

Traxster™ II Assembly Manual



February 1, 2008

Version 1.0

Inventory

Please use the list and images below to ensure your Traxster II Robot Kit contains a complete set of parts. Quantities are in parenthesis. If you find any missing parts, please contact us at sales@roboticsconnection.com to request missing parts. We have put systems in place to ensure that our kits are shipped complete, but we are human, and err from time to time.

Chassis / DriveTrain:

- Orange Traxster Chassis (1)
- Gray Traxster Belly Pan (1)
- Black Steel Drive Disks (8)
- Rear Aluminum Axles (2)
- Front Aluminum Drive Hubs (2)
- Rear Aluminum Idler Hubs (2)
- DC Motors & Quadrature Encoders (2)
- ABS Drive Tracks & Pins (Pack of 76 Links and pins)
- Wiring Harness (1)

Stainless Bolts/Nuts:

The Traxster kit comes with the bolts and parts pre-bagged. Each bag contains parts used in specific assembly steps.

- M3 x.5 x 6mm Pan Head Phillips Screws (4)
- #6 Flat Washers (2)
- #4 Flat Washers (4)
- 10-32 Set Screws (2)
- 6-32 x 5/8" Socket Head Cap Screws (16)
- 6-32 Nuts (16)
- 1" Aluminum Hex Male/Female Standoffs (4)
- 1/4" Aluminum Hex Male/Female Standoffs(8)
- 4-40 Stainless Nuts (12)
- 4-40 Stainless Nylock Nuts (4)
- 4-40 x 1/4" Pan Head Phillips Screws(8)
- 4-40 x 3/8" Flat Head Phillips Screws (4)
- 4-40 x 3/8" Pan Head Phillips Screws (6)
- 4-40 x 1/8 Pan Head Phillips Screws(2)
- Velcro Battery Tie Straps (2)

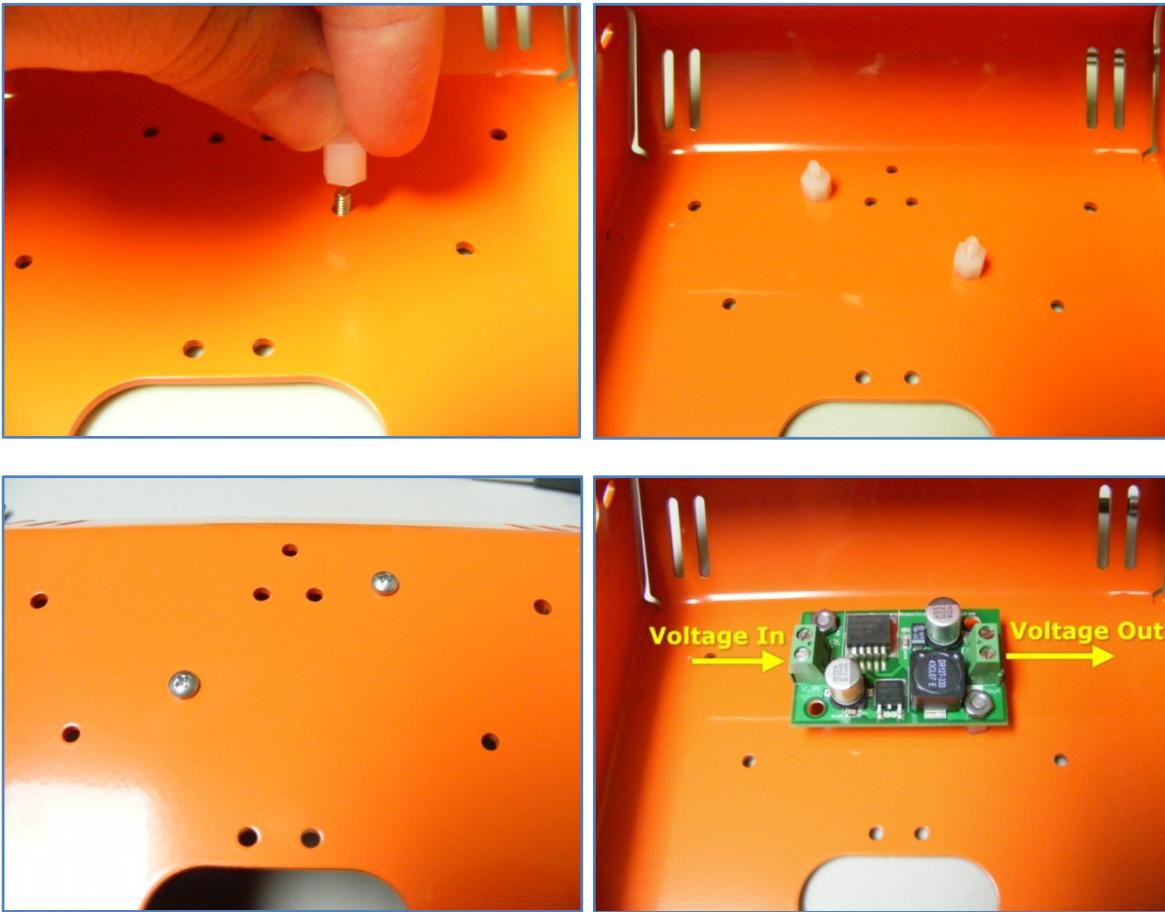


Tools:

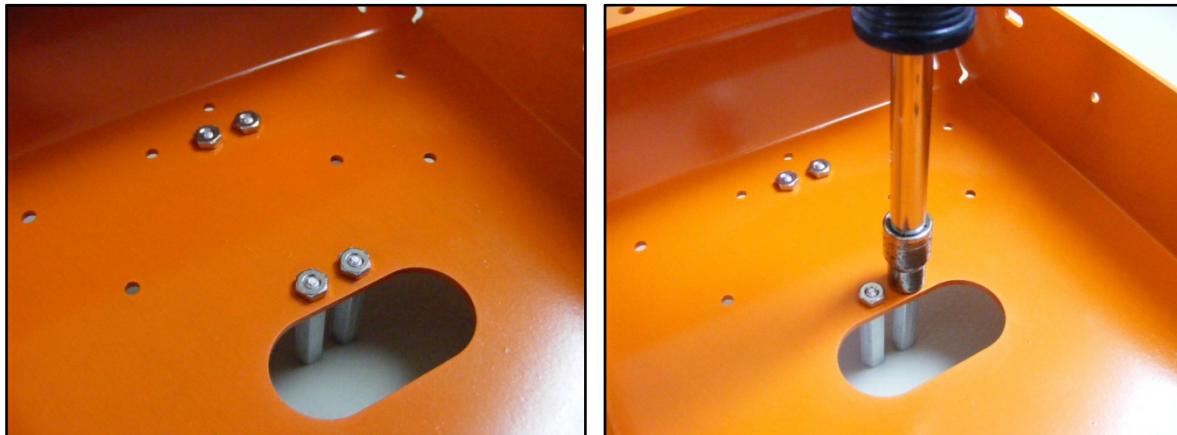
- 3/32 Allen Wrench (1)
- 7/64 Allen Wrench (1)

Assembly

- 1.) If you are planning on using a 5V switching regulator (Stinger CE Kit or Traxster MF Kit), bolt in the $\frac{1}{4}$ " hex standoffs to the top of the chassis, using two 4-40 x $\frac{1}{4}$ Pan Head Phillips Screws as shown below. Then secure the voltage regulator to the male end of the standoffs using two 4-40 nuts as shown. Make sure that VIN is on the left hand side and VOUT is on the right hand side, based on the picture below. This is an optional step.



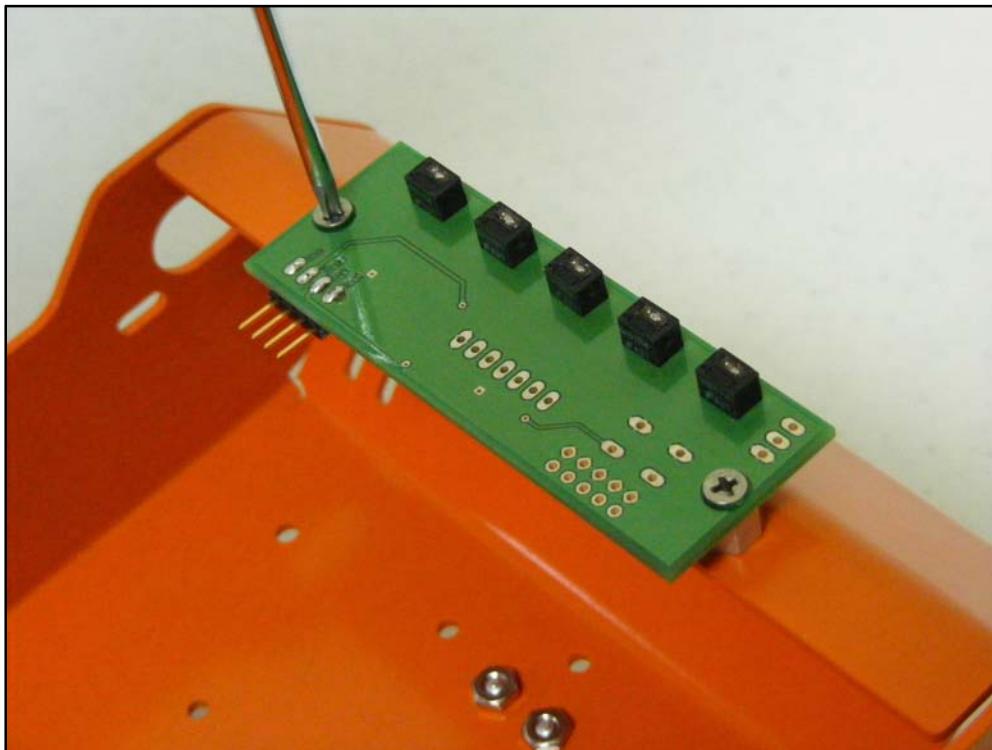
- 2.) If you are planning on using a servo, bolt the 1" Aluminum Hex Standoffs to the top of the chassis as shown below. The male ends bolt thru the chassis, and the female ends are used to attach the servo.



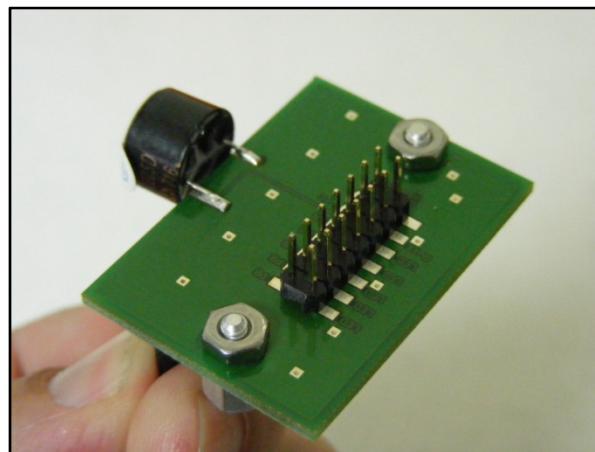
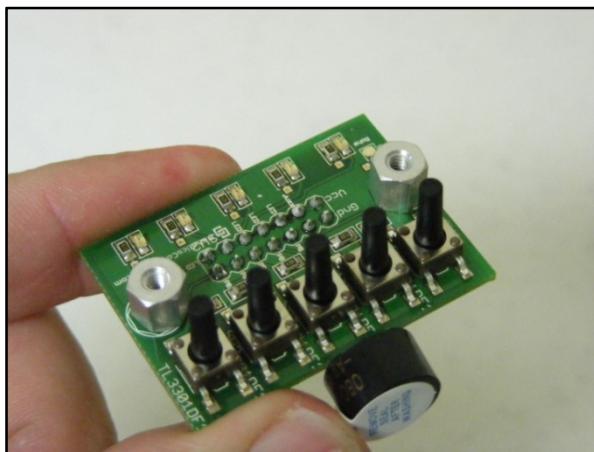
- 3.) If you are planning on using an I2C Line Following sensor, bolt two $\frac{1}{4}$ " Aluminum Hex Standoffs to the bottom lip on the front of the chassis. Male ends go thru chassis, and are secured using a 4-40 nut.



