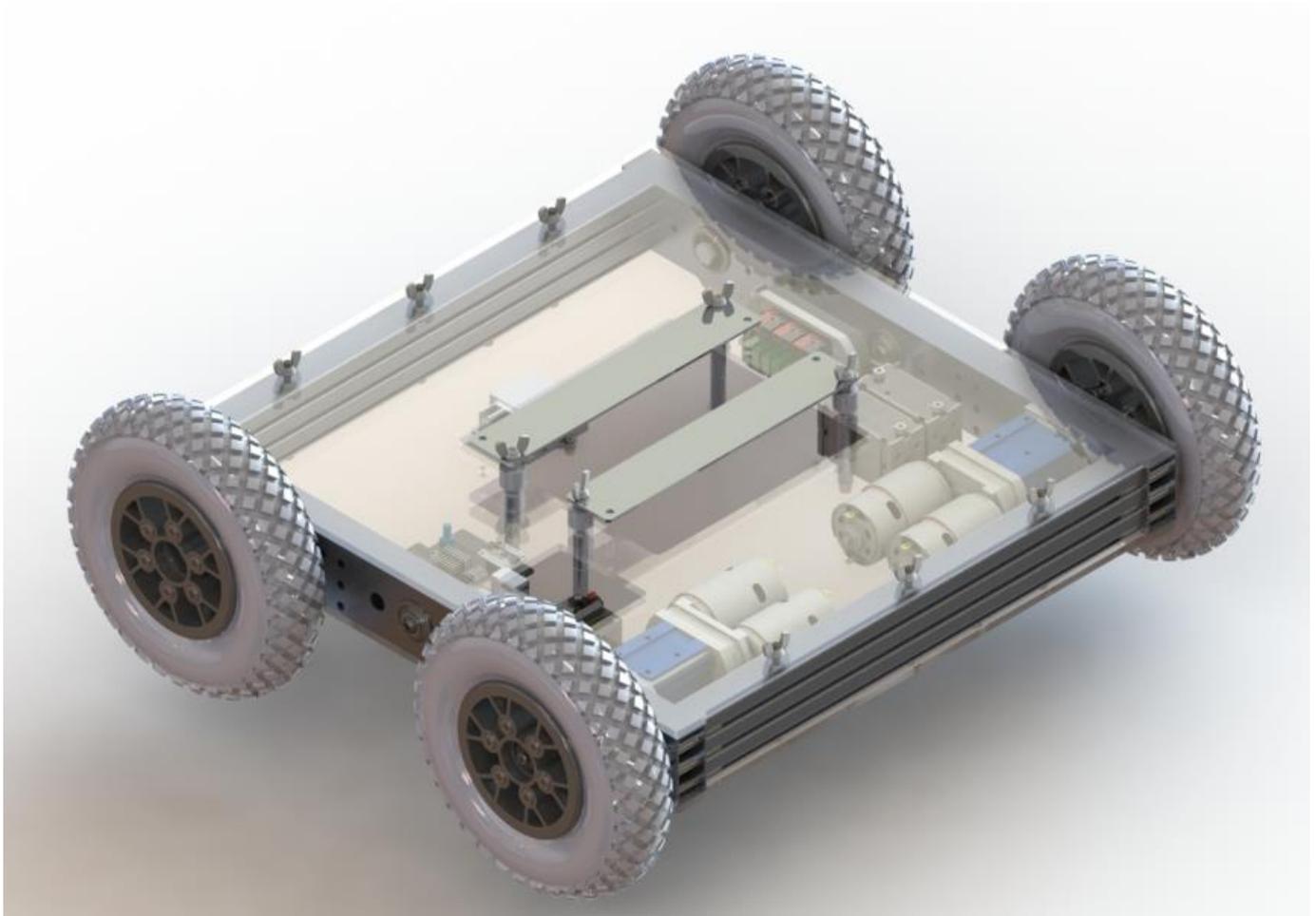




# User Guide

*Rover 8" Pneumatic Drive (am-4100a\_PN8)*



## **Additional Instructions Available**

We encourage customers to seek product information at **AndyMark.com**, contact us via e-mail at **support@andyMark.com**, or call Toll-Free **877-868-4770** with questions about any of our products.

## **Update History:**

10-04-19: Initial Release

12-27-19: Revised Electrical Layout

03-20-20: Updated BoM and relevant parts in various steps

10-21-22: Updated BoM, revised electrical layout, altered instructions.

## **Rover Chassis Recommended Hand Tool List (not included)**

<b>Component</b>	<b>Part Number</b>	<b>QTY</b>	<b>Part Photo</b>
3/16" Allen Driver	am-2752	1	
Fold Up 12 Set Hex	am-3864	1	
5.5mm Nut Driver	am-1287	1	
3/8 in Nut Driver	am-3877	1	
7mm Combination Wrench	am-4140	1	
3/8"-7/16" Open End Wrench	am-2745	1	
DarkSoul #25 Chain Break	am-4024	1	
Retaining Ring Pliers	am-4013	1	
PowerPle Crimper	am-4202	1	
Hand Rivet Tool	am-2834	1	
Ferrule Crimp Tool	am-3739	1	
1/4 Inch Drill Bit	am-4048	1	

## 8" Pneumatic Wheel Assembly Bill of Materials (am-4100a mPN8)

Component	Part Number	QTY	Part Photo
RedLine Motor with 16 Tooth Pinion Gear Installed	am-3775a_16t	4	
Sport Two Motor Gearbox With No Shaft	am-3984	2	
57 Sport 3 Inch Shaft	am-3791	2	
57 Sport Gearbox, 16:1, SD	am-3972_016	2	
2 Motor Sport Gearbox Pinion Shaft	am-3988	2	
57 Sport Flange Mount	am-4132	2	
10-32 x 0.5 Inch Button Head Cap Screw	am-1512	4	
Red Tacky Grease, 14.2 gram	am-2768	1	
Hub Half for 8" Pneumatic Wheel	am-0971_half	8	
4-40 x 1.0 Inch Pan Phillips Self-Tapping Screw, qty 6	am-1250	4	
Tire for 8 inch Pneumatic Wheel	am-0972	4	
Inner Tube for 8 inch Pneumatic Wheel	am-0973	4	
1/2 Inch Hex Hub	am-2568	4	
10-32 x 2.0 Inch Socket Head Cap Screw	am-1049	24	
Rover Drive Rail	am-4094	2	
1/2 Inch Hex Bore Bearing, Flanged	am-2986	10	
1/2 Inch E-Clip	am-0206	2	

#25 Single Strand Riveted Roller Chain, 10 Feet	am-0370	1	
17T Double Sprocket	am-3999	6	
Rover Wheel Shaft	am-4133	2	
Rover Idler Shaft	am-4126	2	
1/4-20 x 0.5 Inch Button Head Cap Screw	am-1039	6	
1/4 Inch Flat Washer	am-1027	6	
1/2 Inch Hex Spacer x 0.25 Inch	am-3948-250	6	
Rover End Rail	am-4131	2	
1/2 Inch Hex Spacer x 0.5 Inch	am-3948-500	4	
1/2 Inch Hex Spacer x 0.188 Inch	am-3948-188	2	
Rover Chassis Bottom Plate, Polycarbonate	am-4100a_bottom	1	
Rover Chassis Top Plate, Polycarbonate	am-4100a_top	1	

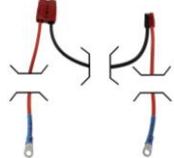
## **Shared Mechanical Hardware Bill of Materials (am-4100a mh)**

<b>Component</b>	<b>Part Number</b>	<b>QTY</b>	<b>Part Photo</b>
3/16 Inch Rivet, 0.376-0.5 Inch Range	am-1340	8	
1/4-20 x 1.75 Inch Self Tapping Screw	am-1372	24	
10-32 Nylock Jam Nut	am-1063	28	

#10 x 0.75 Inch Fender Washer	am-1523	2	
10-32 x 0.375 Inch Socket Head Cap Screw	am-1359	4	
0.375 in. OD x 0.257 in. ID x 0.875 in. Aluminum Spacer	am-1513	16	
10-32 x 0.625 Inch Socket Head Cap Screw	am-1007	4	
10-32 Wing Nut	am-1483	10	
10-32 x 2.75 Inch Socket Head Cap Screw	am-1397	6	
10-32 0.375IN OD x 1.000IN Long Aluminum Spacer	am-3876	8	
10-32 0.5IN Aluminum Spacer	am-3720	8	
1032 x 3.5IN Long Socket Head Cap Screw	am-1402	4	
AM14U Family Horizontal Battery Mount Strap Plate	am-2940	2	
10-32 x 0.5IN Button Head Cap Screw	am-1512	4	

## Electronics Bill of Materials (am-4100a elec)

Component	Part Number	QTY	Part Photo
PowerPole Distribution Board	am-3699a_NF	1	
Victor SPX Motor Controller	am-3748	4	
120A Circuit Breaker	am-0282	1	
20 AWG White Ferrule Crimp	am-3738_20	4	

30 Amp Resettable Fuses	am-4112	4	
5 Amp Resettable Fuse	am-4822	1	
Rover Chassis Power Cable	am-4113	1	
12 Gauge Red Black Bonded Wire	am-0904-5	5 ft	
Powerpole Kit, 8 Pack	am-2198	2	
Female Spade Connector, 12-10 AWG, Yellow, 10 Pack	am-2211	1	
S3 Battery Mount	am-3687	1	

