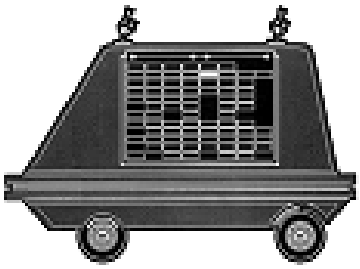


Scavenger MSE-6 Droid Build Guide

Droid Designed By
Mark Hammonds of USA
Andrew Cations of Australia

Build Guide By
Donald Allen of USA

Welcome to the Scavenger Workshop.

Congratulations on your choice to build the Scavenger MSE-6 Droid. This Droid platform is a collaboration between Mark and Andrew. They wanted a design that mostly used off the shelf components, was repeatable, and did not require expert knowledge or experience such as welding or design work. The result is the Scavenger MSE-6, a robust and powerful all aluminum “Mousezilla” style Droid. Please read this guide completely before ordering parts or starting assembly as some tips, tricks, and/or specs are listed throughout the guide.

This guide and the accompanying video on YouTube should help you along your journey to build your own Scavenger MSE-6. For more help visit the links below

THIS GUIDE IS INCOMPLETE AND CURRENTLY ONLY COVERS THE CHASSIS

Discord: https://discord.gg/TuxXhByRKh
Mouse Droid Builders Club Forum: https://forum.mousedroidbuilders.club
MDBC Forum Build Post:
Parts : https://forum.mousedroidbuilders.club/thread-1439.html
Frame: https://forum.mousedroidbuilders.club/thread-1438.html
Shell: https://forum.mousedroidbuilders.club/thread-1437.html

BUILD VIDEOS:

Unveiling the MSE droid: The No Weld Aluminum Frame
https://www.youtube.com/watch?v=RnwEcjvLOS0
Scavenger MSE Chassis deep dive
https://www.youtube.com/watch?v=v5Bwyl-6SIs
Scavenger MSE Chassis assembly tutorial
https://www.youtube.com/watch?v=lFkpY4xjTH4

PARTS LIST:

Xometry

https://www.xometry.com

Scavenger MSE Chassis DFX File

Vex Robotics

https://www.vexrobotics.com

2 x 4" Traction Wheel • SKU#: 217-2588 • $15.99
https://www.vexrobotics.com/traction-wheels.html
3 x 4" Traction Tire (0.5" Wide, 2-pack) • SKU#: 217-2859 • $4.99 (Total of at least 6 Tires)
https://www.vexrobotics.com/traction-wheels.html
4 x 4" Omni-Directional Wheel v2 • SKU#: 217-6194 • $19.99
https://www.vexrobotics.com/omni-wheels.html
2 x 1.125" Bearing Pilot Plastic VersaHub (1/4" Wide, w/ Plate Sprocket Mount) • SKU#: 217-3234 • $2.99
https://www.vexrobotics.com/versahubs.html
2 x 1.125” Bearing Bore Plastic VersaHub Spacer (1/2” Wide) • SKU#: 217-2591 • $2.99
https://www.vexrobotics.com/versahubs.html
8 x 0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing) • SKU#: 217-2731 • $2.99
https://www.vexrobotics.com/pro-bearings.html?config=273-1281,274-1284,275-1289,279-1311
1 x #25 Standard Roller Chain (10') • SKU#: 217-2775 • $12.99
https://www.vexrobotics.com/roller-chain.html
1 x #25 Master Link (5 Pack) • SKU#: 217-6466 • $4.99
https://www.vexrobotics.com/roller-chain.html
2 x 34T Aluminum Plate Sprocket (#25 Chain, 1-1/8" Bearing Bore) • SKU#: 217-2664 • $11.99
https://www.vexrobotics.com/25-sprockets.html?config=364-1931,365-1938,369-1964