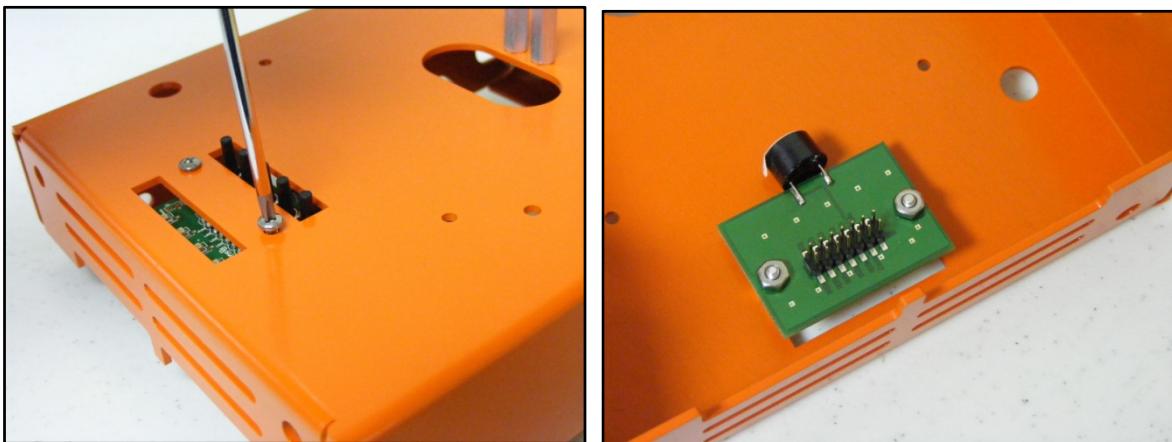
Bolt the I2C Line Following sensor to the standoffs using two 4-40 x $\frac{1}{4}$ Flat Head Phillips screws as shown below. The standoffs space the sensor the correct distance off of the floor, so that it can correctly sense a black/white line. Therefore, no adjustment should be made for additional spacing.



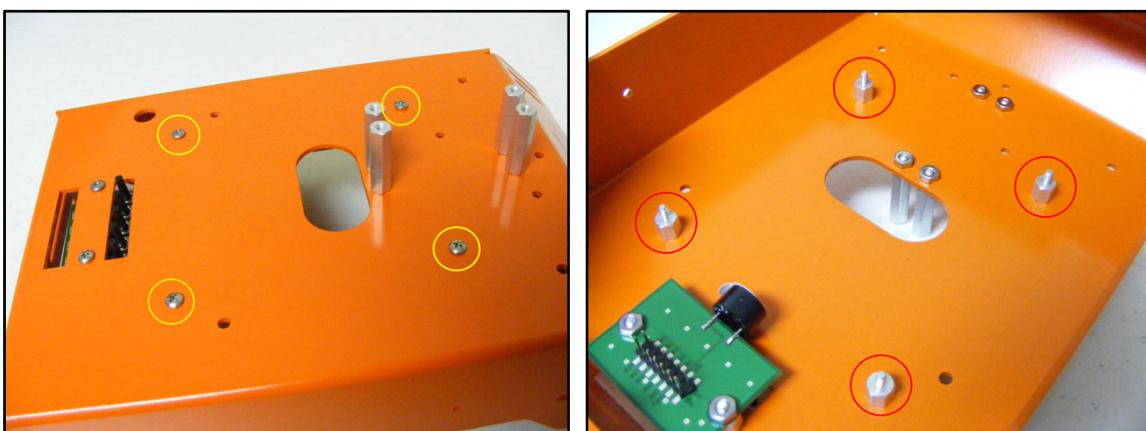
- 4.) If you are planning on using a Push Button I/O Board (PBIO), attach two $\frac{1}{4}$ " Aluminum Hex standoffs to the top of the PBIO board and secure with 4-40 nuts on the bottom as shown below.



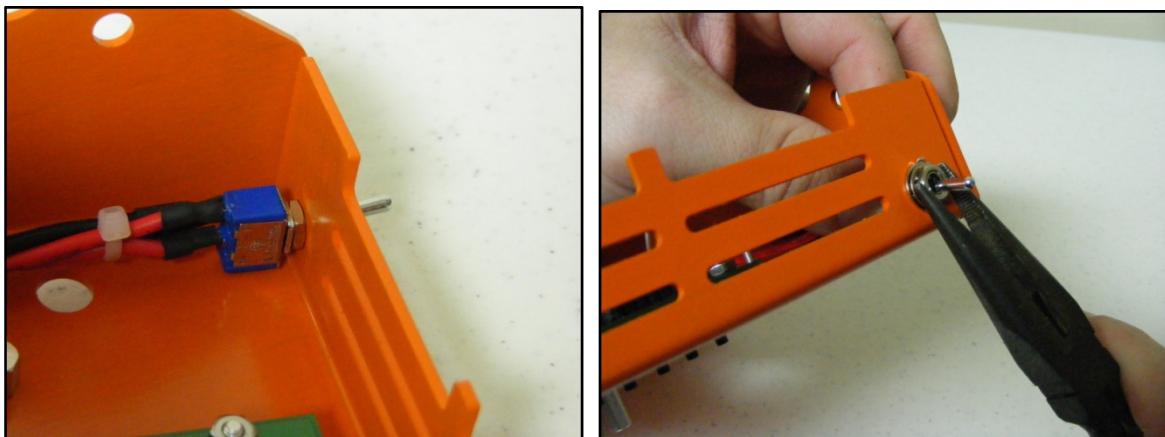
Follow up by bolting the PBIO board into the chassis using two 4-40 x $\frac{1}{4}$ " Pan Head Phillips Screws as shown below:



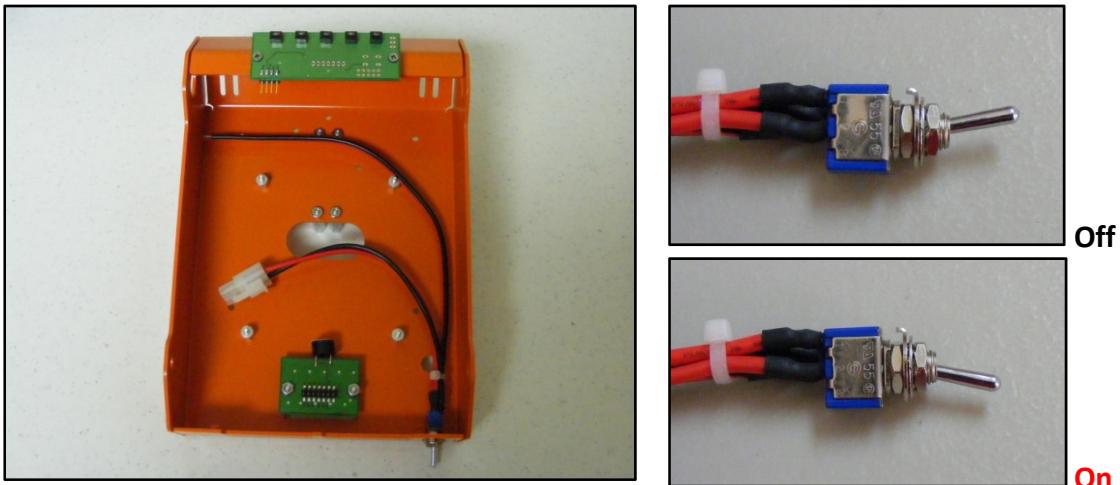
- 5.) If you are using a Serializer Robot Controller, bolt in four $\frac{1}{4}$ " Aluminum Hex Standoffs to the bottom of the chassis as shown using four 4-40 x $\frac{1}{4}$ " Pan Head Phillips screws.



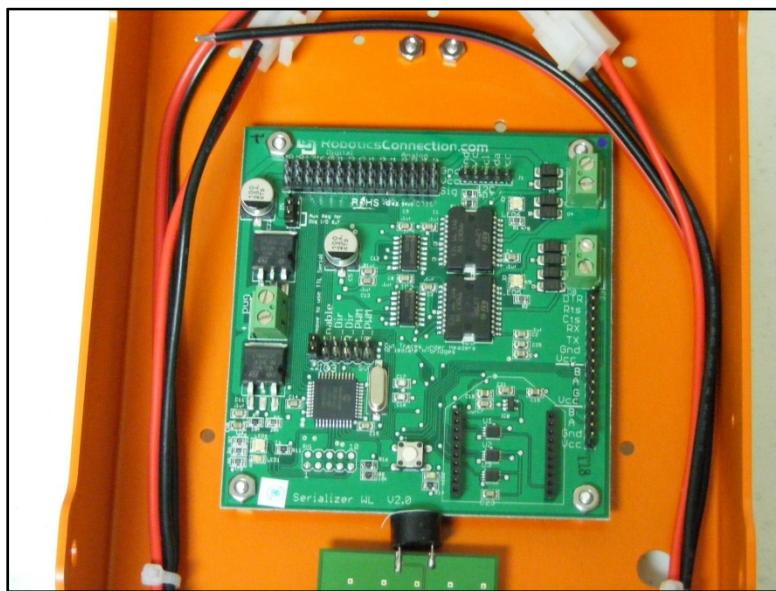
- 6.) Bolt the Wiring Harness switch into the left hole at the rear of the chassis and secure the nut with pliers (or nut driver if you have the correct size).



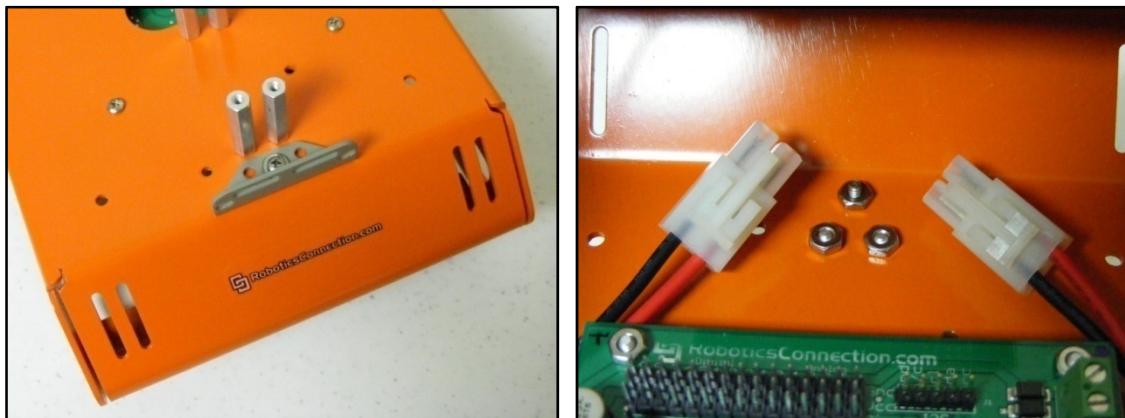
The wiring harness should now look identical to the picture below. **MAKE A NOTE AS TO WHICH DIRECTION THE SWITCH MUST BE POSITIONED WHEN POWER IS APPLIED. THIS WAY YOU WILL KNOW WHICH POSITION IS POWERED, AND NON-POWERED. BEFORE YOU CONNECT THE BATTERY IN THE LASTS STEPS, YOU WILL WANT TO MAKE SURE YOUR SWITCH IS TURNED OFF.**



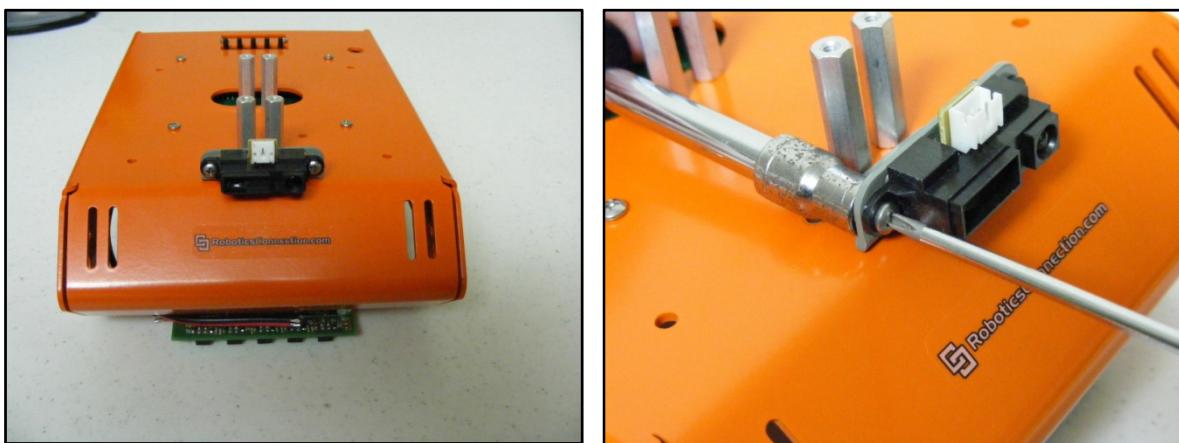
- 7.) Bolt the Serializer into the chassis using the $\frac{1}{4}$ " Aluminum Hex Standoffs installed a few steps back, and secure using 4-40 nuts as shown below. The Serializer and the Buzzer on the PBIO board is a really close fit, but there should be about 0.030" clearance. Please Note: If the holes don't exactly line up, try loosening the aluminum standoff screws a little, mounting the Serializer, and then tighten the aluminum standoff screws.



