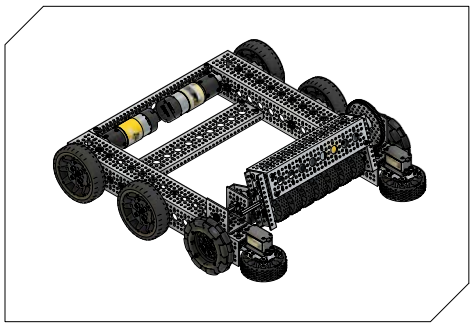
Assembly Instructions for

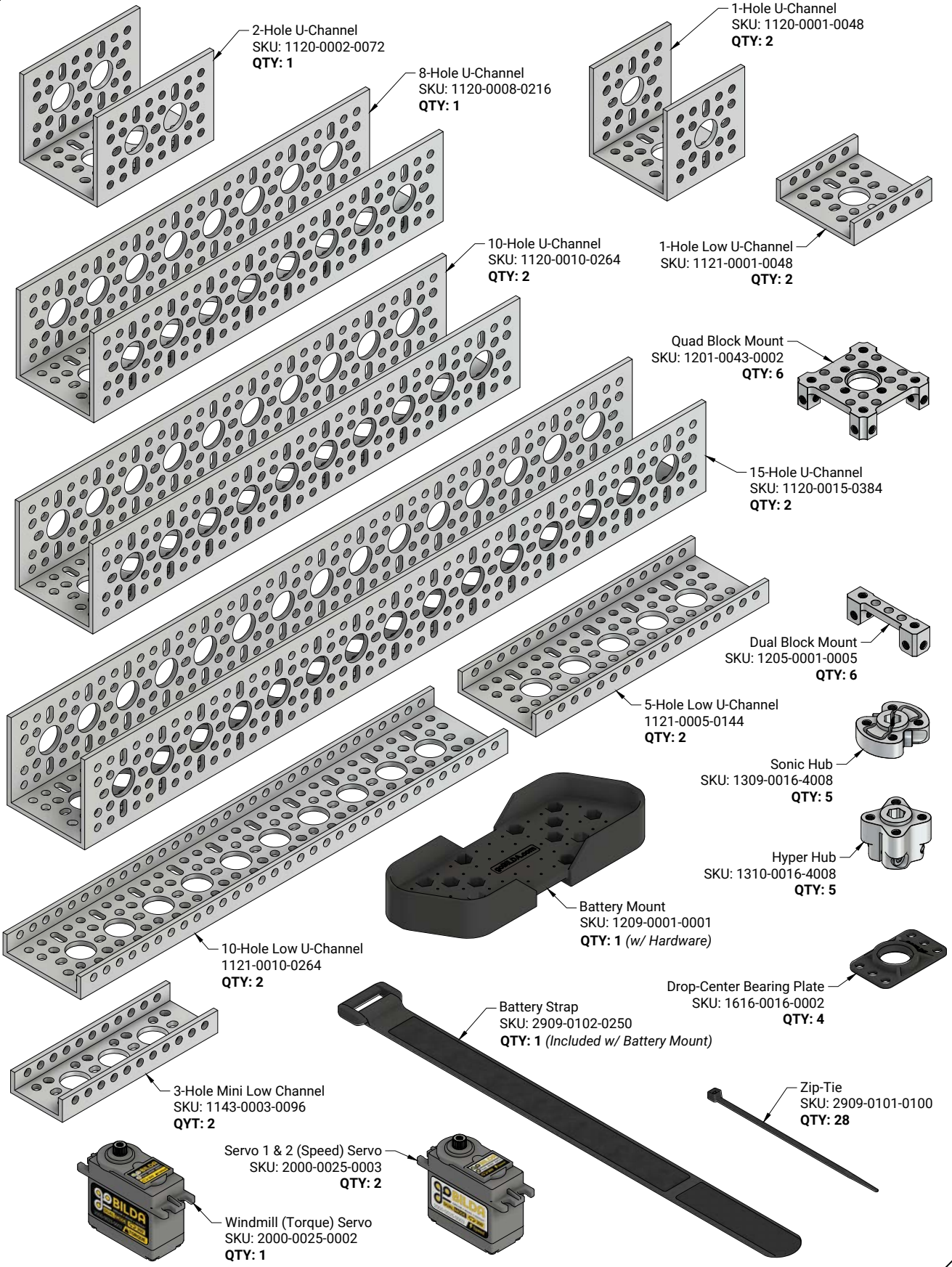
FTC StarterBot (for BIOBUZZ™)

Built from the FTC Starter Kit (SKU: 3200-4008-2627)

Already have a **StarterBot Base** built?
Skip to **STEP 41** on Page 24.



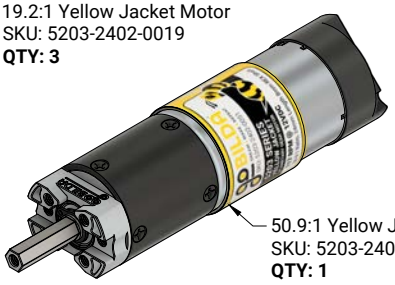
Kit Contents



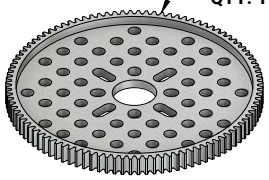
Kit Contents *(Cont)*



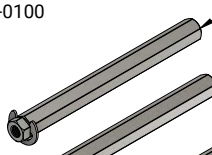
19.2:1 Yellow Jacket Motor
SKU: 5203-2402-0019
QTY: 3



50.9:1 Yellow Jacket Motor
SKU: 5203-2402-0051
QTY: 1



100 Tooth Gear
SKU: 2302-0014-0100
QTY: 1



80mm Length, 8mm REX® Shaft
SKU: 2106-4008-0800
QTY: 8

240mm Length, 8mm REX® Shaft
SKU: 2106-4008-2400
QTY: 1

264mm Length, 8mm REX® Shaft
SKU: 2106-4008-2640
QTY: 1

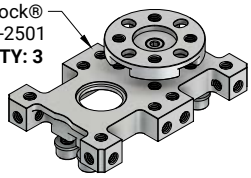
Plastic Chain
SKU: 3309-0108-0050
QTY: 92 Links



Intake Roller
SKU: 3618-4008-0016
QTY: 16



20-Tooth Gear
SKU: 2303-4008-0020
QTY: 1



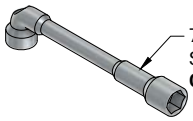
Compact Servo Block®
SKU: 3217-0001-2501
QTY: 3



30-Tooth Gear
SKU: 2303-4008-0030
QTY: 4



10-Tooth Sprocket
SKU: 3307-4008-0010
QTY: 4



7mm Nut Driver
SKU: 4206-0070-0001
QTY: 1



Hogback Wheel
SKU: 3626-0014-0096
QTY: 5



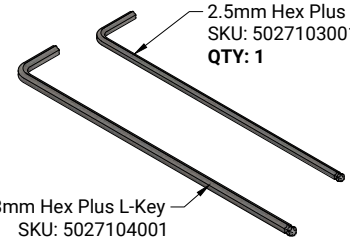
48mm GripForce® Gecko Wheel
SKU: 3613-4008-0048
QTY: 7



72mm GripForce® Gecko Wheel
SKU: 3613-0014-0072
QTY: 2



Omni Wheel
SKU: 3624-0014-0096
QTY: 2



2.5mm Hex Plus L-Key
SKU: 5027103001
QTY: 1

3mm Hex Plus L-Key
SKU: 5027104001
QTY: 1

6mm Socket Head Screw
SKU: 2800-0004-0006
QTY: 8



8mm Socket Head Screw
SKU: 2800-0004-0008
QTY: 20



10mm Socket Head Scerw
SKU: 2800-0004-0010
QTY: 95



12mm Socket Head Screw
SKU: 2800-0004-0012
QTY: 57



20mm Socket Head Screw
SKU: 2800-0004-0020
QTY: 4



M4 Locknut
SKU: 2812-0004-0007
QTY: 44



Washer
SKU: 2801-0004-0008
QTY: 50



0.5mm Shim
SKU: 2807-0811-0500
QTY: 6



4mm ID x 11mm Spacer
SKU: 1502-0006-0110
QTY: 4



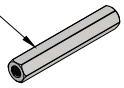
8mm ID x 12mm Spacer
SKU: 1522-0010-0120
QTY: 7



43mm Length, 6mm Round Standoff
SKU: 1501-0006-0430
QTY: 3



24mm Length, 8mm REX® Standoff
SKU: 1516-4008-0240
QTY: 1



43mm Length, 8mm REX® Standoff
SKU: 1516-4008-0430
QTY: 2



8mm REX® Bearing
SKU: 1611-0514-4008
QTY:18



8mm REX® Collar
SKU: 2920-0001-4008
QTY: 4

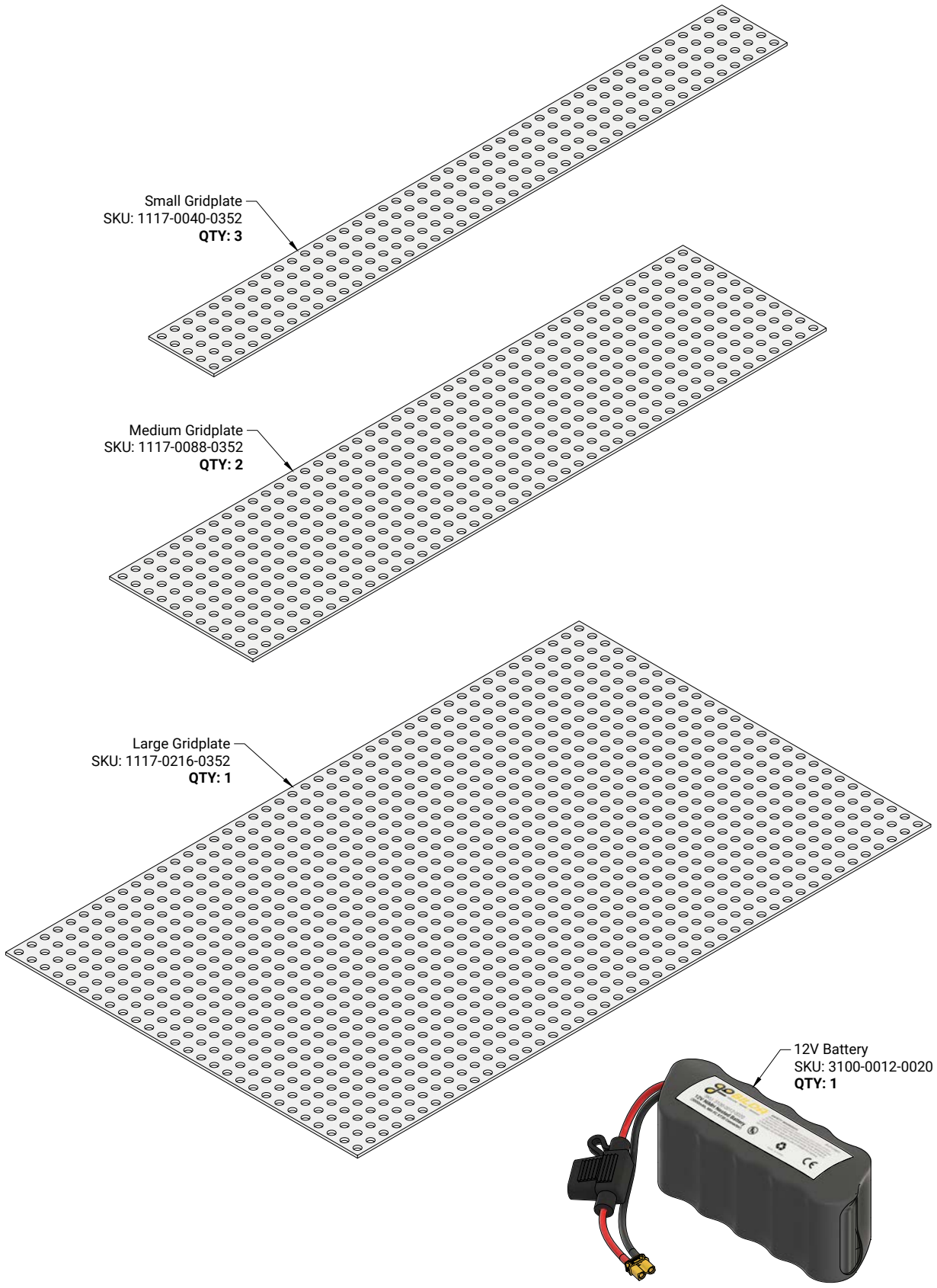


11T Conversion Coupler
SKU: 5105-0209-0019
QTY: 1

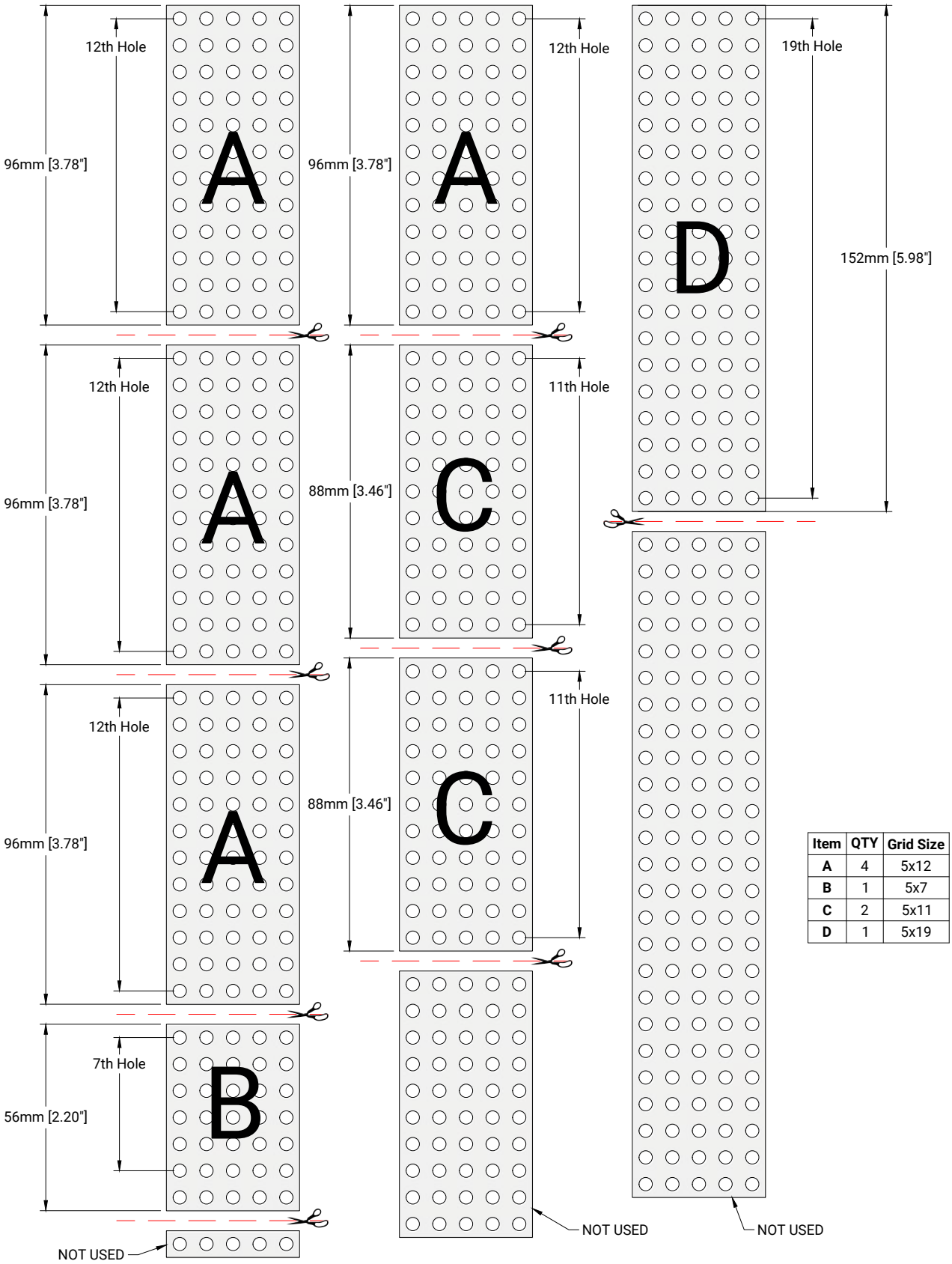


17T Conversion Coupler
SKU: 5105-0107-0019
QTY: 1

Kit Contents *(Cont)*

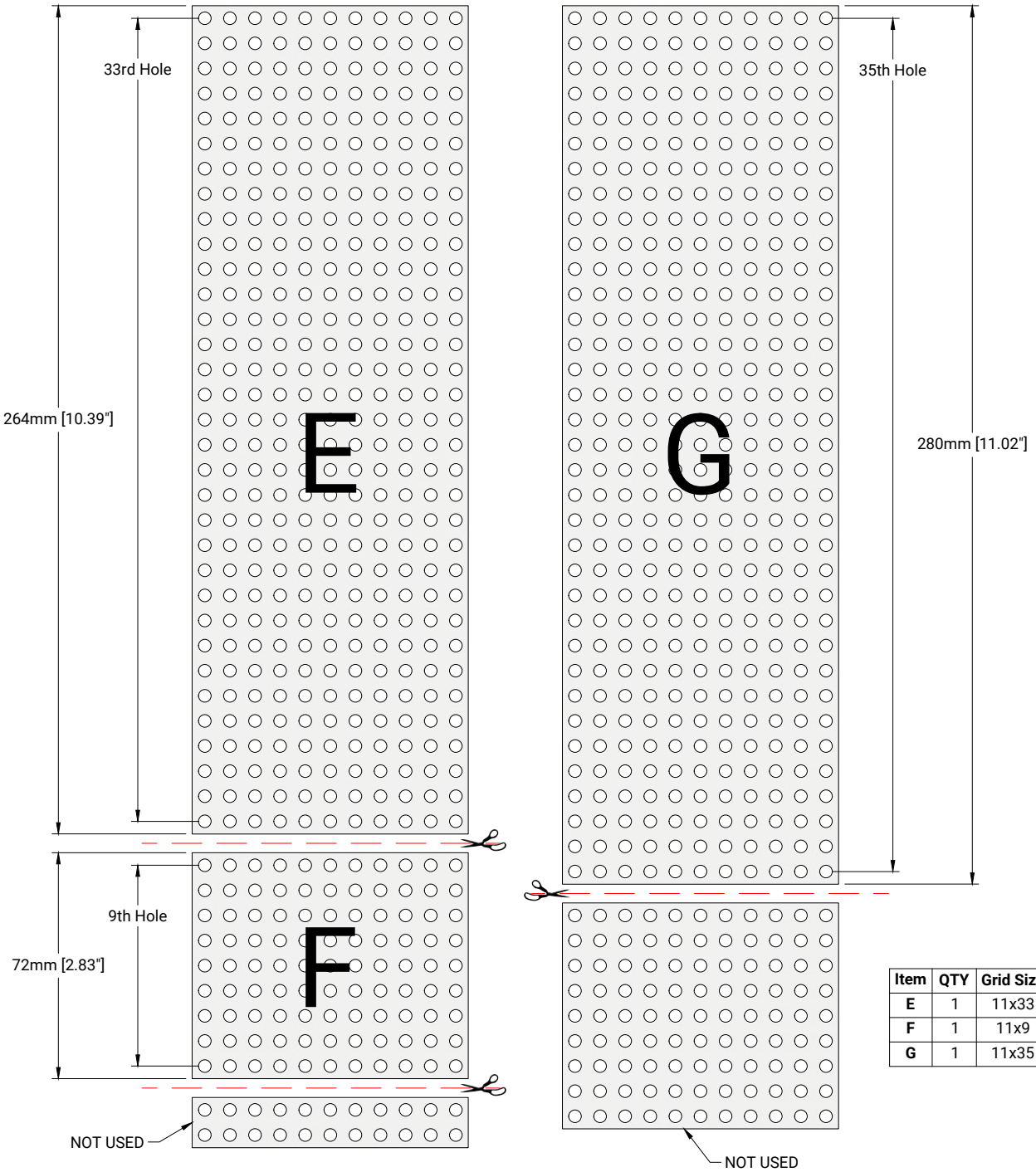


Small Plastic Gridplate Cutlines



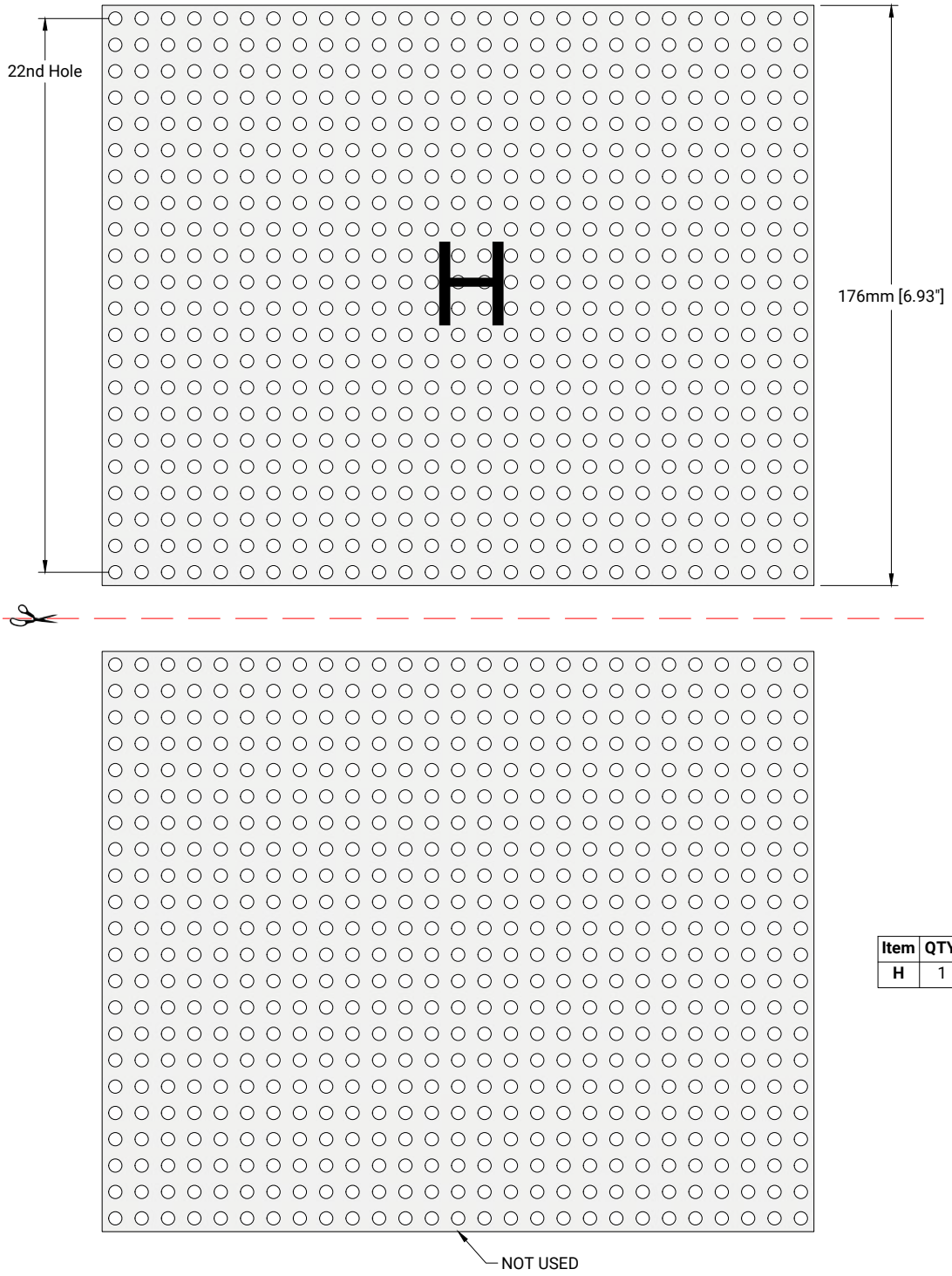
Item	QTY	Grid Size
A	4	5x12
B	1	5x7
C	2	5x11
D	1	5x19

Medium Plastic Gridplate Cutlines



Item	QTY	Grid Size
E	1	11x33
F	1	11x9
G	1	11x35

Large Plastic Gridplate Cutlines



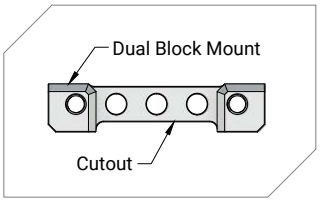
Item	QTY	Grid Size
H	1	22x27

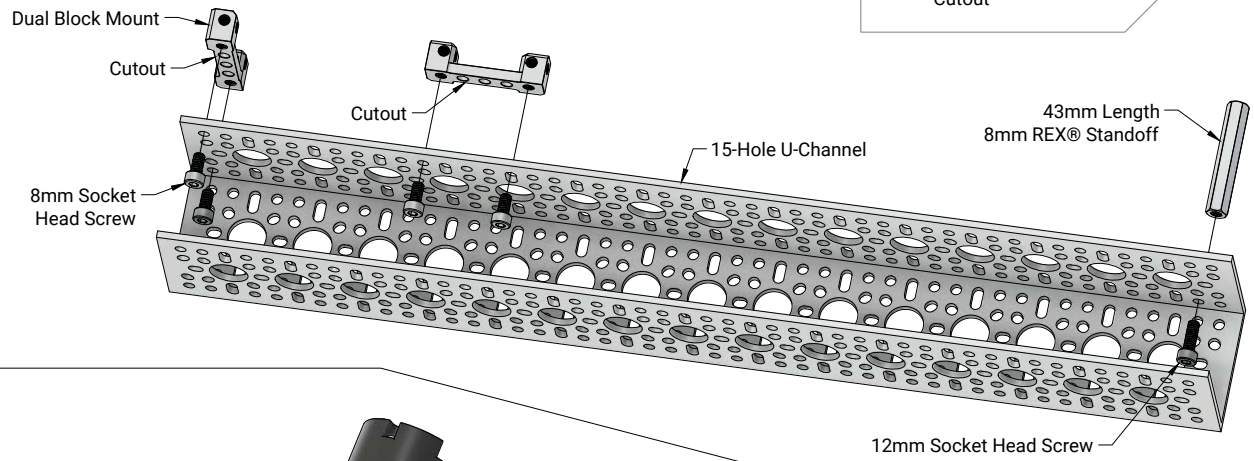
Already have a **StarterBot Base** built? Skip to **STEP 41** on Page 24.

