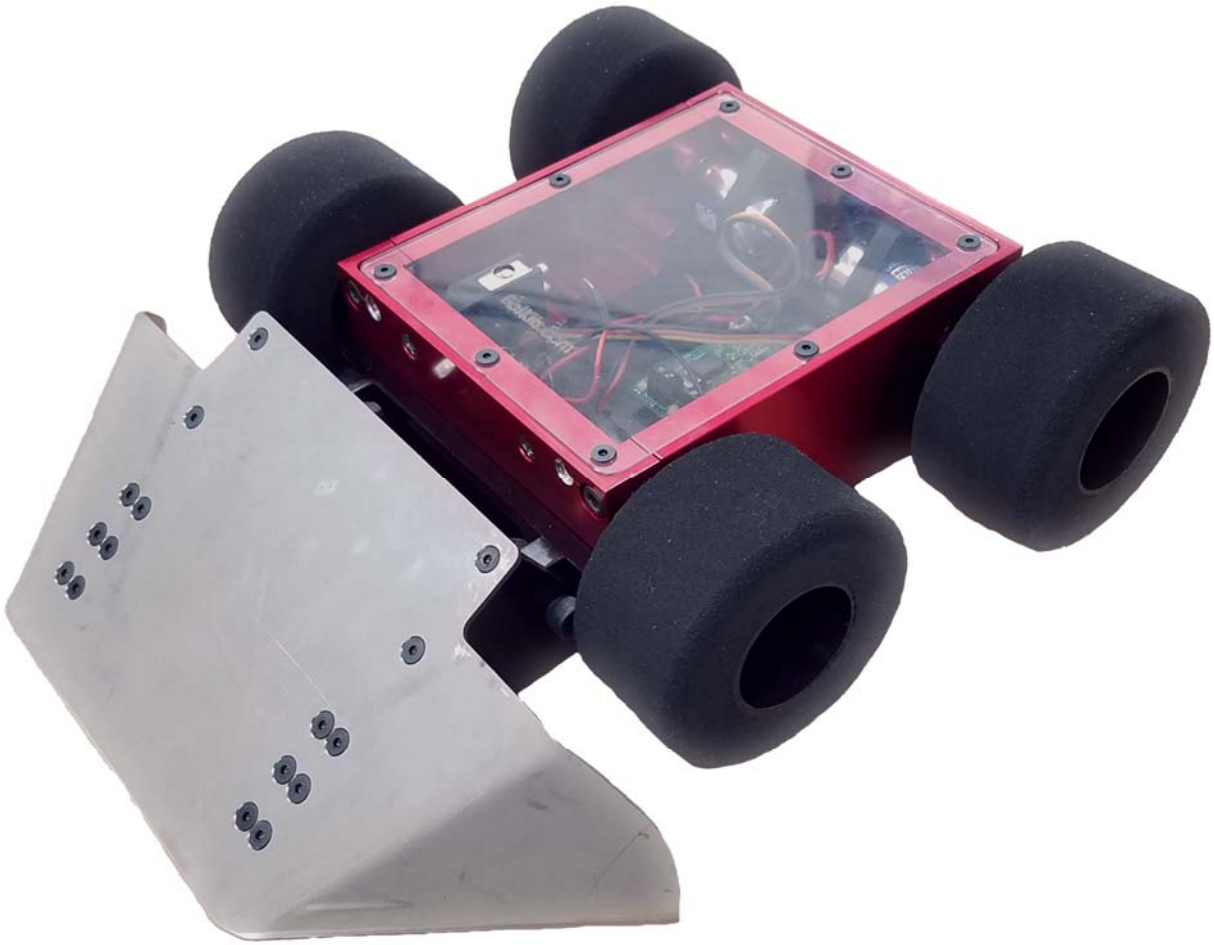
D2 Combat Robot Chassis Kit Instructions



Parts included in kit:

Part	Count
D2-Side	2
D2-End	2
D2-Bottom	1
D2-Top	1
D2-WedgeTi	1
D2-WedgeBracket-L	1
D2-WedgeBracket-R	1
D2-WedgeMount	1
D2 Carbon Fiber Reinforced Motor Brace (3) & Switch Mount (1)	1
M3 x 6mm Flat Head Screws (Top & Bottom - pack of 20)	1
10-24 x 3/4" Socket Head Screws (Ends - pack of 8)	1
RP-01-005-Kit Axle Adapter Kit	4
#6 x 5/8" Sheet Metal Screws (Motor braces - pack of 8)	1
M3 x 10mm Flat Head Screws (Wedge - pack of 20)	1
1/4-20 x 3/4" Socket Head Screws (Wedge - pack of 2)	1
1/4-20 x 7/8" Socket Head Screws (Wedge - pack of 2)	1
1/4-20 Lock Nuts (Wedge - pack of 2)	1
RP-GM-22-12V780 DC Gear Motor	4
Soft Foam Wheel, 2.75" OD x 1.5" wide	4
Mini Power Switch & Hex wrench (pack)	1
LED Power Indicator Light	1
4" Velcro Strip	1
D2 Wire set 6" (5 Red & 5 Black)	1
Hex wrench (2mm)	1