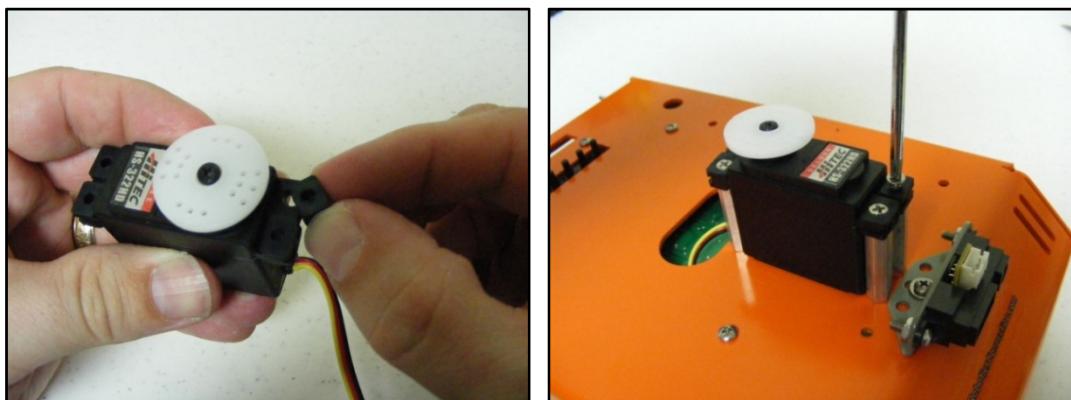
- 8.) If you are using a Sharp Infrared Sensor Mount, bolt it onto the hole in the center of the top of the chassis using a 4-40 x 3/8" Pan Head Phillips screw (included w/ Sharp IR Mount kit). Secure to chassis using a 4-40 nut (also included in Sharp IR Mount kit).



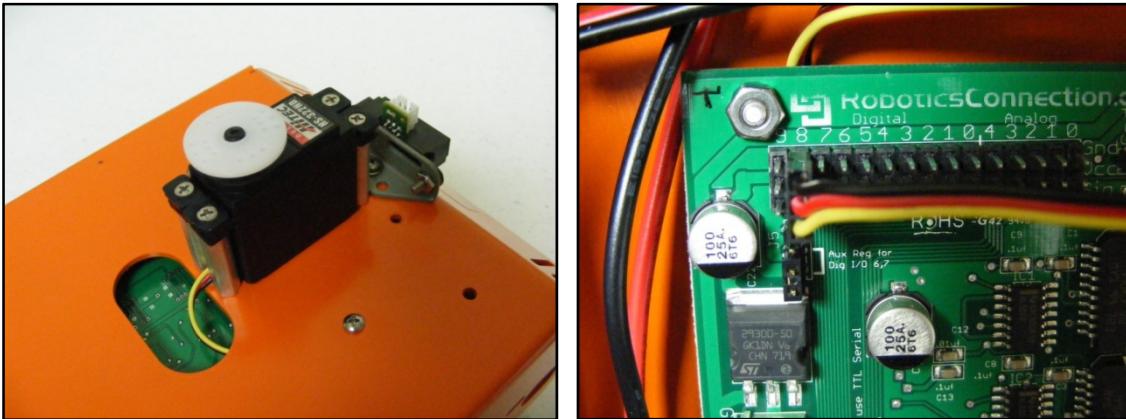
Bolt on the Sharp Infrared Sensor using two 4-40 x 3/8" Pan Head Phillips screws and nuts (included in Sharp IR Mount Kit).



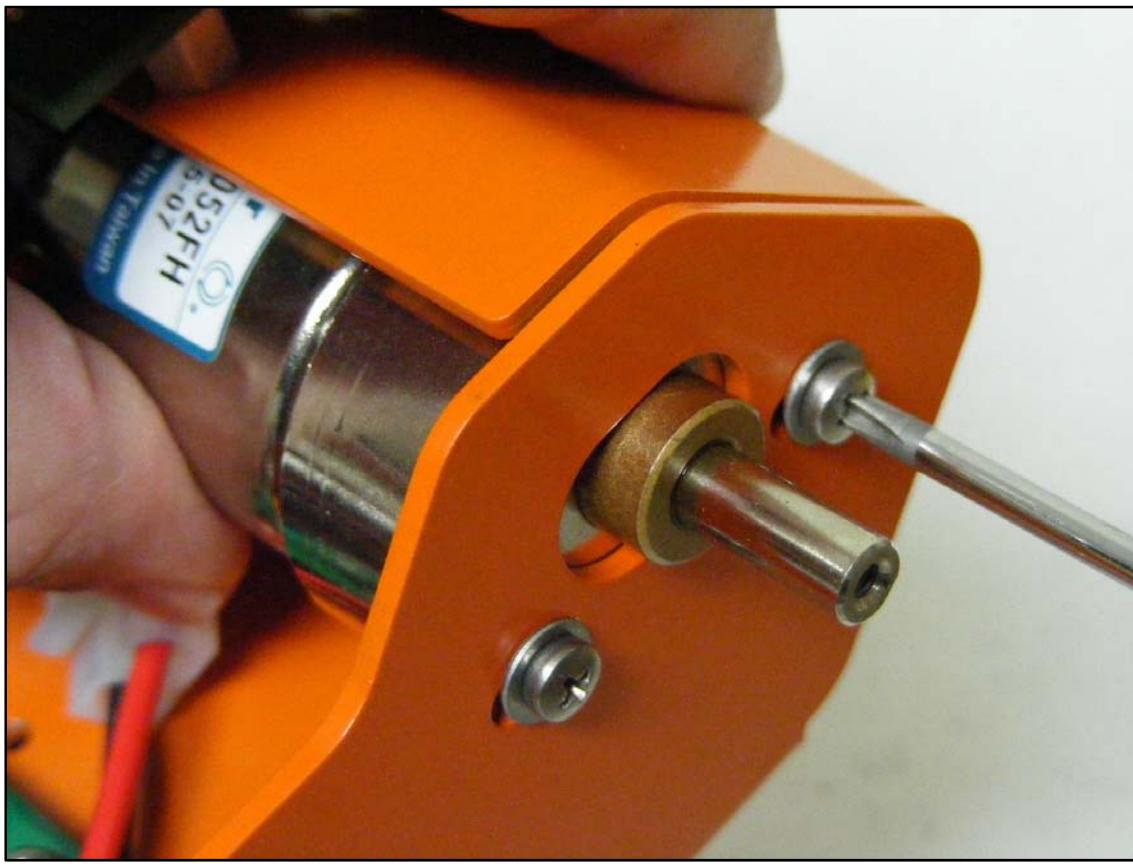
- 9.) Install the rubber grommets into your servo, and then bolt the servo to the Aluminum Hex Standoffs using the 4-40 x ½" Flat Head Phillips Screws as shown below. You can position the servo horn in either the rear or forward position, based on your needs.



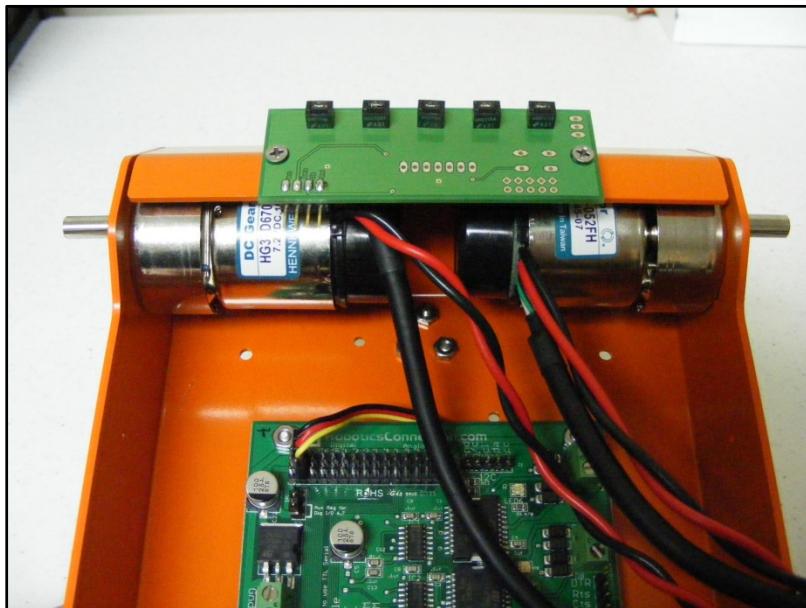
Route the servo cable through the hole in the top of the chassis, and between the Serializer and the chassis. Then, connect to either I/O line 8 or 9 on the Serializer as shown below. This corresponds to servo 1 and 2, respectively. Make sure you connect the servo cable to the Serializer using the correct polarity (match colors below).



- 10.) Bolt in the DC Gearhead motors using two M3 x .5 x 6mm screws and two #4 spacers per motor as shown below. **DO NOT TIGHTEN** screws yet! We will need to adjust the tension in the tracks later, thus we'll tighten the screws at that time.

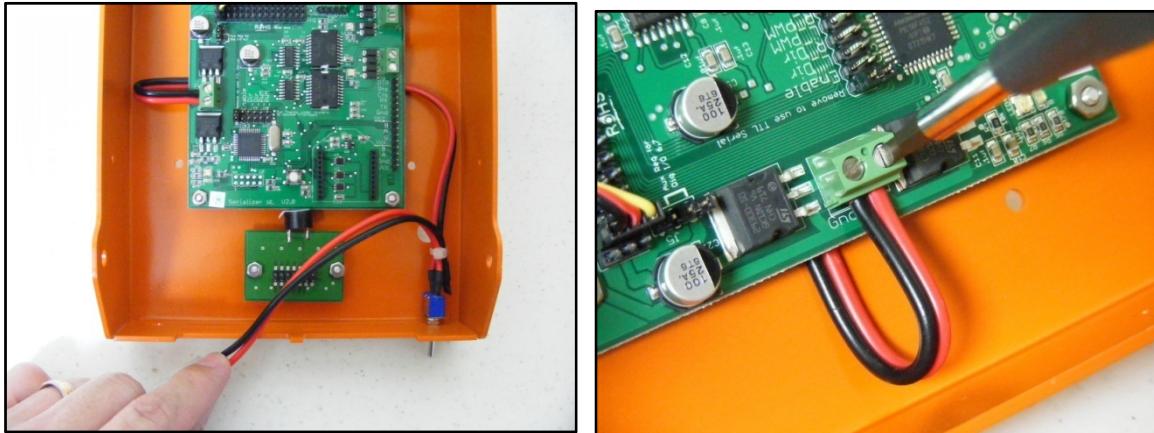


Your robot should look similar to the picture below.

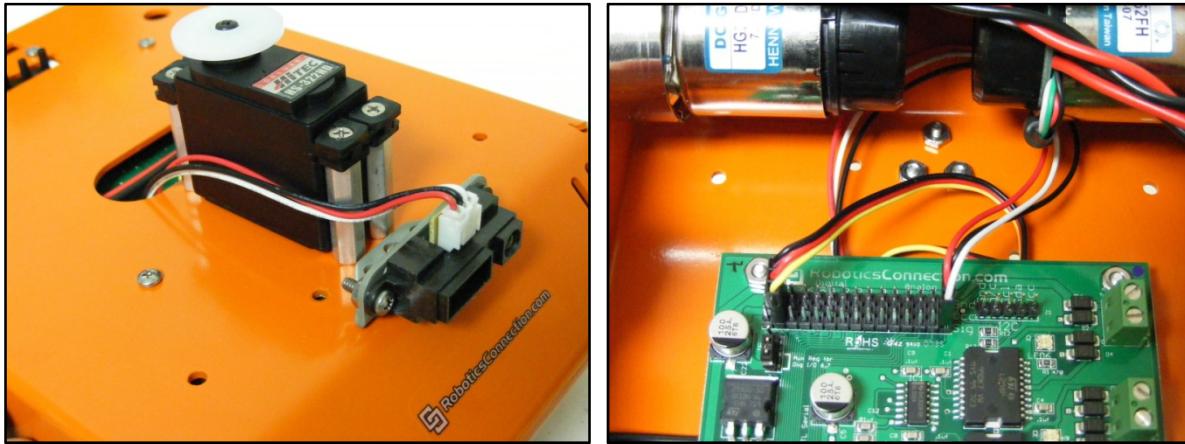


- 11.) Attach the wiring harness to the Serializer as shown below. **MAKE SURE YOU DO NOT REVERSE POLARITY!!! DAMAGE WILL OCCUR AND WE ARE NOT RESPONSIBLE!**

The red wire goes to the "+" screw terminal, and the black wire goes to the Gnd screw terminal on the Serializer.