STEP 1:

Attach **two** Dual Block Mounts using **four** 8mm Socket Head Screws, and **one** 43mm Length, 8mm REX® Standoff using **one** 12mm Socket Head Screw to **one** 15-Hole U-Channel as shown. Note the orientation of the Dual Block Mount using the Cutout shown in **FIGURE 1-A**

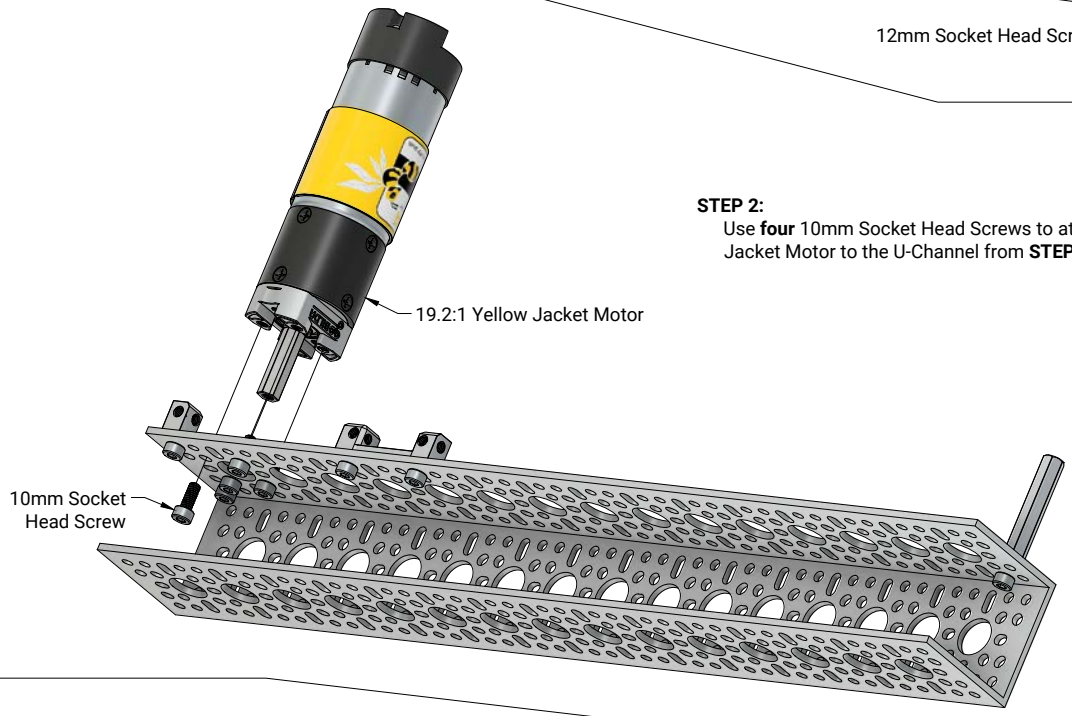
FIGURE 1-A





STEP 2:

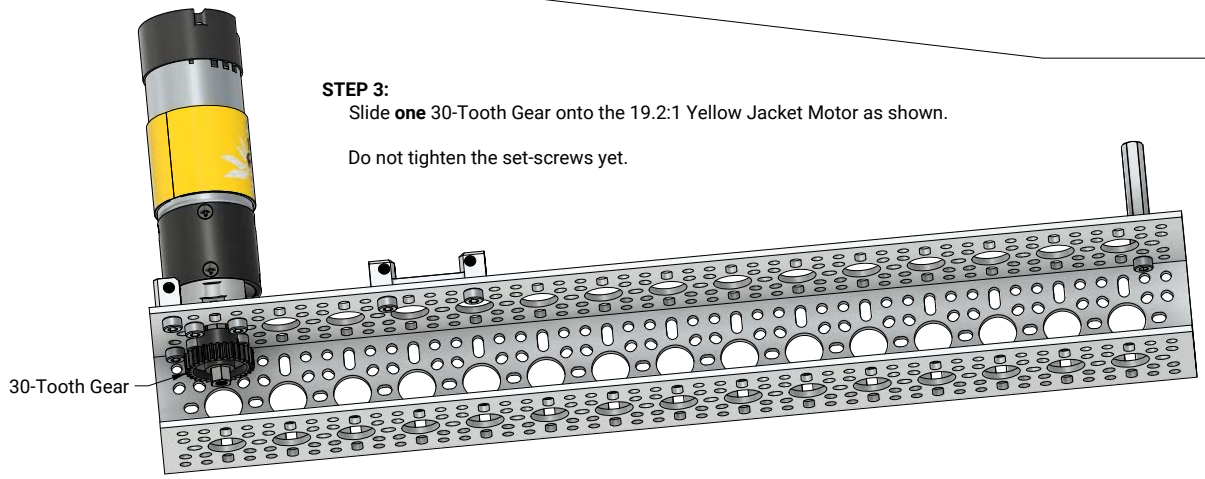
Use **four** 10mm Socket Head Screws to attach **one** 19.2:1 Yellow Jacket Motor to the U-Channel from **STEP 1** as shown.



STEP 3:

Slide **one** 30-Tooth Gear onto the 19.2:1 Yellow Jacket Motor as shown.

Do not tighten the set-screws yet.



STEP 4:

Use **eight** 10mm Socket Head Screws and **eight** Locknuts to attach **two** Drop-Center Plates as shown. Note the orientation of the "Logo" on the Drop-Center Plate (**FIGURE 4-A**).

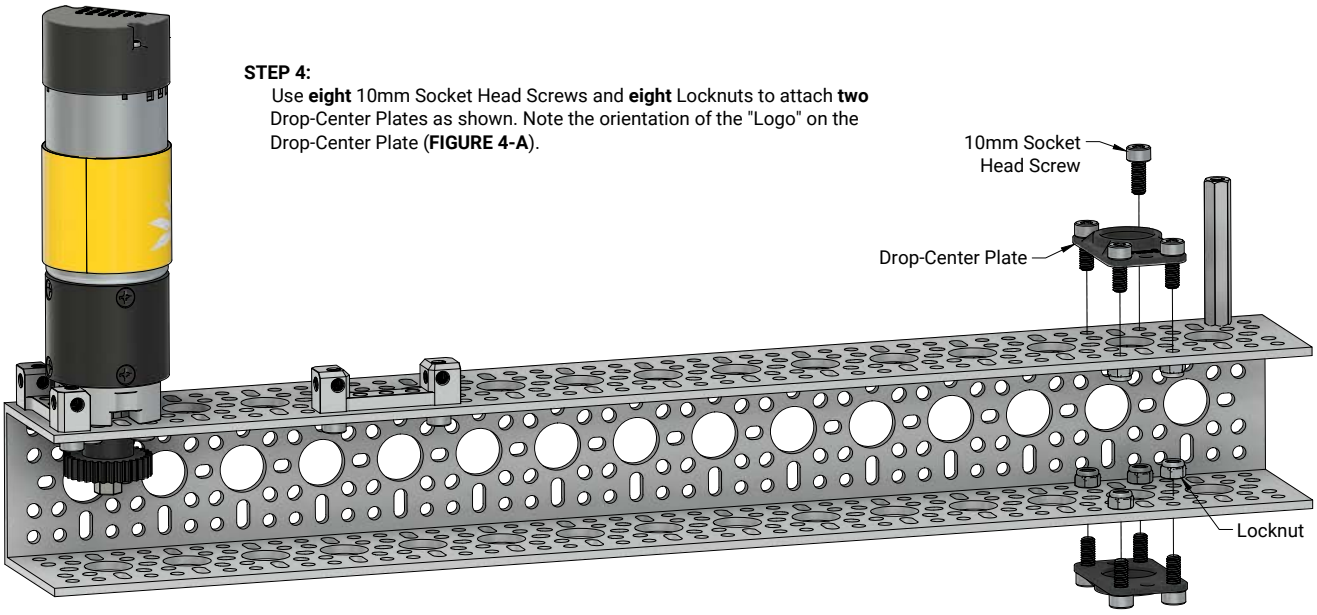
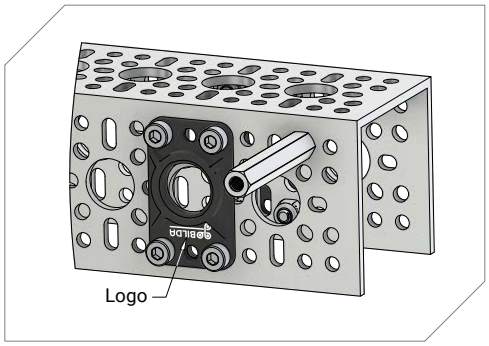
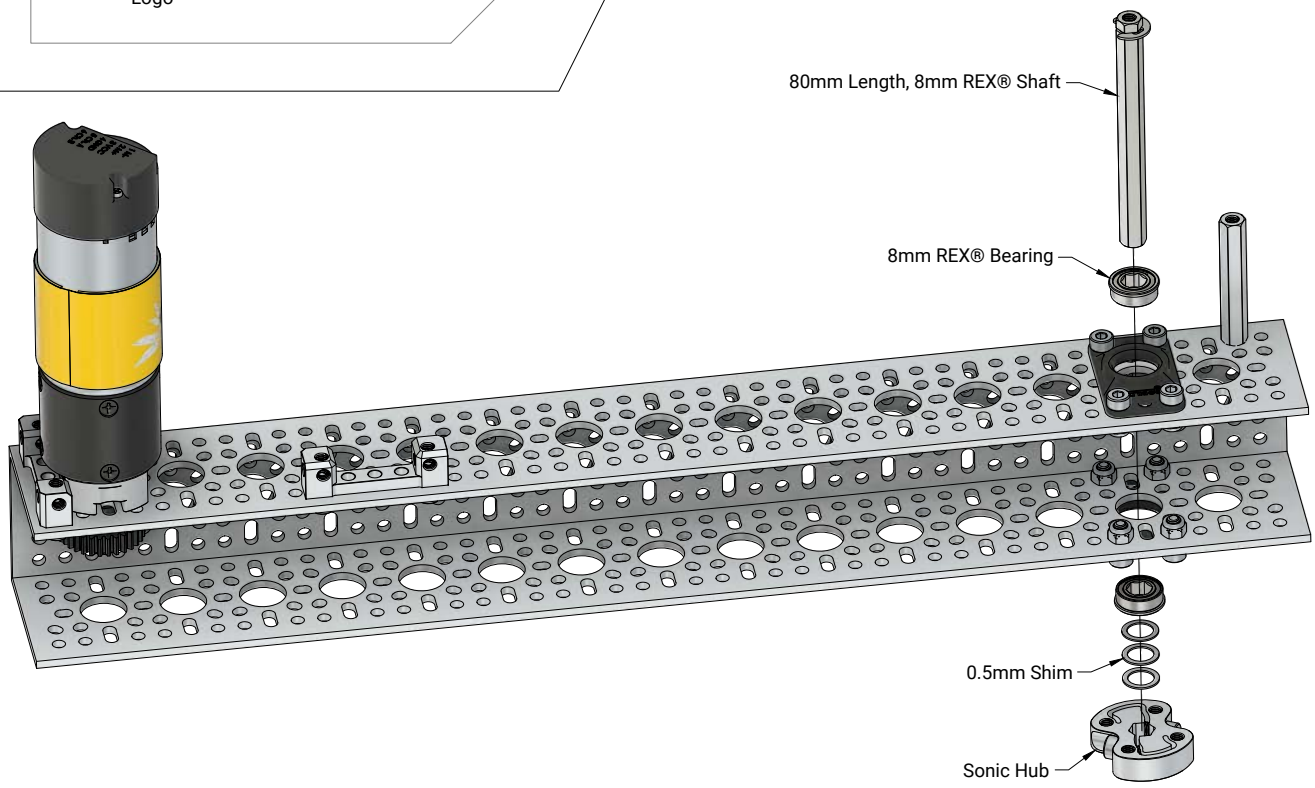


FIGURE 4-A



STEP 5:

Assemble **one** 80mm Length, 8mm REX® Shaft through **two** 8mm REX® Bearings, **three** 0.5mm Shims, and **one** Sonic Hub as shown.



STEP 6:

Use **fourty-six** Plastic Chain Links to create one Chain Loop (**FIGURE 6-A**).

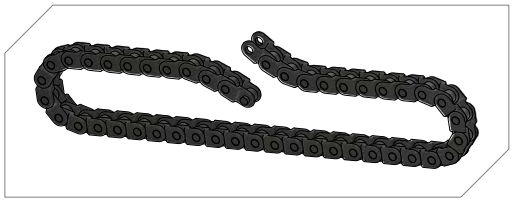
Assemble the Chain Loop, **one** 10-Tooth Sprocket, **one** 80mm Length, 8mm REX® Shaft, **two** 8mm REX® Bearings, **one** 30-Tooth Gear, and **one** Hyper Hub as shown.

Pull the Hyper Hub and 80mm Length, 8mm REX® Shaft together firmly before tightening the hub in place.

Push the 30-Tooth Gear and 10-Tooth Sprocket against the 8mm REX® Bearings before tightening the set-screws (**FIGURE 6-B**).

Align the 30-Tooth Gears (**FIGURE 6-C**), then tighten its set-screws.

FIGURE 6-A



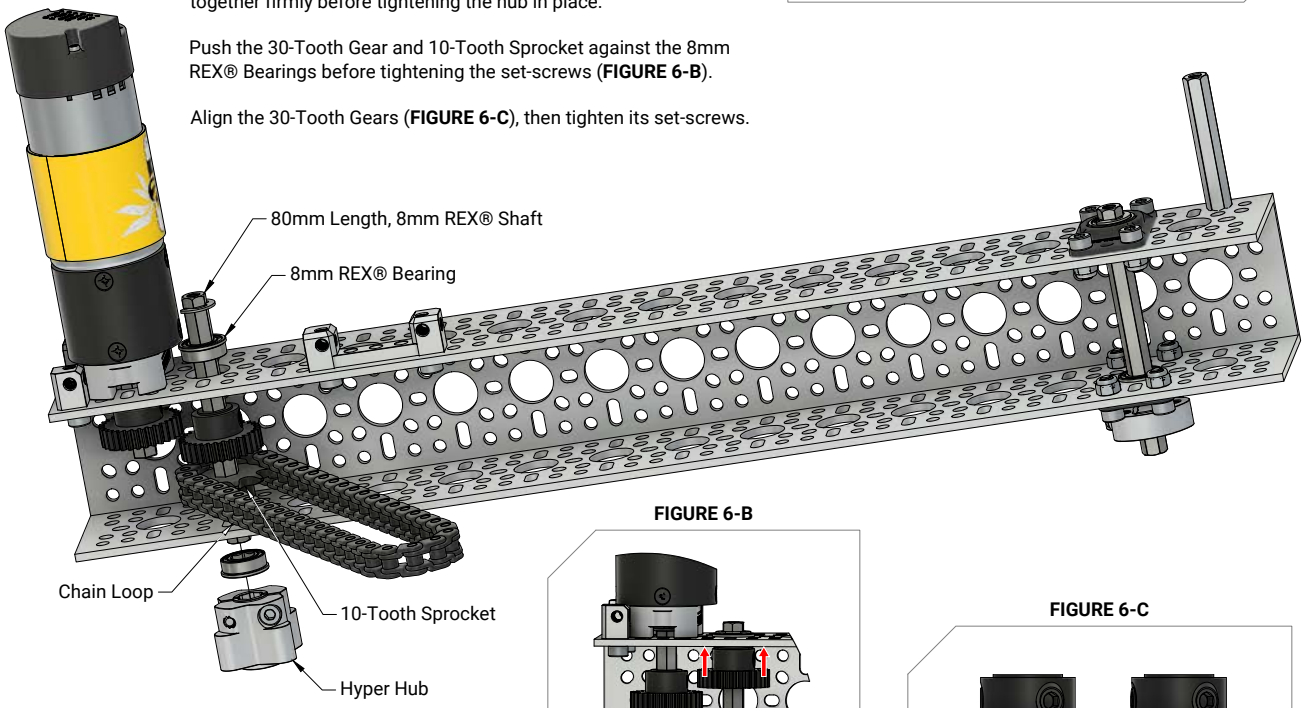
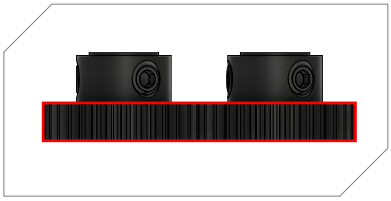


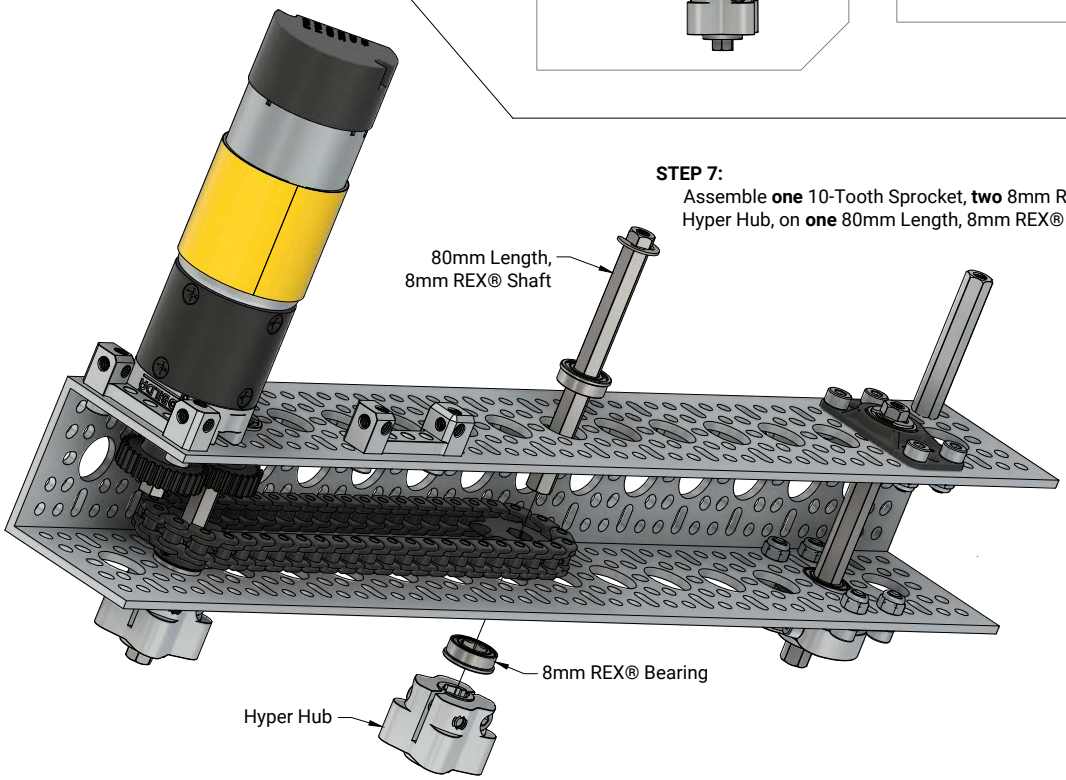
FIGURE 6-B

FIGURE 6-C



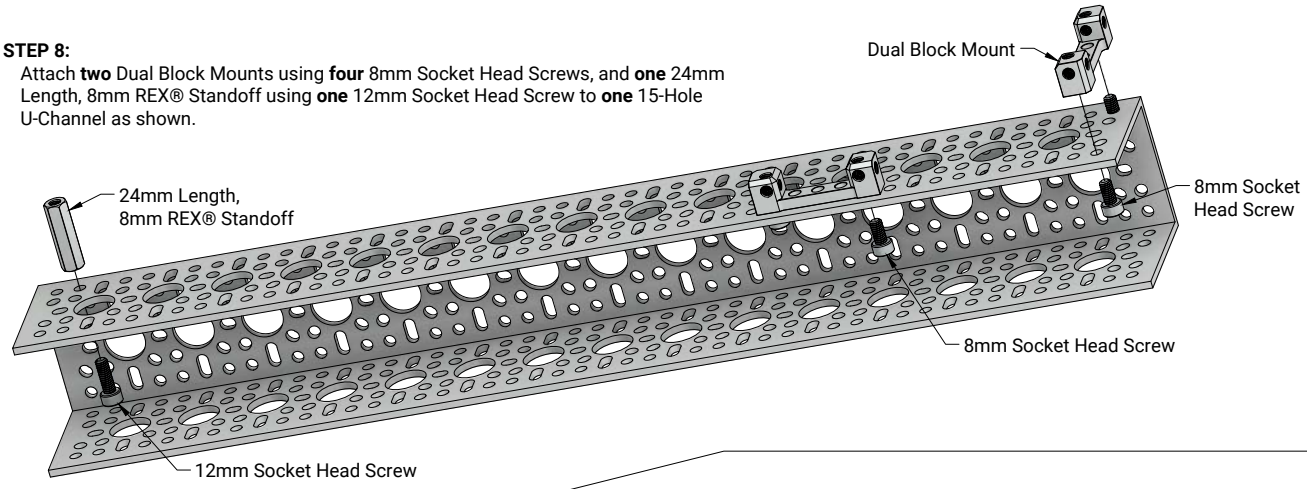
STEP 7:

Assemble **one** 10-Tooth Sprocket, **two** 8mm REX® Bearings, **one** Hyper Hub, on **one** 80mm Length, 8mm REX® Shaft as shown.



