

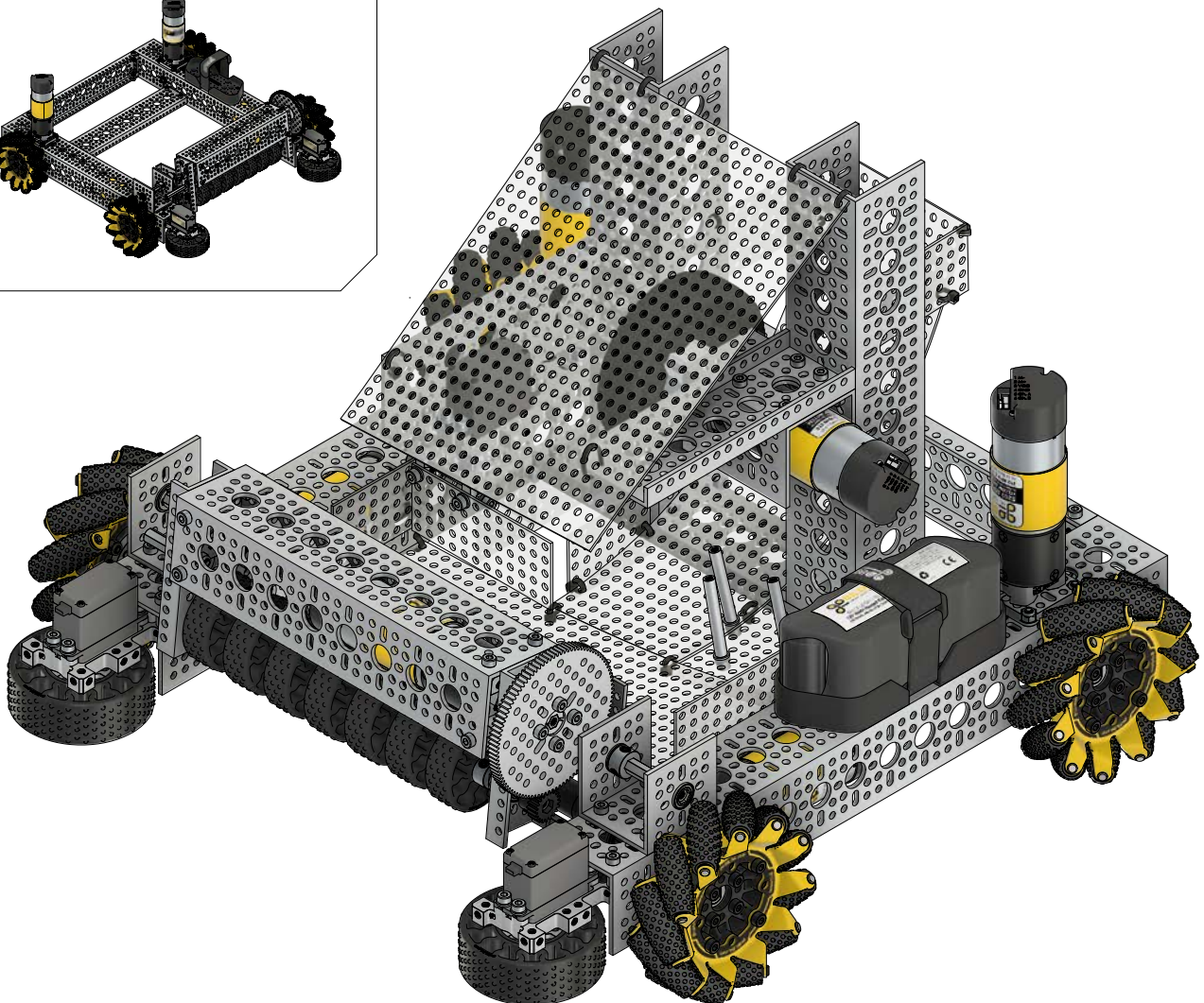
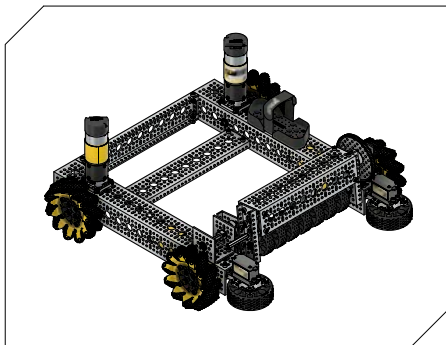


Assembly Instructions for FTC StarterBot with Mecanum Wheels (for BIOBUZZ™)