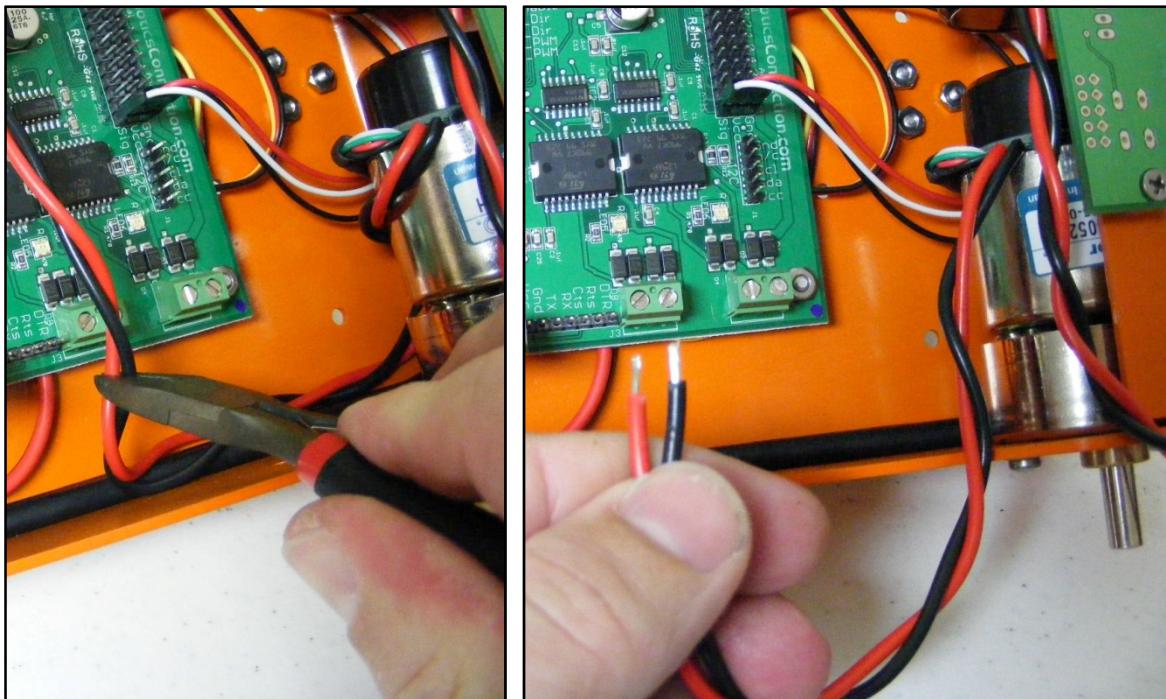


- 12.) If you are using a Sharp IR Mount and Sensor bolted to the top/front of the Chassis, now is a good time to connect the sensor cable, and route it through the hole in the chassis to the Serializer as shown below. You can tuck the extra cable under the motors.

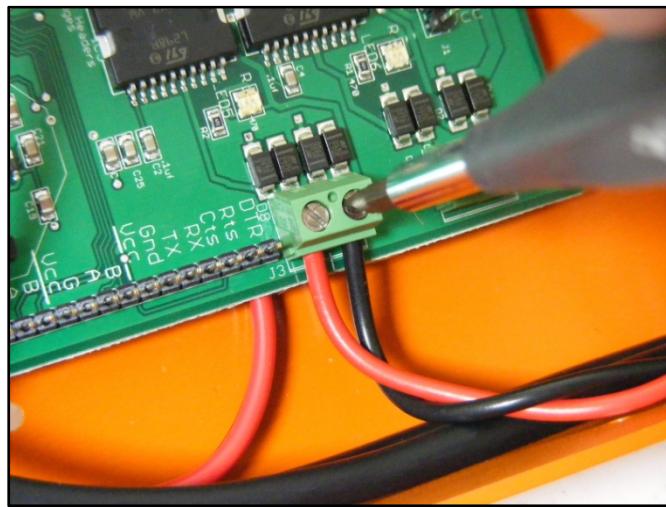


- 13.) Now we need to connect the motor wires to their appropriate Serializer terminals (see Appendix A1 for a pinout diagram).

To begin with, we'll connect the left motor wires. The motor wires are slightly oversize and some length needs to be cut off. Thus, tuck the left motor wires behind the left motor (in the space between the motor and the front of the chassis), and bring them out along the left side of the chassis, and over to Motor 1 Terminal. Once you have the wires cut to length, strip $\frac{1}{4}$ " (~5mm) of insulation from the ends.



Insert the red wire under the left hand screw and the black wire under the right hand screw. If you use our software libraries to control the Traxter, this will ensure that the motors will turn in the correct direction regarding forward/reverse parameters.

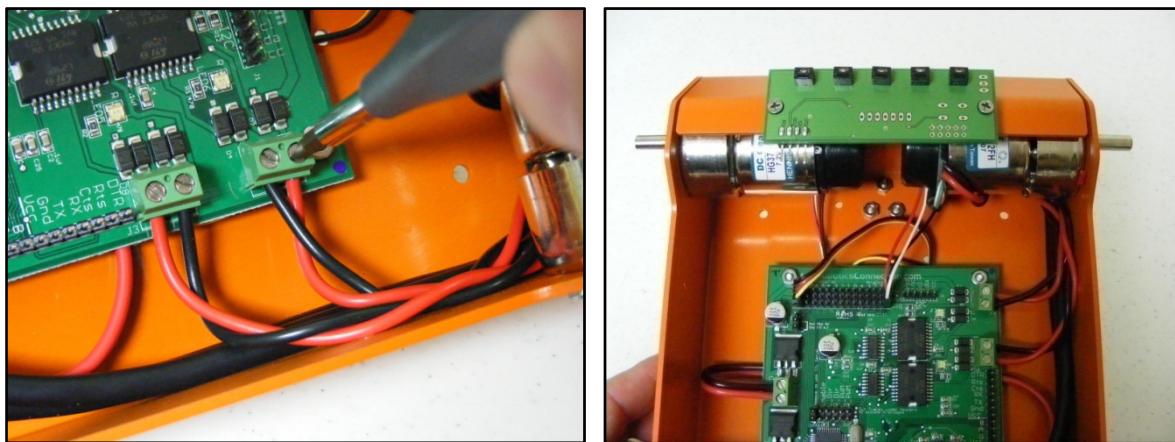


- 14.) Perform the same operation for the right hand motor.

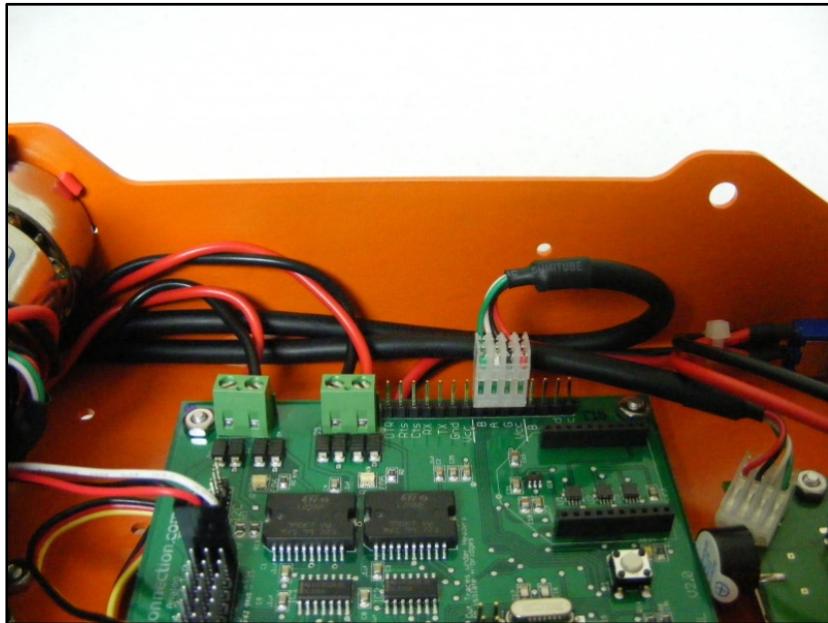
NOTE: It is useful to leave some extra length on the wire, and tuck the extra length between the motors and the chassis.

For the right motor, secure the black wire in the left hand screw, and the red wire in the right hand screw as shown below.

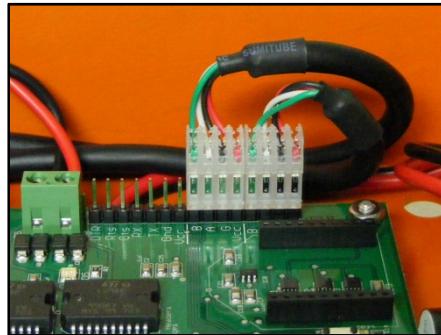
The motor wires should be routed like the ones in the picture below, where the black wires are on the inside, and red ones on the outside.



- 15.) Now, plug in the left motor encoder wire into Encoder Port 2 (see Appendix A1) as shown below.

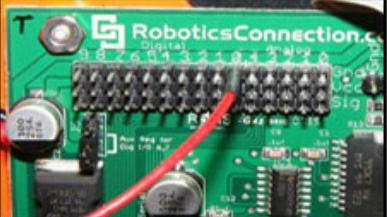
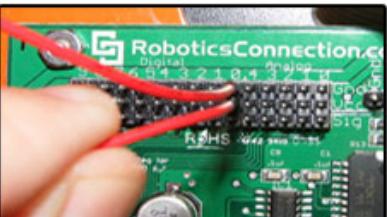
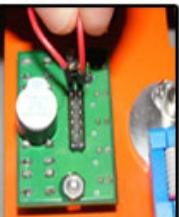
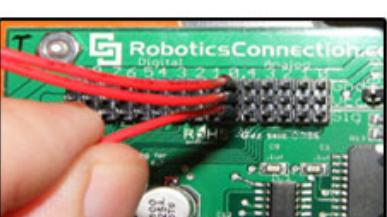


Then, plug the right motor encoder wire into Encoder Port 1 (see Appendix A1) as shown below.

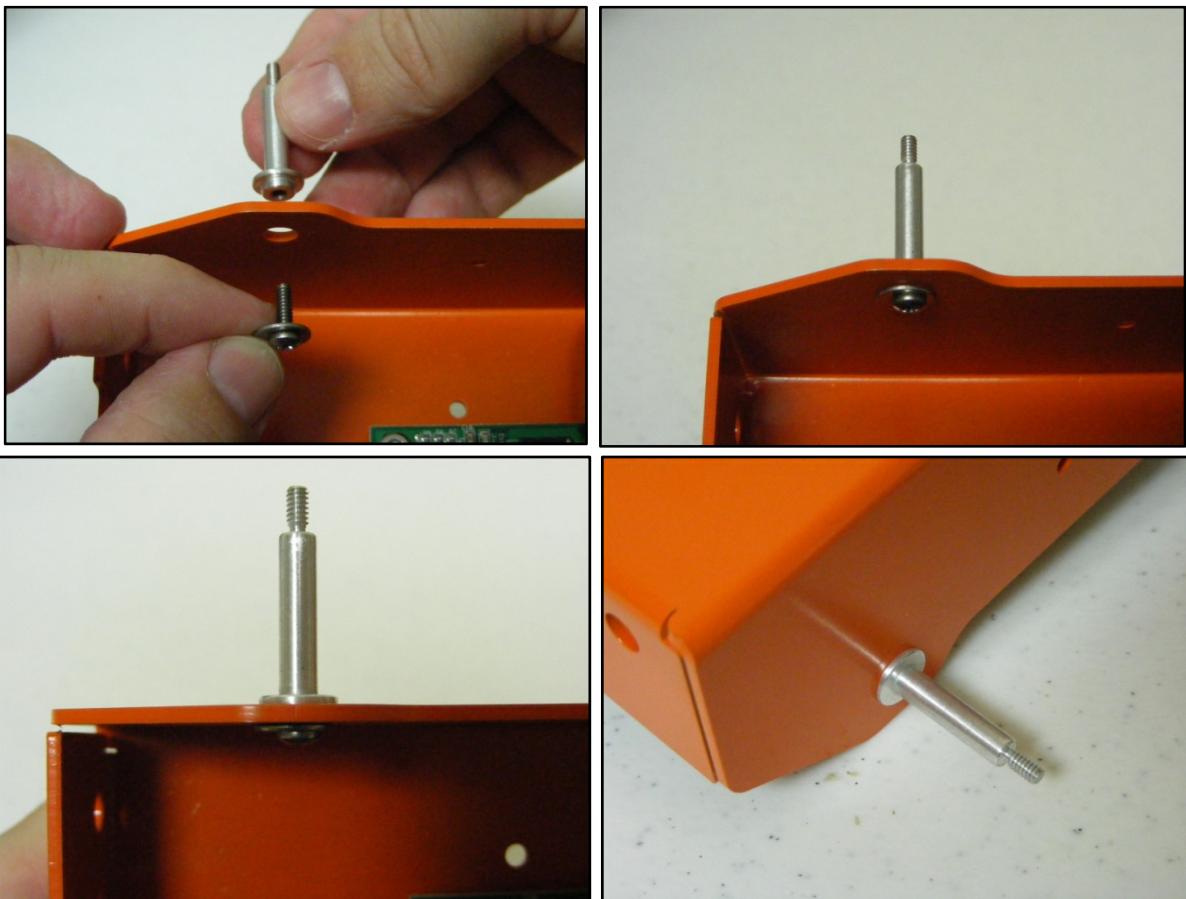


Failure to plug the encoders into the encoder ports specified above will prohibit the internal Serializer PID functionality from working! If you see symptoms where one motor spins really fast, and the other motor won't spin at all, then you have the encoders reversed. Simply swap them around to fix the problem.