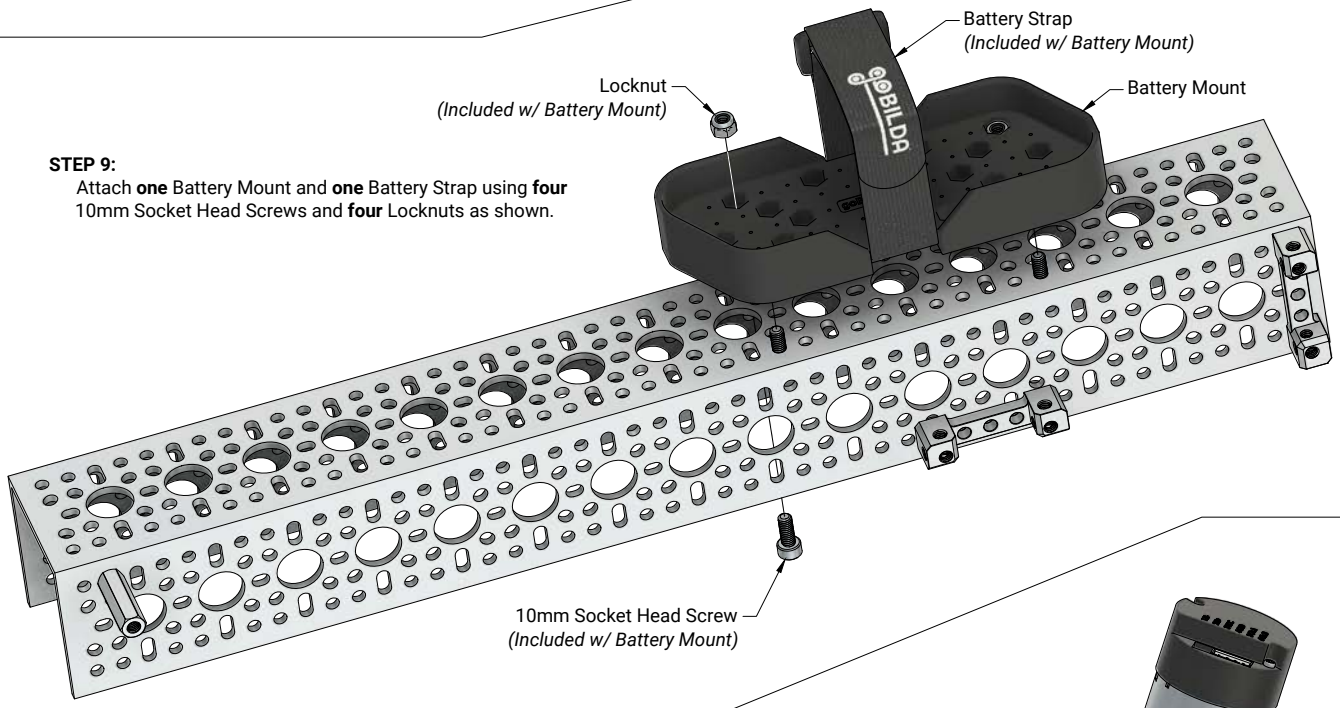
STEP 8:

Attach **two** Dual Block Mounts using **four** 8mm Socket Head Screws, and **one** 24mm Length, 8mm REX® Standoff using **one** 12mm Socket Head Screw to **one** 15-Hole U-Channel as shown.



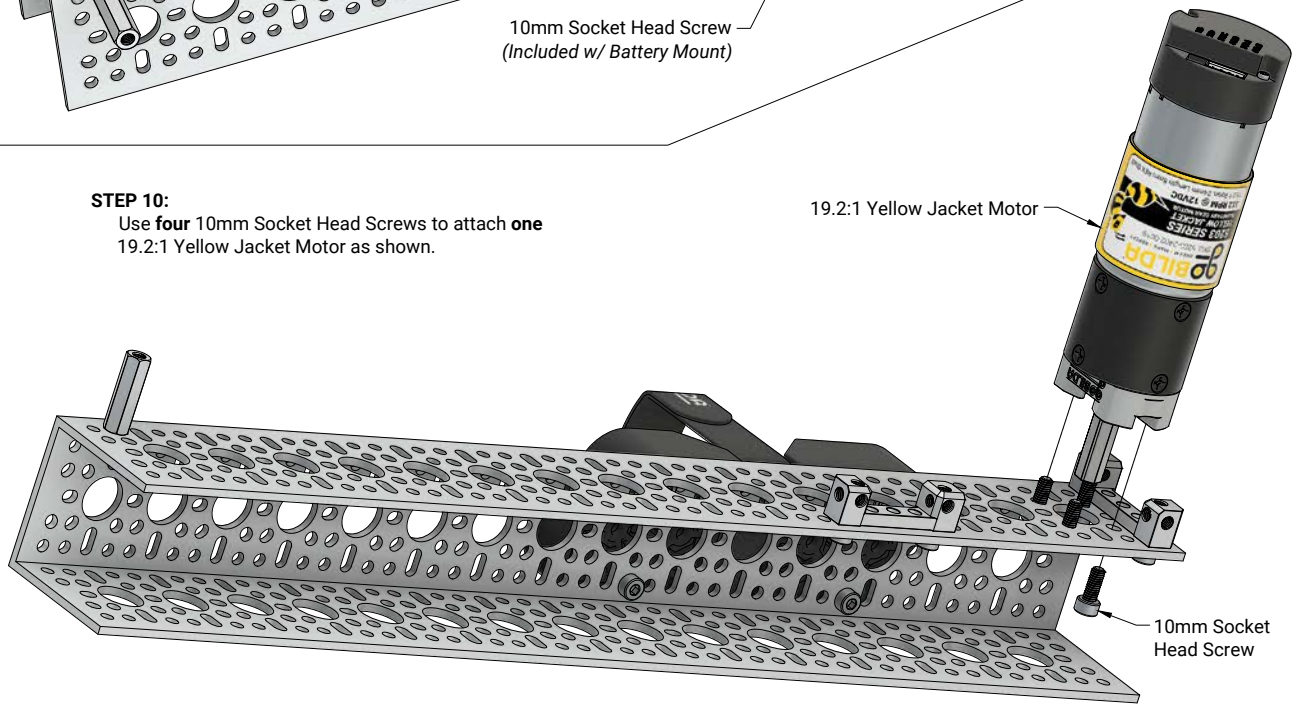
STEP 9:

Attach **one** Battery Mount and **one** Battery Strap using **four** 10mm Socket Head Screws and **four** Locknuts as shown.



STEP 10:

Use **four** 10mm Socket Head Screws to attach **one** 19.2:1 Yellow Jacket Motor as shown.



STEP 11:

Slide **one** 30-Tooth Gear onto the 19.2:1 Yellow Jacket Motor as shown.

Do not tighten the set-screws yet.



STEP 12:

Attach **two** Drop-Center Bearing Plates as shown using **eight** 10mm Socket Head Screws and **eight** Locknuts. Note the orientation of the "Logo" on the Drop-Center Plate (**FIGURE 12-A**).

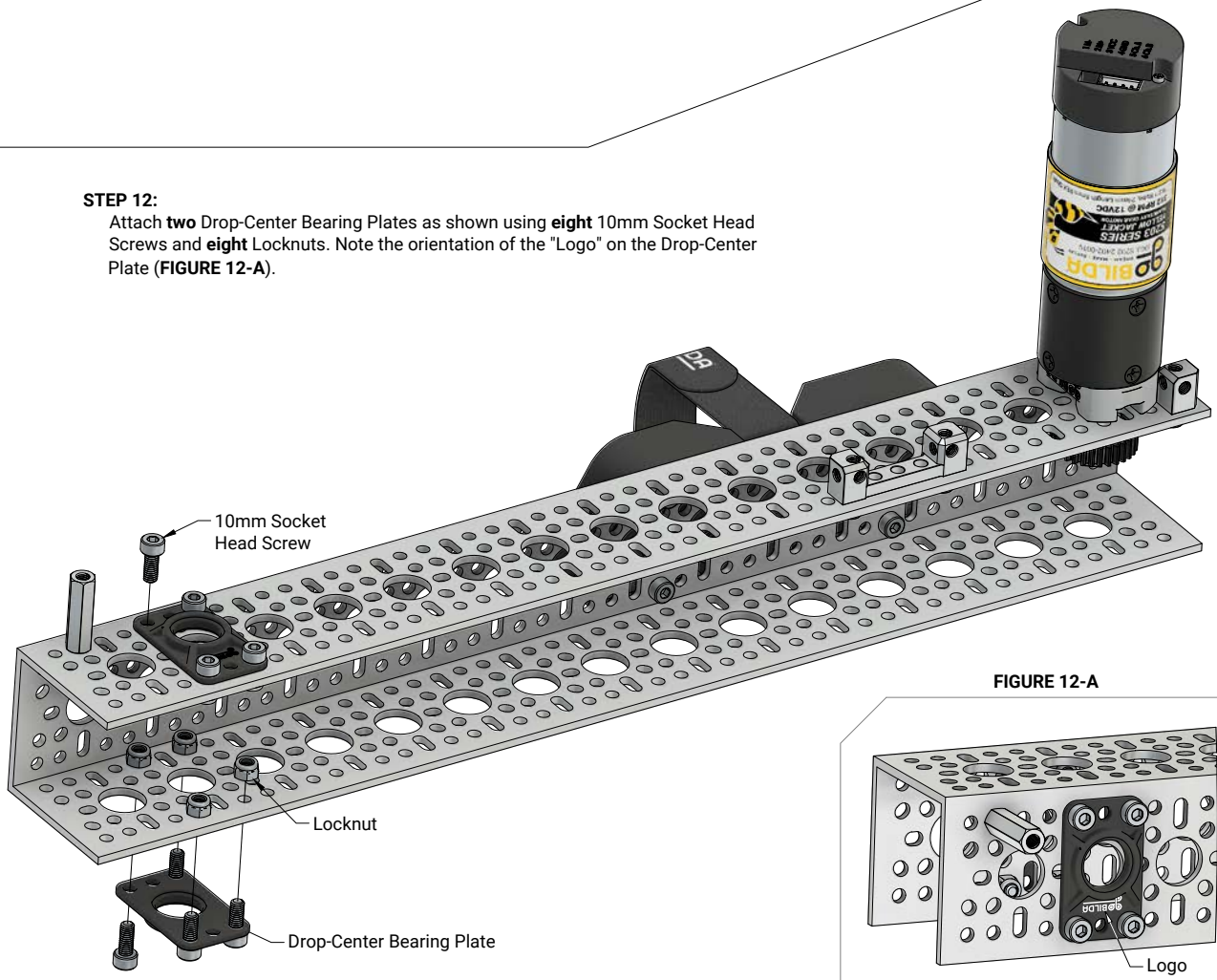
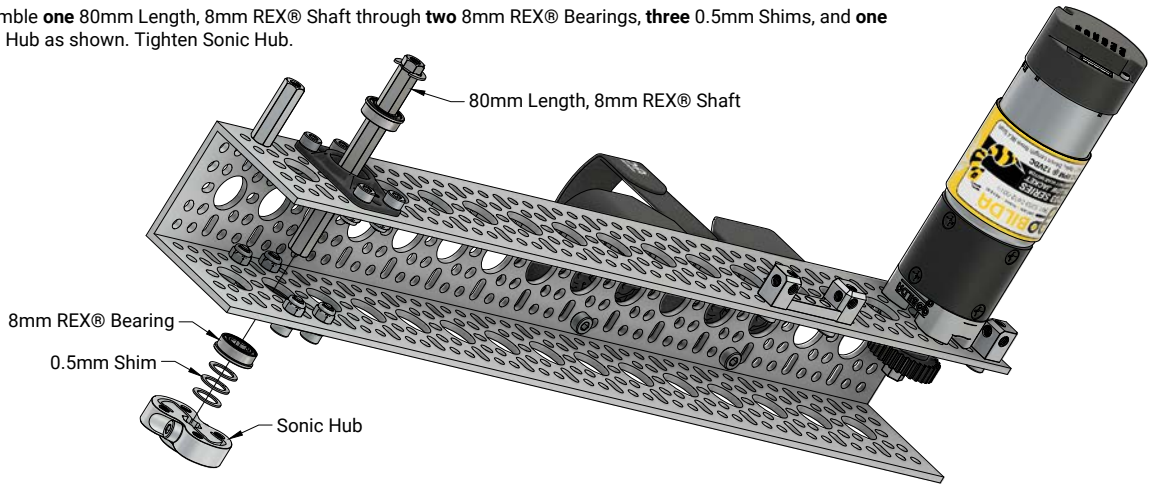


FIGURE 12-A

STEP 13:

Assemble **one** 80mm Length, 8mm REX® Shaft through **two** 8mm REX® Bearings, **three** 0.5mm Shims, and **one** Sonic Hub as shown. Tighten Sonic Hub.



STEP 14:

Use **fourty-six** Plastic Chain Links to create one Chain Loop (**FIGURE 14-A**).

Assemble the Chain Loop, **one** 10-Tooth Sprocket, **one** 80mm Length, 8mm REX® Shaft, **two** 8mm REX® Bearings, **one** 30-Tooth Gear, and **one** Hyper Hub as shown.

Pull the Hyper Hub and 80mm Length, 8mm REX® Shaft together firmly before tightening in place.

Push the 30-Tooth Gear and 10-Tooth Sprocket against the 8mm REX® Bearings before tightening the set-screws (**FIGURE 14-B**).

Align the 30-Tooth Gears (**FIGURE 14-C**), then tighten its set-screws.

FIGURE 14-A

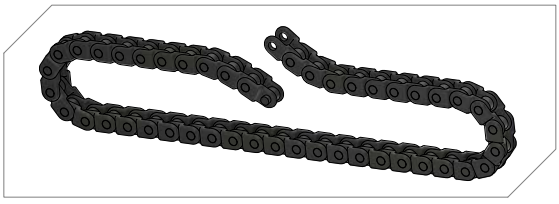


FIGURE 14-B

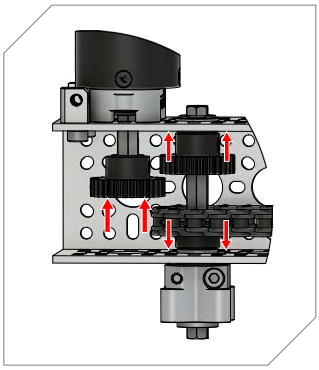


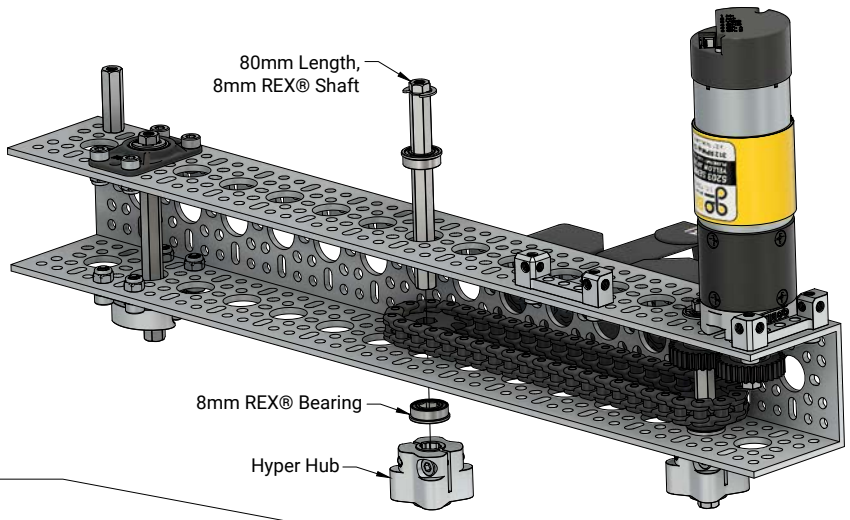
FIGURE 14-C



STEP 15:

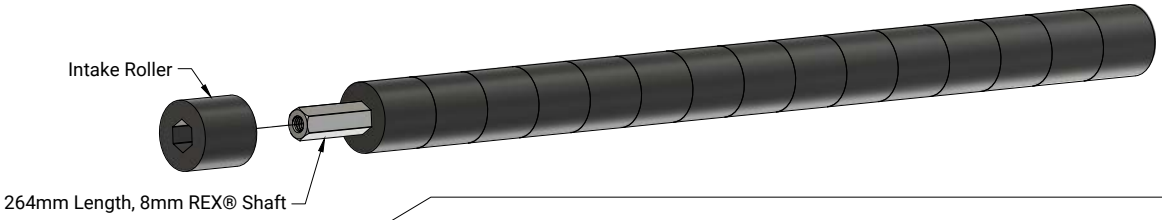
Assemble **one** 10-Tooth Sprocket, **two** 8mm REX® Bearings, **one** Hyper Hub, and **one** 80mm Length, 8mm REX® Shaft as shown.

Tighten Hyper Hub.



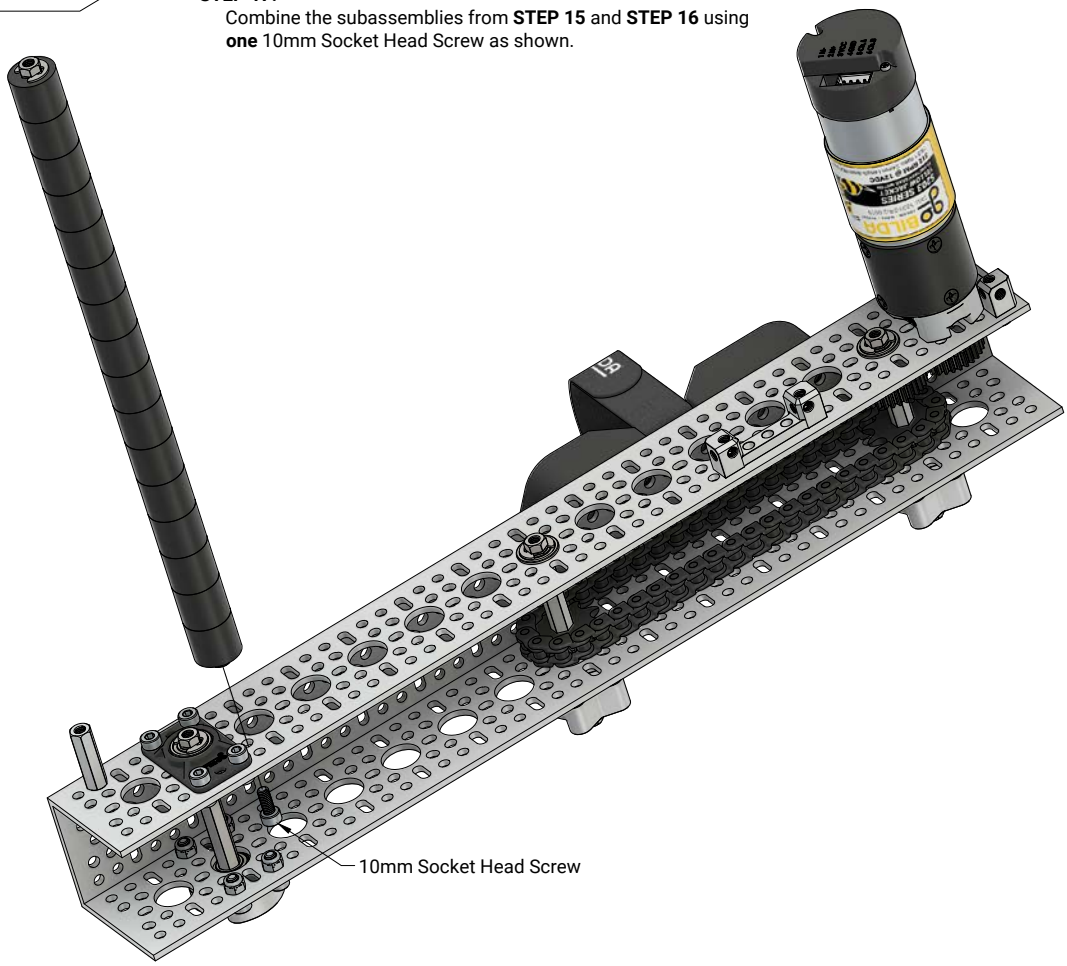
STEP 16:

Slide **sixteen** Intake Rollers onto **one** 264mm Length, 8mm REX® Shaft as shown.



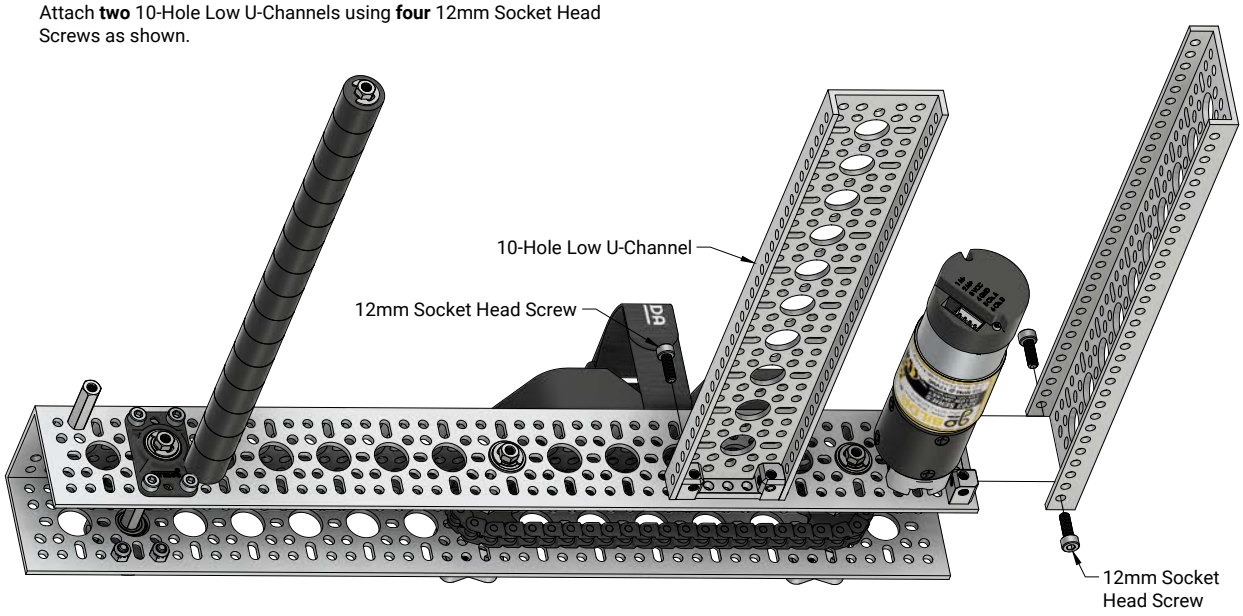
STEP 17:

Combine the subassemblies from **STEP 15** and **STEP 16** using **one** 10mm Socket Head Screw as shown.