## **Universal Drive Control System Bill of Materials (am-4708)**

<b>Component</b>	<b>Part Number</b>	<b>QTY</b>	<b>Part Photo</b>
Logitech F710 Gamepad	am-4049	1	
USB Host Module	am-3040	1	
Universal Drive Control System	am-4707	1	

## **Electrical Hardware Bill of Materials (am-4100a mh)**

<b>Component</b>	<b>Part Number</b>	<b>QTY</b>	<b>Part Photo</b>
4-40 x 0.5IN Socket Head Cap Screw	am-1136	6	
4-40 Nylock Nut	am-1139	6	
M4-0.7 DIN 985 Nylock Nut	am-1435	4	
M4-0.7 x 50mm Socket Head Cap Screw	am-1401	4	
1/4-20 Nylock Nut	am-1015	2	
1/4-20 x 1IN Socket Head Cap Screw	am-1341	2	
6-32 x 0.5IN Hex Head Cap Screw	am-1563	2	
6-32 Nylock Jam Nut	am-1419	2	

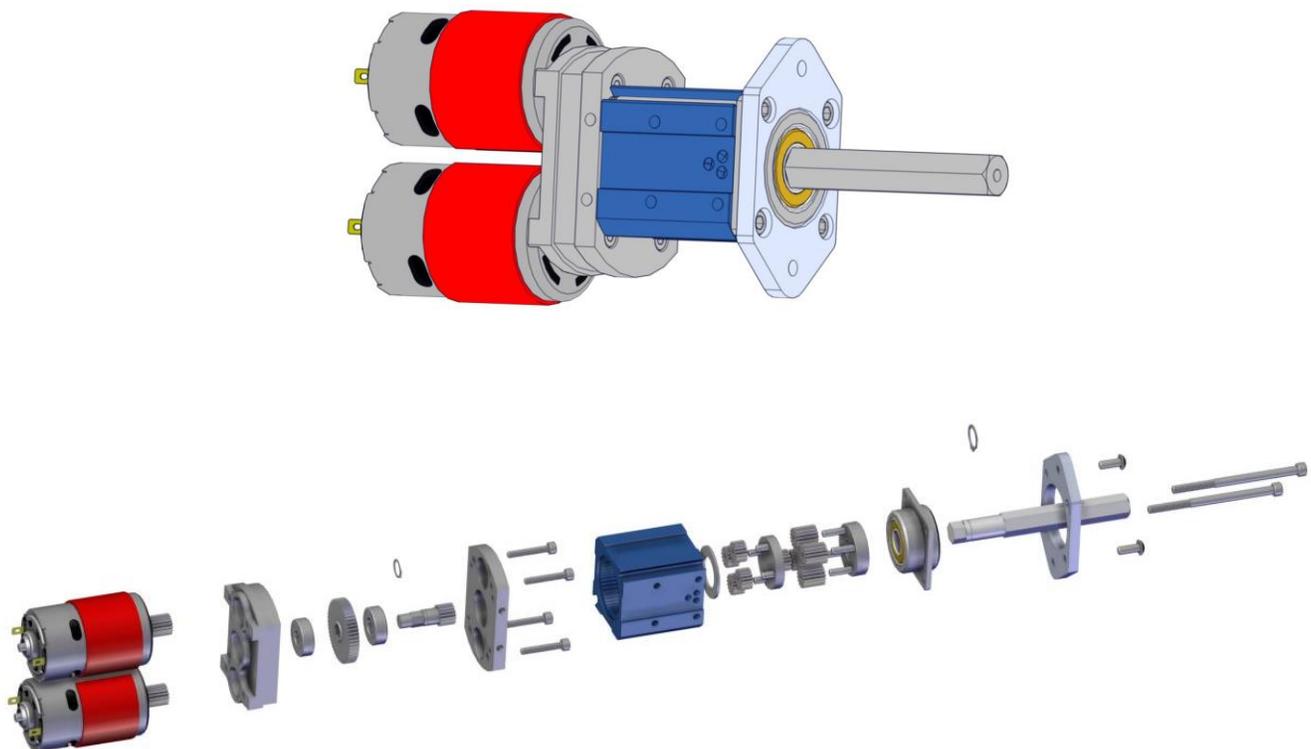
## Gearbox Assembly Instructions (QTY 2)

Each Rover 8" Pneumatic Chassis includes two (2) AndyMark Dual 775 Sport Gearboxes in a 52:1 ratio (am-4010\_52). Four (4) AndyMark 775a RedLine Motors with 16t Pinions (am-3775a\_16T) are also included along with the hardware necessary to mount the motors to the gearboxes. Additionally, a 57 Sport 3 inch Shaft (am-3791) is included for each gearbox to allow for the cantilevered wheel setup utilized in the Rover Chassis.

The 52:1 ratio has been chosen specifically for use with the 8" pneumatic wheels to provide a fast and agile platform to build upon. Other ratios or wheel sizes (sold separately) can be used on the Rover chassis to suit your specific needs.

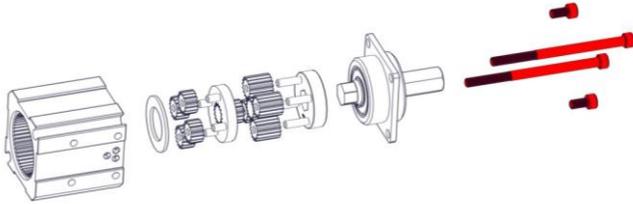
Dual 775 Sport									
Part #	Ratio	Weight	Length	Rated Torque	Stall Torque	Free Speed	Wheel Speed		
							4in.	6in.	8in.
am-4010_013	13:1 SD	1.26 lbs	3.62 in.	120 ft-lbs	18.20 ft-lbs	1616.92 rpm	28.22 ft/sec	42.33 ft/sec	56.44 ft/sec
am-4010_039	39:1 HD	1.56 lbs	4.37 in.	170 ft-lbs	54.60 ft-lbs	538.97 rpm	9.41 ft/sec	14.11 ft/sec	18.81 ft/sec
am-4010_052	52:1 HD	1.57 lbs	4.37 in.	160 ft-lbs	72.80 ft-lbs	404.23 rpm	7.06 ft/sec	10.58 ft/sec	14.11 ft/sec
am-4010_065	65:1 HD	1.58 lbs	4.37 in.	140 ft-lbs	91.00 ft-lbs	323.38 rpm	5.64 ft/sec	8.47 ft/sec	11.29 ft/sec
am-4010_117	117:1 HD	1.77 lbs	4.87 in.	170 ft-lbs	163.80 ft-lbs	179.66 rpm	3.14 ft/sec	4.70 ft/sec	6.27 ft/sec
am-4010_156	156:1 HD	1.80 lbs	4.87 in.	170 ft-lbs	218.40 ft-lbs	134.74 rpm	2.35 ft/sec	3.53 ft/sec	4.70 ft/sec
am-4010_208	208:1 HD	1.78 lbs	4.87 in.	160 ft-lbs	291.20 ft-lbs	101.06 rpm	1.76 ft/sec	2.65 ft/sec	3.53 ft/sec
am-4010_260	260:1 HD	1.80 lbs	4.87 in.	140 ft-lbs	364.00 ft-lbs	80.85 rpm	1.41 ft/sec	2.12 ft/sec	2.82 ft/sec
am-4010_325	325:1 HD	1.80 lbs	4.87 in.	140 ft-lbs	455.00 ft-lbs	64.68 rpm	1.13 ft/sec	1.69 ft/sec	2.26 ft/sec

\*Stall Torque and Free Speed are calculated using the unmodified specs of a pair of AndyMark 775a RedLine Motors

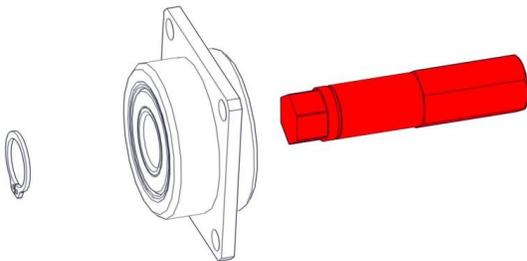


## Gearbox Assembly Instructions (QTY 2)

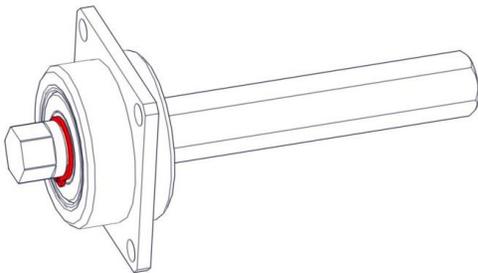
**Step 1:** The 57 Sport gearbox is pre-assembled with a cap on the back. Remove the four (4) #10-32 Socket Head Cap Screws from the front of the gearbox and carefully remove all components, being careful to keep them together. The plastic cap can be discarded.



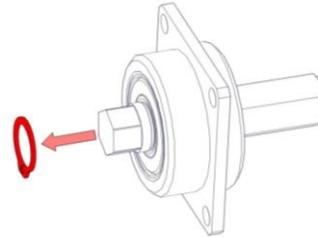
**Step 3:** Remove the output shaft by pulling it through the front of the face plate and bearings.