AluminumSpacers.Com

https://www.aluminumspacers.com/

8 x Aluminum Spacer 1/2 OD x .382 ID x 1-1/2 Long • $2.91
https://www.aluminumspacers.com/spacers-by-hole-size/hole-for-3-8-inch-bolts/as50-18-96
4 x Aluminum Spacer 1/2 OD x .382 ID x 7/32 Long • $1.28
https://www.aluminumspacers.com/spacers-by-hole-size/hole-for-3-8-inch-bolts/as50-18-14
2 x Aluminum Spacer 3/4 OD x .509 ID x 7/8 Long • $3.63
https://www.aluminumspacers.com/spacers-by-hole-size/hole-for-1-2-inch-bolts/as75-22-56
4 x Aluminum Spacer 3/4 OD x .509 ID x 7/32 Long • $3.11
https://www.aluminumspacers.com/spacers-by-hole-size/hole-for-1-2-inch-bolts/as75-22-14

Amazon

https://www.amazon.com

2 x AmpFlow P40-250 Brushed Electric Motor, 250W, 12V, 24V or 36 VDC, 3400 RPM, Black • $64.70
https://www.amazon.com/dp/B00D3ORQ2K

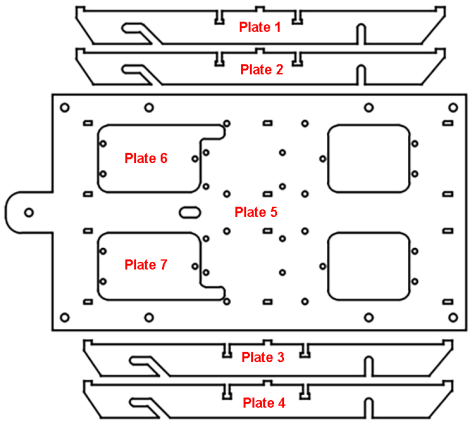
Home Depot

https://www.homedepot.com/

1 x M6-1 x 20 mm. Internal Hex Socket Cap-Head Cap Screws (8-Pack) • $10.87
https://www.homedepot.com/p/Hillman-M6-1-x-20-mm-Internal-Hex-Socket-Cap-Head-Cap
2 x M6-1.0 Zinc Hex Nut 5-Pieces (D5-A) • $2.75 (Total of 10 nuts)
https://www.homedepot.com/p/Everbilt-M6-1-0-Zinc-Hex-Nut-5-Pieces-D5-A
2 x #8-32 x 1/2 in. Stainless Steel Combo Round Head Machine Screw (6-Pack) • $1.98 (Total of 12 screws)
https://www.homedepot.com/p/Everbilt-8-32-x-1-2-in-Stainless-Steel-Combo-Round-Head
1 x M6-1 x 12 mm. Internal Hex Socket Cap-Head Cap Screws (10-Pack) • $12.00
https://www.homedepot.com/p/Hillman-M6-1-x-12-mm-Internal-Hex-Socket-Cap-Head-Cap
1 x Tube of Loctite Threadlocker 242 Blue Removable Nut and Bolt Adhesive 0.20 oz • $7.98
https://www.homedepot.com/p/Loctite-Threadlocker-242-Blue-Removable-Nut-and-Bolt-Adhesive-0-20-oz
1 x 9/16 in. Yellow Zinc Flat Washer 2-Pieces (D3-R) • $1.25
https://www.homedepot.com/p/Everbilt-9-16-in-Yellow-Zinc-Flat-Washer-2-Pieces-D3-R
4 x 3/8 in.-16 x 4 in. Zinc Plated Hex Bolt • $0.99
https://www.homedepot.com/p/Everbilt-3-8-in-16-x-4-in-Zinc-Plated-Hex-Bolt
2 x 3/8 in.-16 Zinc Hex Nut 2-Pieces (D4-Q) • $0.75 (Total of 4 nuts)
https://www.homedepot.com/p/3-8-in-16-Zinc-Hex-Nut-2-Pieces-D4-Q

THE BUILD:

Cutting The Frame:

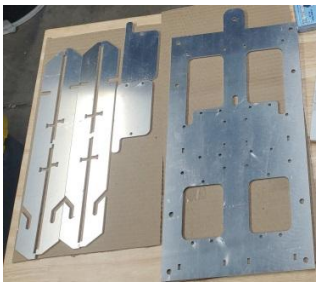


You're going to need to order this from one of the many waterjet companies out there. They'll cut the plates out and ship them to you. There should be seven total plates as 2 of the smaller plates are in the negative space to save on materials cost.