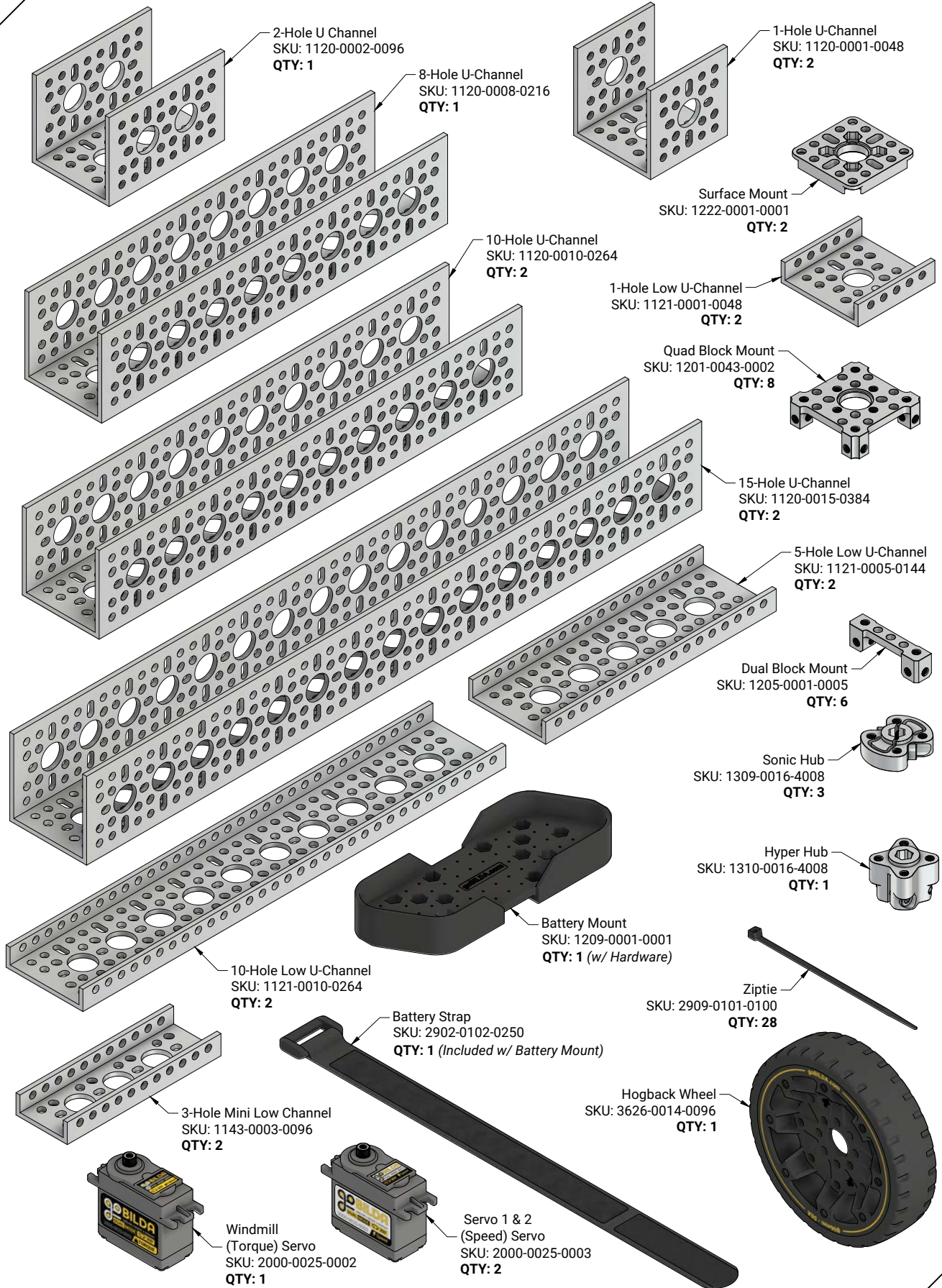
Built from:

- 1 x FTC Starter Kit (SKU: 3200-4008-2627)
- 1 x Strafer® Chassis (SKU: 3209-0001-0007)
- 2 x Flat Pattern Mount (SKU: 1222-0001-0001)

Already have a **StarterBot Base**?
Skip to **STEP 35**, Page 22.



Kit Contents

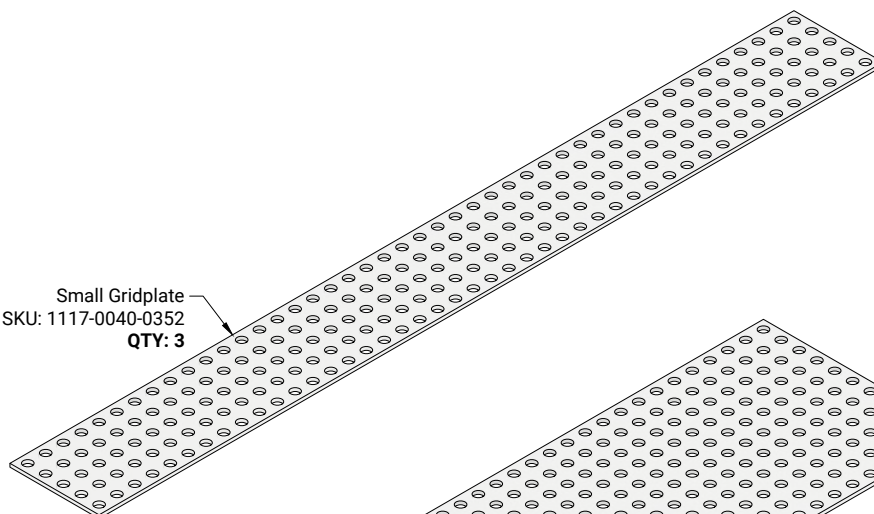


Kit Contents (Cont)