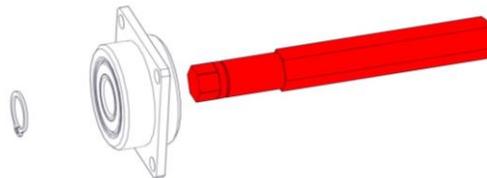
**Step 5:** Replace the snap ring on the new shaft. Be careful to not permanently deform the snap ring by opening it too wide. It should snap into the groove on the output shaft around the full circumference.



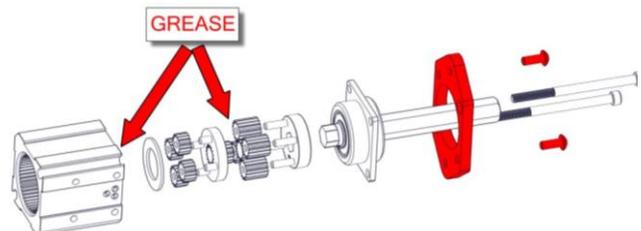
**Step 2:** The short output shaft needs to be replaced with the longer 3 inch output shaft. Using a pair of snap ring pliers, remove the snap ring from the backside of the face plate. Be careful not to permanently deform the snap ring by opening it too wide.



**Step 4:** Insert the new 57 Sport 3 inch Shaft (am-3791) into the faceplate. Be sure to push the shaft all the way in until it rests against the outer bearing and make sure the inner bearing remains seated in the faceplate.

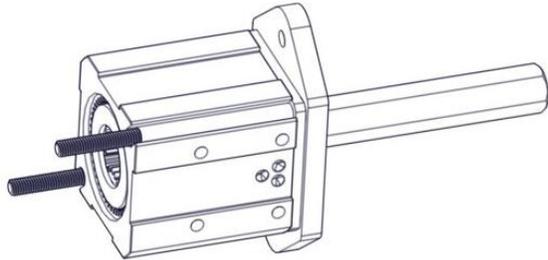


**Step 6:** Reassemble the 57 Sport Gearbox using two (2) #10-32 x 0.5 inch long Button Head Cap Screws (am-1512) in place of the 0.375 inch long Socket Head Cap Screws to add the 57 Sport Flange Mount (am-4132) to the front face of the gearbox – the screws will be used in the pair of counter-bored holes on the flange plate. Add a pea-sized amount of Red Tacky Grease (am-2768) to each planet gear and the carrier plate surfaces. Enough grease should be used so that all internal surfaces get a coating of grease; however, too much grease can cause the gearbox to drag. The original 3" long screws will fit through the Flange Mount Plate.

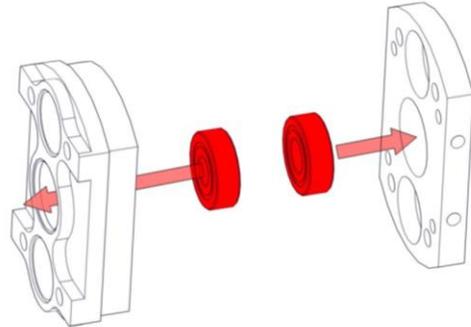


## Gearbox Assembly Instructions (QTY 2)

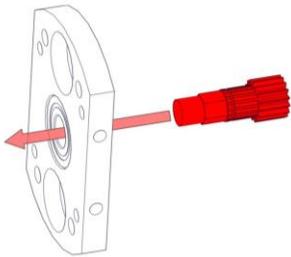
**Step 7:** The 57 Sport Gearbox Assembly is now complete. The Sport 2 Motor Gearbox and Motors will be assembled next. The long Socket Head Cap Screws will remain loose for now.



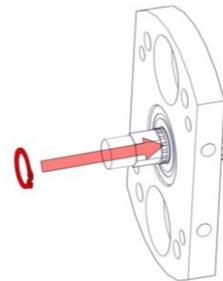
**Step 8:** The two plates for the Sport 2 Motor Gearbox should already have the bearings inserted but give them a light press to make sure they are fully seated.



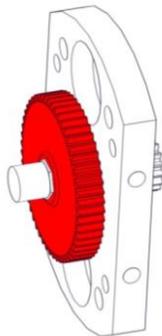
**Step 9:** Insert the 2 Motor Sport Pinion Shaft (am-3988) through the front plate and bearing from the side opposite where the bearing was pressed. Make sure to push the shaft all the way in until it rests against the bearing.



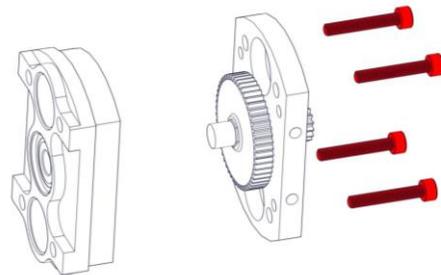
**Step 10:** Install the snap ring (included with the output shaft) on the shaft. Be careful to not permanently deform the snap ring by opening it too wide. It should snap into the groove on the output shaft around the full circumference.



**Step 11:** Install the 52T Hex Bore gear onto the hex portion of the output shaft. Make sure the boss of the gear is away from the snap ring (towards the inside of the gearbox).

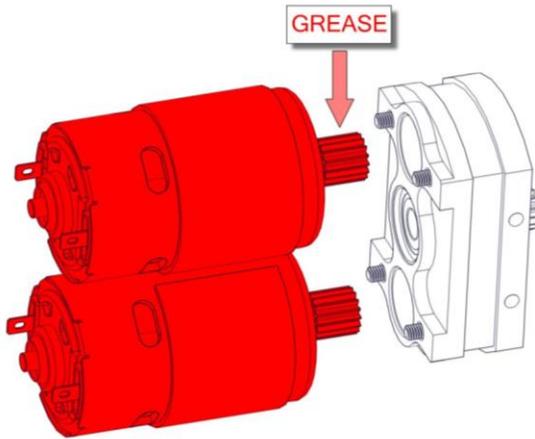


**Step 12:** Prepare the gearbox for the motors by inserting the four (4) M4x25 Socket Head Cap Screws (included with the gearbox) through both the front plate and back plate and closing up the gearbox. The Back Plate bearing should slide onto the protruding portion of the output shaft.

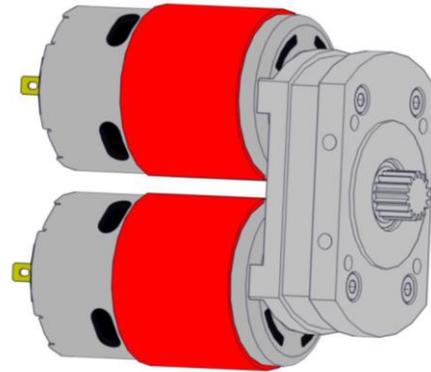


## Gearbox Assembly Instructions (QTY 2)

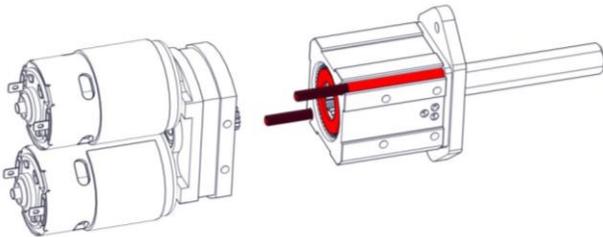
**Step 13:** Add grease to the 16T pinion gears on the 775a RedLine Motors before inserting the motors into the back of the gearbox.



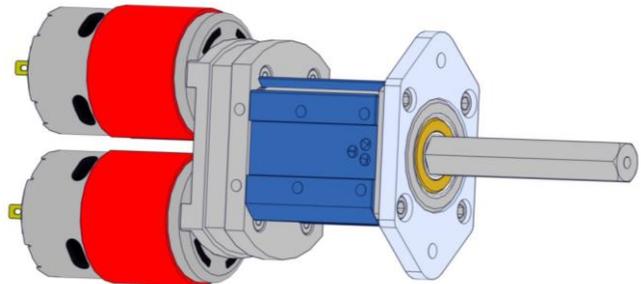
**Step 14:** Line up the motors with the bolts and insert the boss of the motor into the void on the back plate of the gearbox. Tighten the four (4) M4x25 Socket Head Cap Screws to complete the Two Motor Sport Gearbox Assembly.



**Step 15:** Join the 57 Sport Gearbox and the Two Motor Sport Gearbox together using the #10-32 x 3.0 inch Socket Head Cap Screws. Make sure the thrust washer is seated in the ring gear flush against the planet gears before mating the two housings.