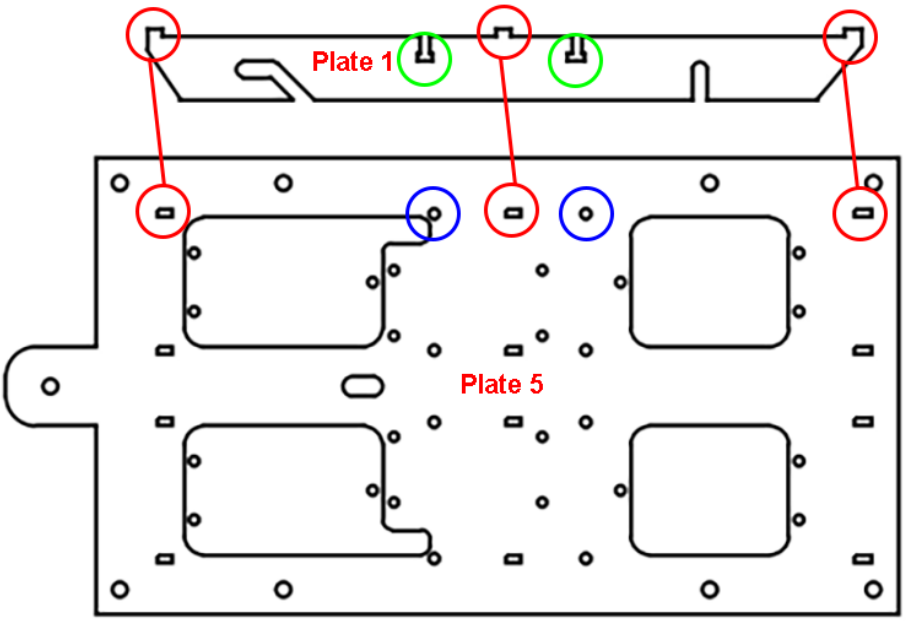
Your recommended specs are as follows:
Cutting Process: Sheet Cutting
Material: Aluminum 5052 H32
Material Thickness: 0.188in
Finish: Standard, As Cut
Threads and Tapped Holes: None
Tolerance: Tightest Tolerance: +/-.010"(+/-.254mm)
Inspection: Standard Inspection

You can order the frame directly from Xometry for around $80 to $120
If your a new customer here is a referral link for $50 credit at Xometry https://blue.mbsy.co/6zjcs8

Once it arrives you should have these parts:



Assembling The Chassis:



Parts:

1 x Each of Scavenger Chassis Plates 1 through 5
8 x M6-1.0 Zinc Hex Nut
8 x M6-1 x 20 mm. Internal Hex Socket Cap-Head Cap Screw

Steps:

Step 1. Take **Plate 1** (wheel rail) and slot the three **RED** tabs into the three **RED** square holes running along **Plate 5**. Make sure the end on **Plate 1** that has the longer L grove is on the same side as **Plate 6**'s hole.

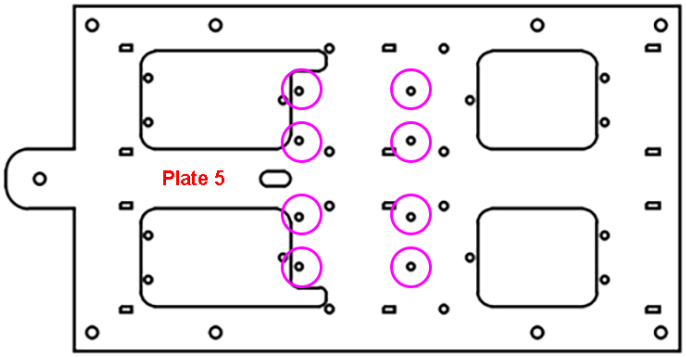
Step 2. Place a **M6-1.0 Zinc Hex Nut** in each of the **GREEN** slots.

Step 3. Using a **M6-1 x 20 mm. Internal Hex Socket Cap-Head Cap Screw** inserted into each of the **BLUE** Holes tighten the plates together.

Step 4. Repeat **Steps 1-3** with **Plates 2,3 and 4** moving across **Plate 5.**

You can use some Loctite if you want to, so as to make sure they don't rattle apart, but so far we have not had an issue with them.