16.) If you are using our Push Button I/O Board, follow the instructions below to connect it to the Serializer using our 12" female-to-female jumper wires.

		<p>1.) Connect Ground from Serializer to PBIO board using a Jumper Wire</p>
		<p>2.) Connect Power (Vcc) from Serializer to PBIO board using a Jumper Wire</p>
		<p>3.) Connect I/O Line 1 to Buzzer Pin on PBIO board using a Jumper Wire</p>
		<p>4.) Connect I/O Line 3 to LED on PBIO board using a Jumper Wire</p>
		<p>5.) Connect I/O Line 4 to Push Button on PBIO board using a Jumper Wire</p>

- 17.) Bolt in the left and right rear axles using a 4-40 x 3/8" Pan Head Phillips screw and #6 washer as shown below. **The axle will fit in the hole very snugly**, and will seat properly when tightening the screw down.

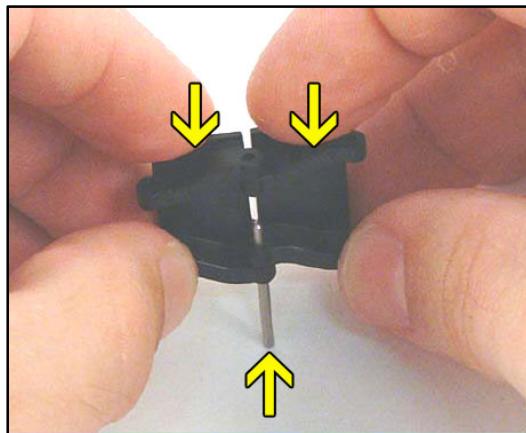


- 18.) Now is the time to assemble the drive tracks. The Traxster Robot Kit includes a bag of 76 links and pins, which is four more links and pins than are needed to assemble both tracks. This leaves two extra replacement links and pins per side. Therefore, each side requires 36 links and pins. You might want to begin by counting out the correct number of links and pins per side.

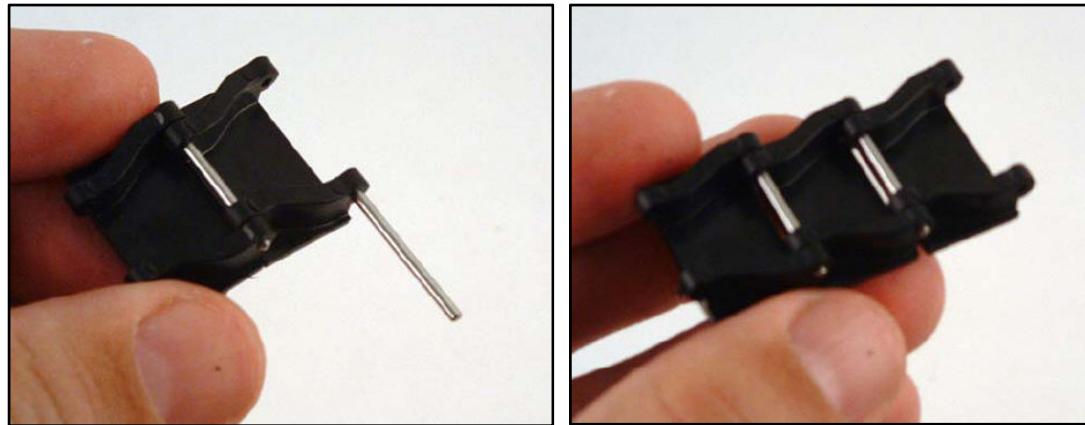


Use a hard surface to assemble the tracks and pins, preferably a scrap surface that can be discarded, or a steel workbench. You will need a hard surface to push the pins up through the links.

Start by inserting one of the stainless steel pins into the hole at the wide end of a link. Then insert the narrow end of another link into the wide end of the first link. Press the pin up through the all of the holes, by pressing down on the links. (see picture below)



Start another pin in the link you just attached, and follow the same procedure as you did above. Keep adding links until you have a track that's 36 links long. On the last link, connect both ends of the track to make a continuous track. You can also use needle nosed pliers to center the pin between the link ends, and snug the links together as shown below.



(Optional) After assembling the track system, you might want to add some additional traction to the links.

You can do this by purchasing a can of "Plasti Dip Spray" at Home Depot or Lowe's for around \$7.

TIP: It is best to remove a pin from a completed (and looped track) to lay the track flat when spraying the Plasti-Dip onto the outside surface of the tracks.



- 19.) Assemble the front and rear wheels using the 6-32 x 5/8" Socket Head Cap Screws, 6-32 nuts, the 7/64 hex wrench, and some pliers. The front wheels use the aluminum hubs containing the set screw, and the rear wheels use the aluminum idler hubs.

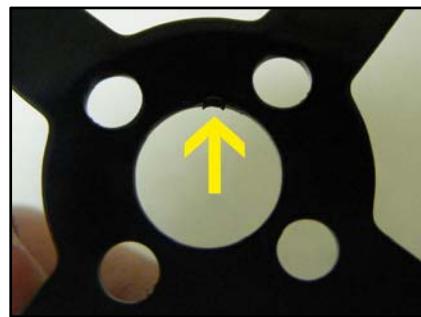


Front Aluminum Hubs



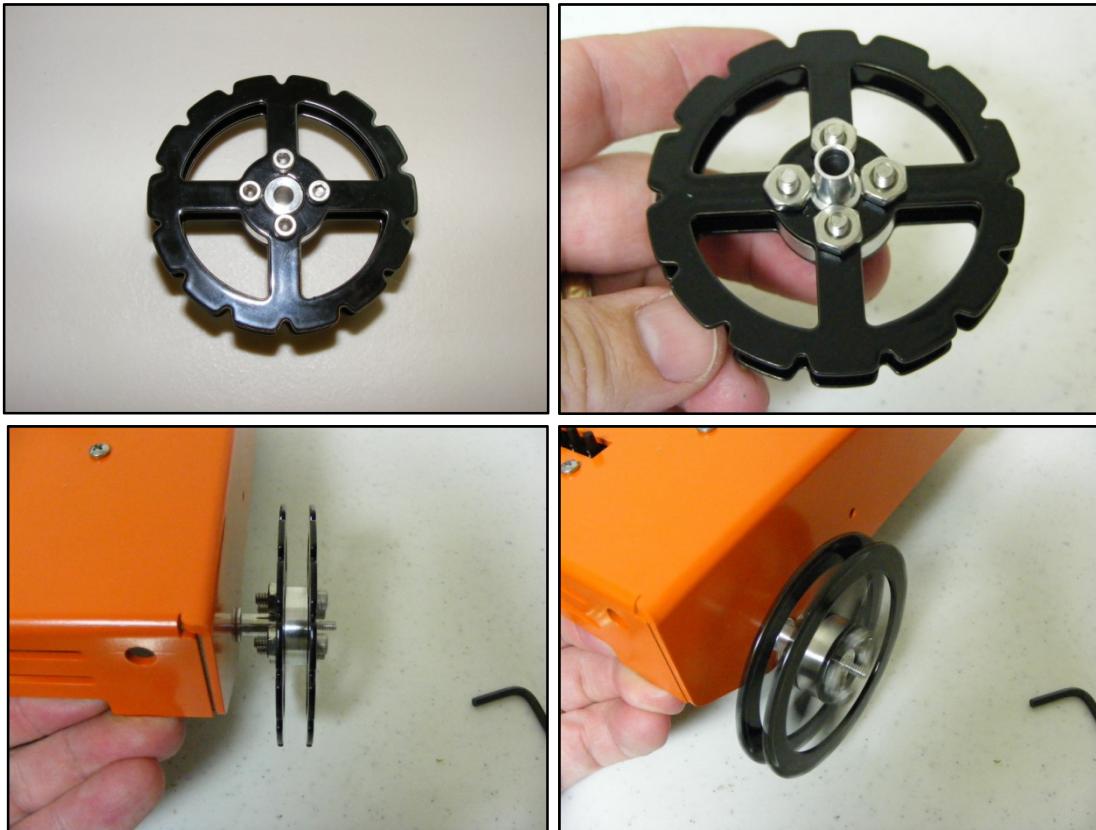
Rear Aluminum Idler Hubs

Please note that the drive disks have been coated with a very durable coating called "Powder Coat". During the coating process, the parts must be suspended on a wire. As the powder is applied, a small amount collects around the location where the part is suspended, which happens to be hole in the center of the disk. Therefore, you might see a place where the powder coat has collected, and it might prevent initial seating of the disk to the drive hub. Properly securing the disk to the aluminum hub using the 6-32 bolts & nuts will push the extra powder coating out of the way.



NOTE: Make sure you match up the drive track notches on the disks when assembling the wheels. It is possible for them to be off by 90 degrees, which will prevent the drive disk from engaging the drive disks.

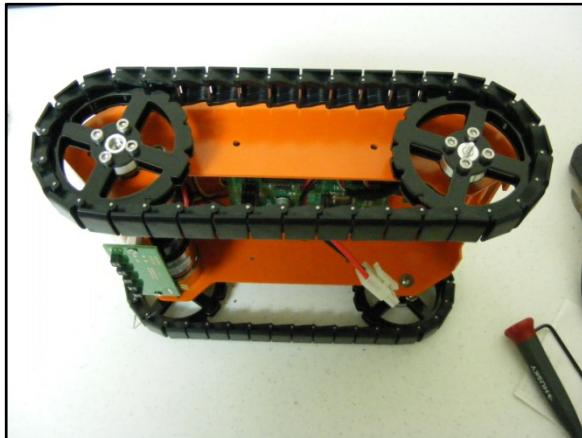
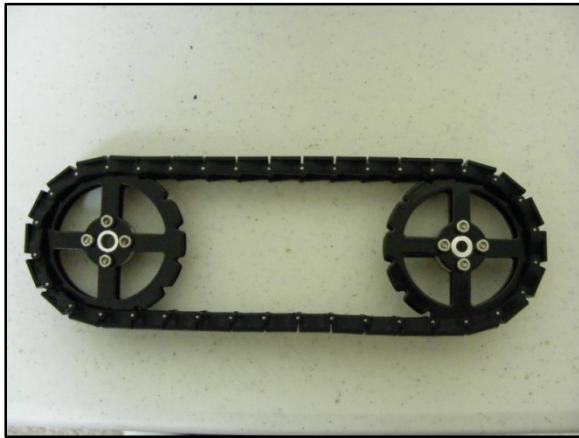
Also, make sure you snug the bolts down securely, so that the drive disks will seat flat against the aluminum hub. Visually check the disks to ensure they're running parallel. You can easily check this on the rear wheels by placing them over the rear axles, spinning them, and checking that they run true.