Additional Parts Required:

- Speed control (we recommend the Robot Power Scorpion Mini available in our store)
- Radio (we prefer the Spektrum DX5C)
- Battery (we prefer the Turnigy Graphene 500mAh 4S 65C Lipo Pack)
- Battery plug for the primary leads plug on your selected battery
- Foam sheet or bubble wrap to secure battery
- Battery charger appropriate for your selected battery
- Medium strength (e.g., blue) thread locker (e.g., Loctite) for certain fasteners (see "Extra Tips" below).

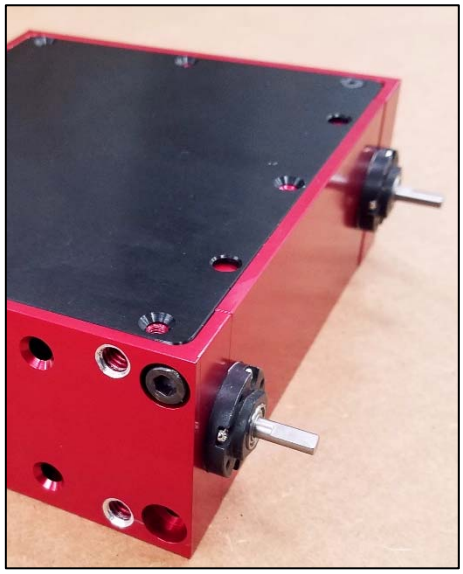
Tools Required:

- Standard hex wrenches
- Cross head screwdriver
- 7/16" open end or adjustable wrench
- Wire stripper
- Soldering iron and solder (60/40 rosin core type recommended)

CAUTION: THIS ROBOT IS POWERFUL AND FAST! MAKE SURE YOU ONLY OPERATE THE ROBOT IN AN AREA WHERE IT CAN NOT CAUSE DAMAGE OR INJURY!

Assembly:

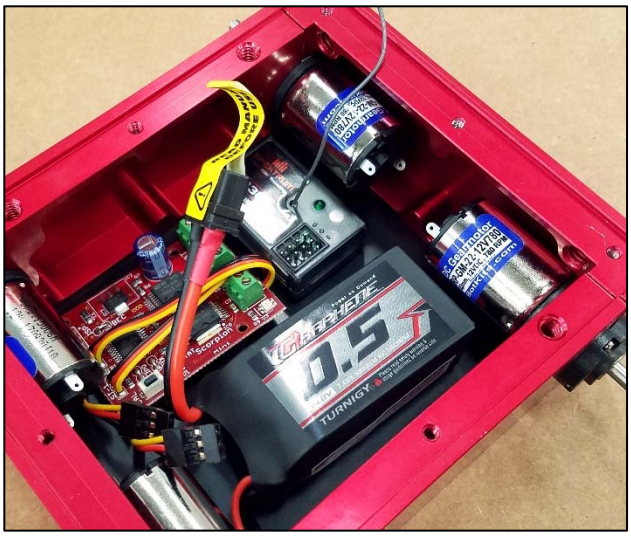
Step 1 – Temporary Assembly:



Form the basic chassis by assembling the 2 sides, 2 ends, 4 motors, and bottom plate:

1. Use 4 of the 10-24 x 0.75 socket head cap screws in the lower holes on each end to *very loosely* (e.g. floppily) connect the ends to the sides. There is no up/down/left/right. All the sides and ends can be used in any position (the large hollowed out areas go towards the insides).
2. Slide the motors into the motor bores until just the black head of the motor (where the shaft comes out) is extending beyond the side of the robot.
3. Snug (e.g., finger tight) the 4 screws so the motors are temporarily held in place.
4. Attach the aluminum bottom plate to the chassis using 2 of the M3 x 6mm machine screws and the included hex wrench.