Attaching The Motors:



Parts:

1 x Scavenger Chassis Plate 5 with attached wheel rails
2 x AmpFlow P40-250 Brushed Electric Motor
8 x M6-1 x 12 mm. Internal Hex Socket Cap-Head Cap Screws
1 x Tube of Loctite Threadlocker 242

Steps:

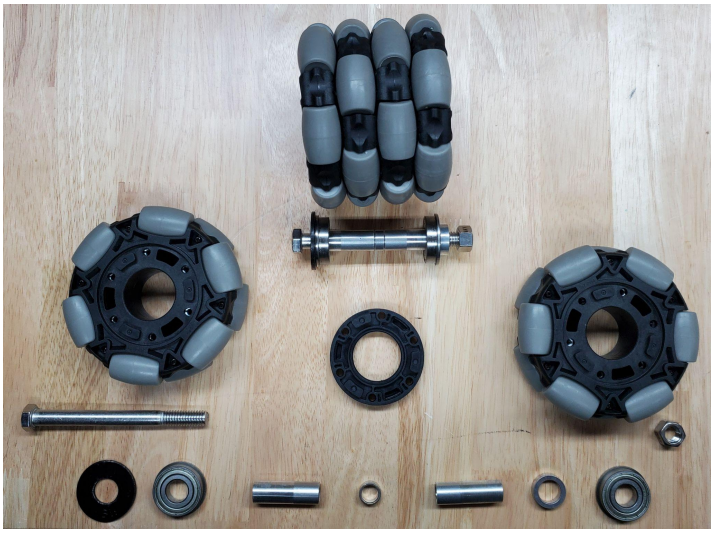
Step 1. Take one of the two **AmpFlow Motors** placing it on the top of **Plate 5** with the sprocket side facing out to the nearest edge of the plate. line up the motor's **PURPLE** screw holes with the **PURPLE** ones on the plate.

Step 2. Take one **M6-1 x 12 mm. Internal Hex Socket Cap-Head Cap Screw** apply some **Loctite Threadlocker 242** and insert the screw from the bottom through the holes and finger tighten screw. Repeat 3 more times for the other holes.

Step 3. Tighten all the bolts down.

Step 4. Repeat **steps 1-3** with the second **AmpFlow Motor**.

Assembling Front Wheels:



Parts:

1 x Scavenger Chassis Plate 5 with attached wheel rails and motors
4 x 4" Omni-Directional Wheel v2
2 x 1.125” Bearing Bore Plastic VersaHub Spacer (1/2” Wide)
4 x 0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)
4 x Aluminum Spacer 1/2 OD x .382 ID x 1-1/2 Long
2 x Aluminum Spacer 1/2 OD x .382 ID x 7/32 Long
2 x Aluminum Spacer 3/4 OD x .509 ID x 7/32 Long
1 x 9/16 in. Yellow Zinc Flat Washer
2 x 3/8 in.-16 x 4 in. Zinc Plated Hex Bolt
2 x 3/8 in.-16 Zinc Hex Nut

Steps:

Step 1. Using a set of two **4" Omni-Directional Wheels** connect them together by adding between them one **1.125” Bearing Bore Plastic VersaHub Spacer** by lining up the groves and snapping them together.

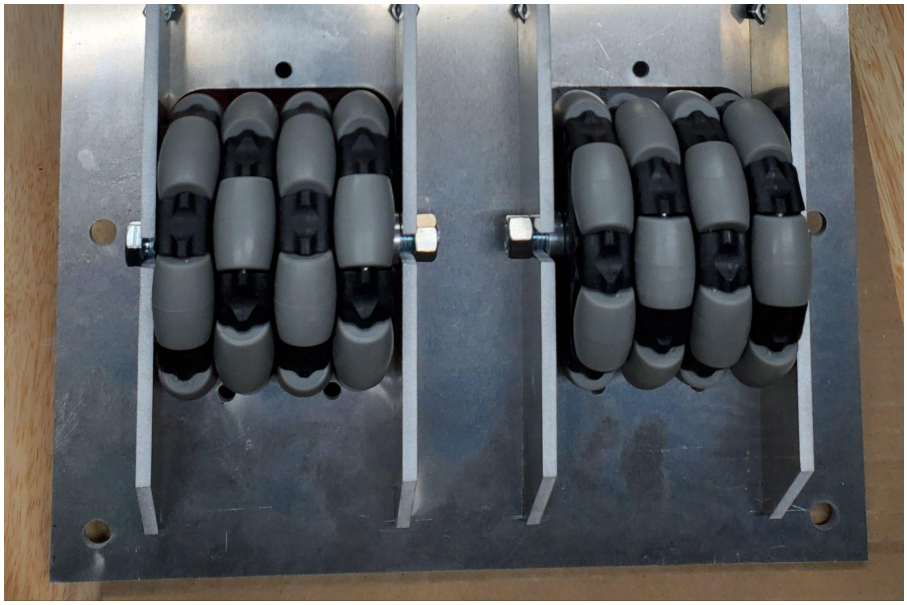
Step 2. Test fit the two **Aluminum Spacer 1/2 OD x .382 ID x 1-1/2 Long** to two of the **Flanged Bearings** and if needed sand them down to fit in the **Flanged Bearing** by putting them in a drill chuck running some sandpaper over them while spinning. Then slide one **Flanged Bearing** over each **1/2 OD Spacer**.