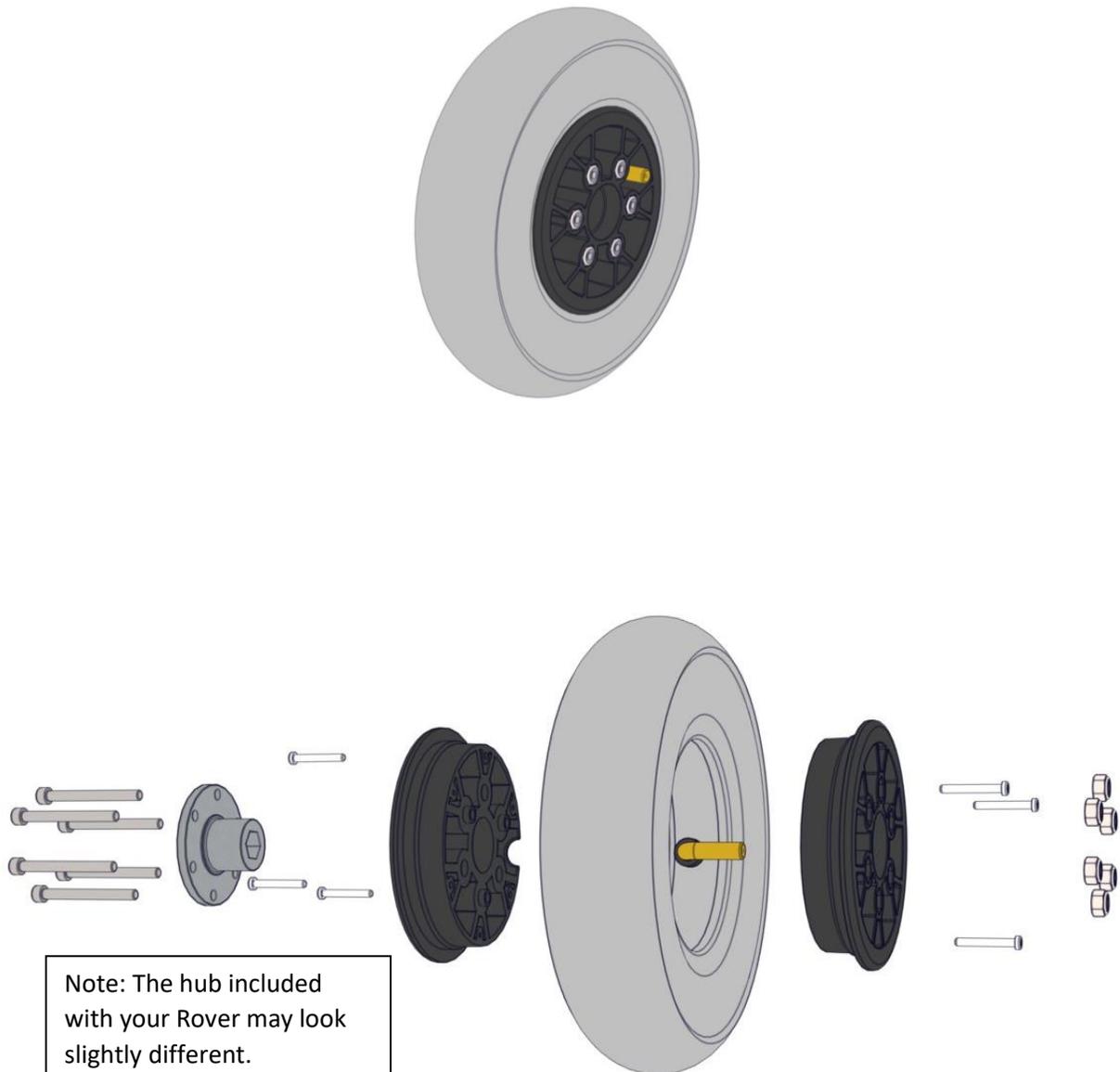


**Step 16:** Congratulations, you now have a completed gearbox assembly. Repeat Steps 1 – 15 to complete a second identical gearbox.



## Wheel Assembly Instructions (QTY 4)

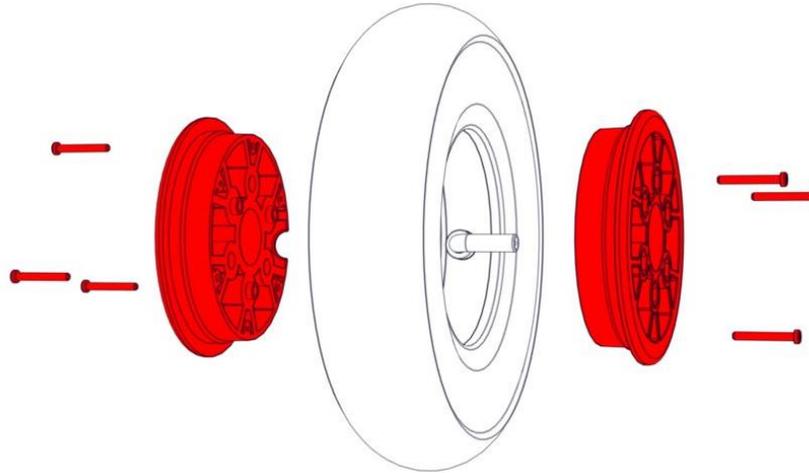
The Rover 8" Pneumatic Chassis includes four (4) high-traction wheels with a grippy rubber tire, a pneumatic inner tube, and a strong plastic hub. The nominal diameter for this wheel is actually 7.65 inch when inflated normally. When assembling the tube within the two hub halves, be careful not to pinch the tube rubber between the plastic hub halves. If assembled with the tube pinched between the hub halves, the tube may puncture and leak. These wheels will be assembled together with a ½" hex hub to be driven by the output shafts of the previously assembled gearboxes and to ride on a chain driven shaft.



## Wheel Assembly Instructions (QTY 4)

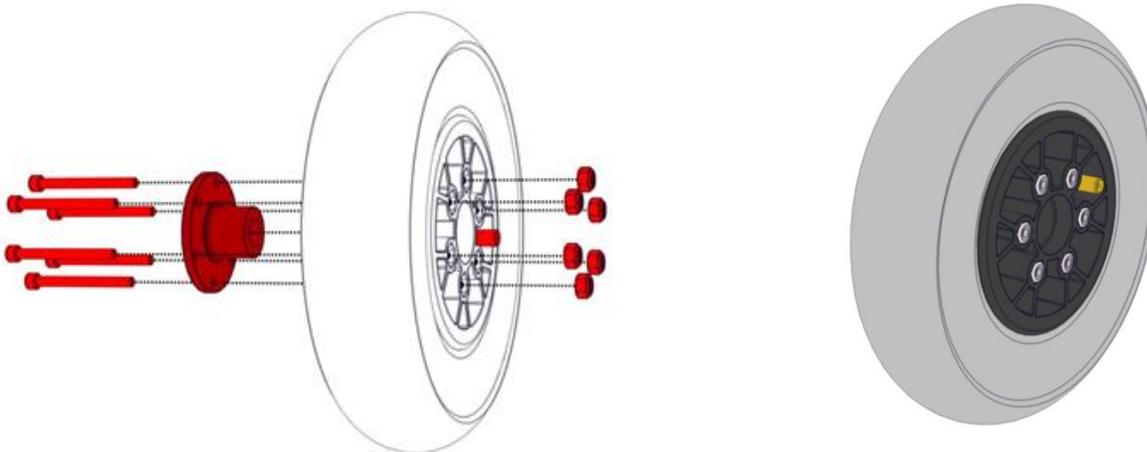
**Step 1:** Insert the Inner Tube for 8 inch Pneumatic Wheel (am-0973) into the Tire for 8 inch Pneumatic Wheel (am-0972). Partially inflating the Inner Tub may help hold it in position.

**Step 2:** Install two (2) of the Hub Half for 8 inch Pneumatic Wheel (am-0971\_half) into the wheel with the valve stem going through the opening in the hubs. Use six (6) #4-40 x 1 Inch Phillips Self-Tapping Screws (am-1250) to join the two hubs together, three (3) from each side in alternating holes.



**Step 3:** Using six (6) #10-32 x 2 inch Socket Head Cap Screws (am-1049) and six (6) #10-32 Nylock Jam Nuts (am-1063), attach a ½ Inch Hex Hub (am-2568) to the wheel. The hub will protrude partially through the center of the wheel and should be installed from the side opposite the valve stem.

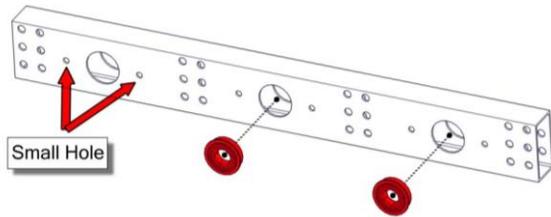
**Step 4:** Congratulations, you now have a completed wheel assembly. Repeat Steps 1 – 3 three (3) more times to complete a total of four (4) wheels.



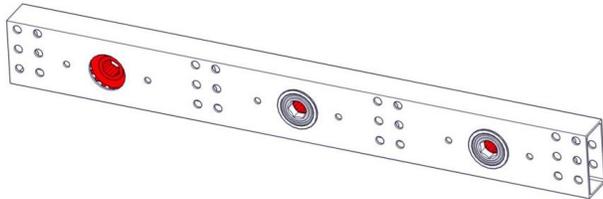
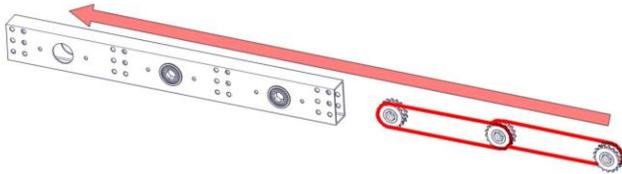
**Step 5:** Inflate the wheels to a maximum pressure of 35 psi.