Step 2 – Arrange Electronics:

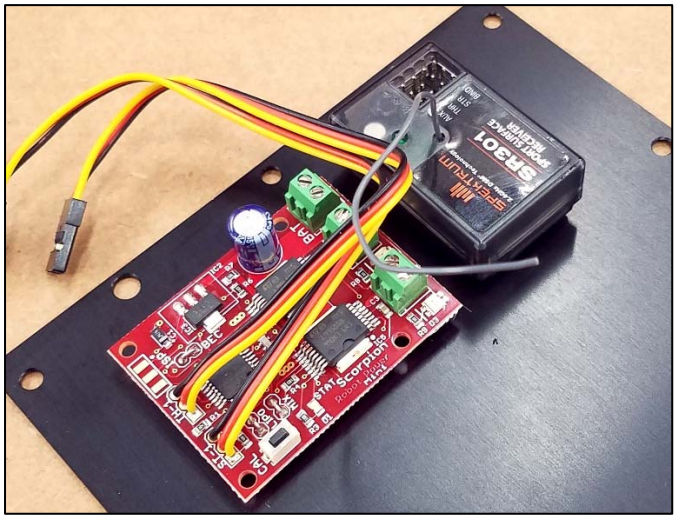


Arrange your battery, receiver, and speed controller on the bottom plate, as you expect to place them in the finished robot.

1. The battery is in there just to make sure sufficient room is being left for it.
2. Make sure there is sufficient clearance between everything and the motors, allowing for spacing up of the receiver and speed control when they are attached using the supplied Velcro or alternatively servo tape (etc.).
3. Mark the location of your receiver and speed controller on the bottom plate.

Step 3 – Attach Electronics:

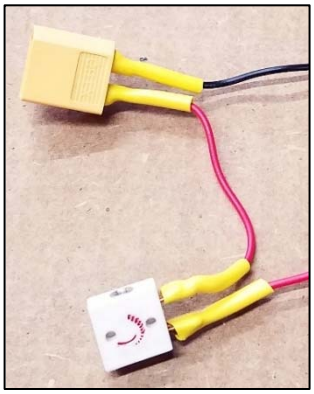
Remove the bottom plate and attach your receiver and speed controller using the included Velcro strips.



Step 4 – Wiring Preparation:

Determine wire lengths needed to connect your motors to your speed control and from the battery to the switch and speed control:

1. Loosely attach the bottom plate.
2. Measure from the motor solder lugs to the speed control lugs.
3. Place the battery in the chassis and determine wire lengths needed to connect to the power switch (positive lead) and the speed control (negative lead).
4. At the same time, trim the power LED leads to an appropriate length to connect to the power lugs on the speed control.



Step 5 – Wiring:

1. Disassemble the entire chassis.
2. Cut the included wires and LED wires to the lengths determined in the previous step.
3. Strip the ends of the wires.
4. Pre-tin the wire ends, switch lugs, and motor lugs.
   <u>IMPORTANT:</u> Do NOT use silver solder. Silver solder requires higher temperatures which will cause motor damage!
5. Carefully and quickly solder wire pairs to the motor lugs. Too much heat on the motor lugs will cause premature motor failure.
6. Solder main power positive wires to the power switch. Attach the other end to the positive terminal of an appropriate plug for your selected battery.
7. Solder main power negative wire to the negative terminal of the battery plug. Attach the other end to the speed control.

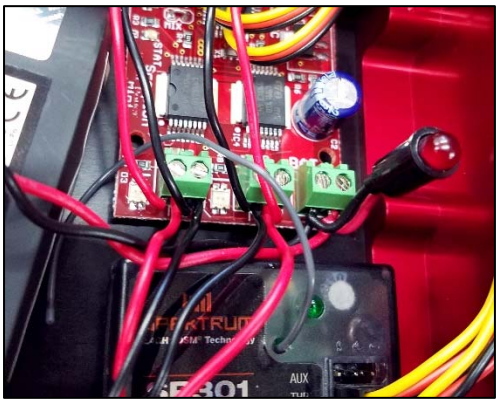
Step 6 – Assemble the robot:

1. Slip the carbon motor braces over the motor wires and on to the motor bodies.
2. Attach the carbon motor braces and motors with the included #6x5/8" sheet metal screws. Insert the motors, up to the heads, being sure to have the motors with the appropriate wire lengths in the correct locations. The motor brace with the added slot for the power switch should be in the rear-left position.

3. Snug the bottom screws, add the upper set of 10-24 machine screws, then tighten the upper screws. This will result in the lower screws becoming tight, as we achieve a compression fit around the motor gearbox.

4. Attach the lower plate, using 8 of the supplied M3 x 6mm machine screws.

5. Connect the motor leads to the speed control. Both wire sets from one side of the robot will attach to one of the speed control ports, and the other side to the other port. Note the polarity will be reversed, one side to the other.