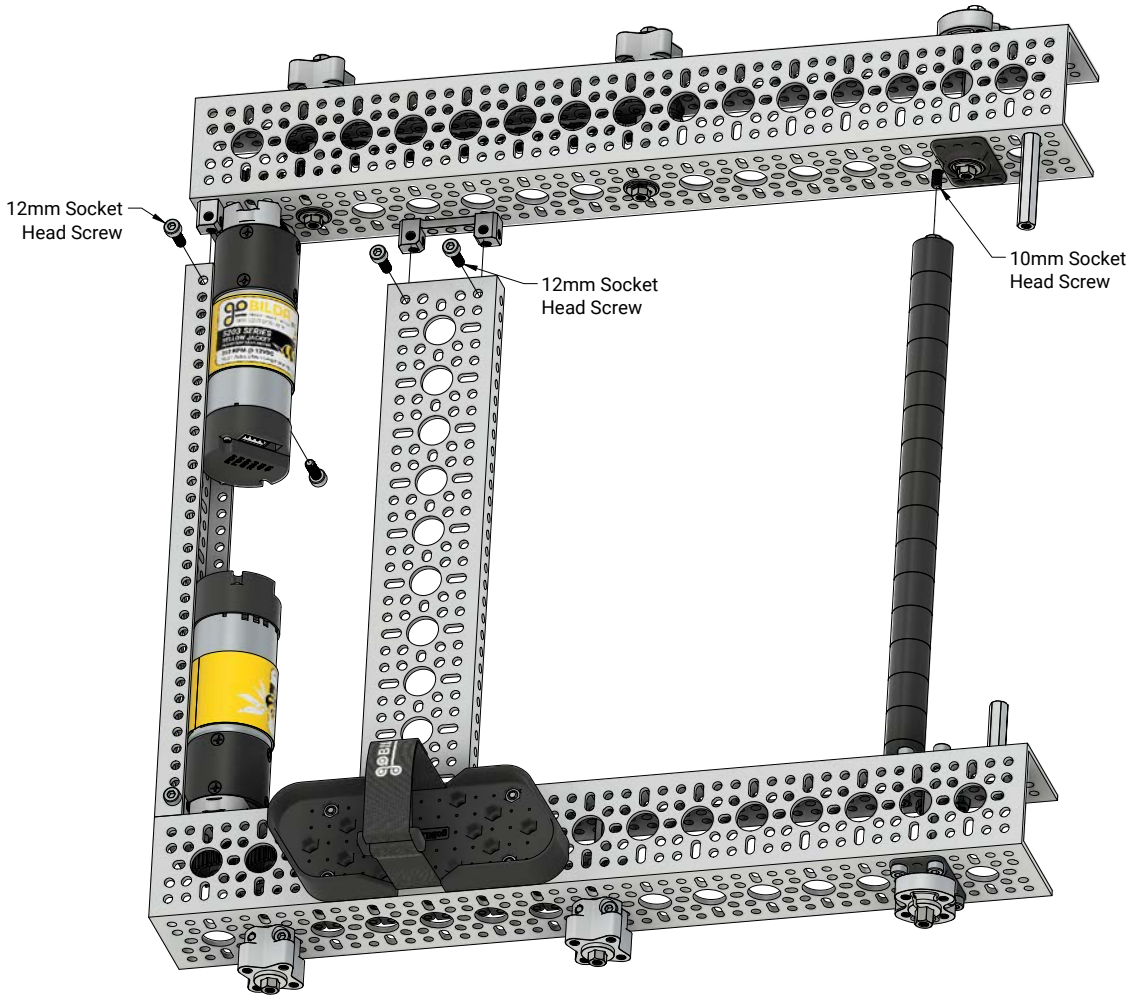
STEP 18:

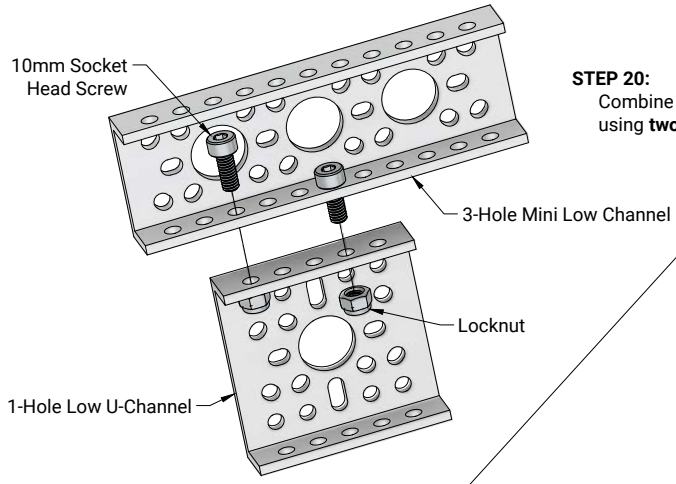
Attach **two** 10-Hole Low U-Channels using **four** 12mm Socket Head Screws as shown.



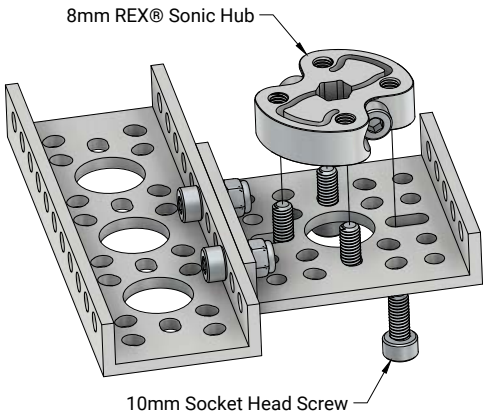
STEP 19:

Combine the subassemblies from **STEP 7** and **STEP 18** using **four** 12mm Socket Head Screws and **one** 10mm Socket Head Screw as shown.

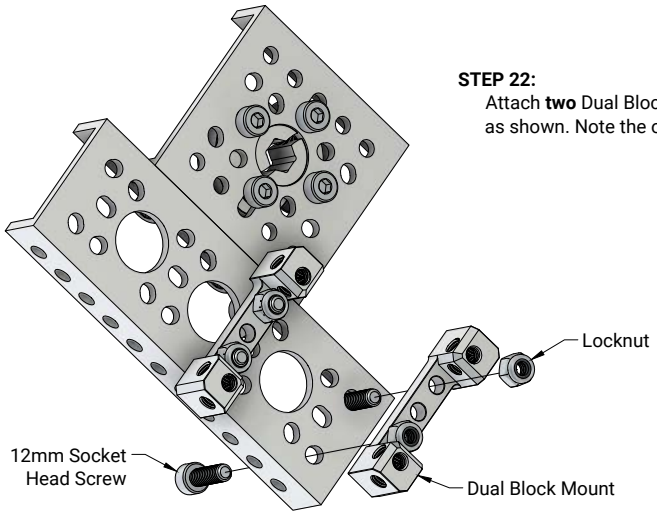




STEP 20:
Combine **one** 3-Hole Mini Low Channel and **one** 1-Hole Low U-Channel as shown using **two** 10mm Socket Head Screws and **two** Locknuts.

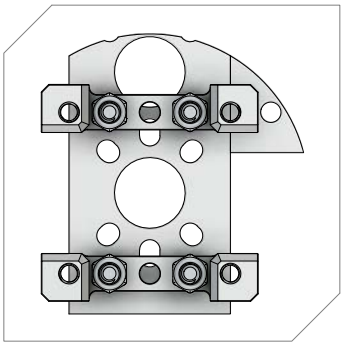


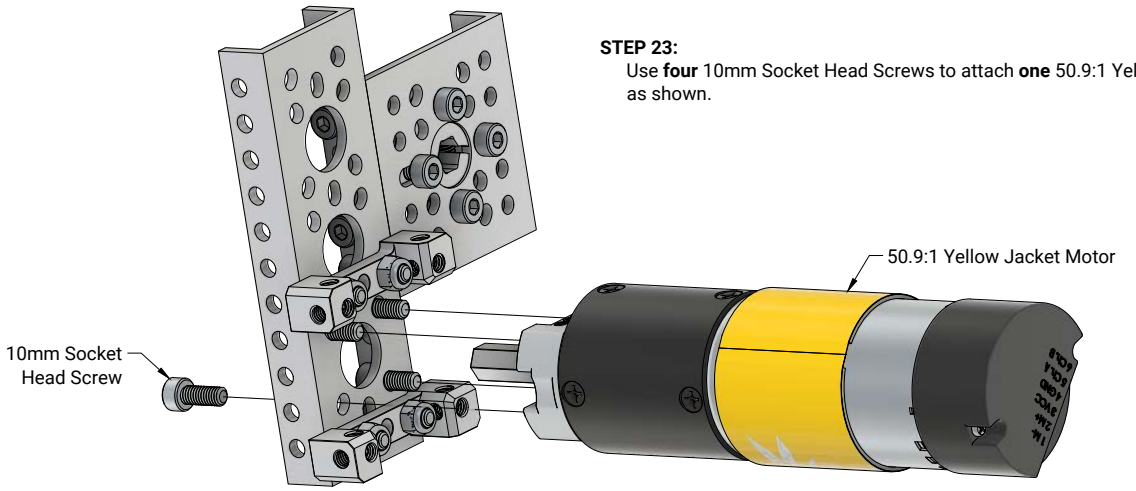
STEP 21:
Attach **one** 8mm REX® Sonic Hub using **four** 10mm Socket Head Screws as shown.



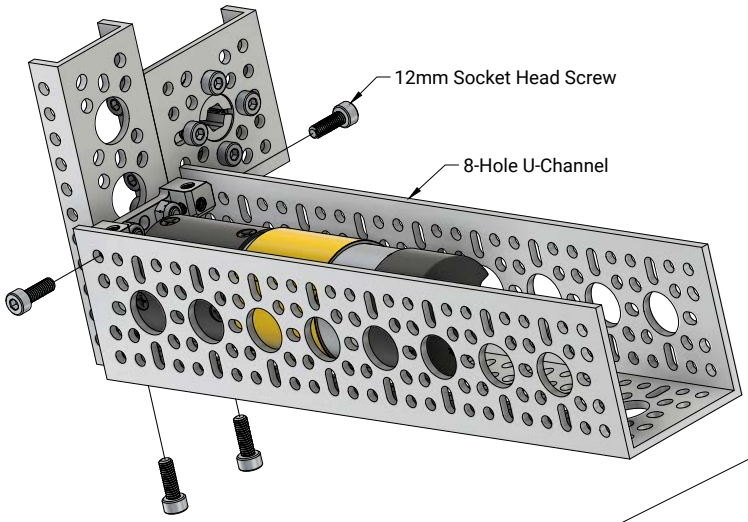
STEP 22:
Attach **two** Dual Block Mounts using **four** 12mm Socket Head Screws and **four** Locknuts as shown. Note the orientation of the Dual Block Mounts (**FIGURE 22-A**).

FIGURE 22-A





STEP 23:
Use **four** 10mm Socket Head Screws to attach **one** 50.9:1 Yellow Jacket Motor as shown.

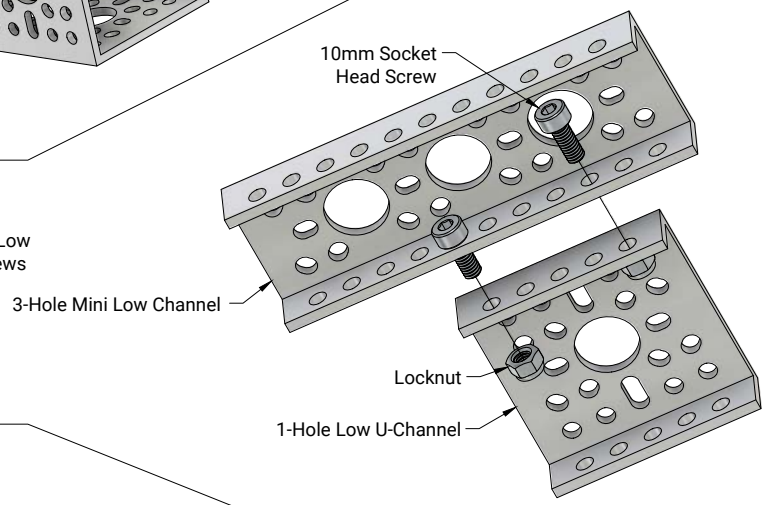


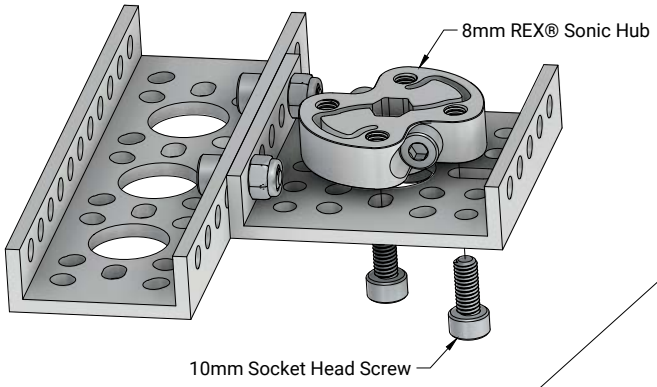
STEP 24:

Attach **one** 8-Hole U-Channel using **four** 12mm Socket Head Screws as shown.

STEP 25:

Combine **one** 3-Hole Mini Low Channel and **one** 1-Hole Low U-Channel as shown using **two** 10mm Socket Head Screws and **two** Locknuts.



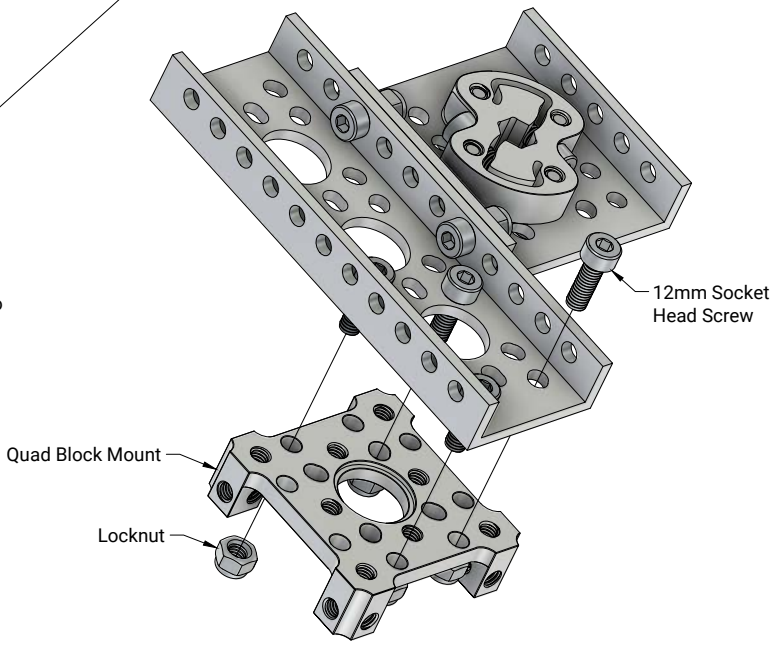


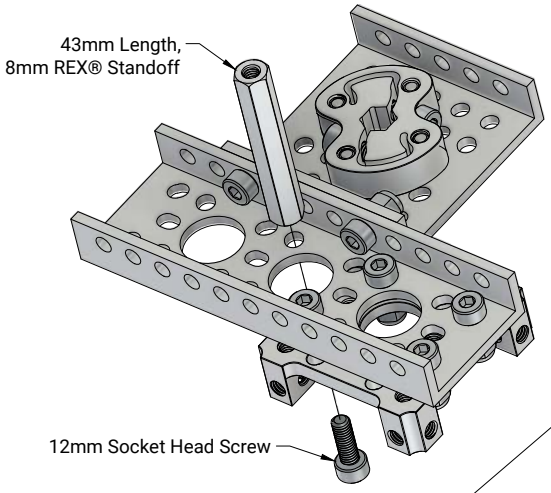
STEP 26:

Attach **one** 8mm REX® Sonic Hub using **four** 10mm Socket Head Screw as shown.

STEP 27:

Use **four** 12mm Socket Head Screws and **four** Locknuts to attach **one** Quad Block Mount as shown.





STEP 28:

Attach **one** 43mm Length, 8mm REX® Standoff using **one** 12mm Socket Head Scew as shown.

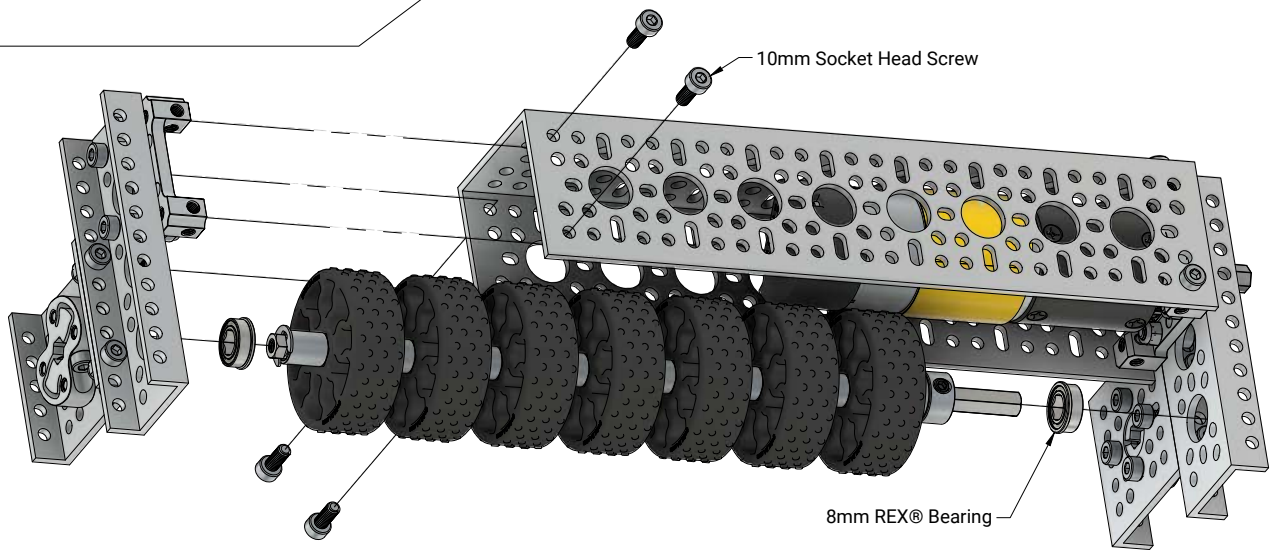


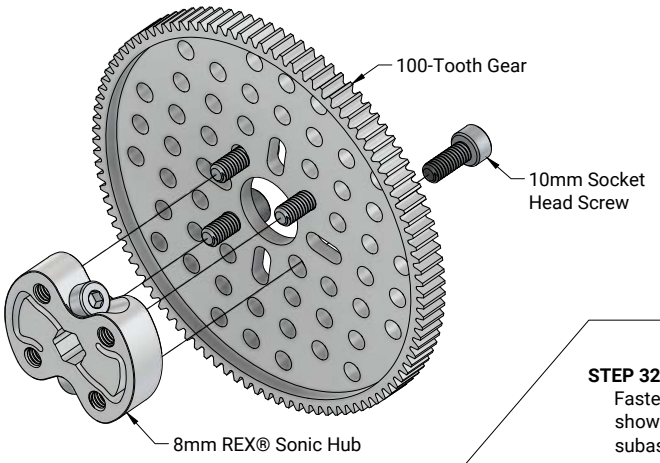
STEP 29:

Slide **seven** 8mm ID x 12mm Spacers, **seven** 48mm GripForce® Gecko Wheels, and **two** Collars onto **one** 240mm Length, 8mm REX® Shaft as shown.

STEP 30:

Combine the subassemblies from **STEP 24**, **STEP 28**, and **STEP 29** with **two** 8mm REX® Bearings and fasten together using **four** 10mm Socket Head Screws as shown.





STEP 31:

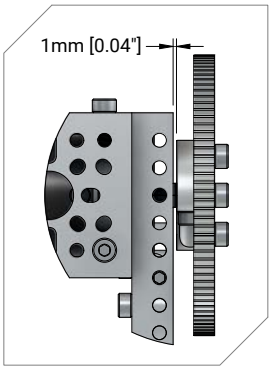
Fasten **one** 8mm REX® Sonic Hub to **one** 100-Tooth Gear using **four** 10mm Socket Head Screws as shown.

STEP 32:

Fasten the subassembly from **STEP 31** to the subassembly from **STEP 30** as shown. The Sonic Hub should be spaced appoximately 1mm away from the subassembly from **STEP 30** as shown in (**FIGURE 32-A**).



FIGURE 32-A



STEP 33:

Fasten **one** 20-Tooth Gear as shown.
Align the gears before tightening its set-screws (**FIGURE 33-A**).

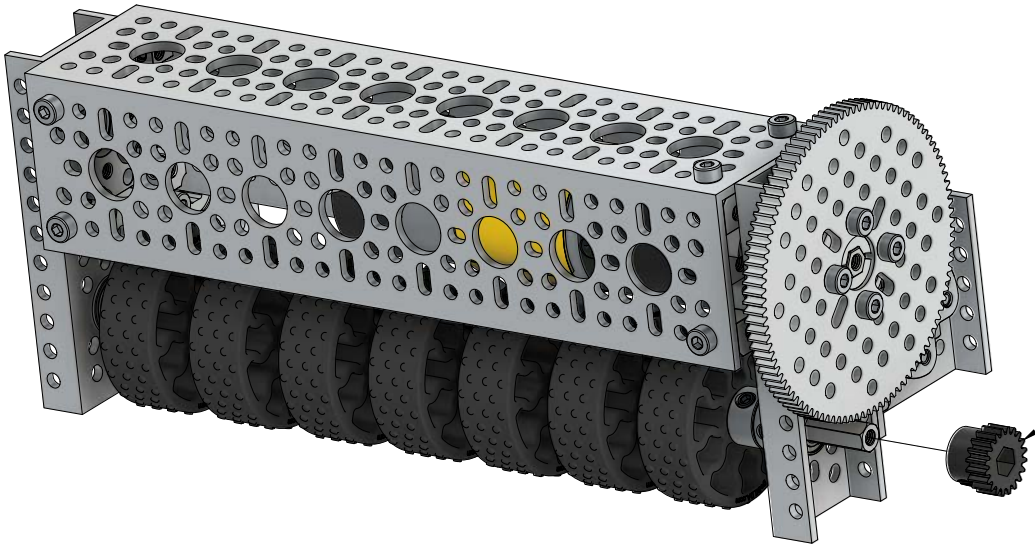
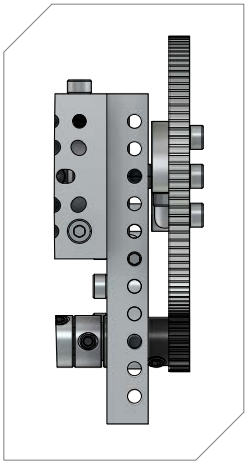
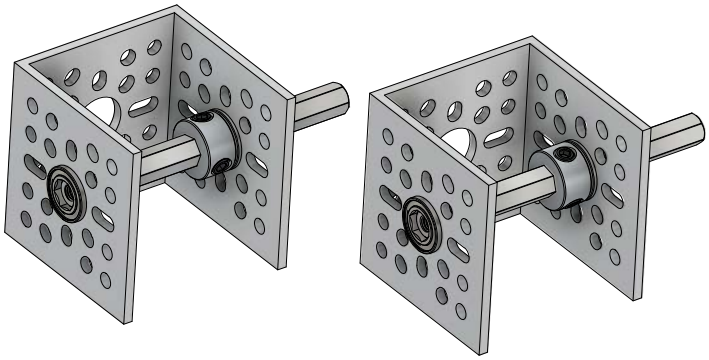


FIGURE 33-A





STEP 34:

Follow the procedure below to create two subassemblies using **two** 1-Hole U-Channels, **four** 8mm REX® Bearings, **two** Collars, and **two** 80mm Length, 8mm REX® Shafts.

FIGURE 34-A

Slide one 80mm Length, 8mm REX® Shaft through one Collar, one 8mm REX® Bearing, and one 1-Hole U-Channel as shown. Note, the built-in-shim of the Collar faces the bearing.

Do not tighten the Collar.

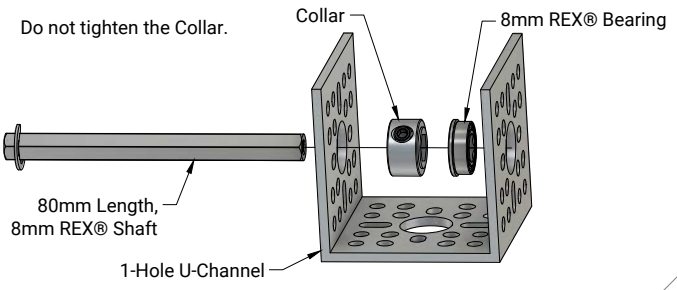


FIGURE 34-B

Slide one 8mm REX® Bearing into the 1-Hole U-Channel as shown.