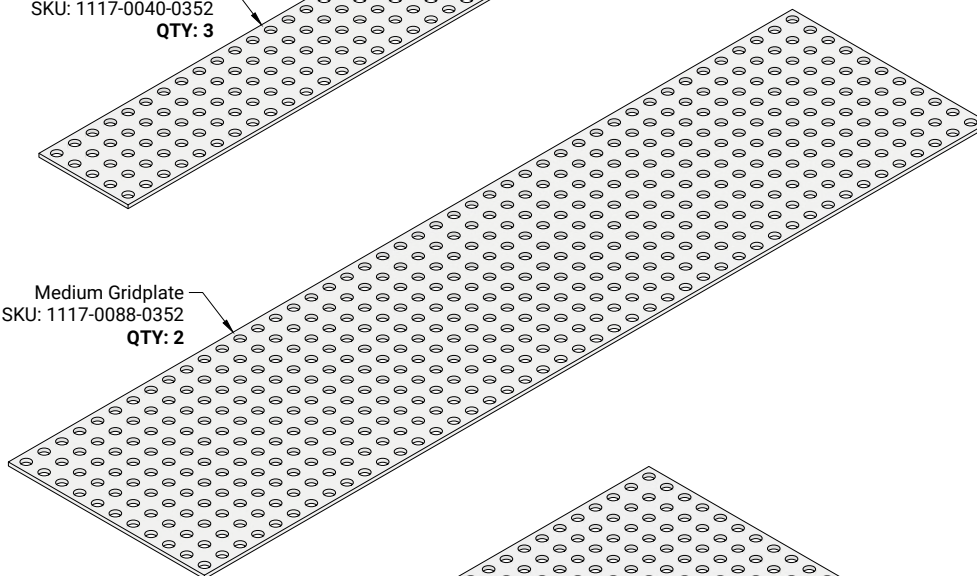


Kit Contents (Cont)

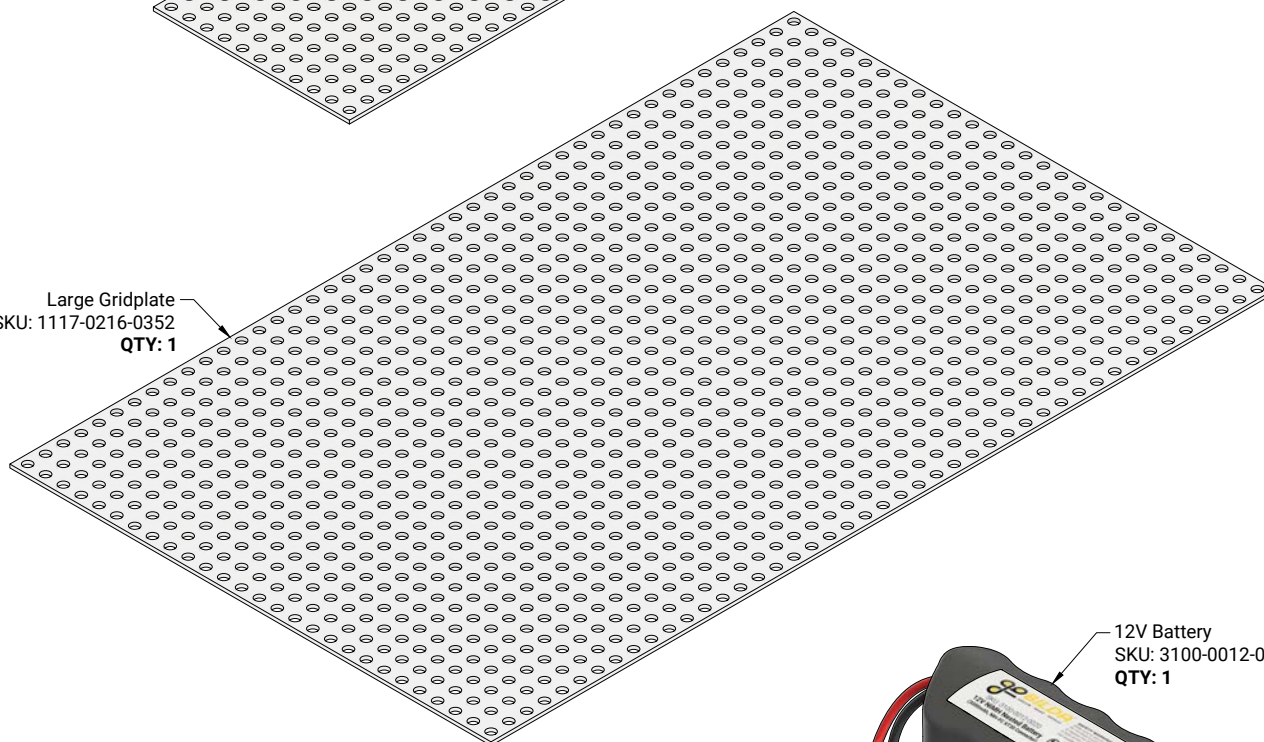
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SKU: 1117-0040-0352
QTY: 3