Step 3. Take one **9/16 in. Washer** and place it on the outside of one of the **Flanged Bearing - 1-1/2 spacer** sets from **Step 2** and then slide this on the on to one of the **3/8 in.-16 x 4 in. Hex Bolts** and place it inside one of the **Omni-Directional Wheel** locking the flange into the center hub.

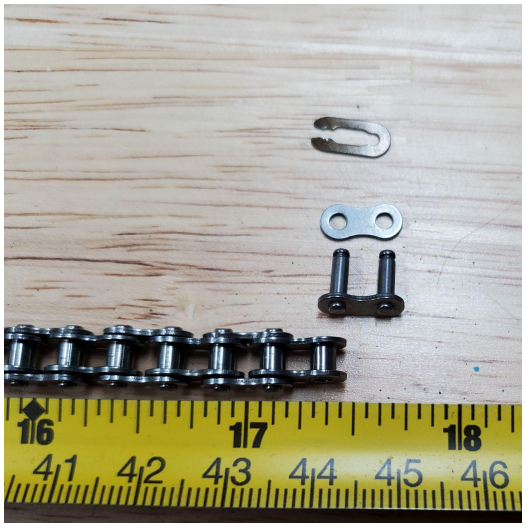
Step 4. Turn over the Omni-Directional **Wheel** and add one **Aluminum Spacer 1/2 OD x .382 ID x 7/32 Long** to the bolt then add the **Flanged Bearing - 1-1/2 spacer** sets from **Step 2**. next add one **Aluminum Spacer 3/4 OD x .509 ID x 7/32 Long** and a lastly one of the **3/8 in.-16 Zinc Hex Nuts**.

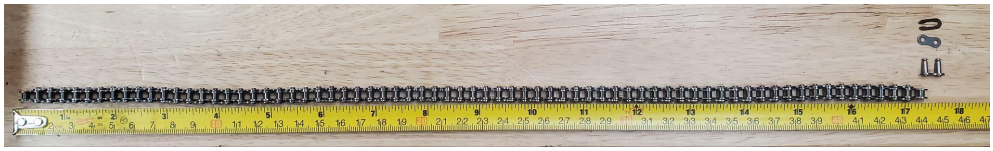
Step 5. Place the **Omni-Directional Wheel** set on to the **Scavenger Chassis** in one of the straight channels with the nut side on inside and tighten it down.

Step 6. Repeat **Steps 1-5**



Preparing The Chain:





Parts:

1 x #25 Standard Roller Chain (10')
2 x #25 Master Link

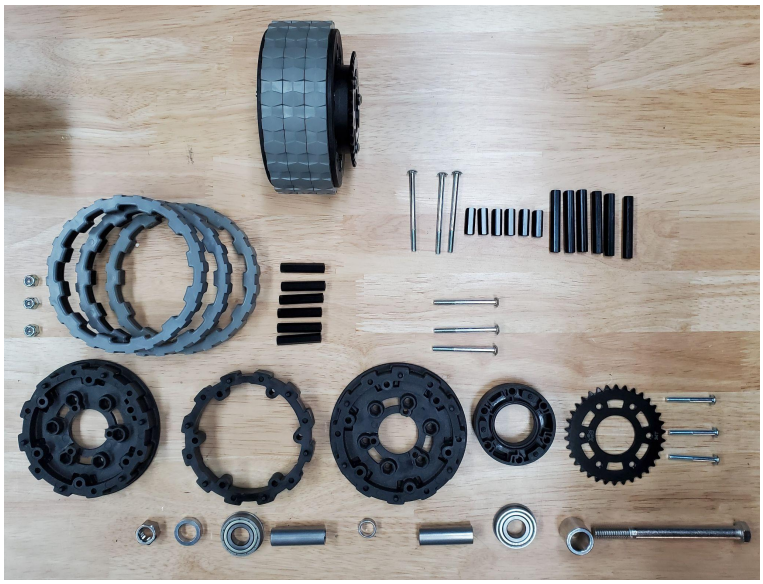
Steps:

Step 1. Measure out two lengths of **#25 Standard Roller Chain** should be 70 rollers worth or about 17-½ inches

Step 2. Disassemble chains at the measured point using a chain breaker tool if you don't have one you could cut with a grinder or dremel tool.

Step 3. Assemble chains in to loops with **#25 Master Links** and lock with C clips. Set aside for later

Assembling Rear Wheels:



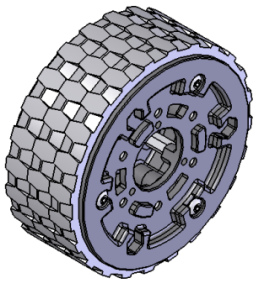
Parts:

1 x Scavenger Chassis Plate 5 with attached front wheels and motors
2 x Previously completed #25 chain loops
2 x 4" Traction Wheel
6 x 4" Traction Tire (0.5" Wide)
2 x 1.125" Bearing Pilot Plastic VersaHub (1/4" Wide, w/ Plate Sprocket Mount)
2 x 34T Aluminum Plate Sprocket (#25 Chain, 1-1/8" Bearing Bore)
4 x 0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)
4 x Aluminum Spacer 1/2 OD x .382 ID x 1-1/2 Long
2 x Aluminum Spacer 1/2 OD x .382 ID x 7/32 Long
2 x Aluminum Spacer 3/4 OD x .509 ID x 7/32 Long
2 x Aluminum Spacer 3/4 OD x .509 ID x 7/8 Long
2 x 3/8 in.-16 x 4 in. Zinc Plated Hex Bolt
2 x 3/8 in.-16 Zinc Hex Nut

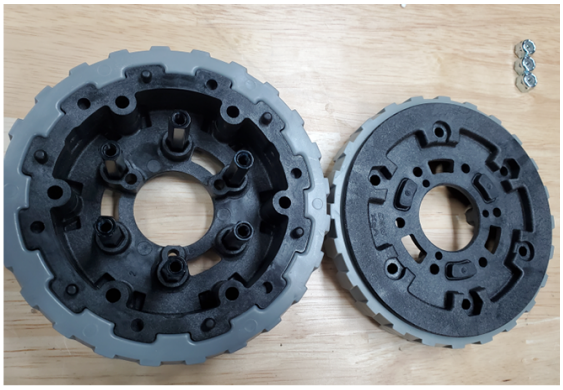
Steps:

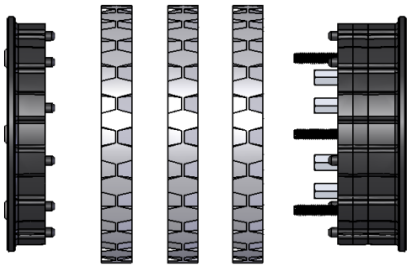
Step 1. Open a package of **4" Traction Wheel** and disassemble the wheel by removing the screws and being careful not to lose any of the standoffs inside you should now have two wheel ends, two wheel slices, three nuts, eighteen screws, and eighteen standoffs in three different sizes. Set aside one wheel slice, the small, and Large screw/standoff sets won't be needed right now.

Step 2. Attach a **4" Traction Tire** to each of the remaining **4" Traction Wheel** ends and center slice. Then insert the medium standoffs into the slots inside one of the wheel ends. Assemble the wheel making sure the outer nut and screw spots are offset to allow a screw on a flat spot to attach to a nut on the opposite side. Screw together the wheel with the medium screws and nuts.