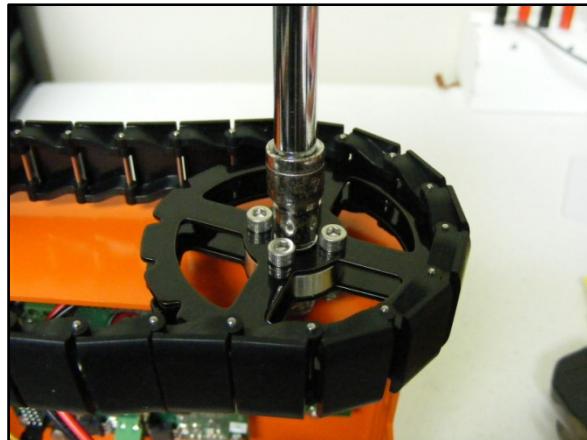
- 20.) Apply a light amount of grease between the rear wheel hubs, and the rear axles. White Lithium grease works the best. Don't use oil or thin lubricants (WD-40), as it will drip off of the rear axles, and attract dirt. **Failure to perform this step could cause the hub to gall against the axle, and become hard to rotate!**



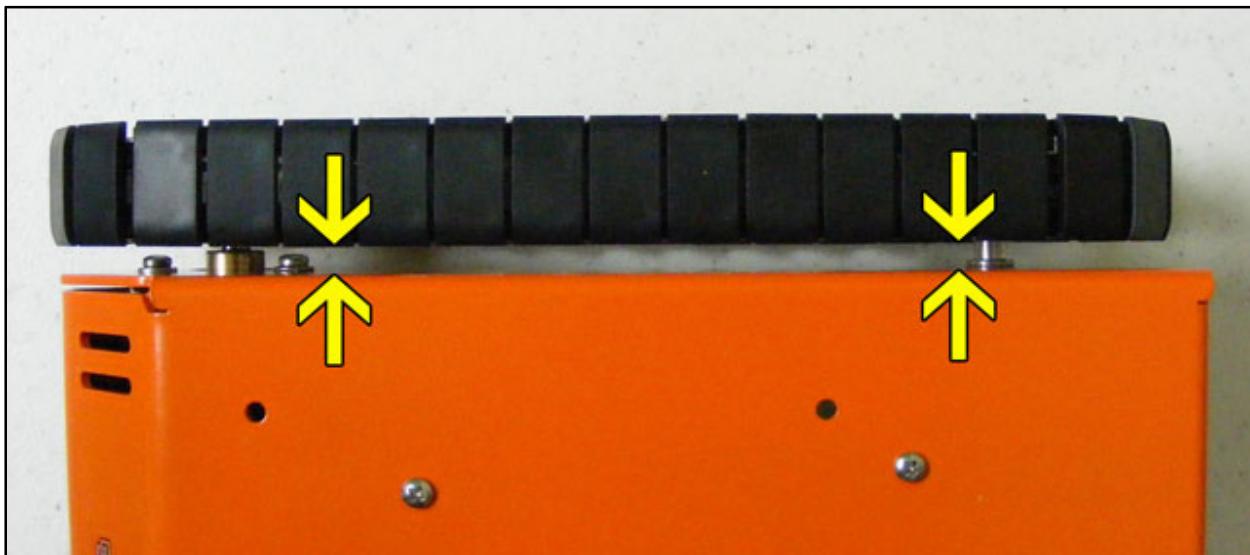
- 21.) Place a front and rear wheel inside of the tracks, and slip each wheel over the motor axle and rear axle as shown to mount it to the Traxster. Make sure you have the motor screws loosened a little, as you might have to move the motor rearwards to slip the wheels on. The track should have a good bit of slack in it at this point.



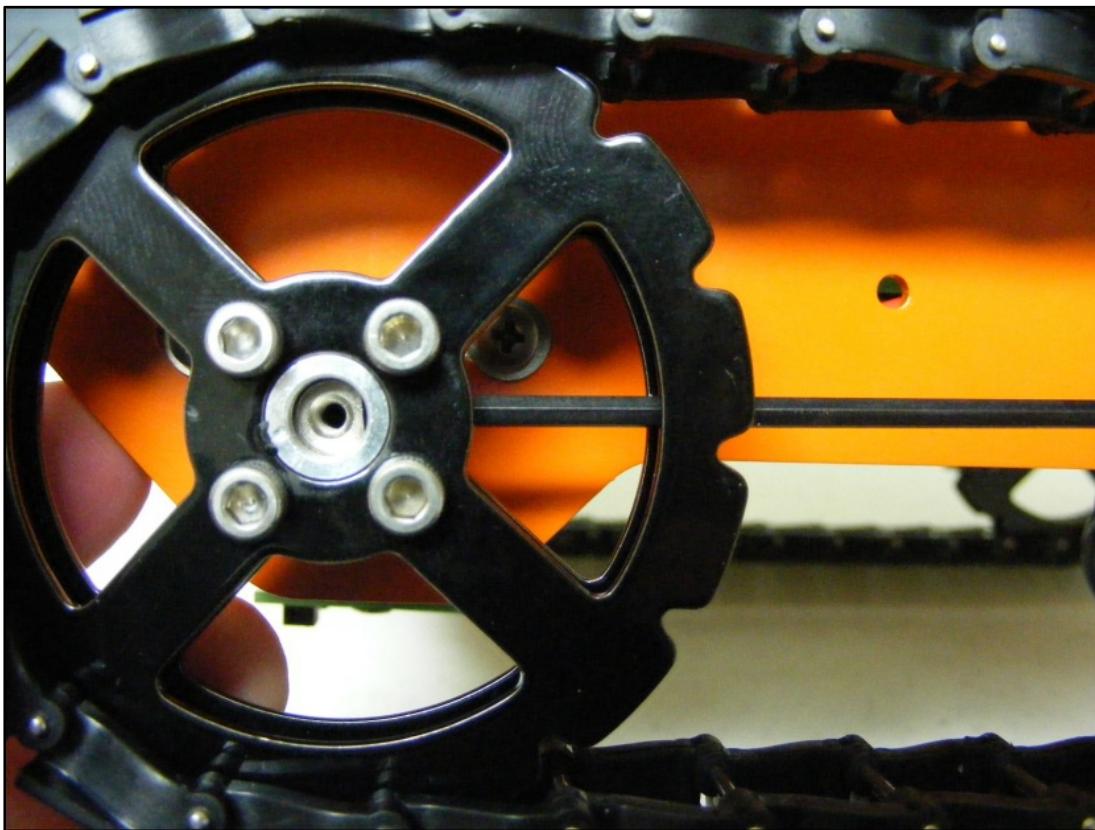
Once you have the track/wheels mounted, secure the rear wheel with a 4-40 nylon lock nut as shown below. **Carefully start the nut with your finger to ensure it threads on to the axle correctly**, then use a socket driver, or pliers to secure the lock nut. **DO NOT OVERTIGHTEN THE NUT!!! IF YOU APPLY TOO MUCH TORQUE, YOU MAY BREAK THE END OF THE ALUMINUM AXLE OFF!!! THIS NUT IS USED TO PREVENT THE WHEEL FROM COMING OFF, AND IT DOES NOT NEED TO BE EXTREMELY TIGHT. WE WILL BE GLAD TO SEND REPLACEMENTS, BUT THEY WILL BE AT YOUR COST.**



- 22.) Adjust the front wheel along the motor axle, so that the track is parallel with the side of the Traxster. Failure to do so will result in binding of the drive system. This will cause the drive train to be loud, will increase friction, and reduce battery life.



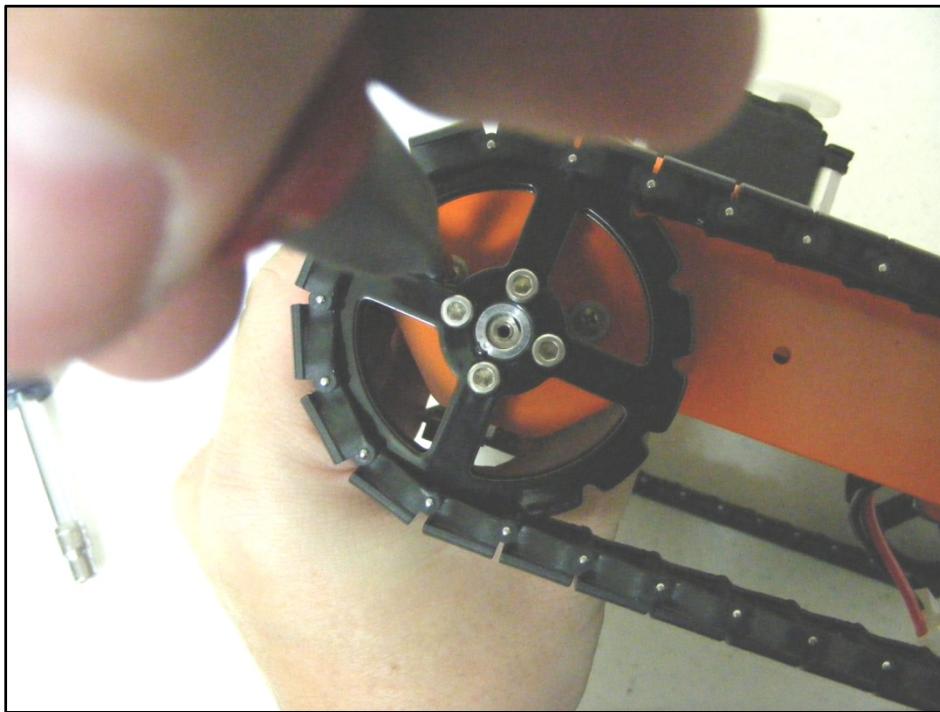
- 23.) Secure the front wheel to the motor drive shaft by seating the set screw against the flat machined in the motor shaft using the 3/32 Allen wrench as shown below:



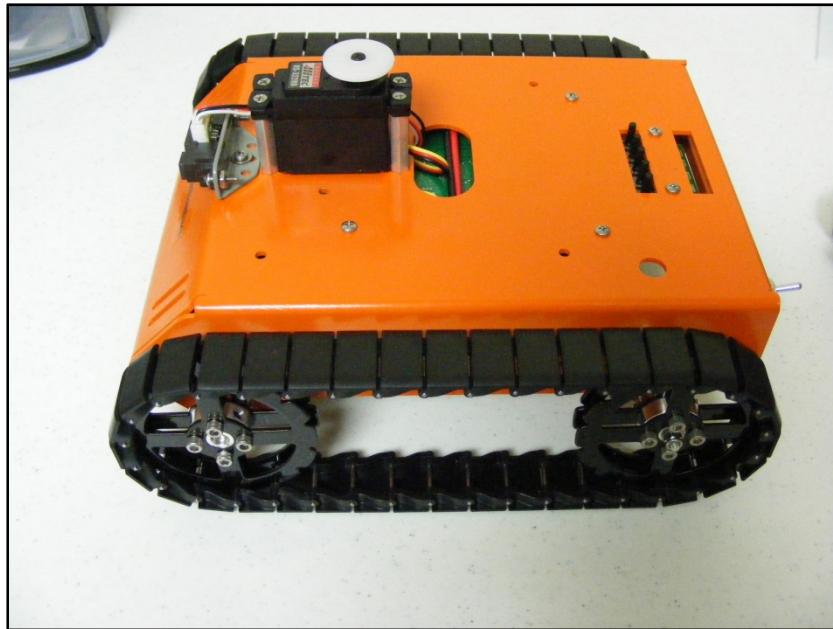
You can snug the set screw down securely using the 3/32 Allen wrench and a pair of pliers as shown.



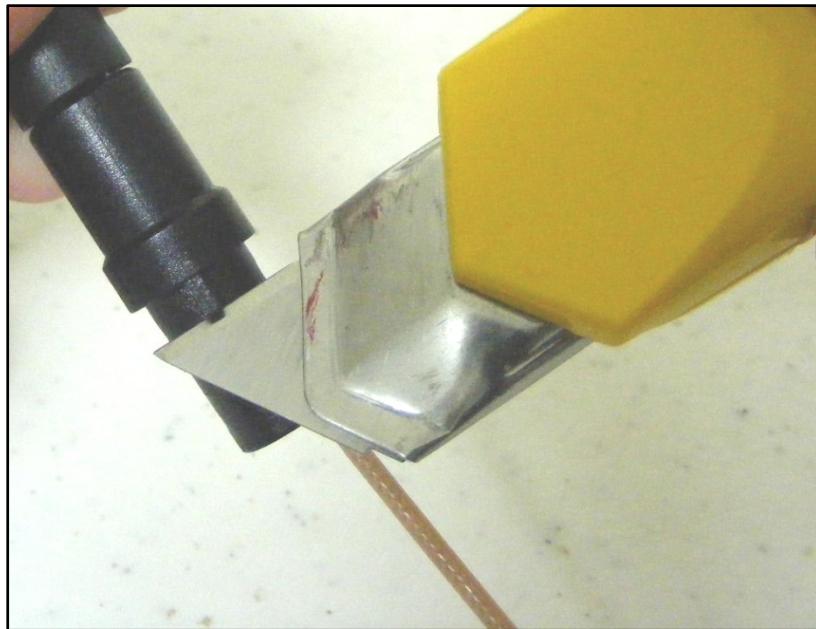
- 24.) Slide the motors forward until there is **LIGHT TENSION** in the track, and secure them by tightening both motor screws down. If you apply too much tension on the tracks, then the drive train will be less efficient, and noisier. These tracks track true very well, so there is no need to apply a large amount of tension.



Your Traxster should look like the one below at this point (minus any optional equipment, such as the Servo, Sharp IR sensor and mount, Push Button I/O, and Serializer).