Medium Gridplate
SKU: 1117-0088-0352
QTY: 2



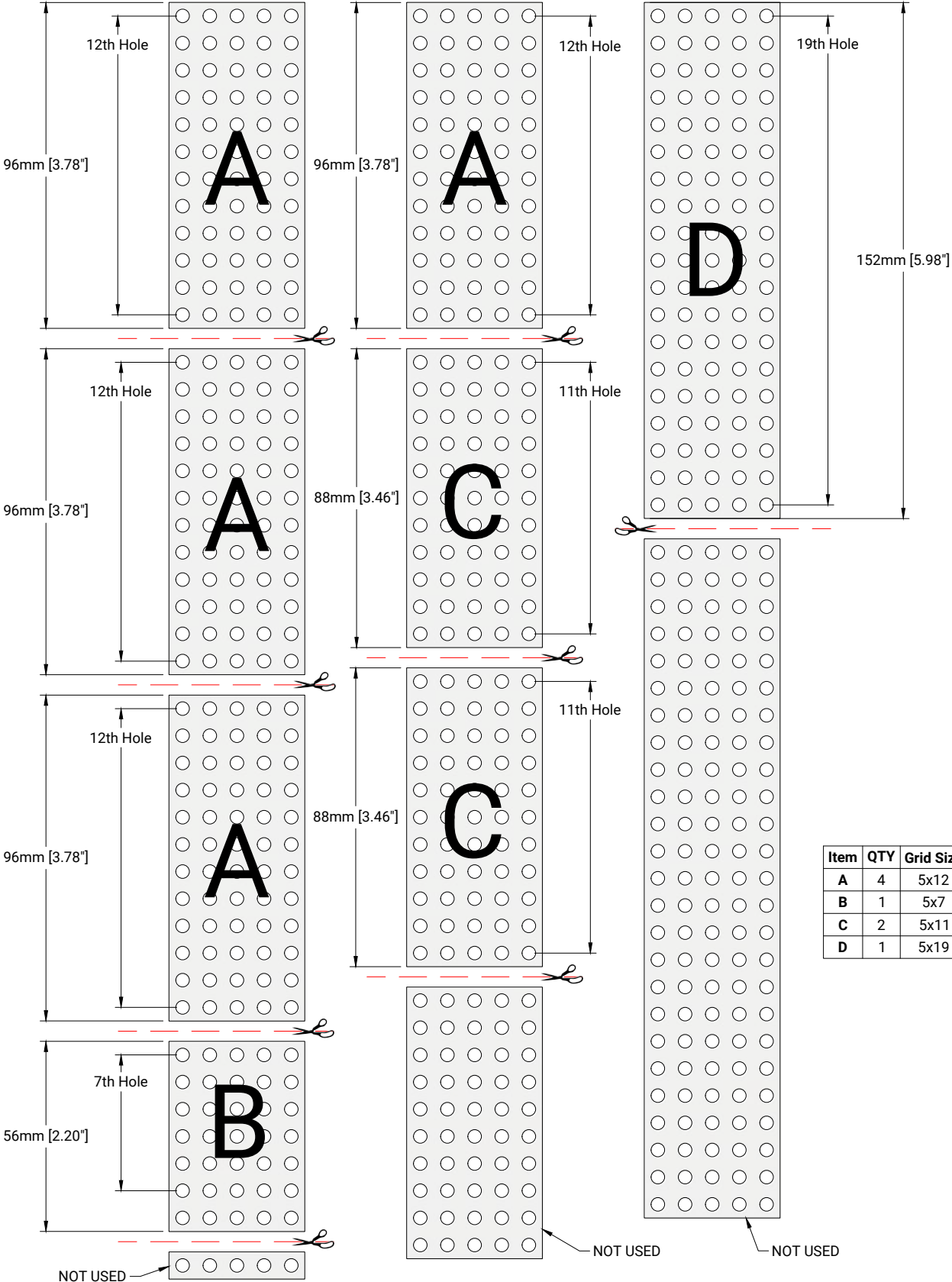
Large Gridplate
SKU: 1117-0216-0352
QTY: 1