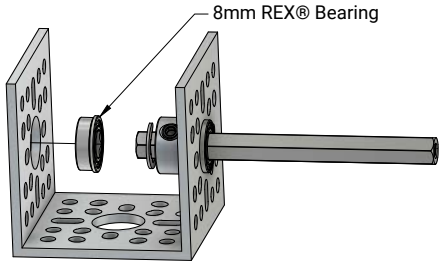
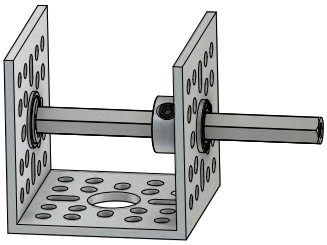


FIGURE 34-C

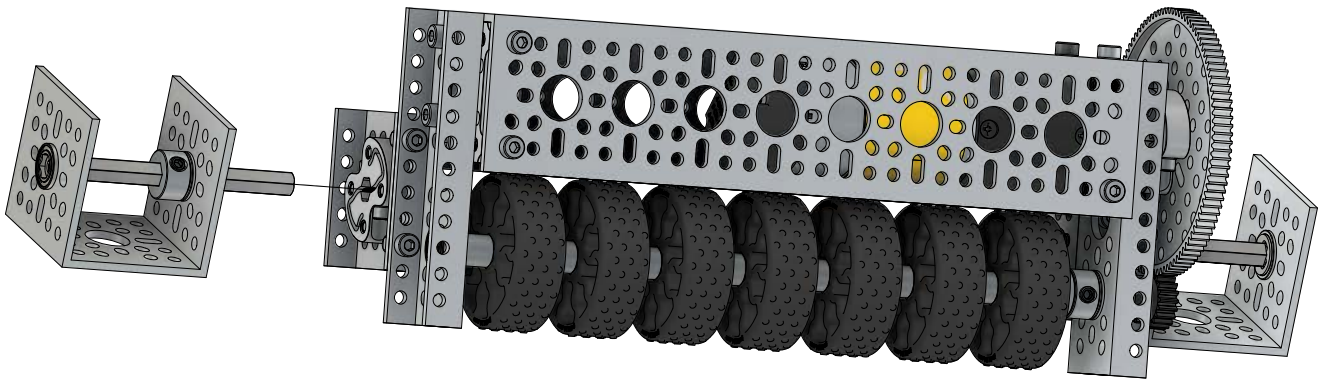
Pull the 80mm Length, 8mm REX® Shaft and the Collar against the 8mm REX® Bearings as shown, then tighten the Collar in place.



STEP 35:

Combine the subassemblies from **STEP 33** and **STEP 34** as shown.

Do not tighten in place.



STEP 36:

Use **eight** 10mm Socket Head Screws and **eight** Locknuts to fasten the subassembly from **STEP 35** to the subassembly from **STEP 19** as shown.

Center the components (**FIGURE 36-A**), then tighten the 8mm REX® Sonic Hubs. A 4mm thick component such as an 1102 Series Flat Beam can be used to achieve acceptable spacing between the 100-Tooth Gear and the 1-Hole U-Channel.

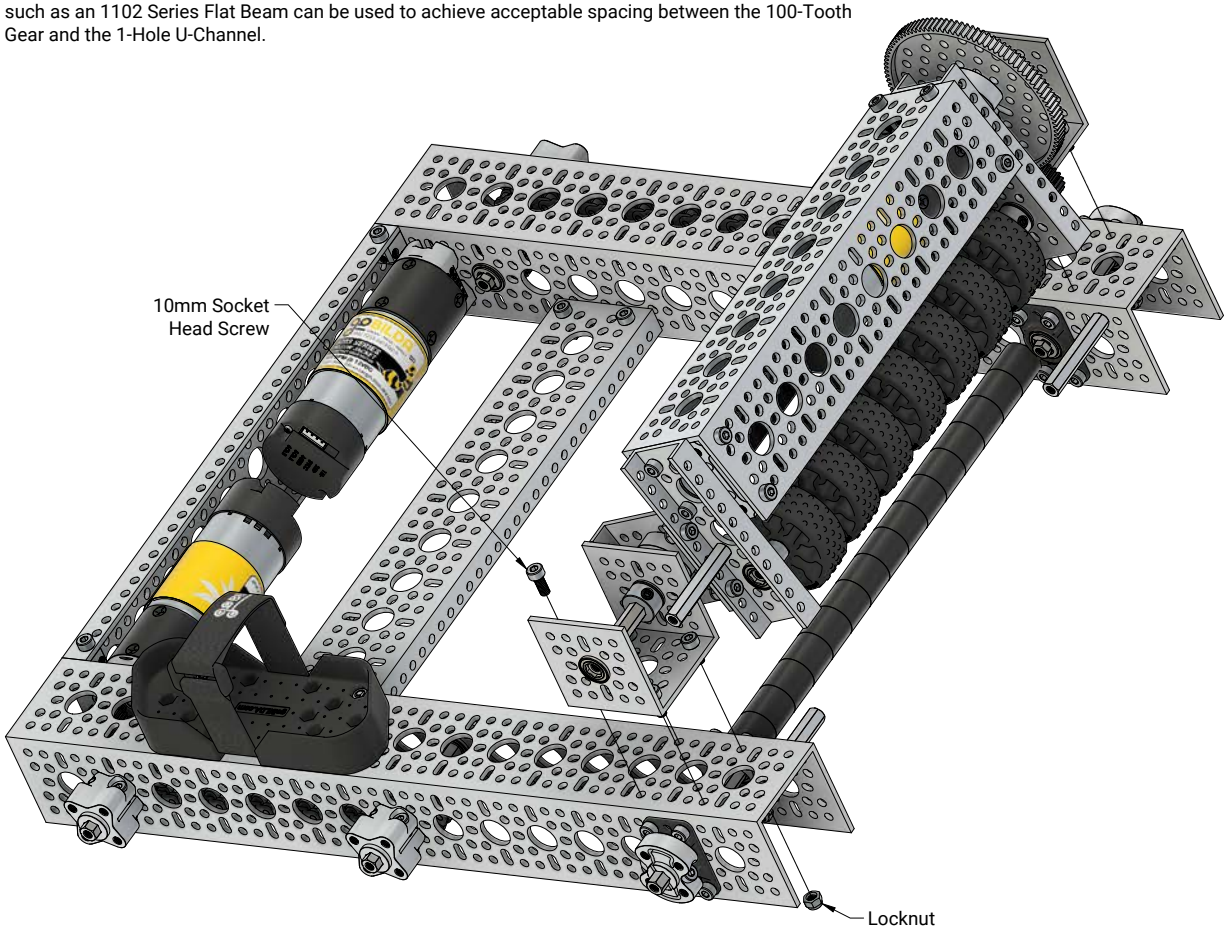
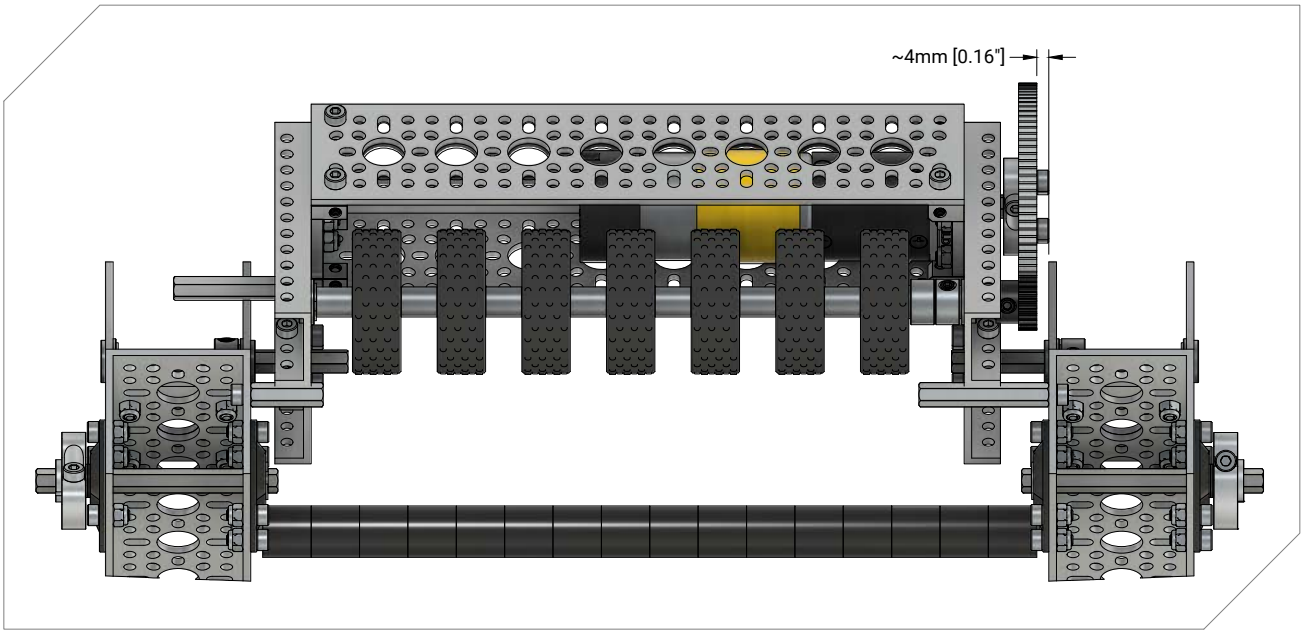
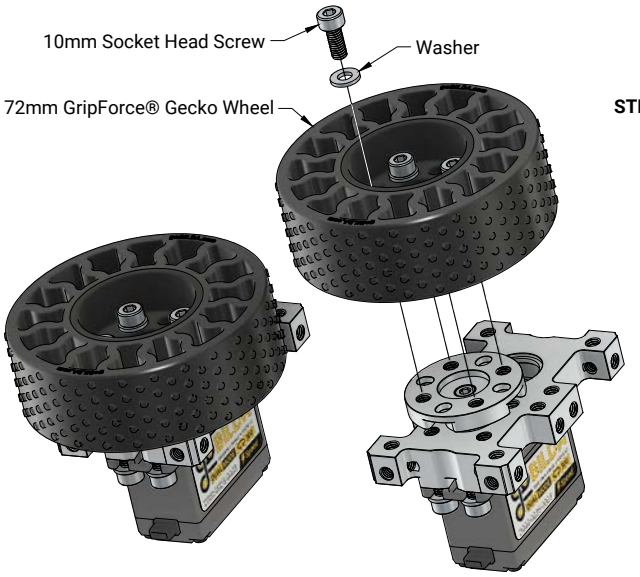


FIGURE 36-A





STEP 37:

Install **two** Servo 1 & 2 (Speed) Servos in **two** Compact ServoBlocks® (**FIGURE 37-A** and attach **two** 72mm GripForce® Gecko Wheels as shown (**FIGURE 37-B**) using **eight** Washers and **eight** 10mm Socket Head Screws.

FIGURE 37-A

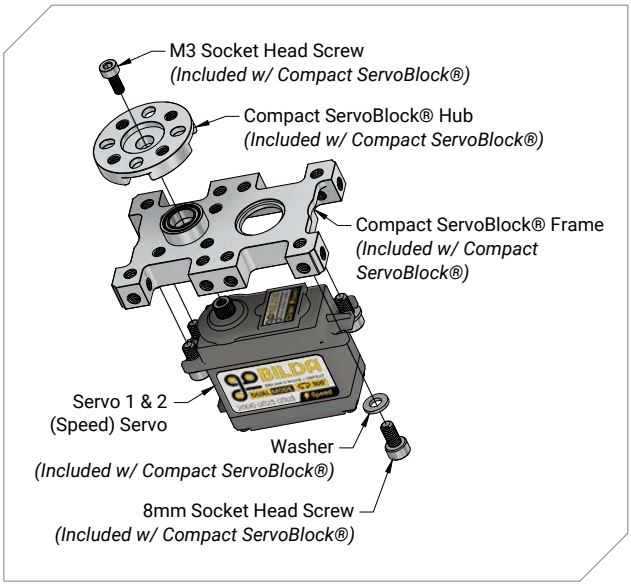
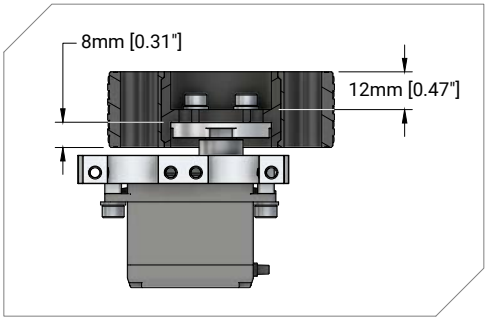
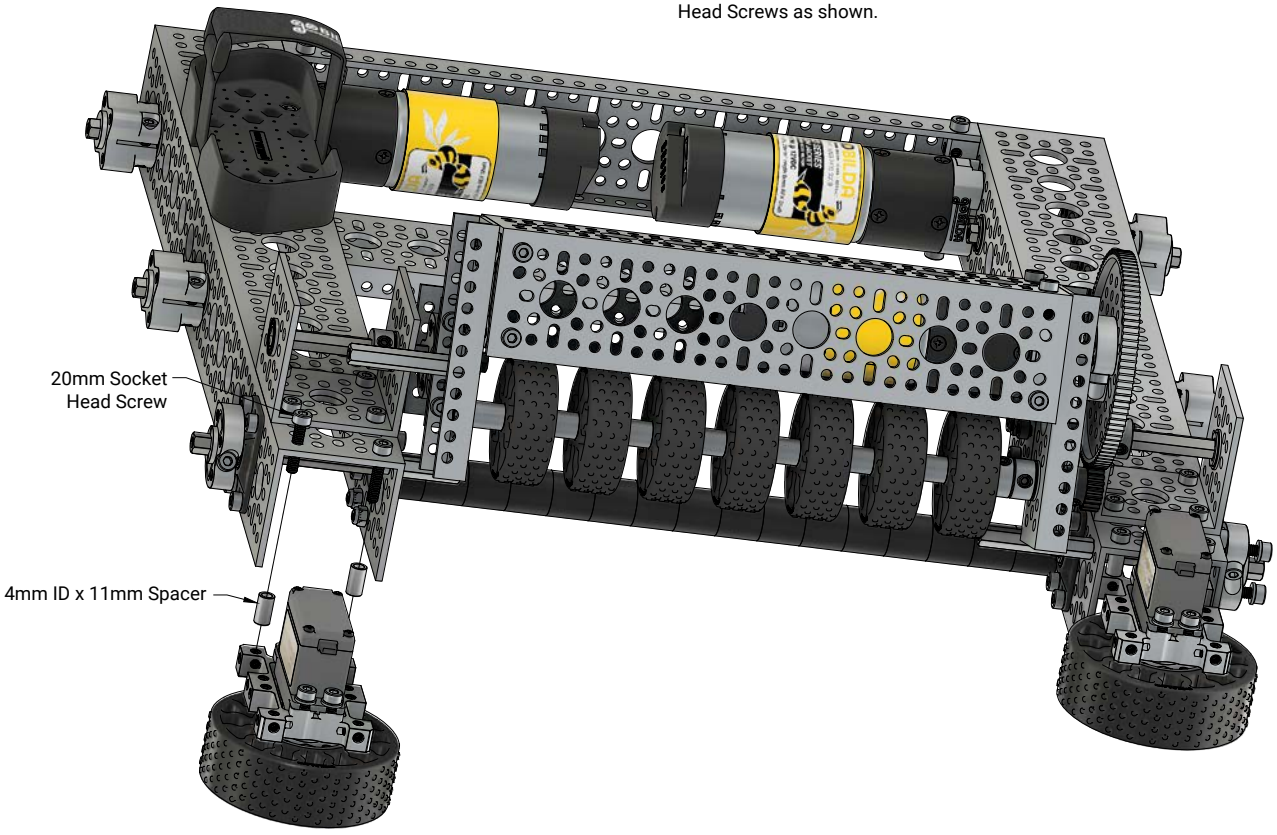


FIGURE 37-B



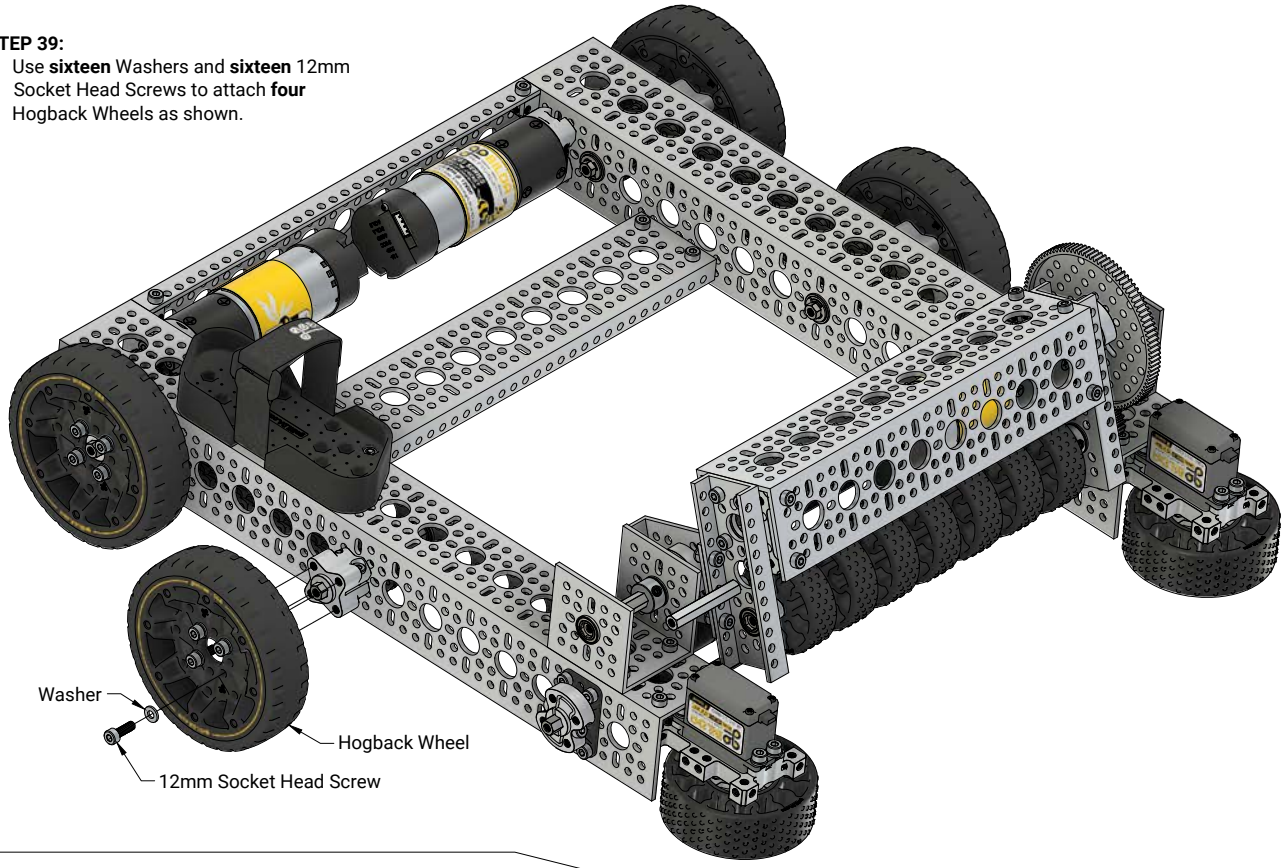
STEP 38:

Install the subassemblies from **STEP 37** onto the subassembly from **STEP 36** using **four** 4mm ID x 11mm Spacers and **four** 20mm Socket Head Screws as shown.



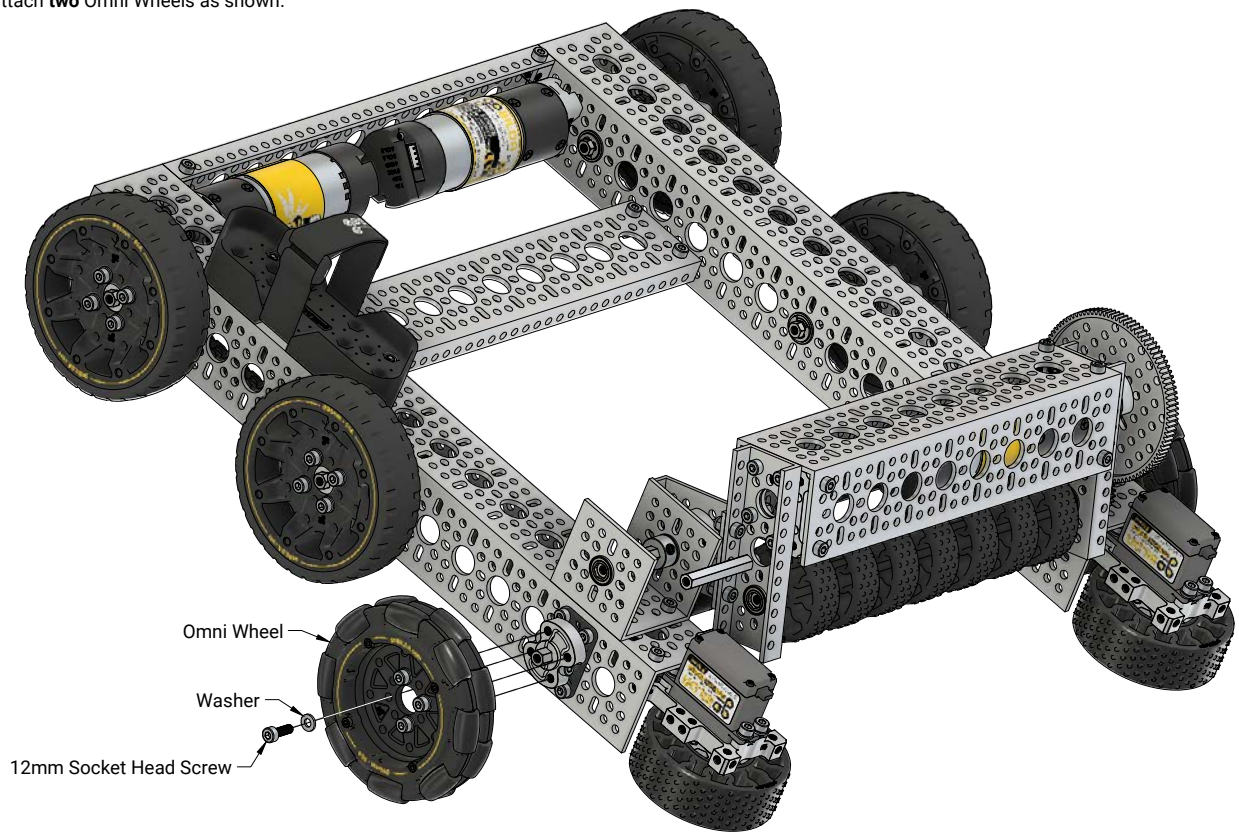
STEP 39:

Use **sixteen** Washers and **sixteen** 12mm Socket Head Screws to attach **four** Hogback Wheels as shown.