## Chassis Assembly Instructions

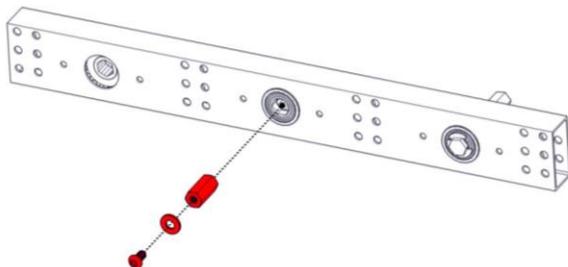
**Step 1:** Into one of the Rover Drive Rails (am-4094), press two ½ Inch Flanged Hex Bearings (am-2986) into the face with the small holes adjacent to the bearing holes. One bearing should go into the middle hole and the other into the front hole (to the right when looking at this face of the tube). **Note:** The twenty-four (24) End Rail holes are not centered vertically on the tube and should be biased toward the top of the tube.



**Step 3:** Slide the sprocket/chain assembly into the tube. It helps to hold the tube vertically and lower the sprocket/chain assembly in from above using the weight of the sprockets to keep the chain taut.



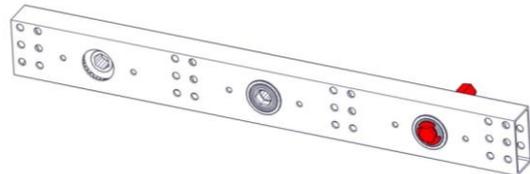
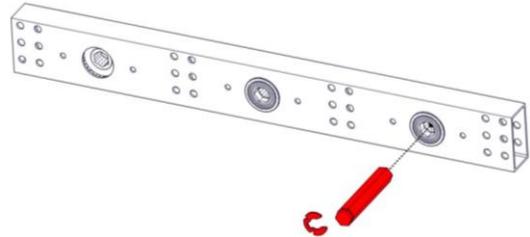
**Step 5:** Insert a Rover Idler Shaft (am-4126) into the center bearing and sprocket. Use a ¼" Washer (am-1027) and a ¼-20 x 0.5 inch Button Head Cap Screw (am-1039) to retain the shaft on this side of the tube.



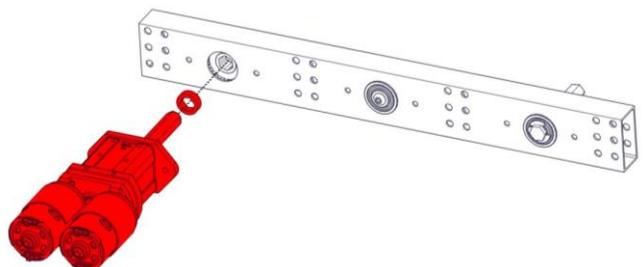
**Step 2:** Create two loops of #25 Chain (am-0370) with 64 pins in each. This can be done with a DarkSoul #25 Chain Break (am-4024) (sold separately) or with a traditional chain break and a #25 Connecting Link for Roller Chain (am-0371) (sold separately). Loop the pair of chains around three (3) 17T Double Sprockets (am-3999).



**Step 4:** Add a ½ Inch E-Clip (am-0206) to a Rover Wheel Shaft (am-4133) and slide the shaft through the front bearing and sprocket until the E-Clip is against the bearing.

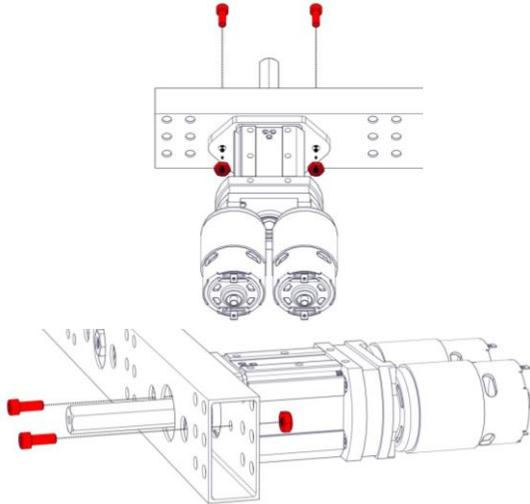


**Step 6:** Place a 0.25 inch long Hex Spacer (am-3948-250) onto the output shaft of an assembled gearbox and slide the output shaft through the rear sprocket and tube from the same side as the previous shafts.

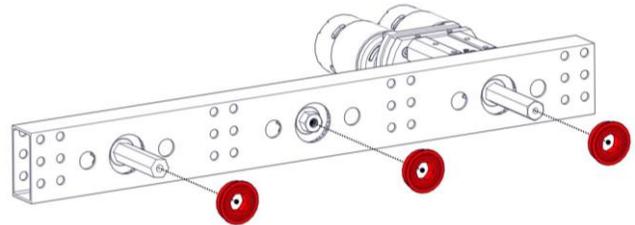


## Chassis Assembly Instructions

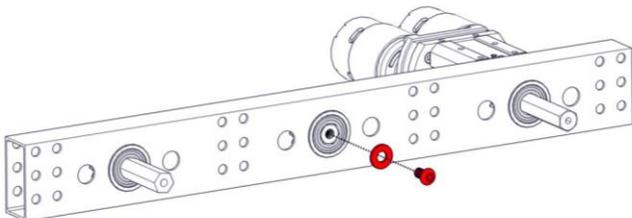
**Step 7:** Use two (2) #10-32 x 0.625 inch Socket Head Cap Screws (am-1007) on the inner wall and #10-32 Nylock Jam Nuts (am-1063) to attach the gearbox to the tube.



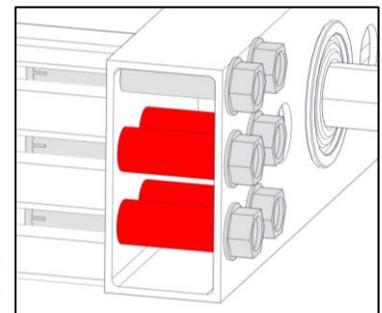
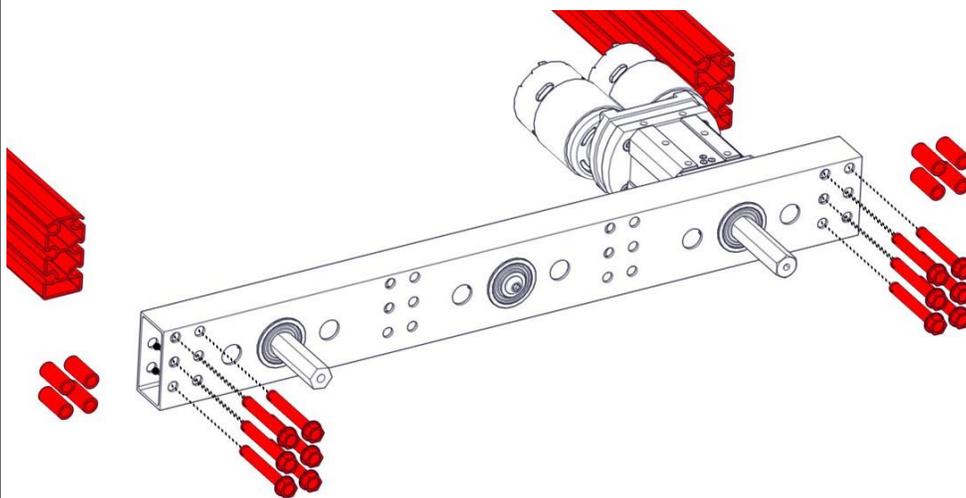
**Step 8:** On the opposite face of tube, add three (3) more ½" Hex Bearings (am-2986). Align the hex to slide onto the shafts and press the bearings into the holes of the tube. You may need to gently tap the bearings into plate to fully seat – be sure to use something, such as a short piece of PVC pipe, to ensure any force is being applied to the outer race of the bearing only.



**Step 9:** Add a ¼" Washer (am-1027) and a ¼-20 x 0.5 inch Button Head Cap Screw (am-1039) to the middle Rover Idler Shaft (am-4126) to capture it completely.

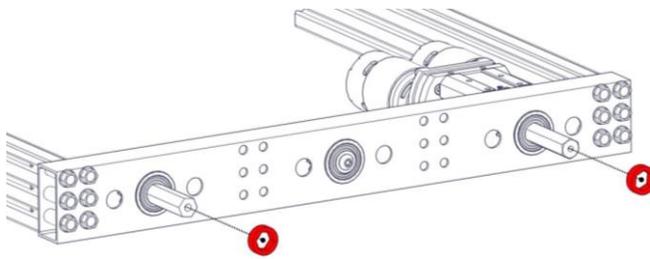


**Step 10:** Using twelve (12) ¼-20 x 1.75 inch Self-Tapping Screws (am-1372), join the Rover Drive Rail Assembly to two Rover End Rails (am-4131). The Rover End Rails will have the rounded face towards the top to ensure the top and bottom faces of all three rails are flush. Use eight (8) 0.375 inch OD x 0.875 inch long Aluminum Spacers (am-1513) inside the Rover Side Rail with the screws that are not adjacent to the top wall to prevent crushing the tube.