12V Battery
SKU: 3100-0012-0020
QTY: 1

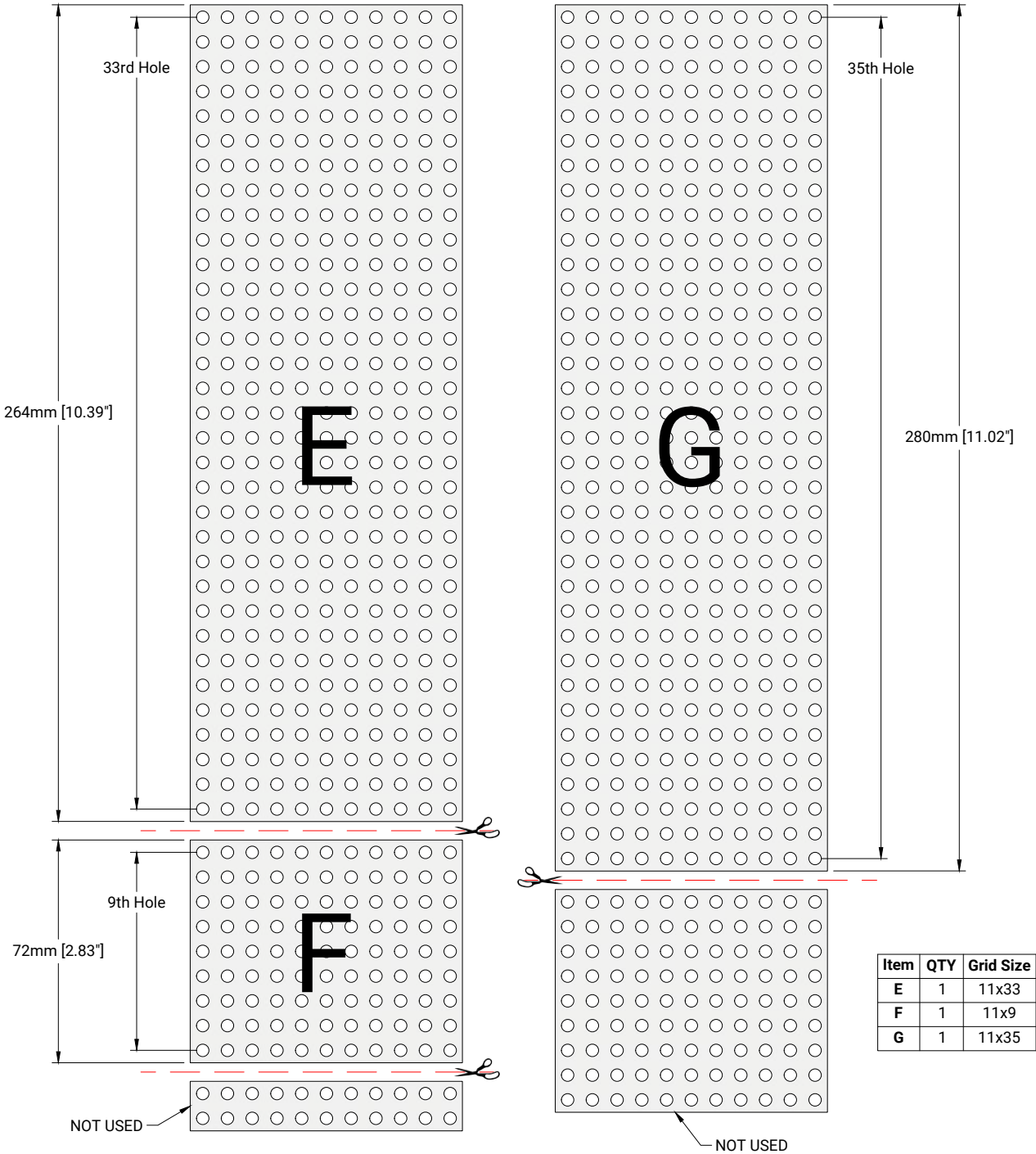


Small Plastic Gridplate Cutlines

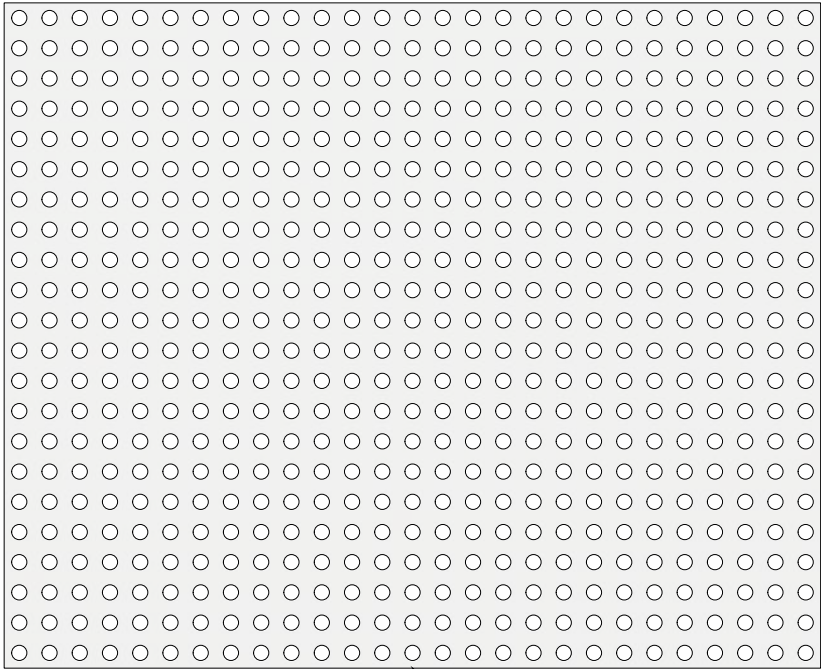
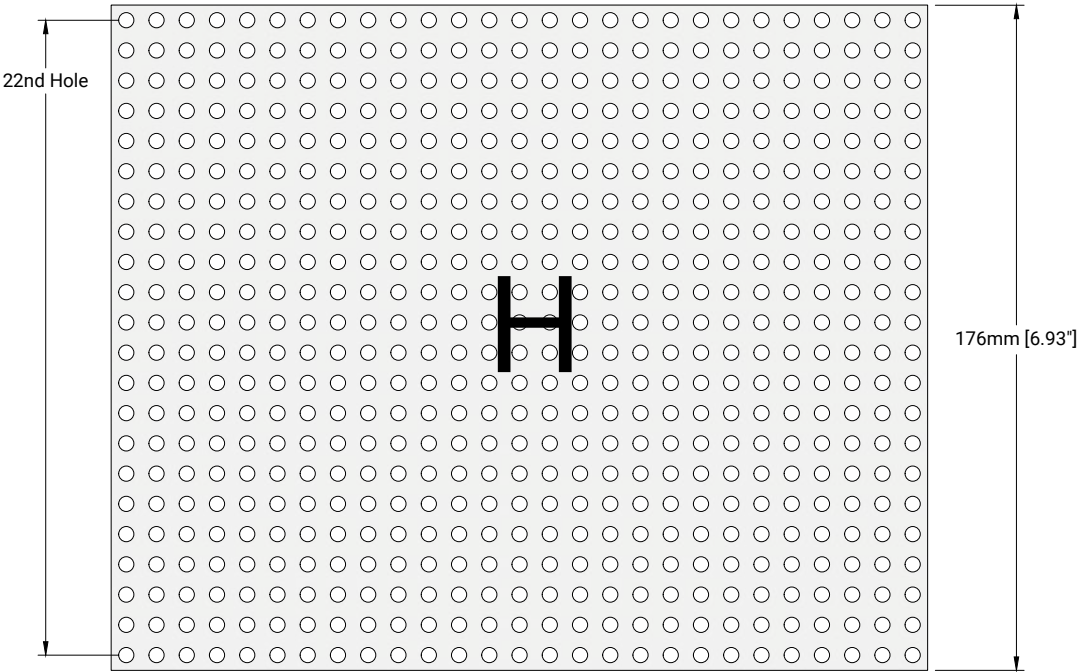