6. Connect the main power leads and the power LED leads to the speed control power lugs.

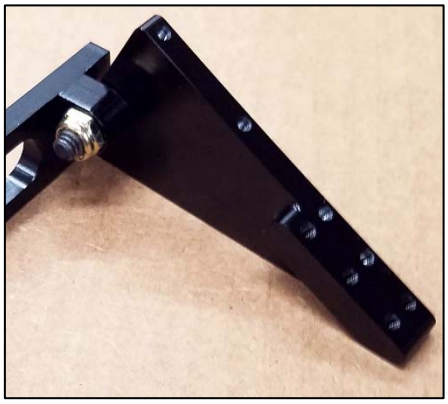
Step 7 – Attach wheels:

1. *Loosely* screw the supplied 4-40 machine screws into the axle clamp portion of the axle adapters.

2. Slide each axle adapter fully onto a motor shaft, with the clamp portion towards the chassis, and tighten the 4-40 machine screws to secure the adapters to the motor shafts.

3. Slide a wheel onto each of the axle adapters, and secure with the supplied 6-32 machine screws. Your 4-40 sized Allen wrench can be used to help align the holes in the wheel hub with the tapped holes in the axle adapters.

Step 8 – Attach titanium wedge:

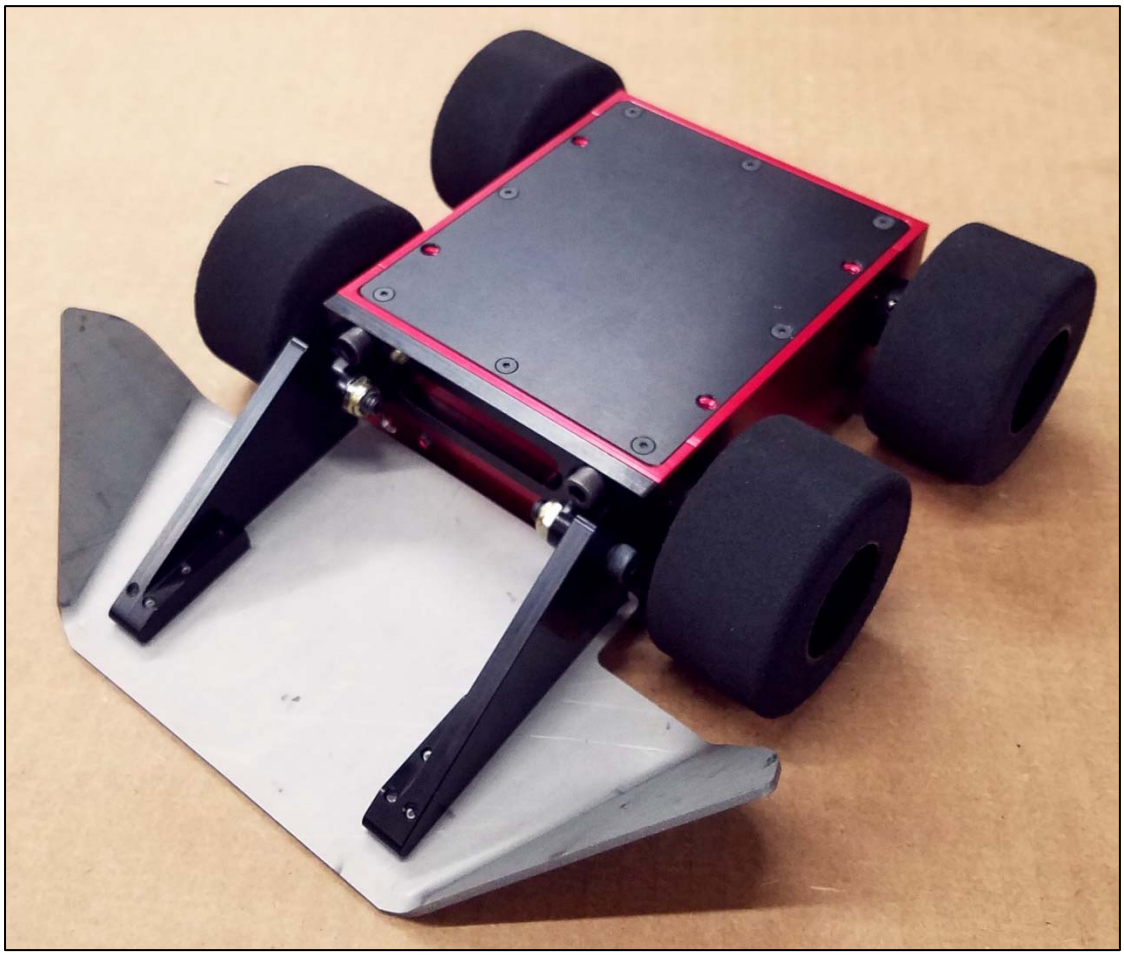


1. Finger tighten the two ¼-20 x 7/8" screws through wedge brackets through the mount on both sides. Make sure the appropriate side bracket is on the correct side. Leave screws somewhat loose to allow free movement and alignment with wedge.