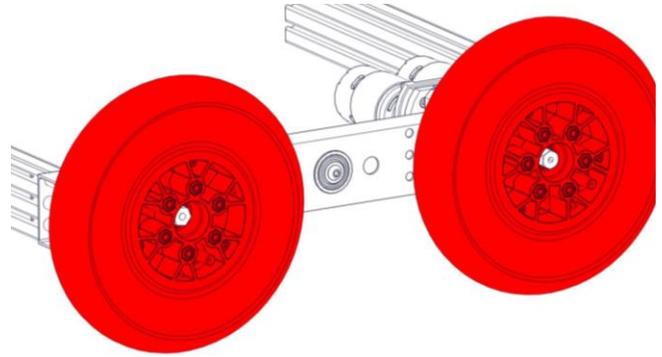


## Chassis Assembly Instructions

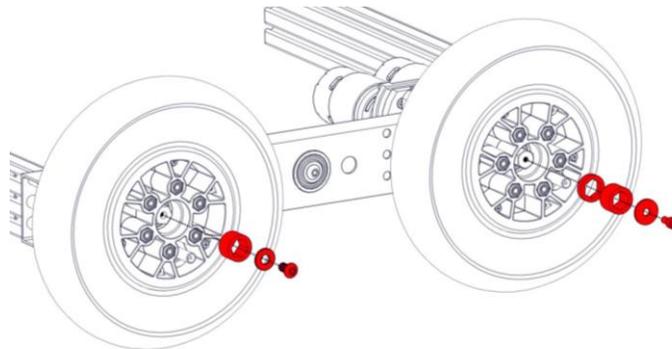
**Step 11:** Place a 0.25 inch long Hex Spacer (am-3948-250) onto each of the two drive shafts.



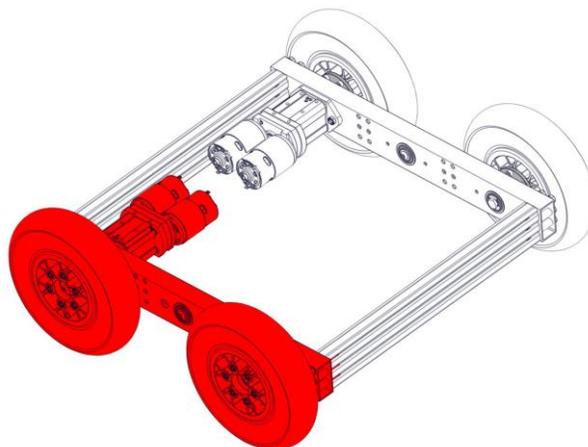
**Step 12:** Place a completed wheel assembly onto each of the two drive shafts. The hub should be adjacent to the spacer and the valve stem should be away from the Side Rail.



**Step 13:** Place a 0.5 inch long Hex Spacer (am-3948-500) onto each of the two drive shafts. Place an additional 0.188 inch long Hex Spacer (am-3948-188) onto the output shaft of the gearbox. Capture the wheel on the Rover Wheel Shaft with a 1/4-20 x 0.500 inch Button Head Cap screw (am-1039) and a 1/4 inch Washer (am-1027). Capture the wheel on the gearbox output shaft with a #10-32 x 0.375 inch long Socket Head Cap Screw (am-1359) and a #10 Washer (am-1523).

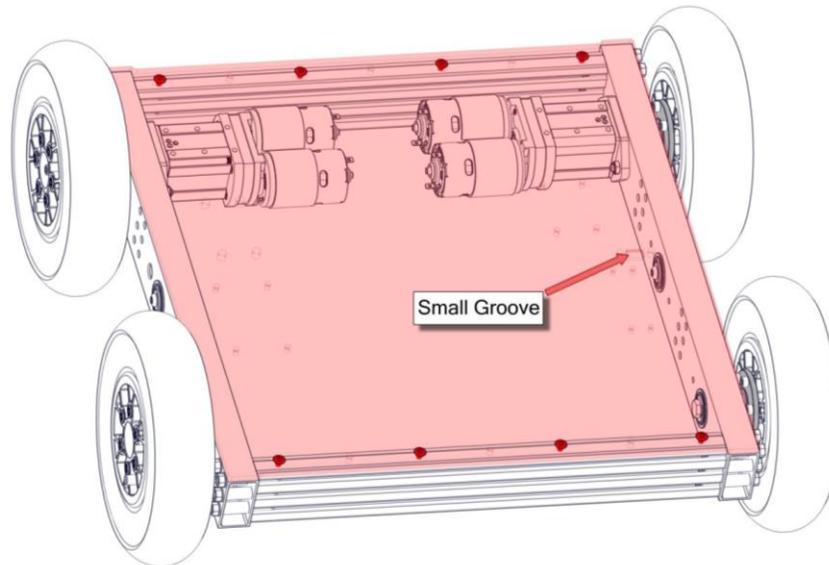


**Step 14:** Repeat Steps 1-13 to build the other half of the chassis. Be sure to mirror the assembly left-to-right and orient the Rover Side Rail such that the 24 End Rail holes are in the same vertical orientation as the previous assembly.

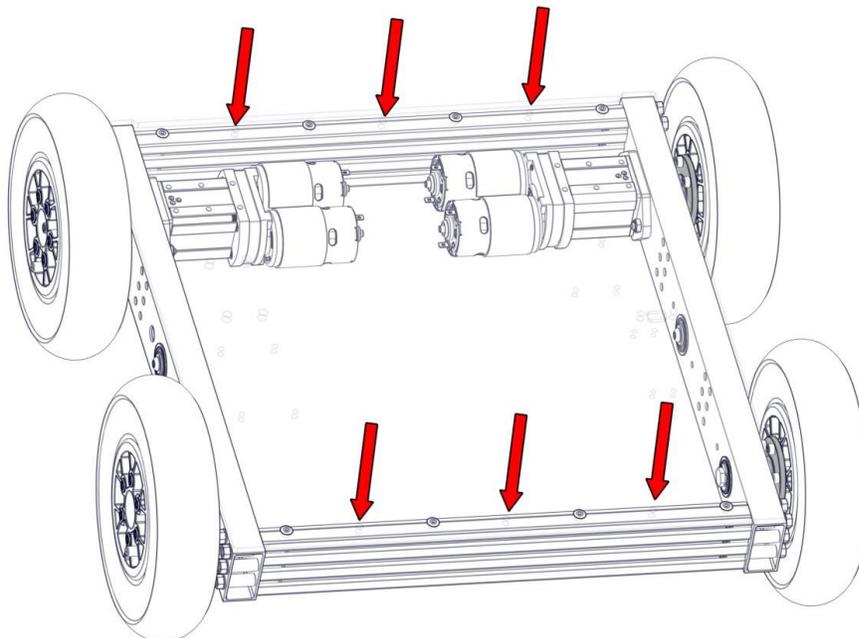


## Chassis Assembly Instructions

**Step 15:** With the rounded edges of the Rover End Rails still on top, place the Rover Chassis Bottom Plate (am-4100a\_bottom) on top of the four rails oriented as shown below (the small groove should be on the bottom face on the right, as seen below). Rivet the Bottom Plate in place using eight (8) 3/16 inch Rivets (am-1340) in the four corner holes and every alternate hole in-between.



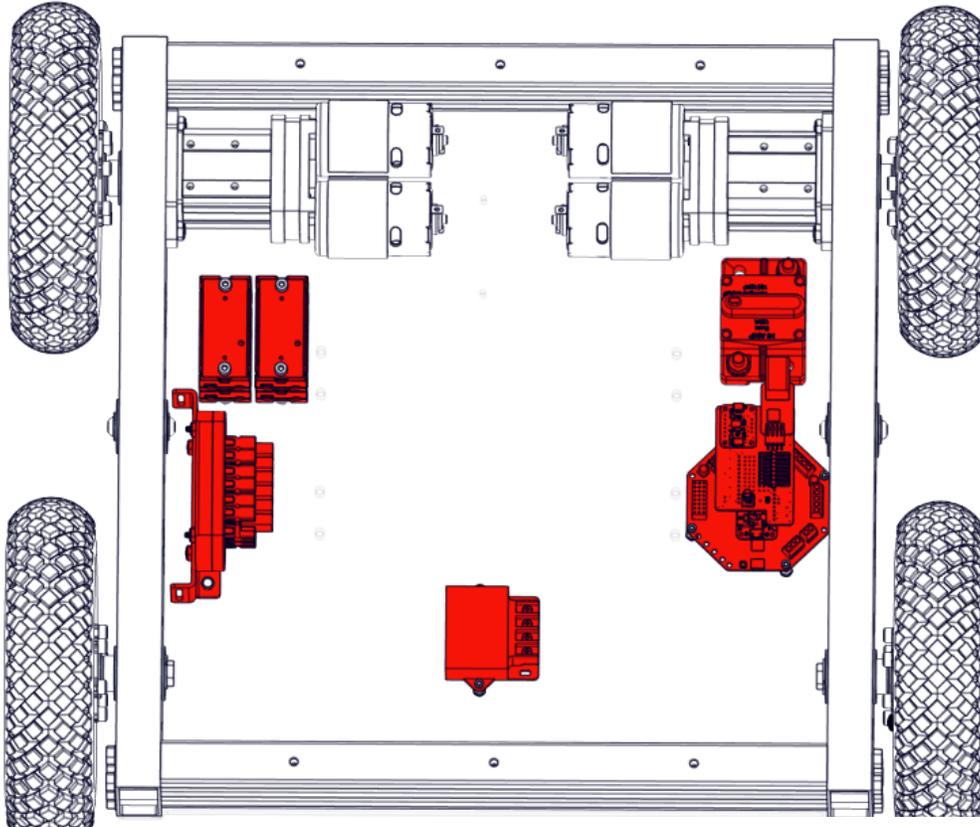
**Step 16:** The six (6) remaining holes along the End Rails should align with the through-holes in the End Rails but may need to be drilled out to ensure a bolt may pass through.