Item	QTY	Grid Size
A	4	5x12
B	1	5x7
C	2	5x11
D	1	5x19

Medium Plastic Gridplate Cutlines



Large Plastic Gridplate Cutlines



NOT USED

Item	QTY	Grid Size
H	1	22x27

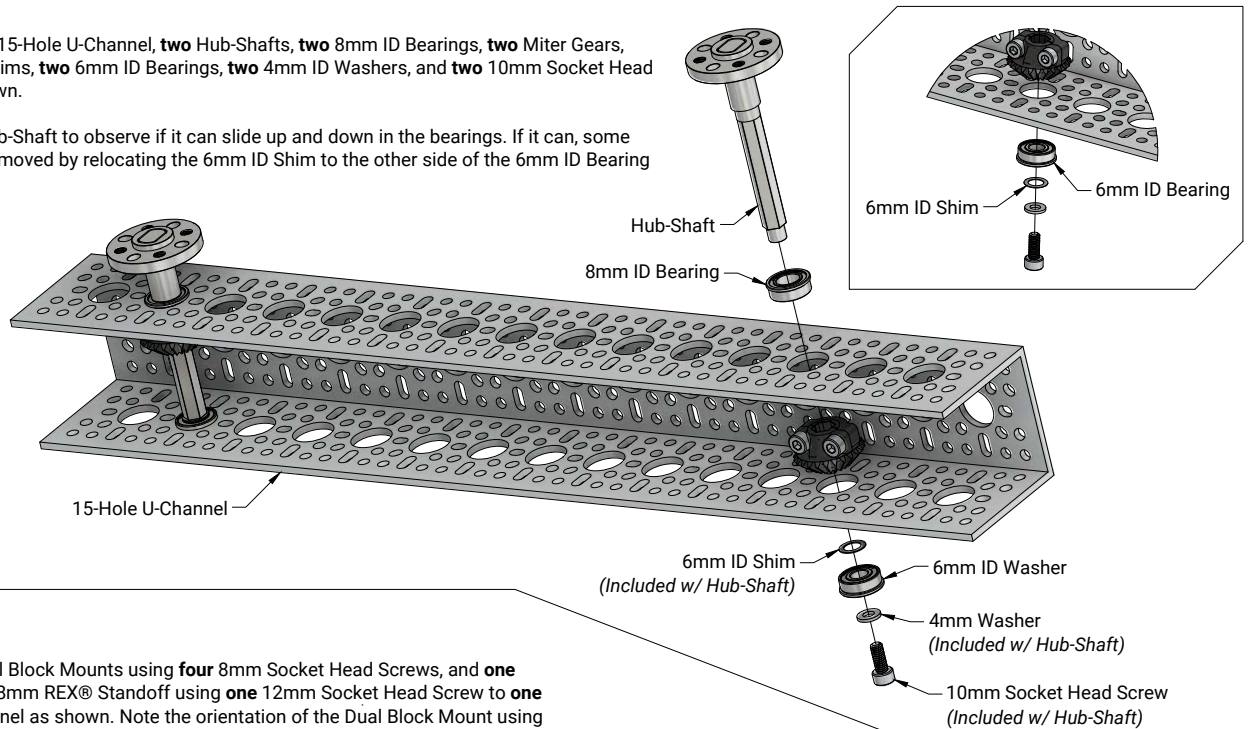
Already have a **StarterBot Base** built? Skip to **STEP 35** on Page 22.