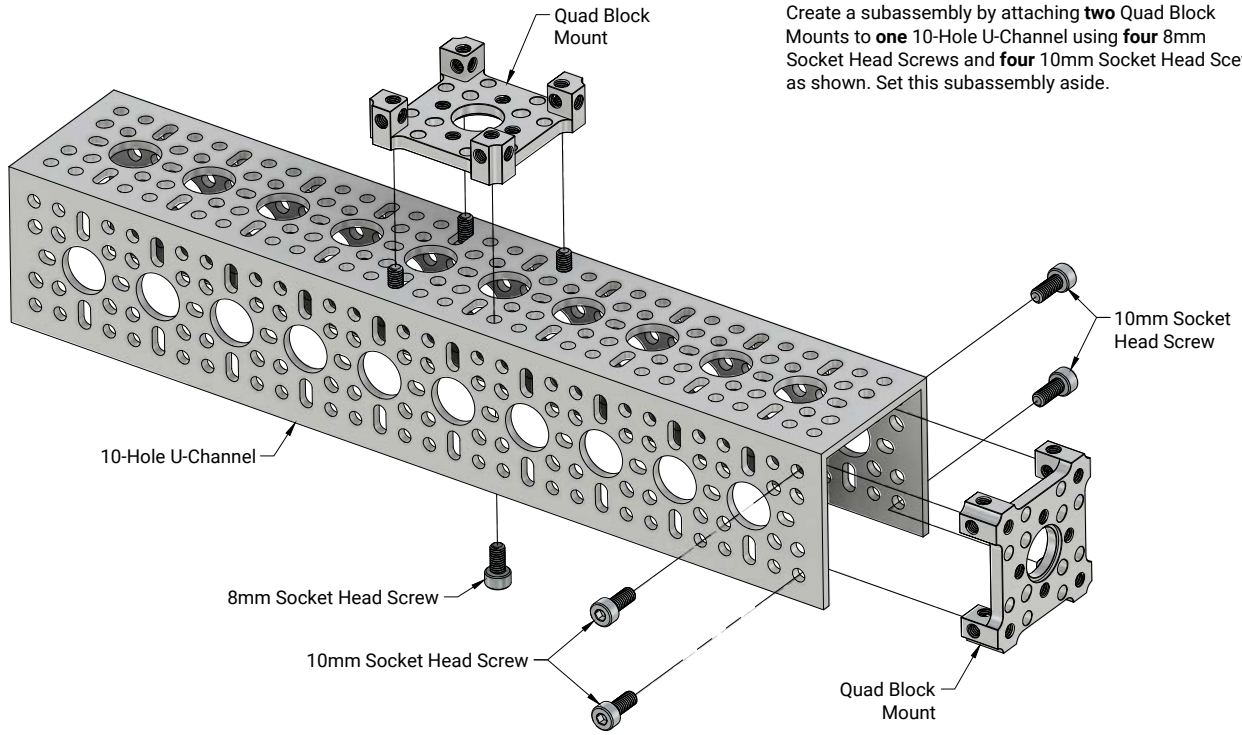
STEP 40:

Use **eight** 12mm Socket Head Screws and **eight** Washers to attach **two** Omni Wheels as shown.



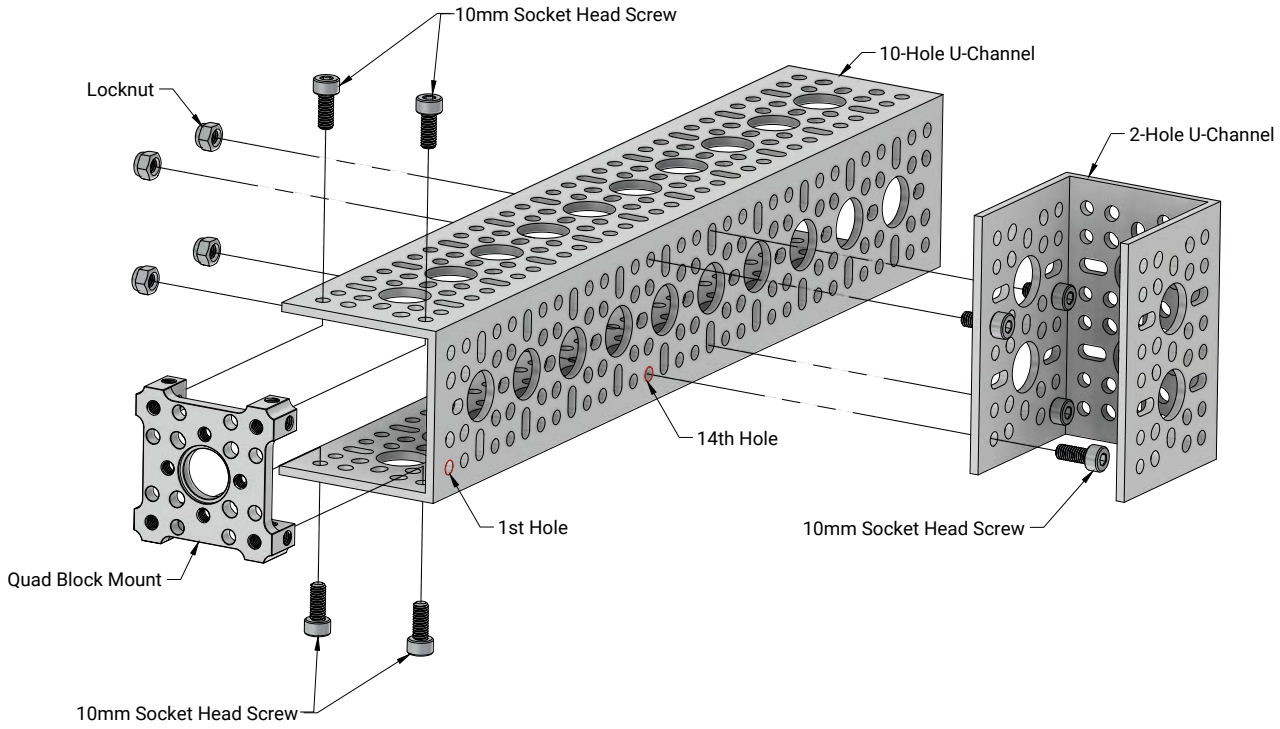
STEP 41:

Create a subassembly by attaching **two** Quad Block Mounts to **one** 10-Hole U-Channel using **four** 8mm Socket Head Screws and **four** 10mm Socket Head Scews as shown. Set this subassembly aside.



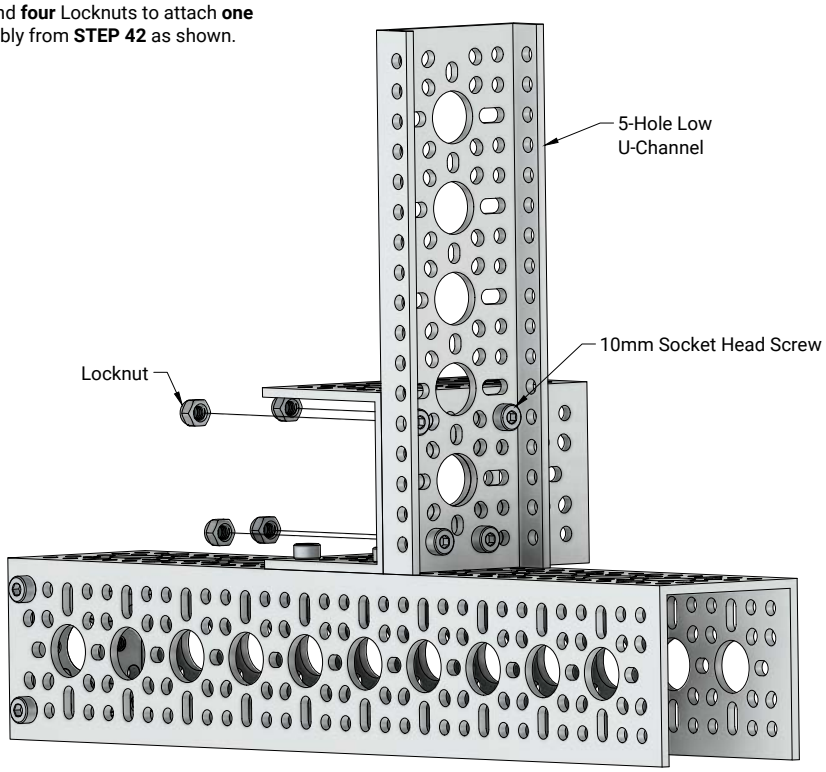
STEP 42:

Create another subassembly by combining **one** Quad Block Mount, **one** 2-Hole U-Channel, and **one** 10-Hole U-Channel, using **eight** 10mm Socket Head Screws and **four** Locknuts as shown.



STEP 43:

Use **four** 10mm Socket Head Screws and **four** Locknuts to attach **one** 5-Hole Low U-Channel to the subassembly from **STEP 42** as shown. Note the locations of the screws.



STEP 44:

Convert **one** 19.2:1 Ratio Yellow Jacket Motor to a 1:1 Ratio Yellow Jacket Motor using **one** Conversion Coupler (**FIGURE 44-A** , **FIGURE 44-B**). Attach the 1:1 Yellow Jacket Motor to **one** Quad Block Mount using **four** 12mm Socket Head Screws as shown.

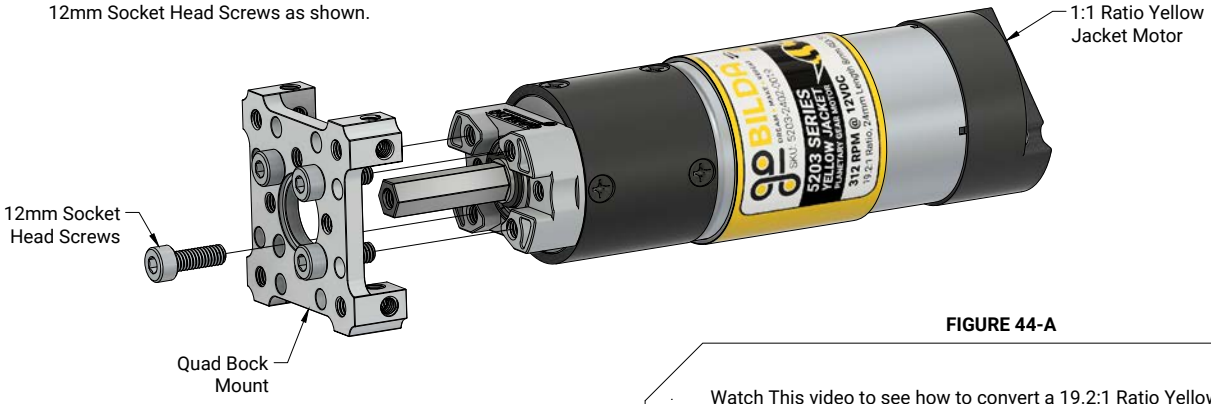


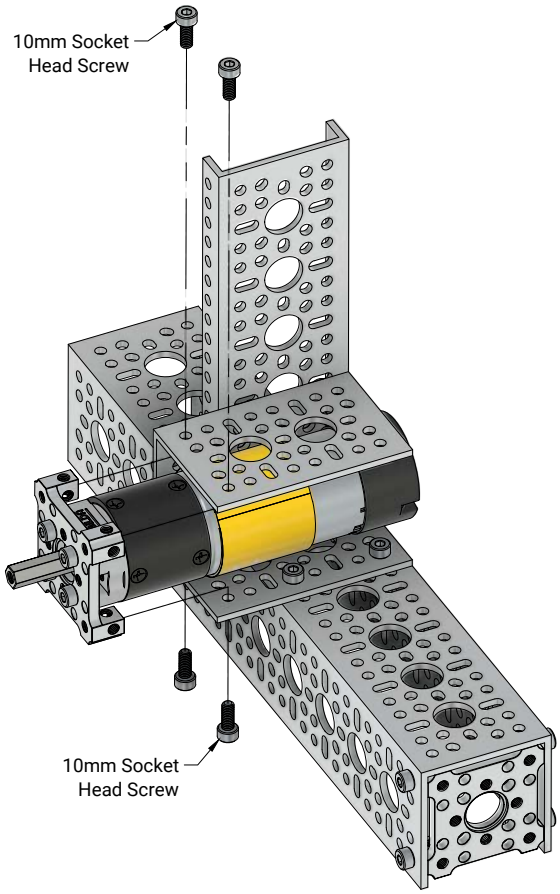
FIGURE 44-A

Watch This video to see how to convert a 19.2:1 Ratio Yellow Jacket Motor to a 1:1 Ratio Yellow Jacket Motor: **http://bit.ly/41fQtuj**



FIGURE 44-B


M3 Thread-Locking Screw
Torx T10, 6mm Length
Remove These
Components
5105-0208-0019
1:1 Conversion Coupler

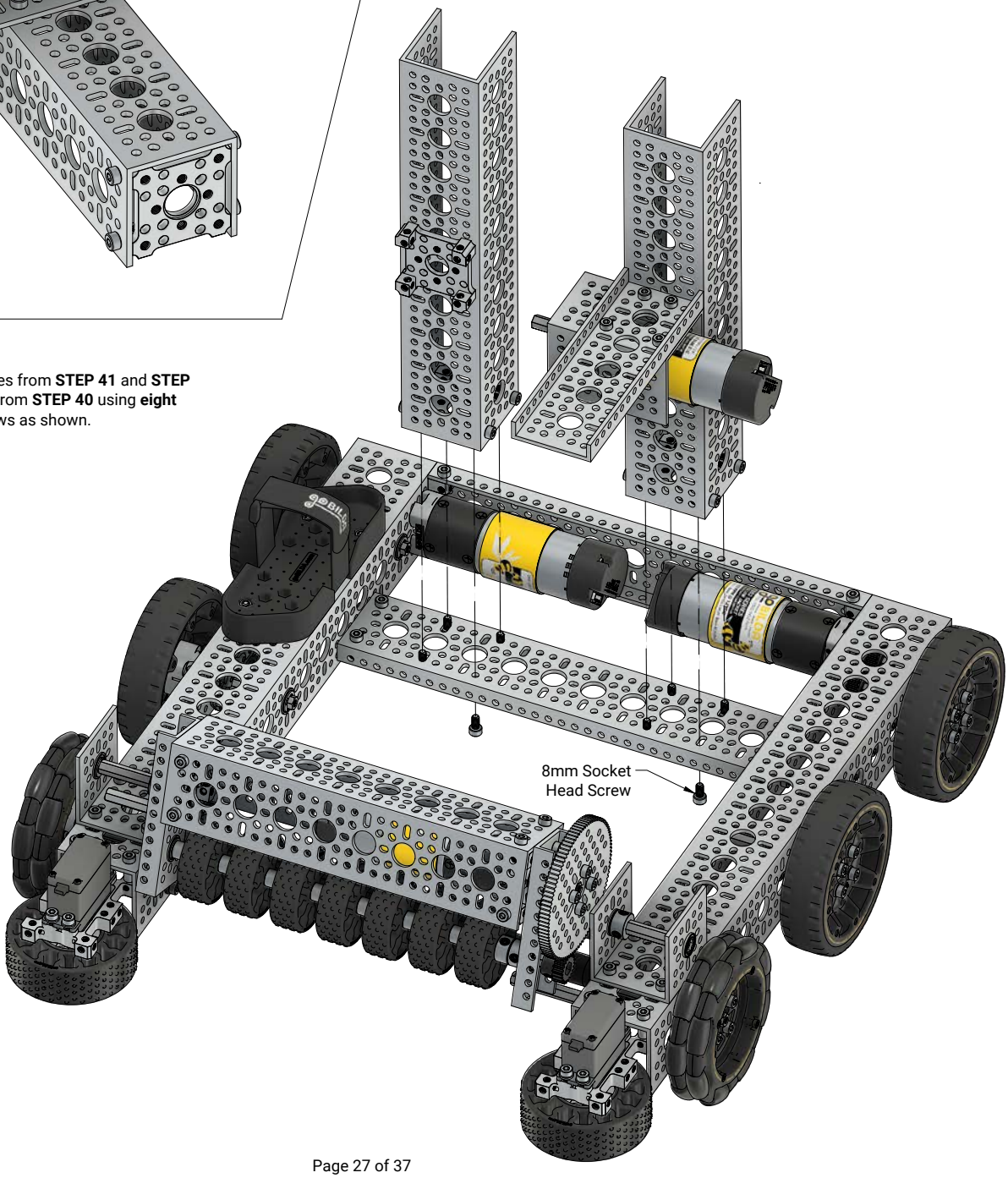


STEP 45:

Combine the subassembly from **STEP 43** with the sub assembly from **STEP 44** using **four** 10mm Socket Head Screws.

STEP 46:

Attach the subassemblies from **STEP 41** and **STEP 45** to the subassembly from **STEP 40** using **eight** 8mm Socket Head Screws as shown.



STEP 47:

Reference the Plastic Gridplate Cutline guide, pages 5-7. Use scissors to cut all sizes of Polycarbonate Gridplate. Note the size and identification letter of each plate to be used in the following steps.

Attach **two** Small Gridplate C's to the inside wall of both 11-Hole U-Channels using **four** Zipties as shown (**FIGURE 47-A**). Note the location of the Gridplates in relation to the 10-Hole U-Channel.

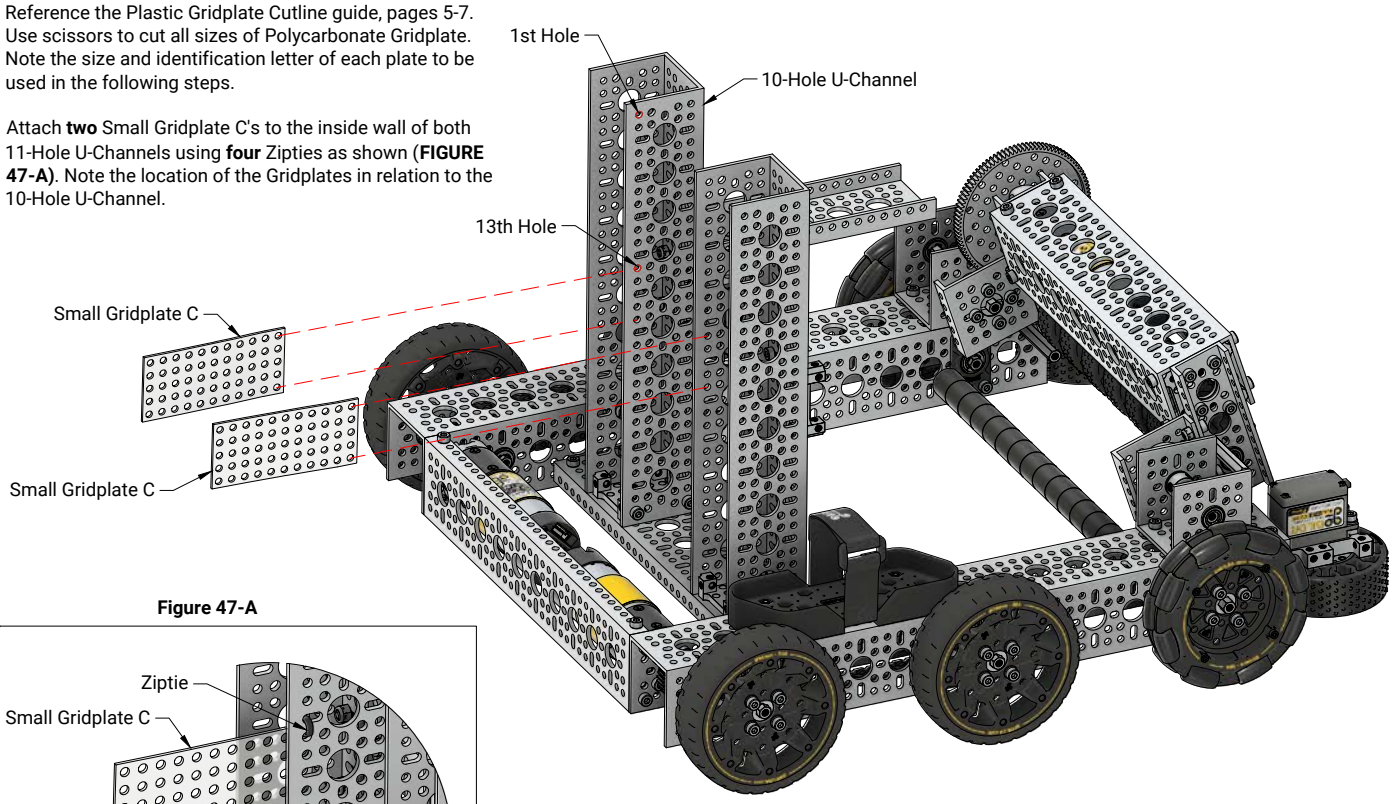
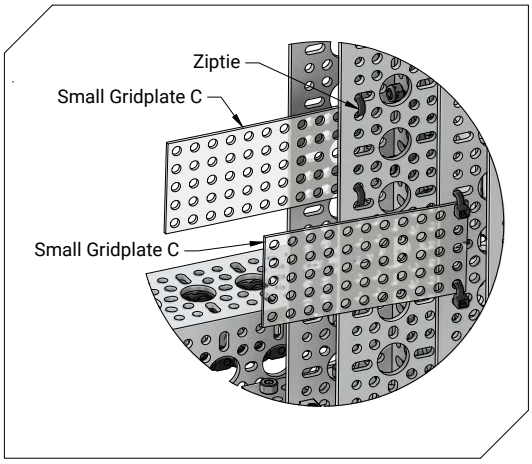


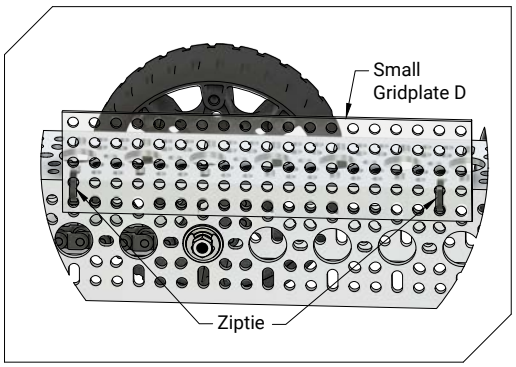
Figure 47-A

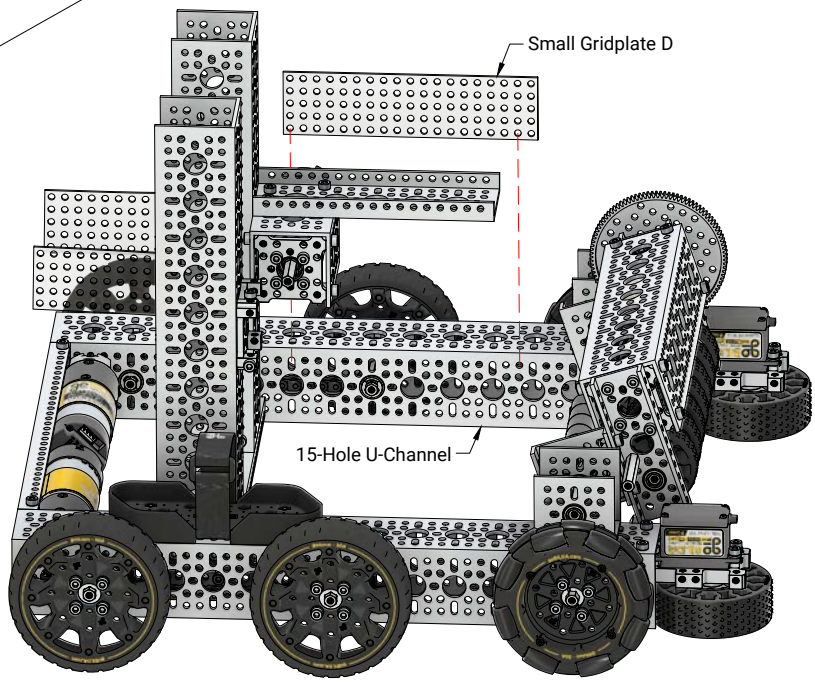


STEP 48:

Use **two** Zipties to attach **one** Small Gridplate D to the 15-Hole U-Channel as shown (**FIGURE 48-A**).