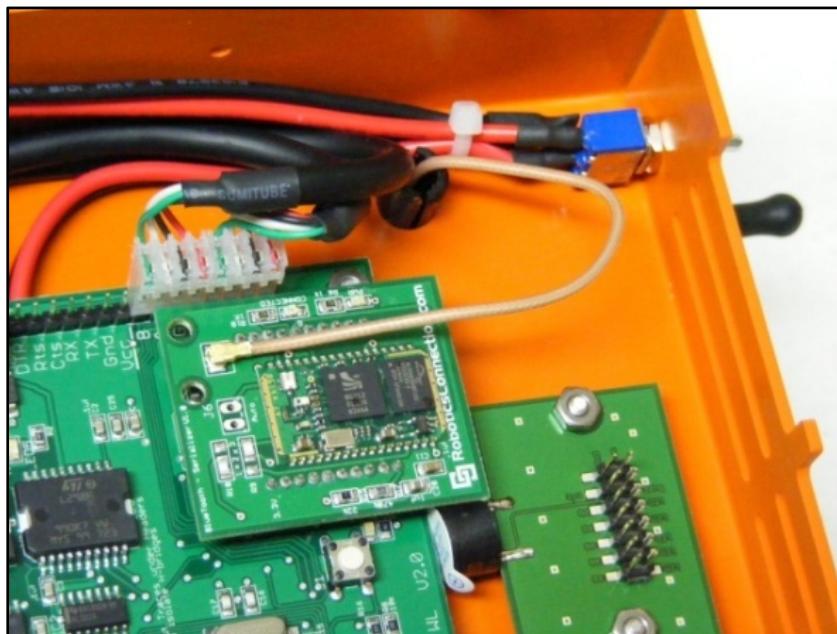
- 25.) If you will be using an optional Bluetooth/XBee antenna, now is a good time to attach it. Start by shaving off the small tab at the base of the antenna as shown below. This will allow the antenna to seat properly in the chassis. **BE CAREFUL NOT TO CUT/HARM YOURSELF WHEN TRIMMING THE TAB OFF!**



- 26.) Now, (optionally) insert the base of the antenna through the 3/8" hole in the top, rear of the Traxster chassis as shown below.

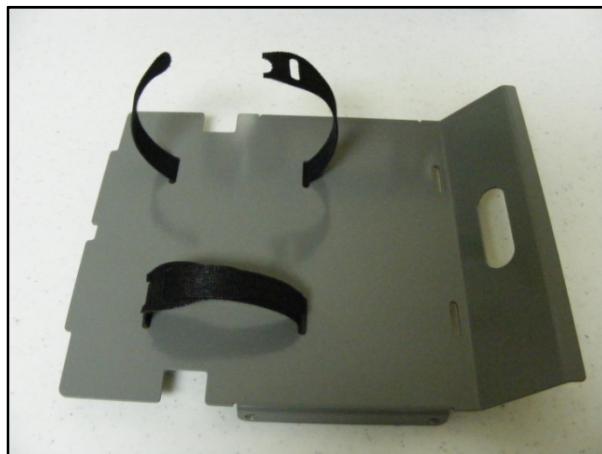
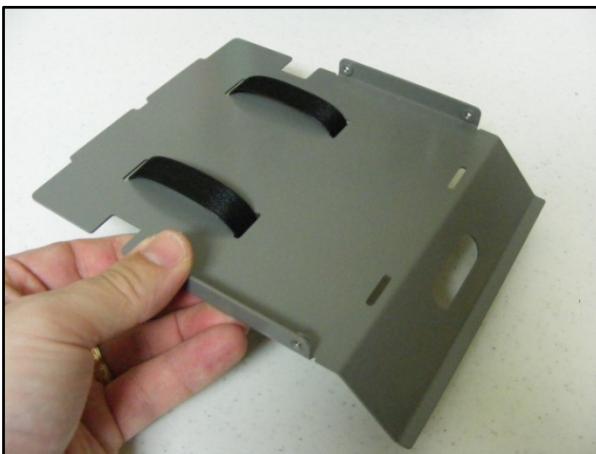


Insert the Bluetooth module into the Serializer, and connect the antenna to it as shown. You would perform a similar operation for the XBee modules.

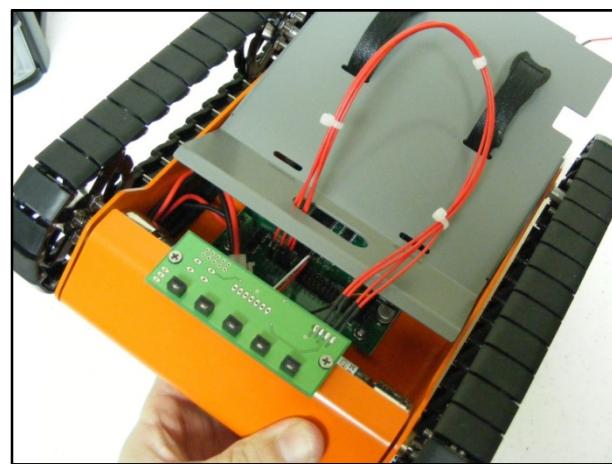
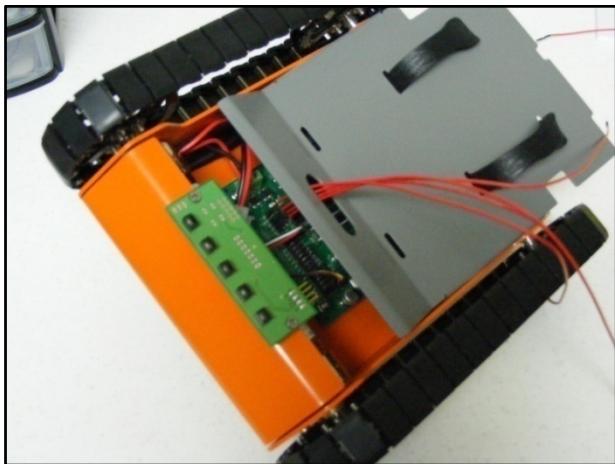


- 27.) Before we attach the belly pan, **double check all of your wiring** to ensure that you're not going to fry anything once you apply power.

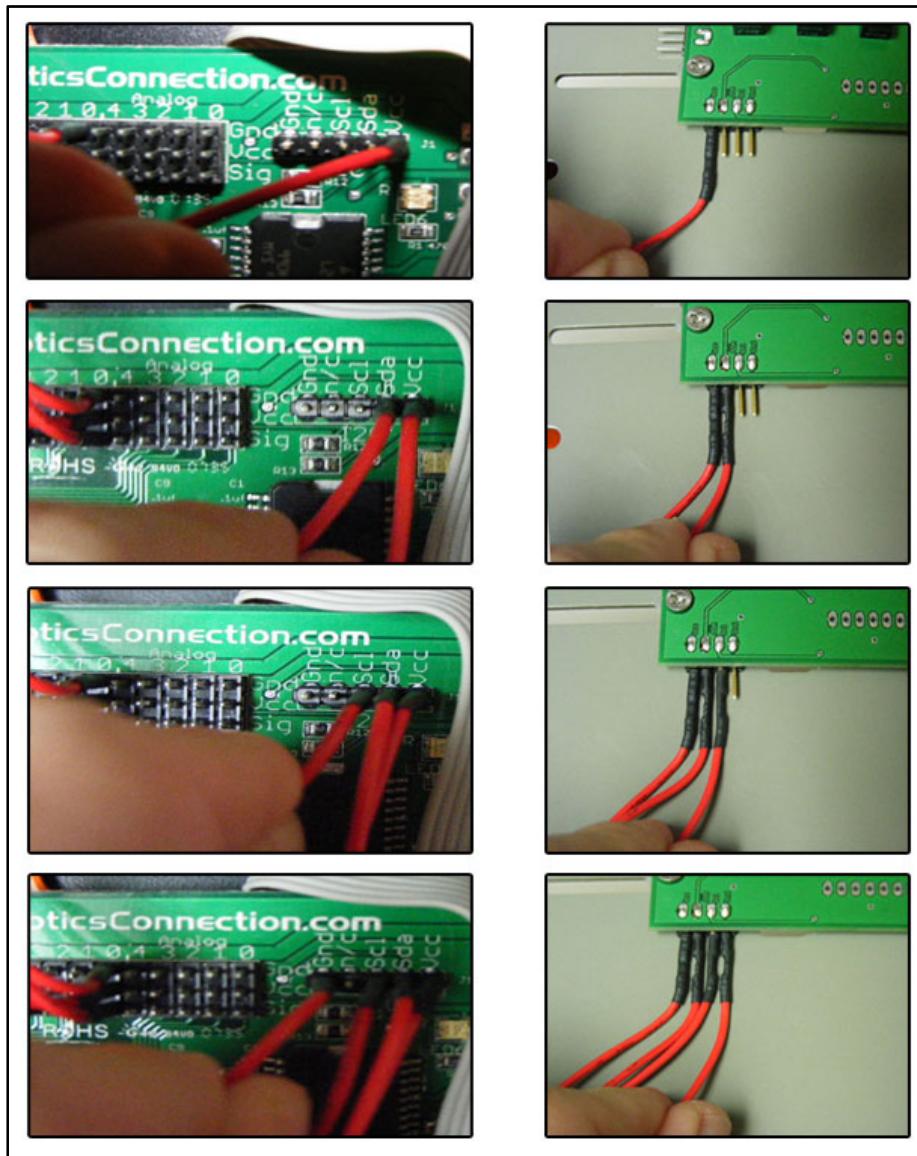
- 28.) Thread the Velcro™ battery straps through the slots in the belly pan as shown below, and connect the ends.



- 29.) If you are using the optional I2C Line Following Sensor, go ahead and connect the four jumper wires to the I2C port on the Serializer. Thread the wires through the large oval hole in the belly pan. Then start inserting the belly pan into the bottom of the Traxster chassis as shown below. You might want to tidy up the jumper wires using some tie wraps too.



You can use the steps below to connect the Line Following Sensor to the Serializer using our 12" Female-to-Female jumper wires.



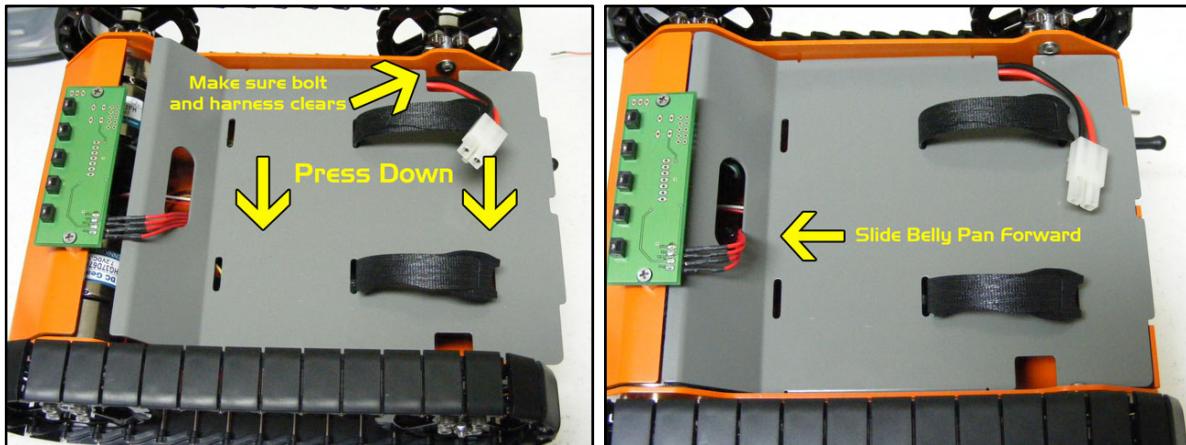
1.) Connect
Vcc Pins

2.) Connect
Gnd Pins

3.) Connect
SCL Pins

4.) Connect
SDA Pins

- 30.) Make sure the battery connector is threaded through the rectangular hole in the belly pan, and press the belly pan down into the chassis. You will need to make sure the bolts for the rear axles line up w/ the rectangular holes in the side of the belly pan, so that it slides down all the way. Finish by pressing the belly pan toward the front of the robot until it matches as shown below.

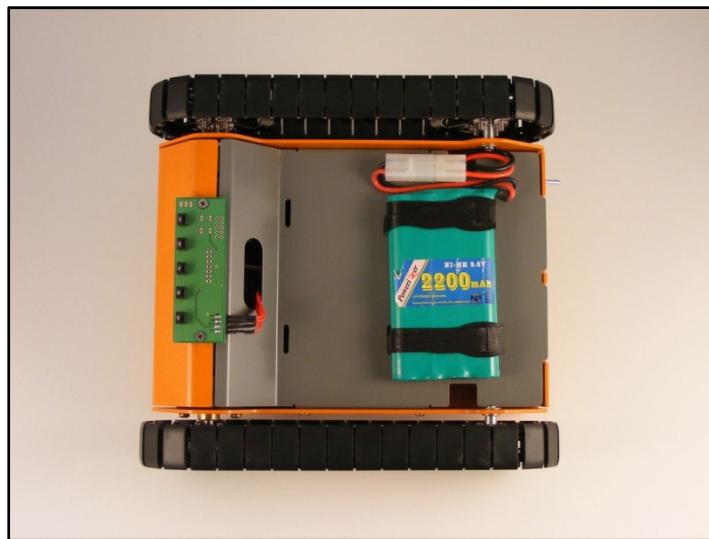


- 31.) Secure the belly pan using two 4-40 x 3/8" Phillips Pan Head screws on each side of the chassis as shown below. Your Traxster should now look like the one in the image below when the belly pan is secured properly.