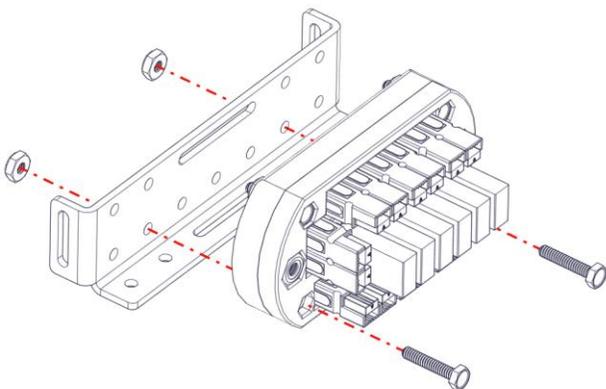
**Step 17:** Flip your chassis over and you have completed the assembly of the Rover 8" Pneumatic Chassis. Electronics will be added in the following section. You may skip to Step 19 of the Electronics Assembly when assembling only the mechanical portion of the chassis or using a custom electronics package.

## Electronics Assembly Instructions

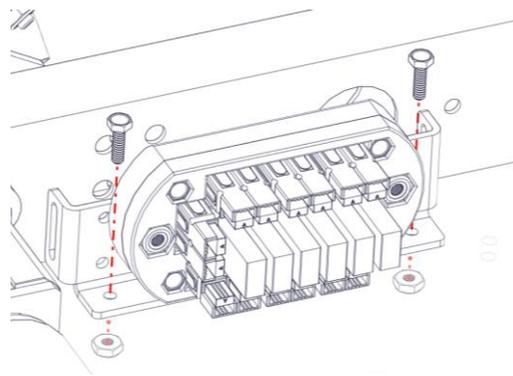
**Step 1:** The Rover 8" Pneumatic Chassis is designed to use four (4) Victor SPX (am-3748) speed controllers and a Universal Drive Control System (am-4707). The Rover Chassis Bottom Plate (am-4100a\_bottom) has mounting holes for all pre-selected components. The following steps cover how and where to install the components but wires have been removed from the images for clarity. A full wiring diagram can be found at the end of this section.



**Step 2:** Mount the PowerPole Distribution Board (am-3699a) to the S3 Battery Mount (am-3687) using the 6-32 Socket Head Cap Screws and 6-32 Nylock Nuts included with the Distribution Board Kit, as shown below.



**Step 3:** Mount the PowerPole Distribution Board assembly to the top of the Bottom Plate using four (2) 0.5IN 6-32 Socket Head Cap Screws (am-1563) and 6-32 Nylock Nuts (am-1419) on the underside of the Bottom Plate.

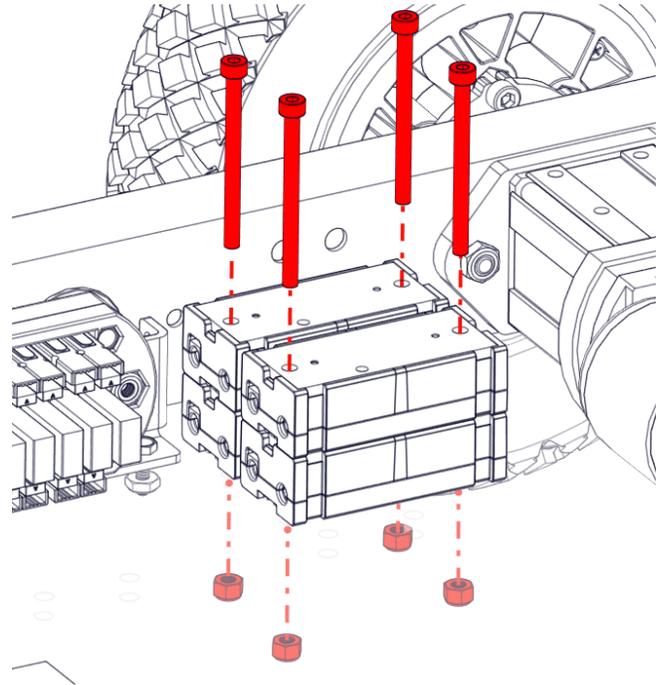


## Electronics Assembly Instructions

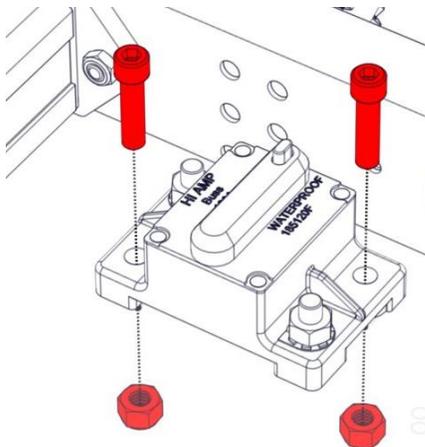
**Step 4:** Add PowerPoles (am-2198) to the four power leads on each Victor SPX. Red PowerPoles should be added to the Red and White leads and black PowerPoles should be added to the Black and Green leads. A PowerPole Crimp Tool (am-4202) (sold separately) should be used to ensure a proper crimp.



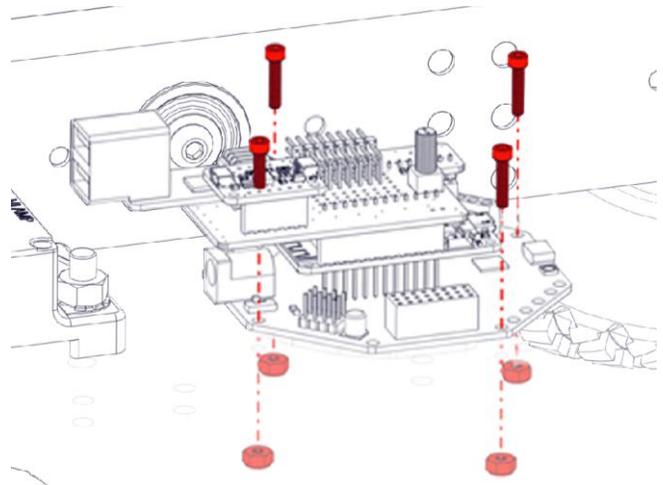
**Step 5:** Add four (4) Victor SPX Speed Controllers (am-3748) in two stacks of two with the PWM wires oriented facing towards the PWM Connector. Use four (4) M4x50 Socket Head Cap Screws (am-1401) and M4 Nylock Nuts (am-1435) to secure the controllers to the top of the Bottom Plate.



**Step 6:** Attach the 120A Circuit Breaker (am-0282) on the other side of the robot from the previous components using two (2) ¼-20 x 1.0 inch long Socket Head Cap Screws (am-1341) and ¼-20 Nylock Nuts (am-1015) on the underside of the Bottom Plate.

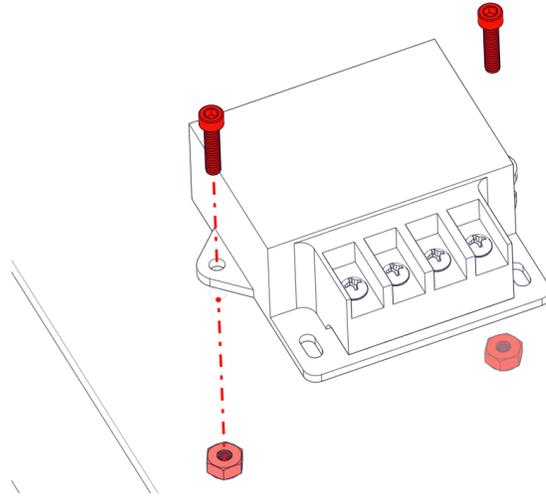


**Step 7:** Place the UDCS board (am-4707) on top of the standoffs with the USB-A ports toward the main breaker. Secure the UDCS using four (4) 4-40 Socket Head Cap Screws (am-1136) and 4-40 nuts (am-1139).



## Electronics Assembly Instructions

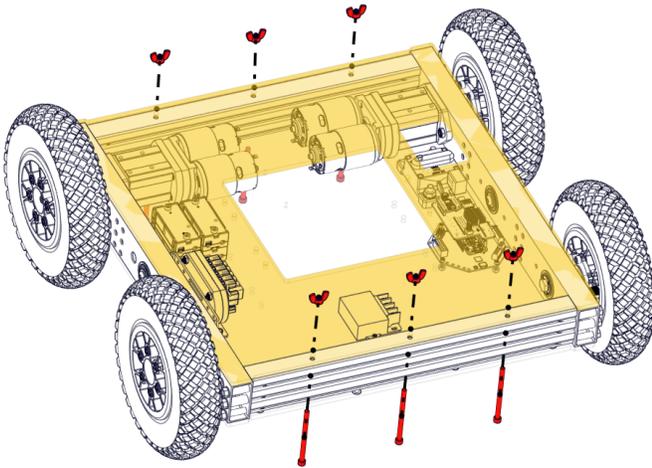
**Step 8:** Attach the DC 12V to 5V converter to the bottom plate via (2) 4-40 0.5IN socket head cap screws (am-1136) and (2) 4-40 nuts (am-1139). Point the wire inserts towards the UDCS board.