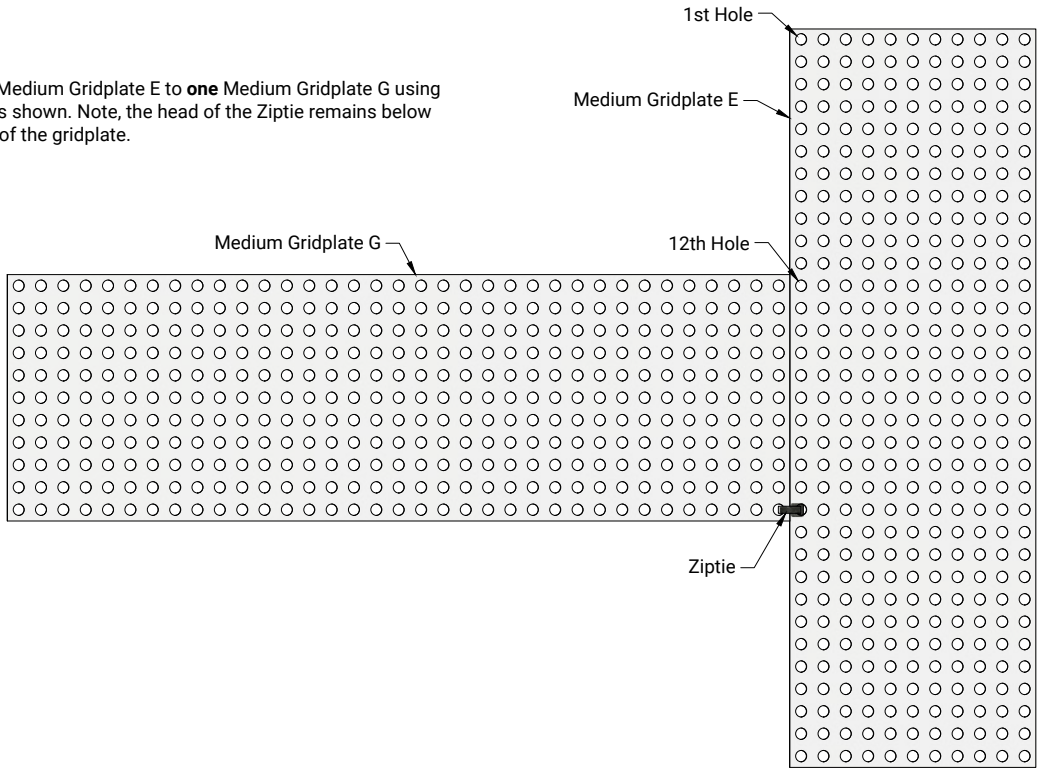
FIGURE 48-A





STEP 49:

Attach **one** Medium Gridplate E to **one** Medium Gridplate G using **one** Ziptie as shown. Note, the head of the Ziptie remains below the surface of the gridplate.



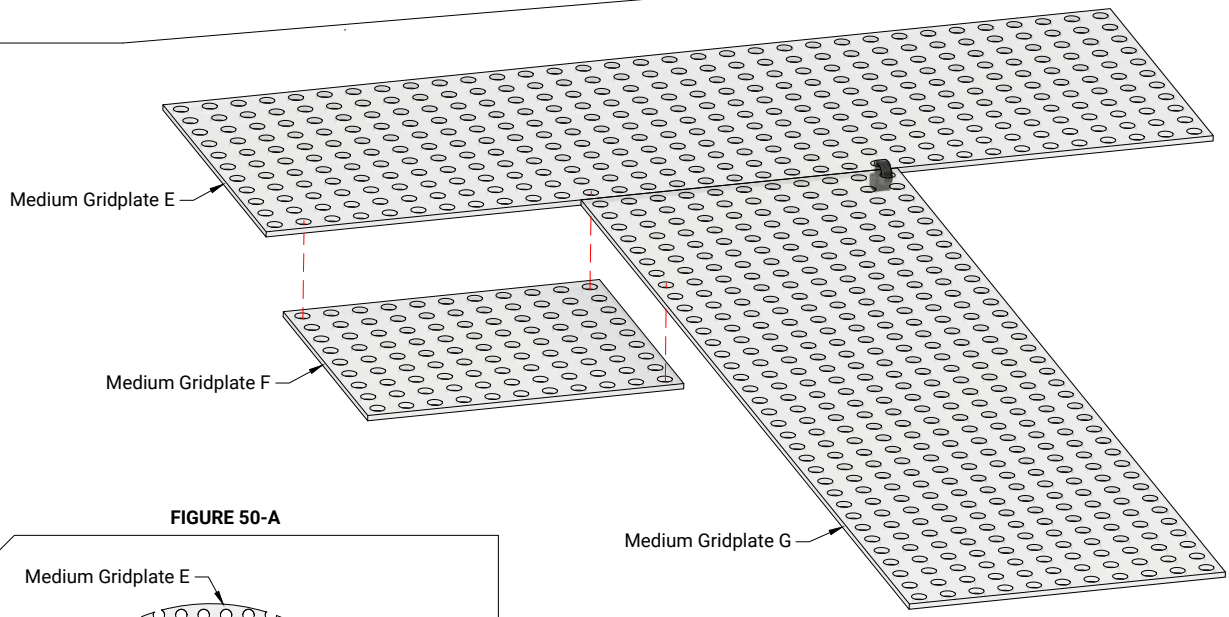
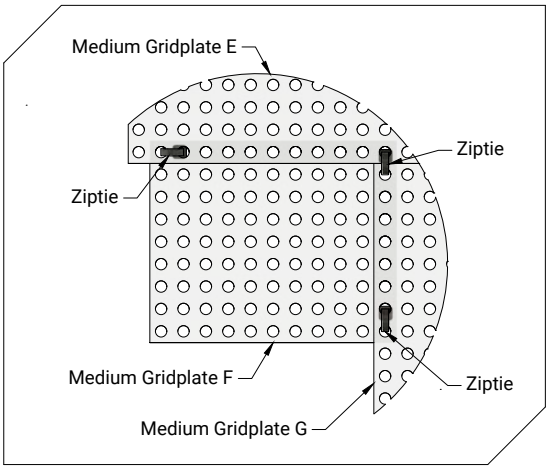


FIGURE 50-A



STEP 50:

Secure **one** Medium Gridplate F to the bottom edges of the subassembly from **STEP 49** using **three** Zipties as shown (**FIGURE 50-A**). Note, all Ziptie heads are below the surface of the Gridplates.

STEP 51:

Fasten **three** 43mm Length, 6mm Round Standoffs and **six** washers using **three** 10mm Socket Head Screws to the subassembly from **STEP 50** in the locations shown (**FIGURE 51-A**).

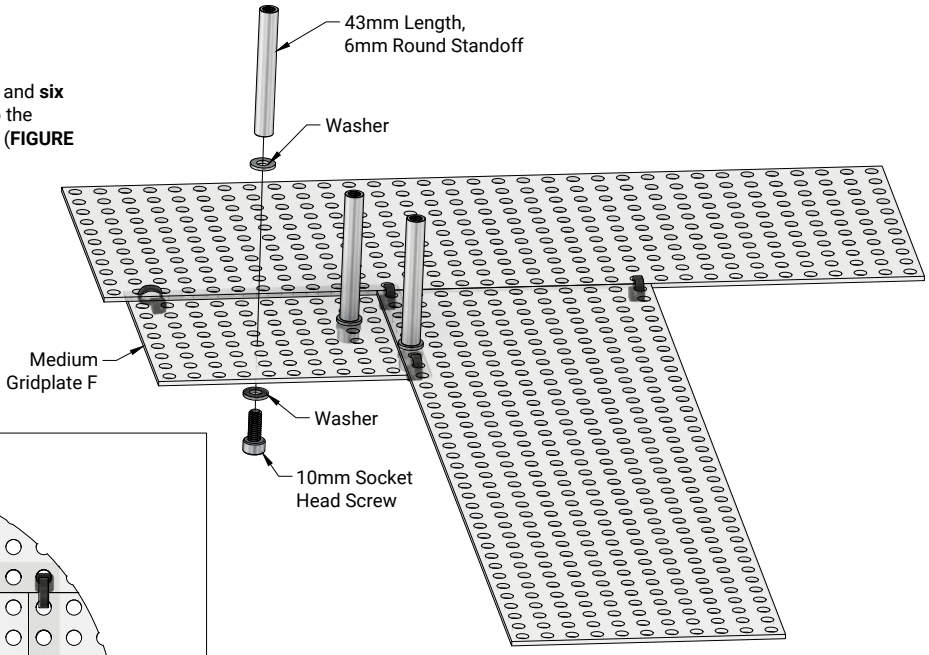
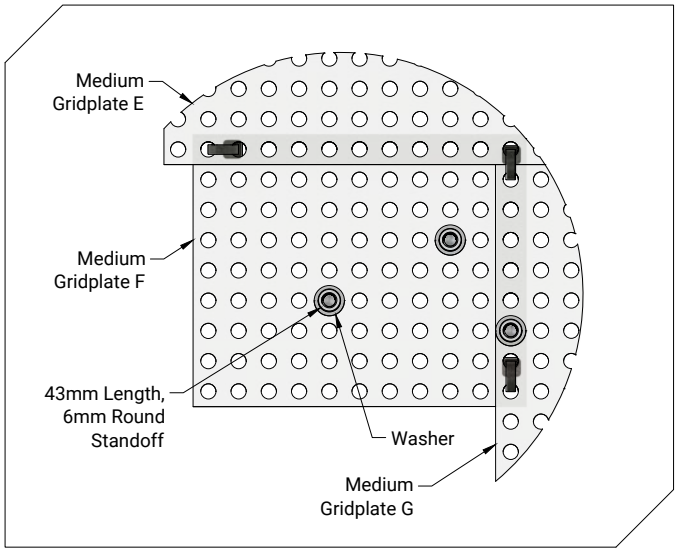
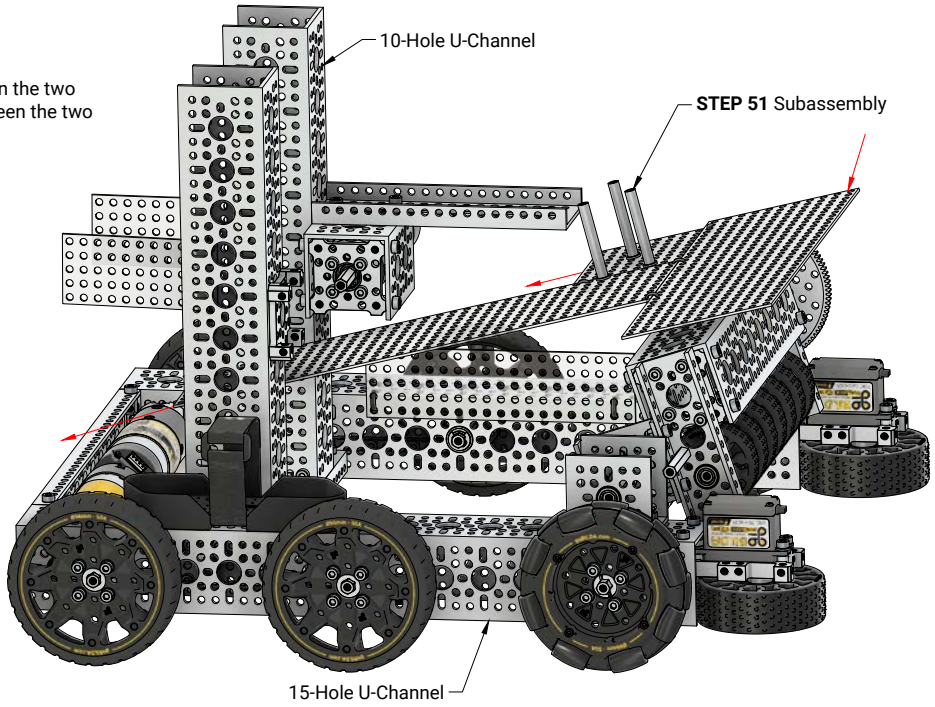


FIGURE 51-A



Step 52:

Slide the subassembly from **STEP 51** between the two vertical 10-Hole U-Channels, then down between the two horizontal 15-Hole U-Channels.



STEP 53:

Attach the narrow edges of Medium Gridplate E to the outside wall of the two 15-Hole U-Channels using **four** Zipties as shown (**FIGURE 53-A** and **FIGURE 53-B**). Note that in (**FIGURE 53-A**), one Ziptie passes through both the 15-Hole U-Channel and Small Gridplate D.

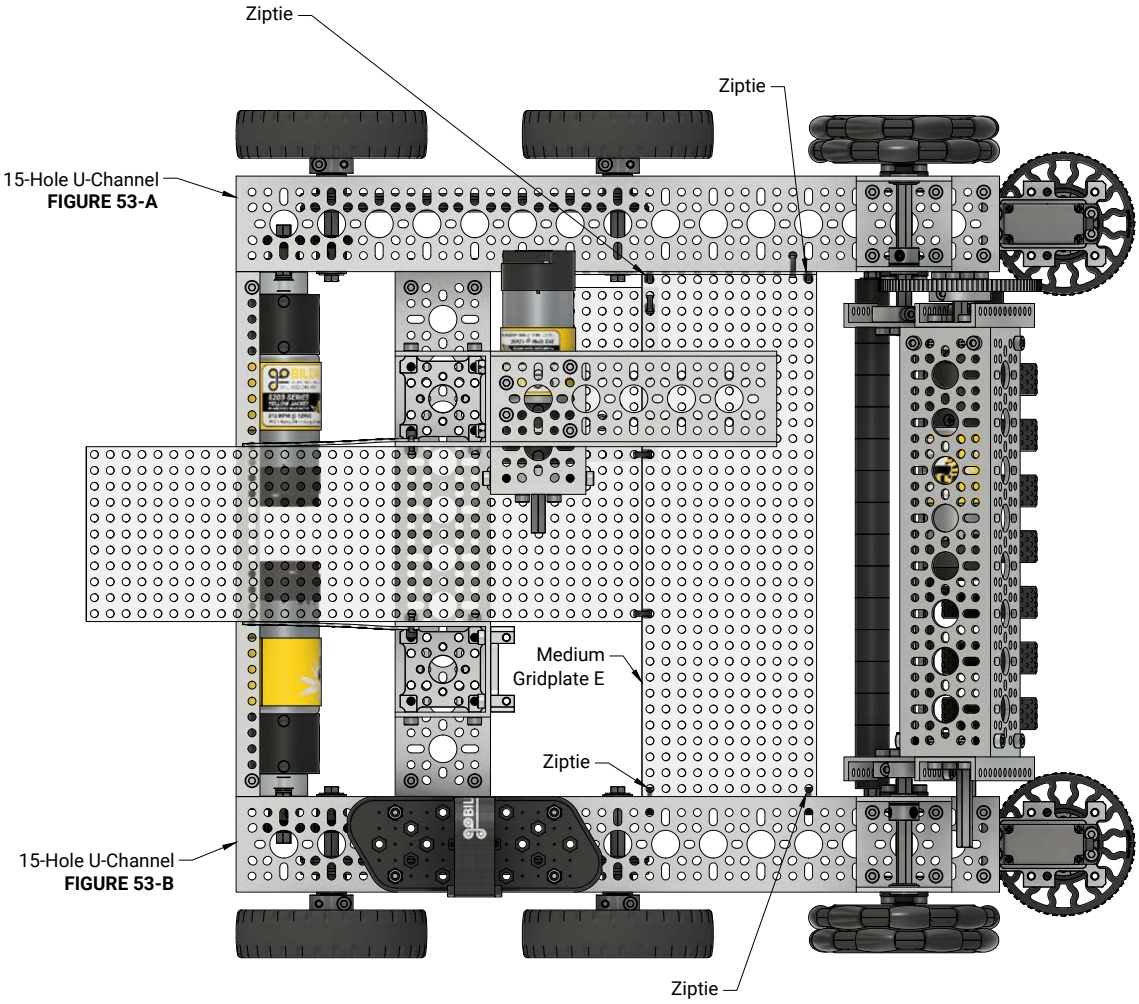


FIGURE 53-A

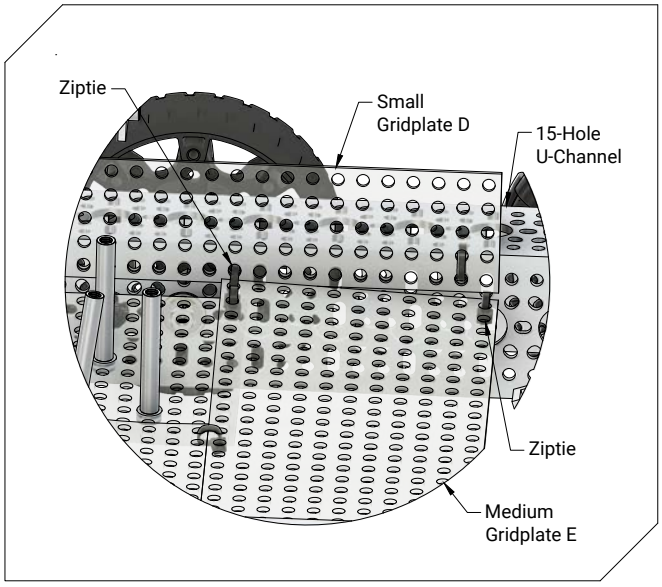
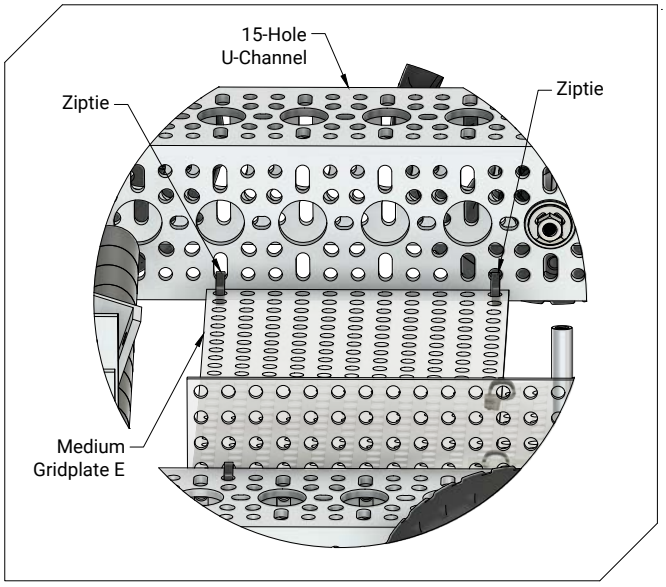


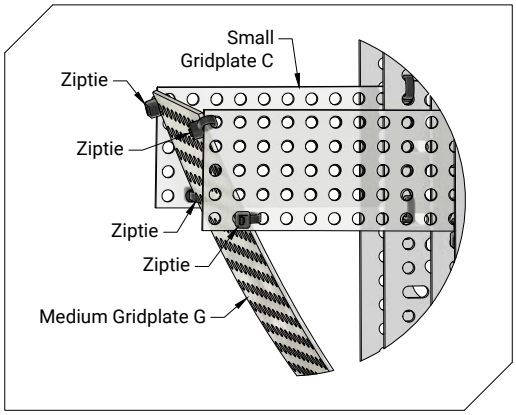
FIGURE 53-B

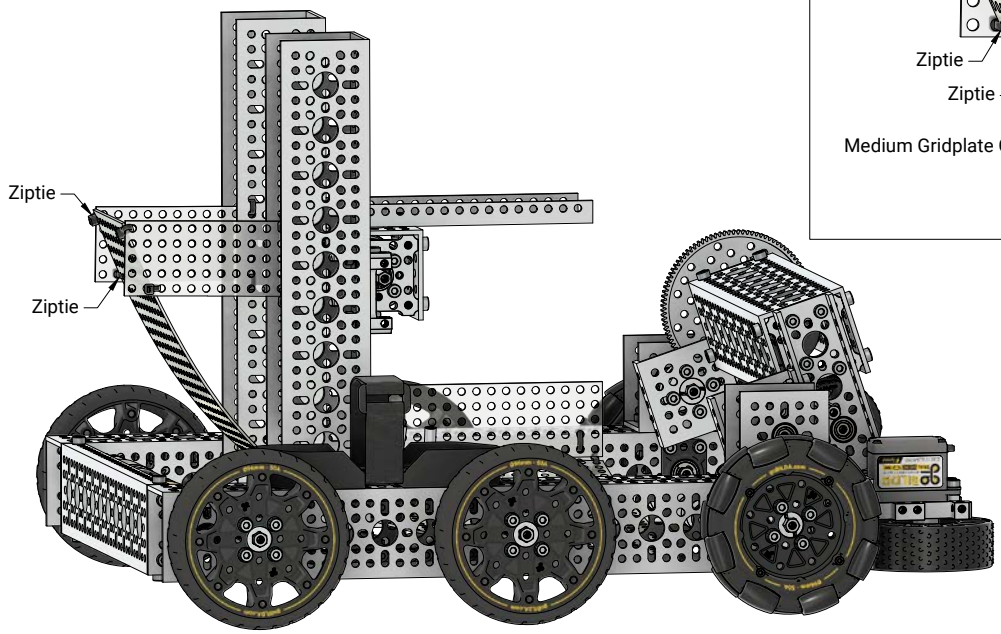


STEP 54:

Gently curve Medium Gridplate G up between the two Small Gridplate C's and use **four** Zipties to secure Medium Gridplate G as shown (**FIGURE 54-A).**

FIGURE 54-A

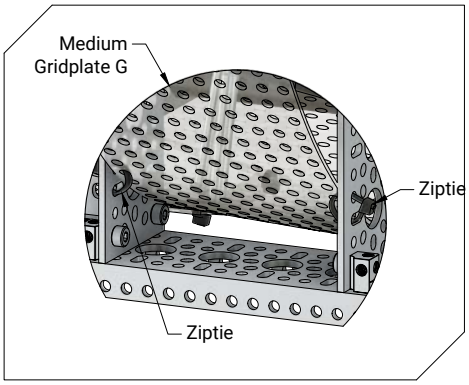


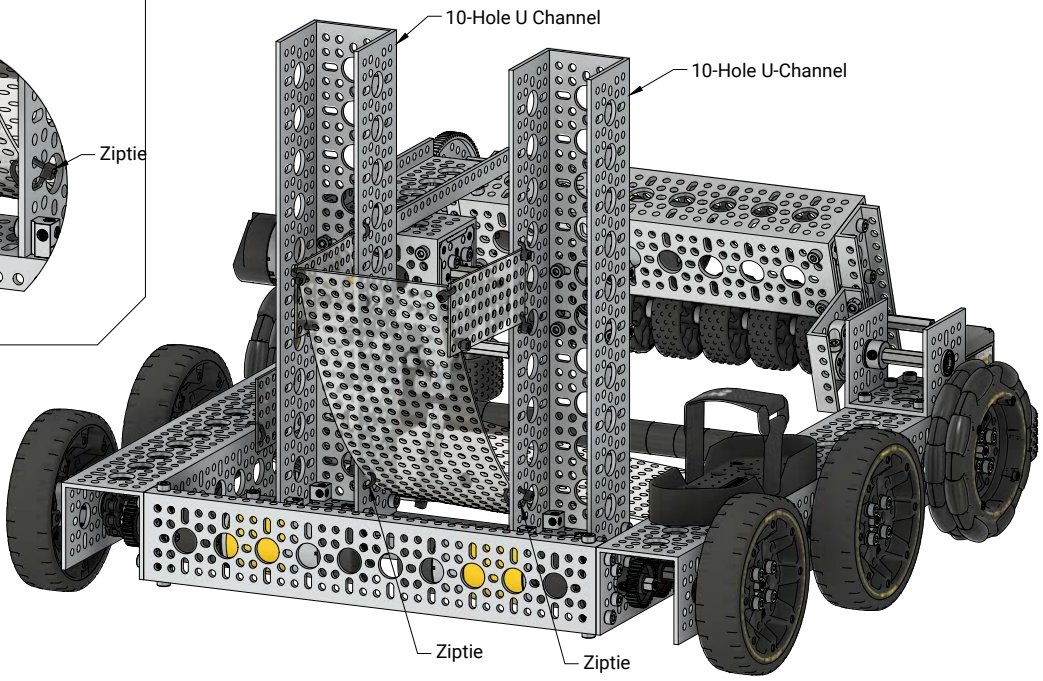


STEP 55:

Use **two** Zipties to secure the middle of Medium Gridplate G to the walls of the two vertical 10-Hole U-Channels as shown (**FIGURE 55-A)**.