STEP 1:

Assemble **one** 15-Hole U-Channel, **two** Hub-Shafts, **two** 8mm ID Bearings, **two** Miter Gears, **two** 6mm ID Shims, **two** 6mm ID Bearings, **two** 4mm ID Washers, and **two** 10mm Socket Head Screws as shown.

Check each Hub-Shaft to observe if it can slide up and down in the bearings. If it can, some slack can be removed by relocating the 6mm ID Shim to the other side of the 6mm ID Bearing (FIGURE 1-A).

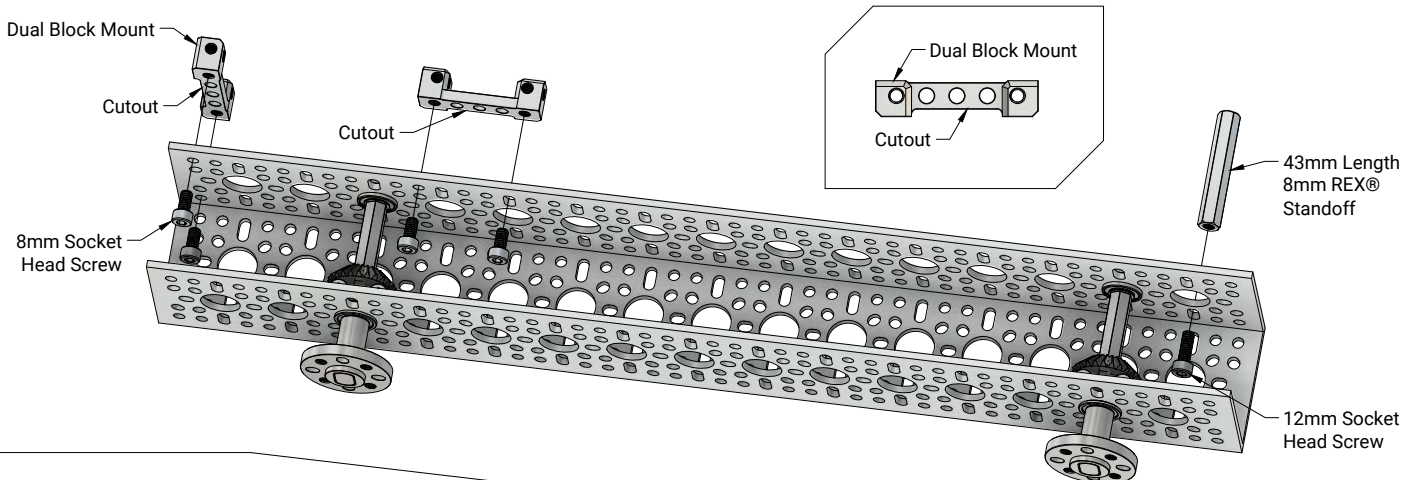
FIGURE 1-A



STEP 2:

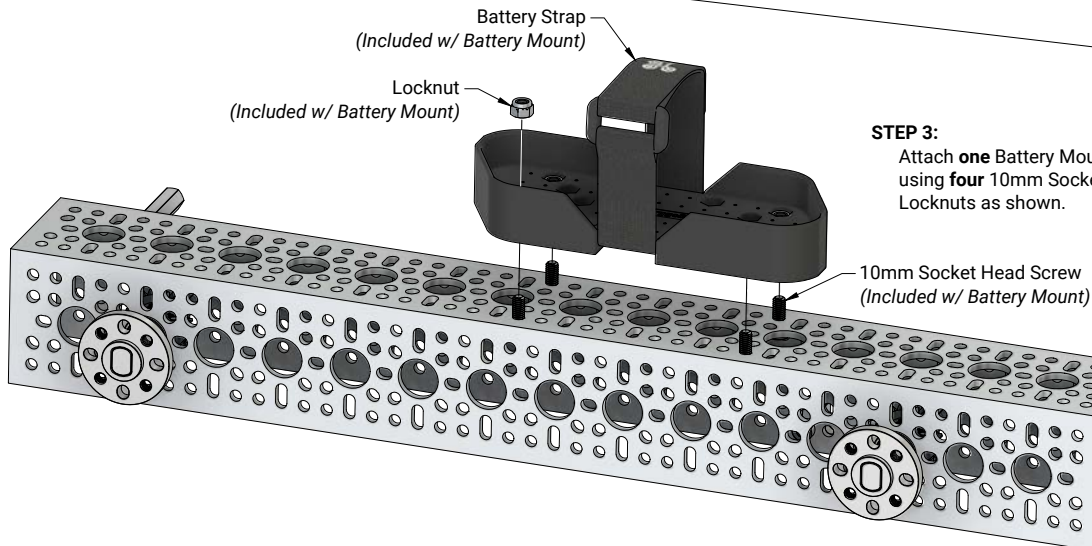
Attach **two** Dual Block Mounts using **four** 8mm Socket Head Screws, and **one** 43mm Length, 8mm REX® Standoff using **one** 12mm Socket Head Screw to **one** 15-Hole U-Channel as shown. Note the orientation of the Dual Block Mount using the Cutout shown in FIGURE 2-A