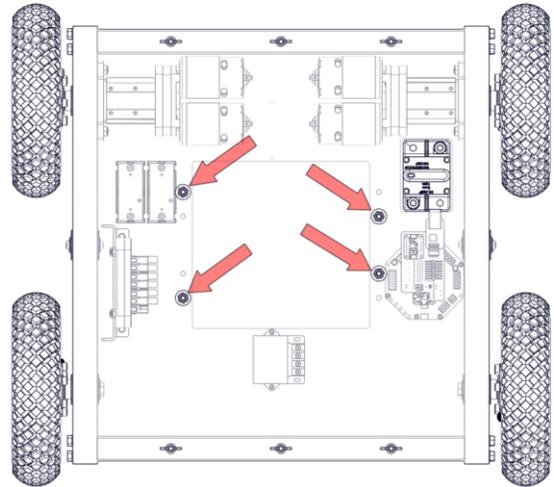
Now that all the electronics have been mounted properly, pause and carefully wire each component according to the wiring guide on **Page 22**. Make sure none of your wires cross through the center of the Rover where the battery will be positioned.

## Electronics Assembly Instructions

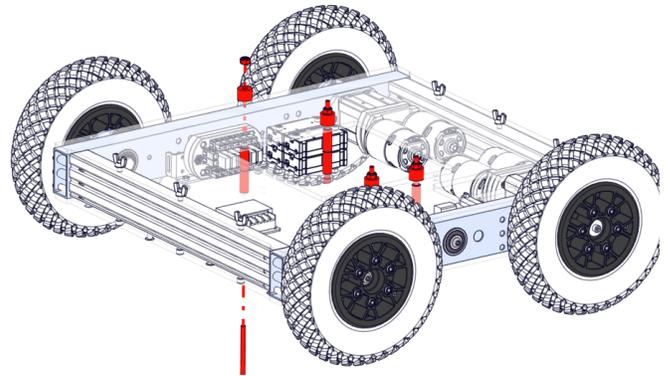
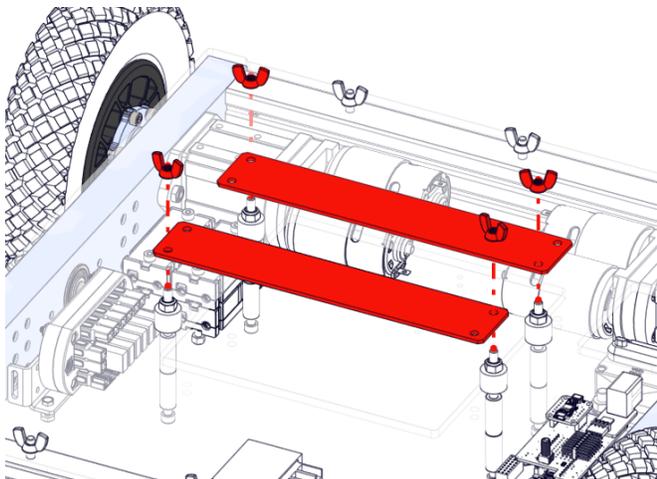
**Step 9:** With all of the wiring complete, the Rover Top Sheet (am-4100a\_top) can be attached using (6) 10-32 2.75IN socket head cap screws (am-1397) and (6) 10-32 wing nuts (am-1483).



**Step 10:** Run (4) 3.5IN 10-32 socket head cap screws through the center of the rover in the pattern shown. Place (8) 1IN 10-32 spacers between the top and bottom plates along the screws. Above the top plate, put (1) 0.5IN spacer on each screw and hold the assemblies together with (1) 10-32 nylock nut each.



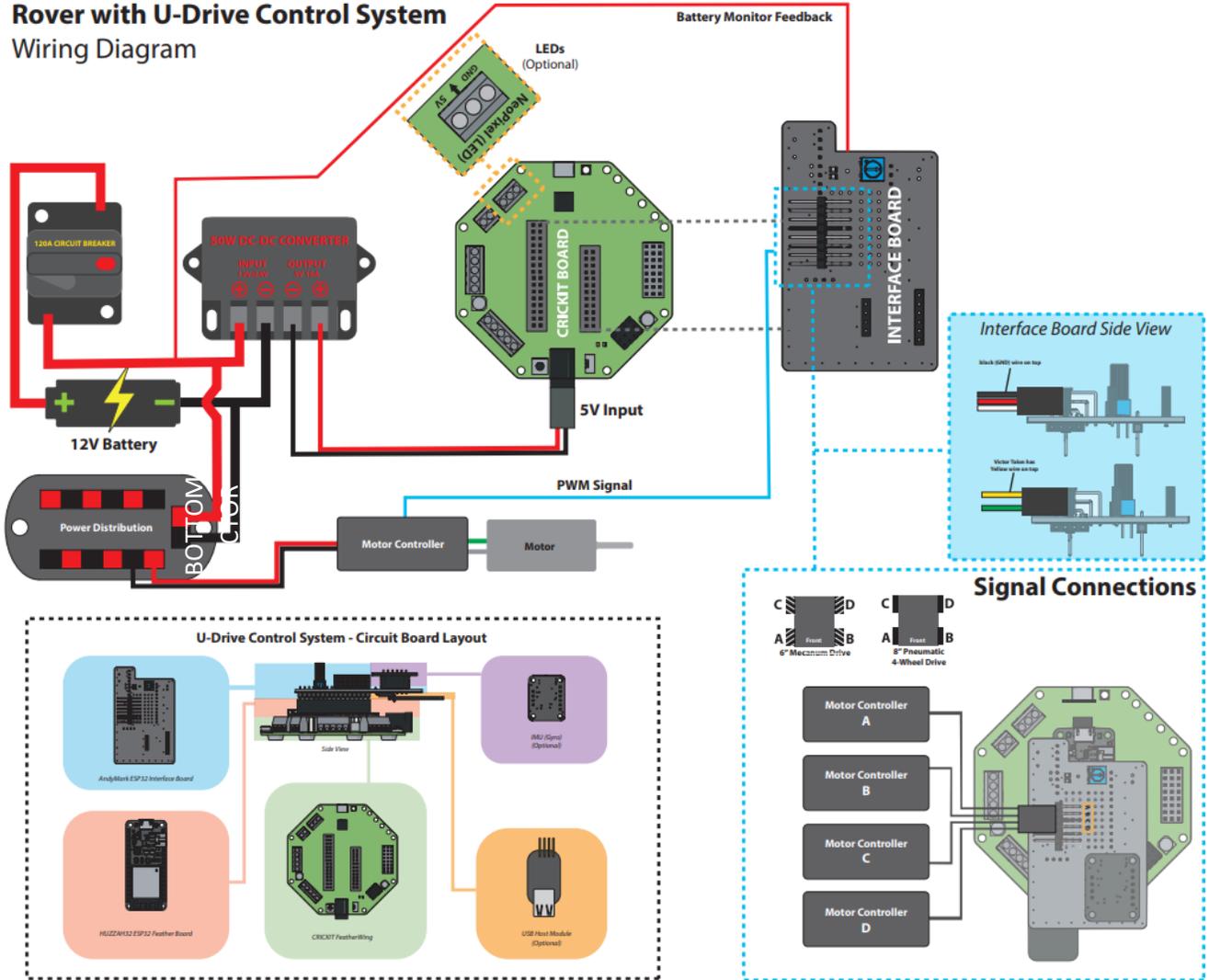
**Step 11:** When taking the battery in and out of the Rover, use (4) 10-32 wingnuts (am-1483) placed on the standoffs created in step 10 to hold down the (2) battery straps (am-2940) as shown.



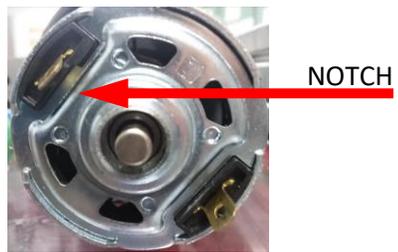
# Wiring Diagram

The following schematic shows where each wire should be connected and generally how the wires should be laid out in the Rover Chassis.

## Rover with U-Drive Control System Wiring Diagram



**RedLine Motor:** The back of the RedLine motor has a positive and negative terminal. The positive terminal is in the black plastic housing with a notch:



## Configurations

Rover is designed to use four (4) 8" Pneumatic Wheels but can be configured in other ways. Users can swap wheels to other sizes, including 4" and 6" wheels. With 4" wheels, a 6-wheel configuration is also possible. Users can even move the end rails inboard to create a frame opening or an H configuration. Some of these configurations will require additional custom components beyond what is included in the Rover kits. Below is an example of a center driven six-wheel drive with a front frame opening.