2. Using a wrench, secure the two lock nuts on the inside of the screws. Tighten securely against wedge mount, but make sure brackets stay somewhat loose.

3. Attach the titanium wedge to the brackets with the sixteen M3 x 10mm flat head screws.

4. Connect the wedge to the D2 using the two ¼-20 x ¾" socket head cap screws.



Nice! You are basically done!

Step 9 – Power on test:

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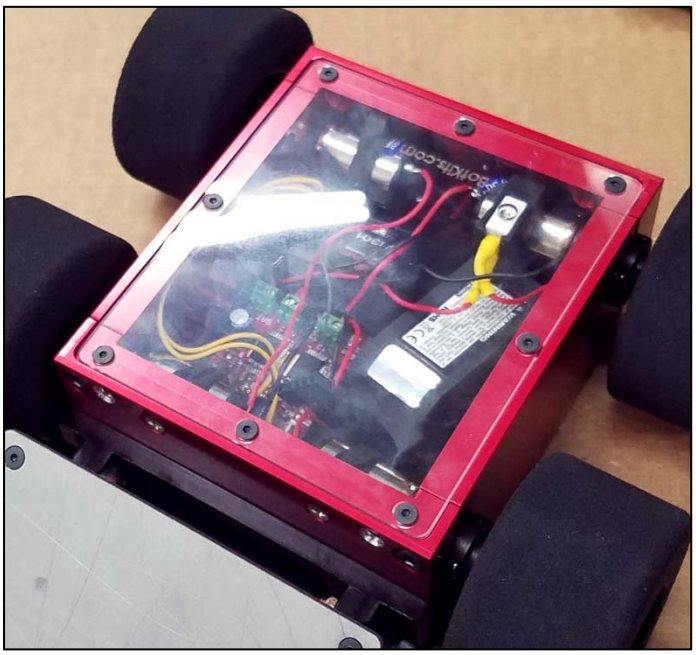
1. Make sure the robot power switch is off.
2. Attach the battery and secure it in the chassis by wrapping it with an appropriate amount of foam sheet or bubble wrap to take up excess space in the chassis around the battery.
3. If you have not yet bound your radio to the receiver, do that now, following the instructions provided with your radio.



4. Attach the clear plastic top cover using the 8 supplied M3 x 6mm machine screws. The plastic top will allow your radio to reach the receiver without having the antenna outside of the robot. Make sure the mini power switch aligns with the hole in the plastic cover.
5. Turn on your radio and the robot, and test movement. There is no front or back on the robot until you attach a weapon. If you have a preferred front, and the robot is going backwards to the input you give on the radio, power down the robot and reverse the motor power leads on the speed control.

Extra Tips:

Use blue (medium strength) thread locker on certain fasteners:

There are some screws that benefit from use of thread locker (e.g., Loctite). These include:

1. M3x10 screws used to attach the wedge to the wedge brackets
2. M3x6 screws used to attach the bottom cover (top cover screws aren't as likely to loosen since they are tightened against the plastic top).
3. ¼-20 x ¾" screws used to attach the wedge (or Wolverine attachment) to the chassis.

Calibrate the Scorpion Mini:

If you are using a Scorpion Mini with your D2 kit, make sure you follow the calibration procedures included with the Scorpion Mini. During the calibration procedure, make sure you sweep your radio controls throughout the full range of motion (the Scorpion Mini instructions are a bit unclear about this).

Grind the lower edge of the wedge:

Takes time, but will help your wedge get under other bots more easily. Belt sander is the easiest way to do this. Always use a dust mask and safety glasses when grinding!

Reduce the turning speed of your D2:

Speed forward and reverse is great for combat matches but reducing the turn power (in your radio) will make driving easier, enabling more precise turns.

Swap a motor:

You do not have to fully disassemble the robot to change a motor:

1. Remove the top cover
2. Disconnect the leads from the speed control for the affected motor.
3. Loosen the M3 x 6mm screws on the bottom that screw into the end with the bad motor
4. Loosen the 10-24 screws on the end with the bad motor.
5. Slide out the bad motor
6. Move the leads to a good motor, slide it back in, tighten up, attach the axle adapter and wheel, and you are ready to go!