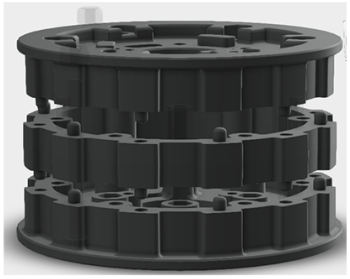


1.5" WIDE CONFIG [1 SLICE, 3 TIRES]





INSTALL TREAD SLICES BEFORE ASSEMBLING WHEEL



Step 3. Attach the **1.125" Bearing Pilot Plastic VersaHub (1/4" Wide, w/ Plate Sprocket Mount)** to the **4" Traction Wheel** by lining up the groves. Attach the **34T Aluminum Plate Sprocket (#25 Chain, 1-1/8" Bearing Bore)** to the **VersaHub** by lining up the groves. Using the three small screws set saide in **Step 1** screw down the sprocket to the wheel and set aside.

Step 4. Test fit the two **Aluminum Spacer 1/2 OD x .382 ID x 1-1/2 Long** to two of the **Flanged Bearings** and if needed sand them down to fit in the **Flanged Bearing** by putting them in a drill chuck running some sandpaper over them while spinning. Then slide one **Flanged Bearing** over each **1/2 OD Spacer**.

Step 3. Take one **Aluminum Spacer 3/4 OD x .509 ID x 7/32 Long** and place it on the outside of one of the **Flanged Bearing - 1-1/2 spacer** sets from **Step 4** and then slide this on the on to one of the **3/8 in.-16 x 4 in. Hex Bolts** and place it inside one of the **4" Traction Wheel Assembly** on the non-sprocketed side locking the flange into the center hub.

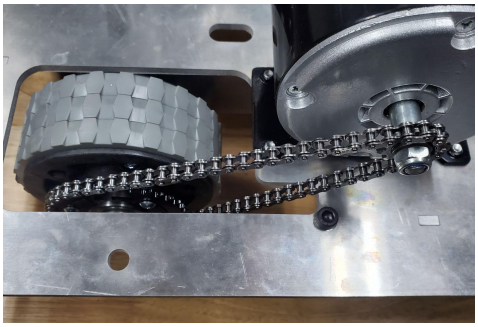
Step 4. Turn over **4" Traction Wheel Assembly** and add one **Aluminum Spacer 1/2 OD x .382 ID x 7/32 Long** to the bolt then add the **Flanged Bearing - 1-1/2 spacer** sets from Step 2. next add one **Aluminum Spacer 3/4 OD x .509 ID x 7/8 Long** over the remaining part of the **1-1/2 spacer set** and a lastly one of the **3/8 in.-16 Zinc Hex Nuts**.

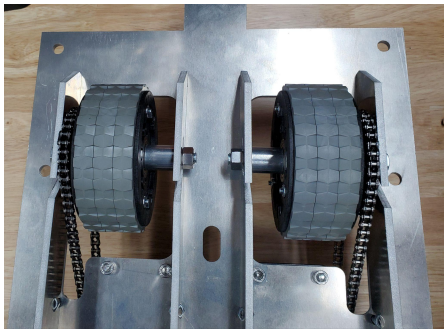
Step 5. Repeat **Steps 1-5**

Step 6. Place one of the **#25 chain loops** on the sprocket of each of the wheels.

Step 7. Place one of the **4" Traction Wheel Assembly** sets with its chain on to the **Scavenger Chassis** in one of the angled channels with the nut side on inside. Loop the chain around the motor. Slide the wheel deeper in the channel until the chain is taunt then tighten down the wheel to hold it in place.

Step 5. Repeat **Step 7**





Attaching Mounting Plates:

Parts:

1 x Scavenger Chassis Plate 5 with attached wheels and motors
1 x Scavenger Chassis Electronics Mounting Plate 6
1 x Scavenger Chassis Electronics Mounting Plate 7
12 x #8-32 x 1/2 in. Stainless Steel Combo Round Head Machine Screw
6 x Large size standoffs from rear wheel assembly

Steps:

Step 1. Attach the **Large Standoffs** to the **Mounting Plates** using **#8-32 x 1/2 in. Machine Screws** then attach **Mounting Plates** to the **Scavenger Chassis** using the remaining **Machine Screws.**