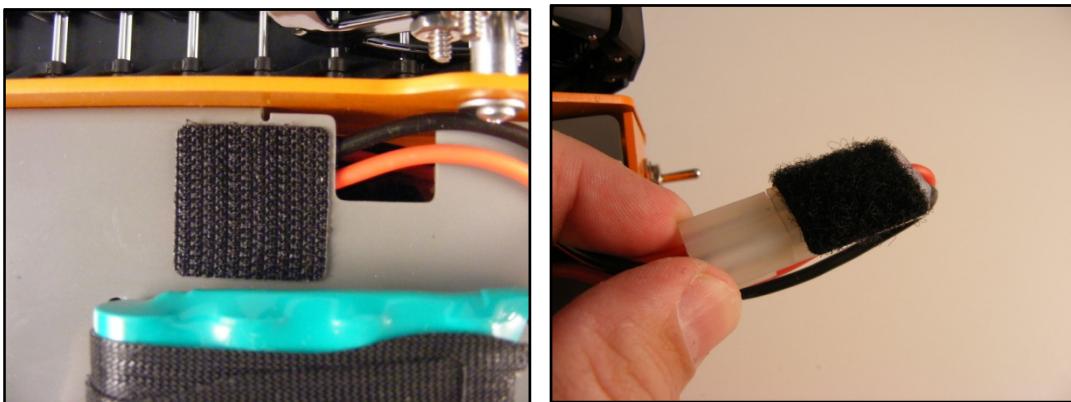


32.) The Traxster was designed to use a commonly available rechargeable battery pack containing 8 AA cells. We have added information in Appendix A2 pertaining to a place where the battery packs can be purchased. There are two sets of Velcro™ tie strap slots to allow customers to mount two of the battery pack shown below, in case one is needed to power a higher level controller.

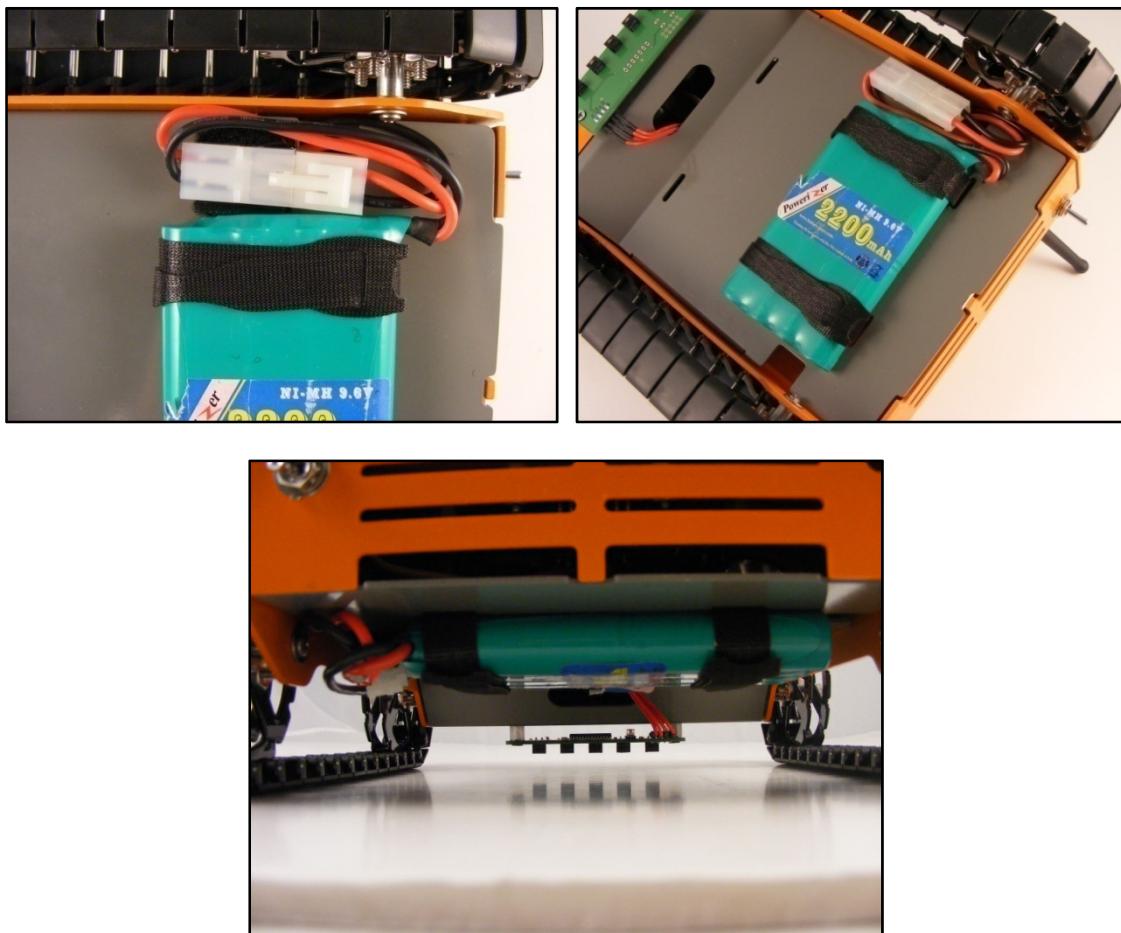
BEFORE CONNECTING THE BATTERY, MAKE SURE THE SWITCH IS POWERED OFF. AT THIS POINT, YOU SHOULD HAVE VERIFIED THAT ALL WIRING IS PROPERLY CONNECTED TO PREVENT REVERSE POLARITY DAMAGE. IF YOU ARE CONFIDENT, THEN PROCEED WITH CONNECTING THE BATTERY TO THE WIRING HARNESS.



While we don't include these with the Traxster, it's a good idea to pick up some Velcro™ squares w/ adhesive backs, and use them to secure the battery connector to the belly pan. This allows for rapid battery swapping. If you don't want to do that, you can thread/push the battery cable/connector back up into the inside of the chassis through the rectangular hole in the belly pan.



Secure the battery to the belly pan by synching down the Velcro™ straps as shown below.

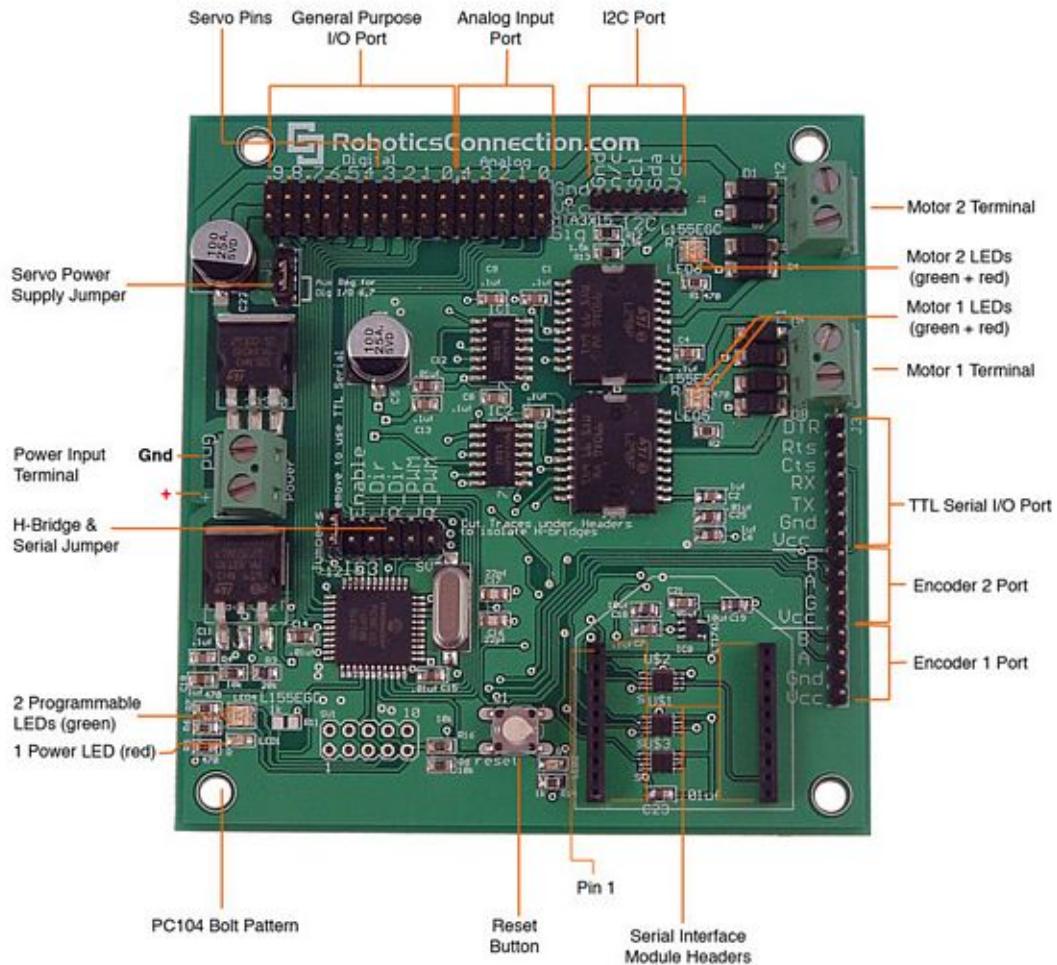


33.) Congratulations! You have now completed assembly of your Traxster Robot. ☺



Appendix

A1 – Serializer Pinout



A2 – Recommended Batteries

Battery Combos: These batteries connect directly to the included wiring harness.

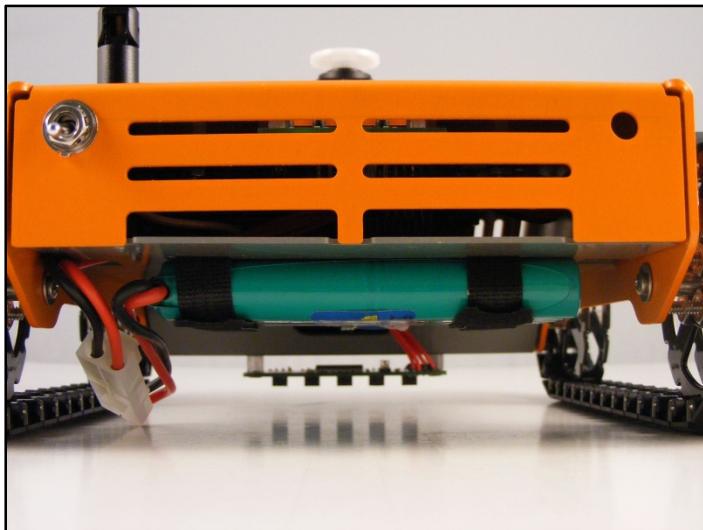
9.6V 2200mAH NiMH Batteries – BatterySpace.com

Battery Holders: These holders offer an alternative solution to the batteries above. However, it will require soldering the correct Tamiya battery connector to the holder to be compatible with the wiring harness. They will also reduce the amount of ground clearance.

[Digi-Key](#): 8 AA Cells (9.6V total) – [Catalog Page](#) [Product Diagram](#)

A3 – Additional Accessory Mounting Points

The Traxster II was designed to accommodate a few additional accessories.



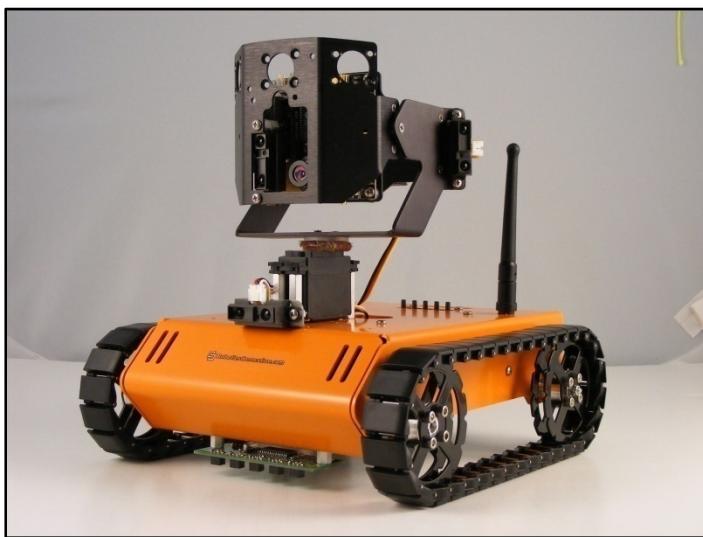
The rear of the Traxster features horizontal slots that can be used to mount various accessories, and has holes for two power switches.

The slots provide an ideal place to bolt a recharging circuit. You could then back up your Traxster to a wall mounted, or free standing charging system.



The front vertical slots can be used to mount additional accessories, such as sensors and/or Sumo blades/bumpers.

You can also mount bump sensors as well.



The pan servo can be used to mount one of our CMUcam2/2+/3 Turrets, or one of our Sharp IR Panners.