FIGURE 55-A

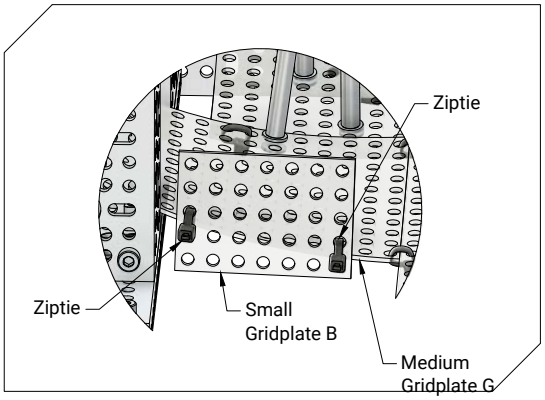


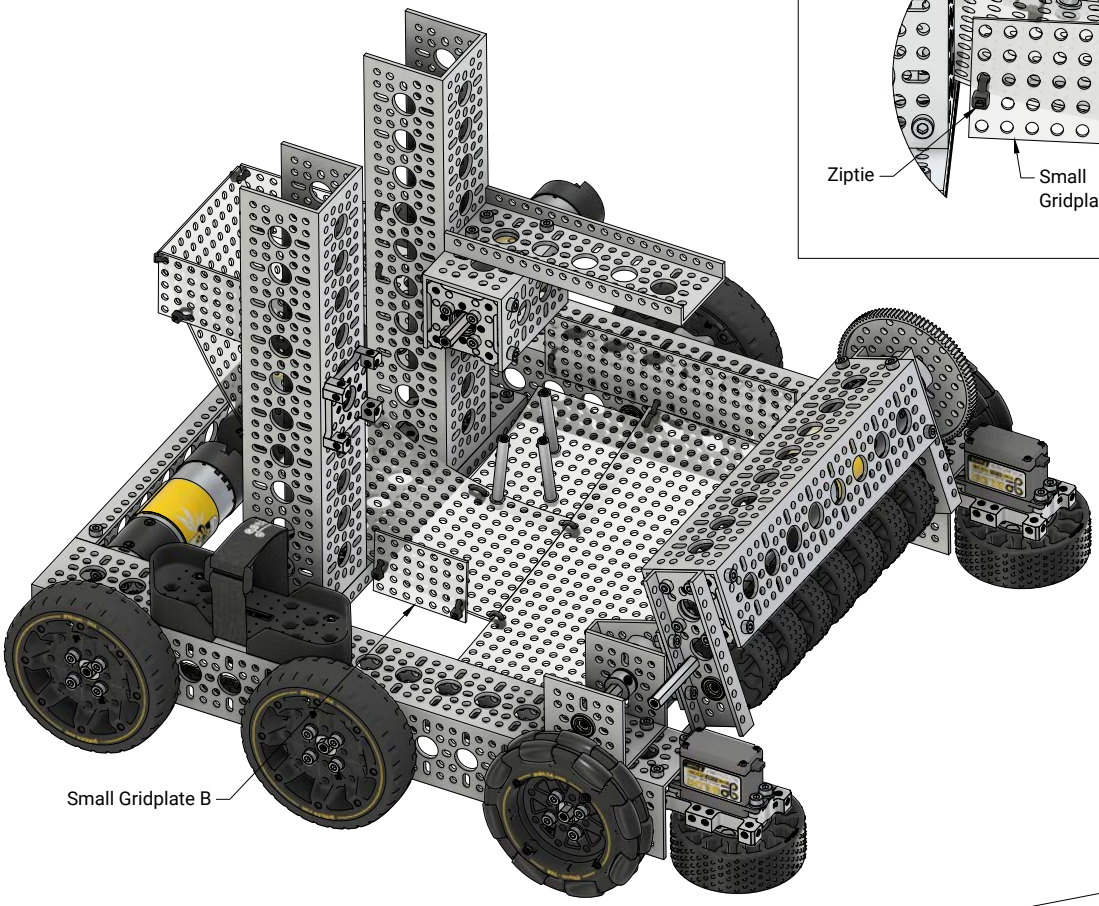


STEP 56:

Mount **one** Small Gridplate B to the side of Medium Gridplate G using **two** Zipties as shown (**FIGURE 56-A**).

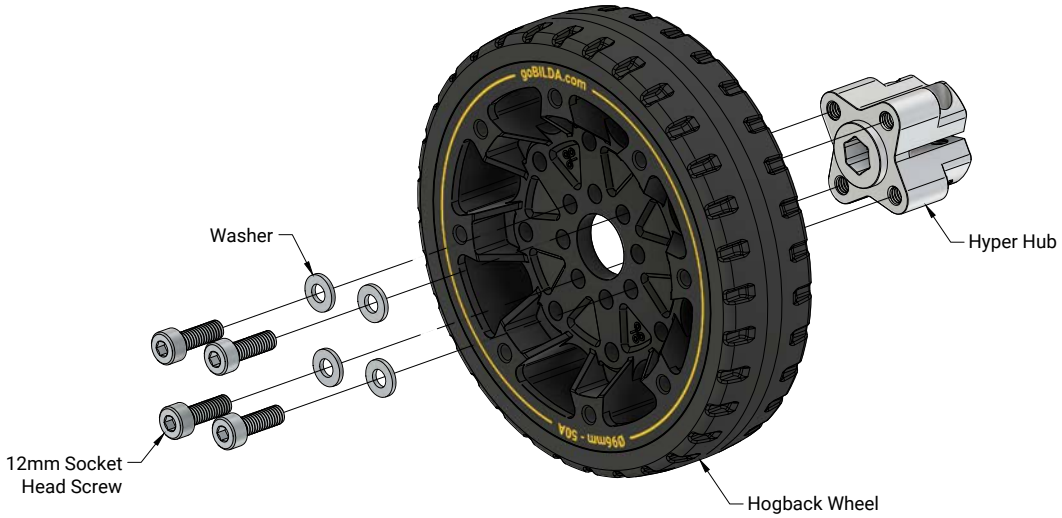
FIGURE 56-A





STEP 57:

Attach **one** Hogback Wheel to **one** Hyper Hub using **four** washers and **four** 12mm Socket Head Screws as shown.



STEP 58:

Install **one** Windmill (Torque) Servo in **one** Compact ServoBlock® (**FIGURE 58-A** and attach **one** Quad Block Mount using **four** 10mm Socket Head Screws

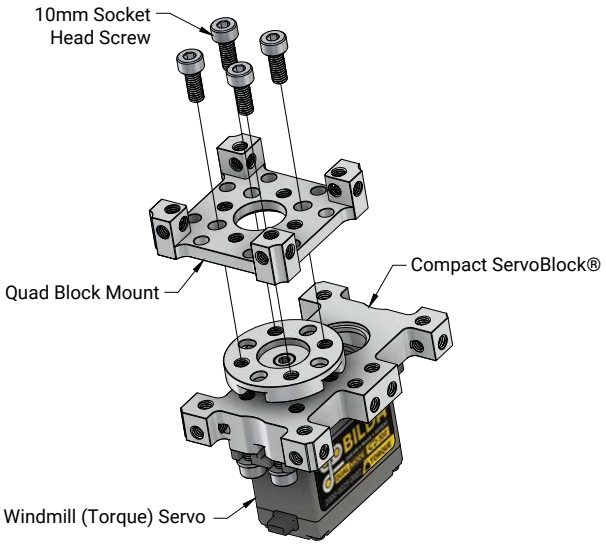
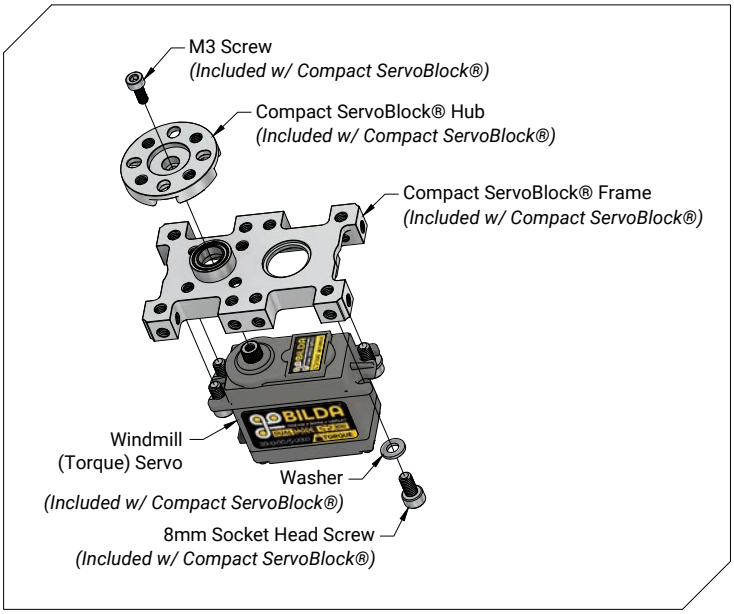
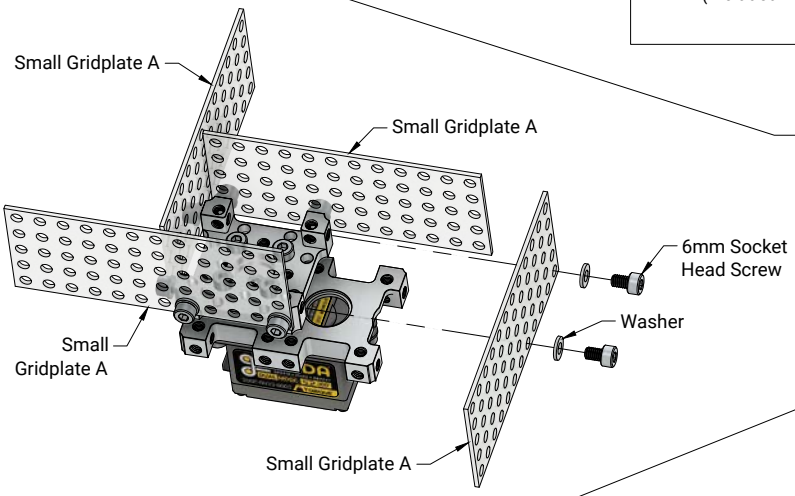


FIGURE 58-A



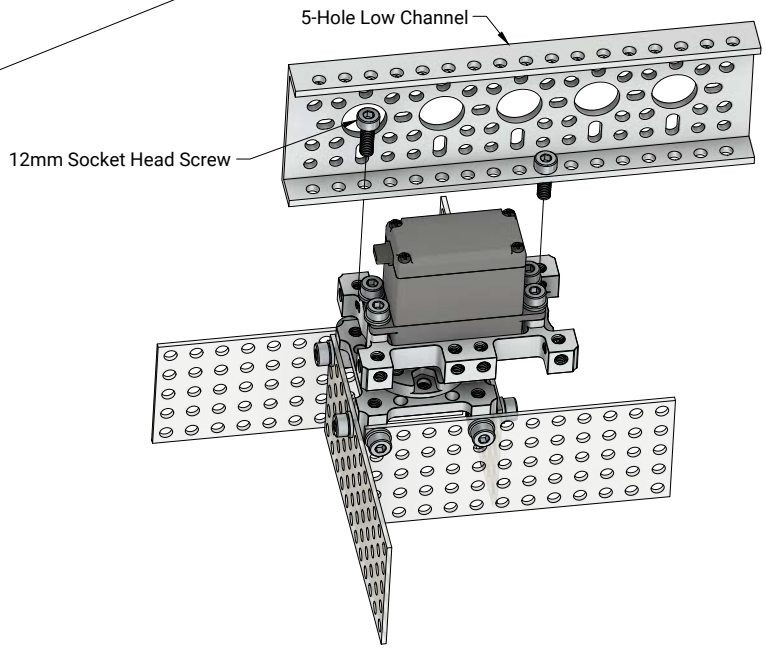


STEP 59:

Attach **four** Small Gridplate A to the subassembly from **STEP 58** using **eight** Washers and **eight** 6mm Socket Head Screws as shown.

STEP 60:

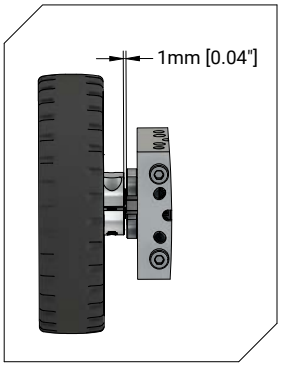
Combine the subassembly from **STEP 59** with **one** 5-Hole Low Channel using **two** 12mm Socket Head Screws as shown.

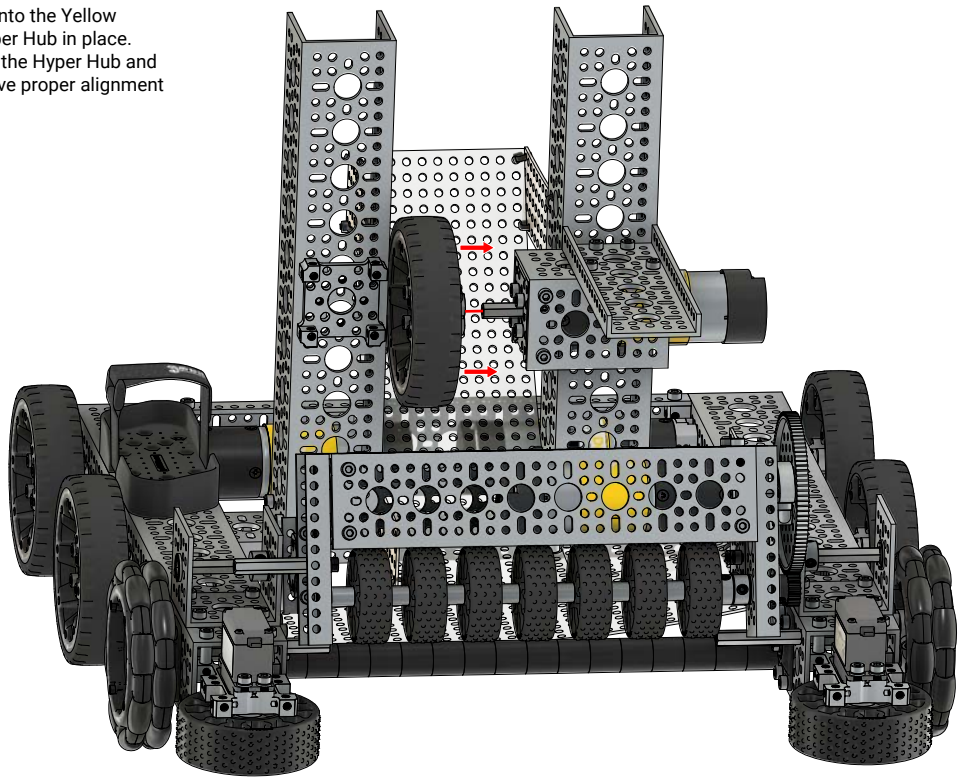


STEP 61:

Install the subassembly from **STEP 57** onto the Yellow Jacket Motor Shaft, then tighten the Hyper Hub in place. Leave approximately 1mm gap between the Hyper Hub and the 12mm Socket Head Screws to achieve proper alignment (**FIGURE 61-A**).

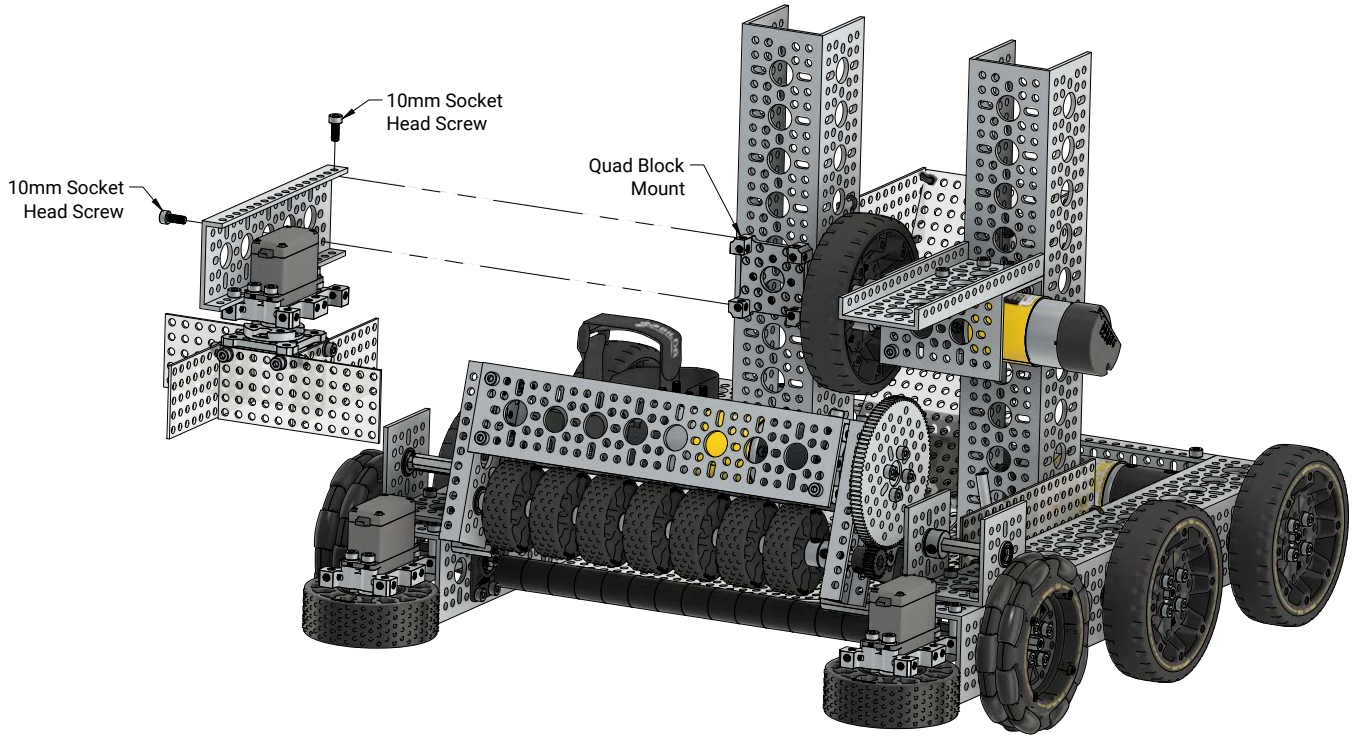
FIGURE 61-A





STEP 62:

Attach the subassembly from **STEP 60** to the Quad Block Mount using **two** 10mm Socket Head Screws as shown.



STEP 63:

Attach **one** Large Gridplate H to the two 11-Hole U-Channels and the two 5-Hole Low Channels using **six** Zipties as shown (**FIGURE 63-A**).

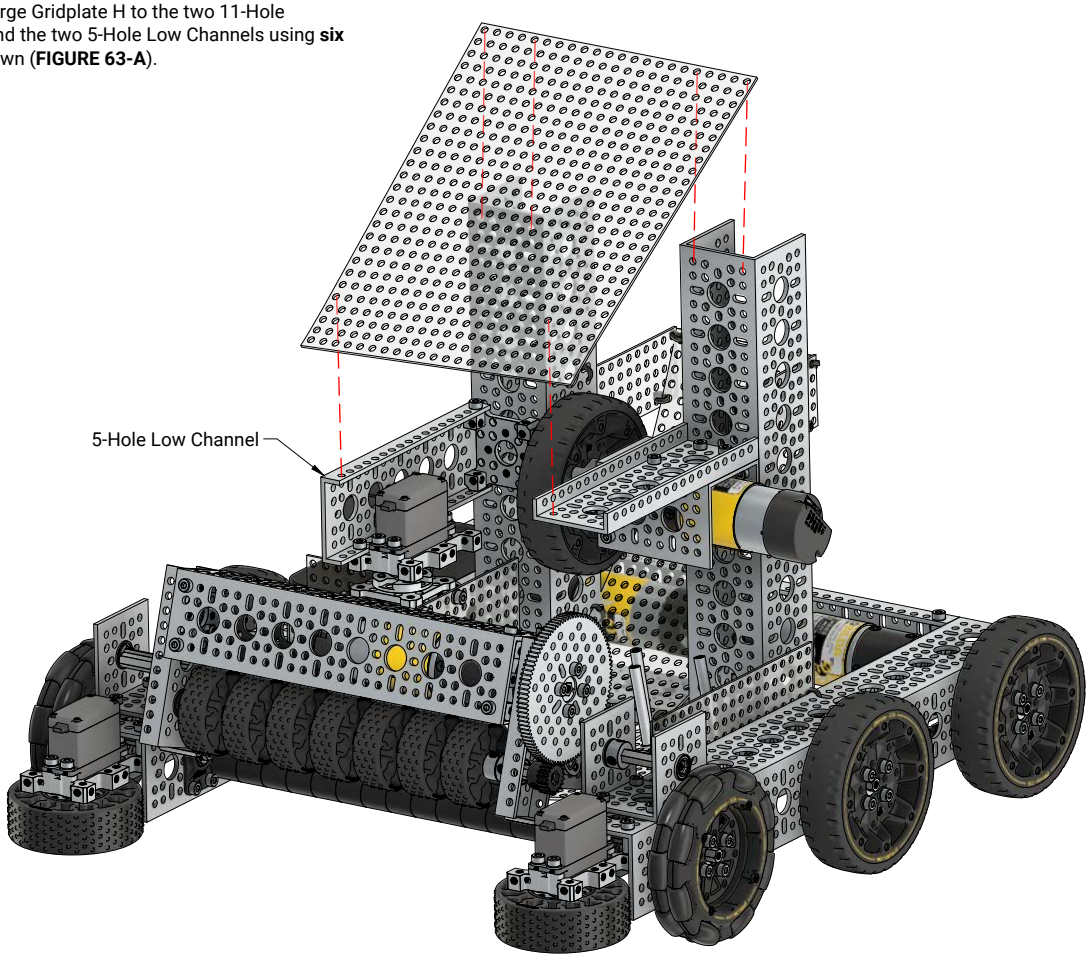
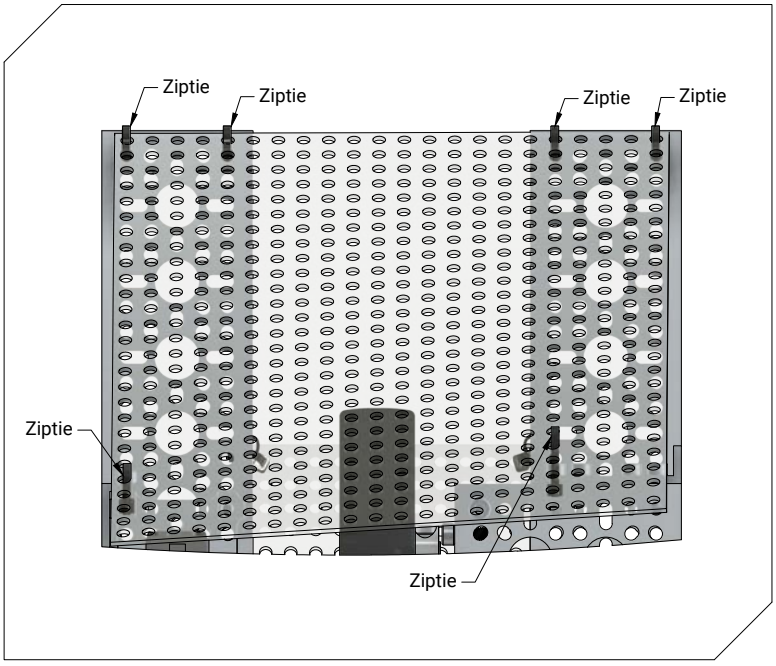


FIGURE 63-A



Congratulations!

You've completed the assembly! You're almost there—next up is wiring and programming your robot. Remember, this is just the beginning of what you can accomplish. Stay curious, and enjoy the journey ahead!