FIGURE 2-A



STEP 3:

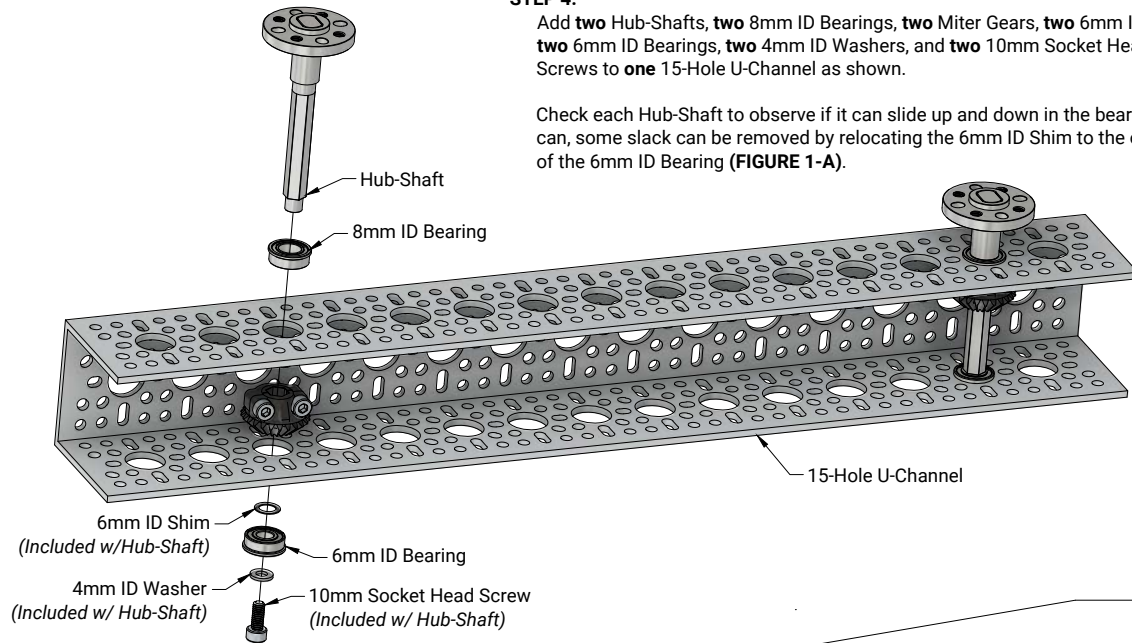
Attach **one** Battery Mount and **one** Battery Strap using **four** 10mm Socket Head Screws and **four** Locknuts as shown.



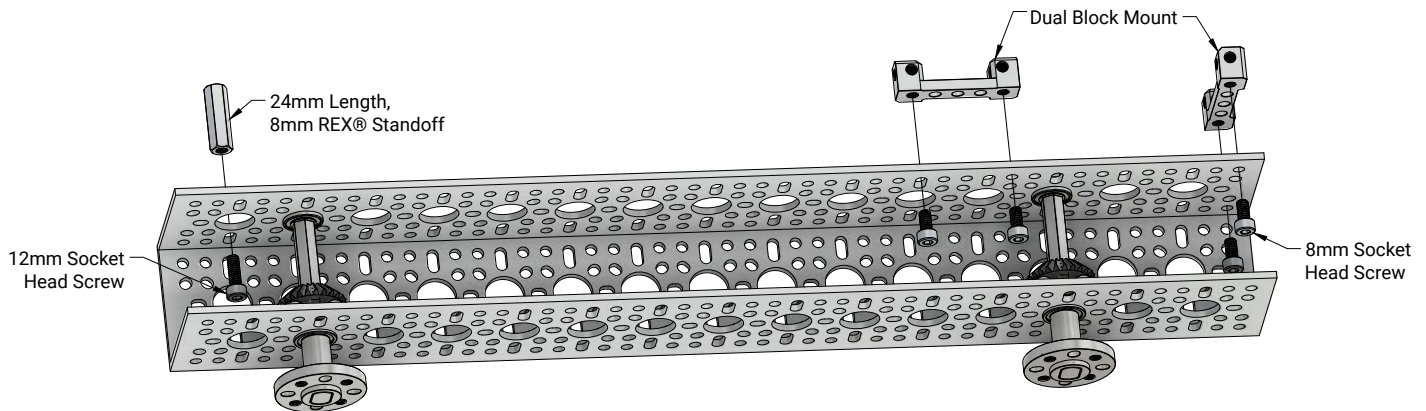
STEP 4:

Add **two** Hub-Shafts, **two** 8mm ID Bearings, **two** Miter Gears, **two** 6mm ID Shims, **two** 6mm ID Bearings, **two** 4mm ID Washers, and **two** 10mm Socket Head Screws to **one** 15-Hole U-Channel as shown.

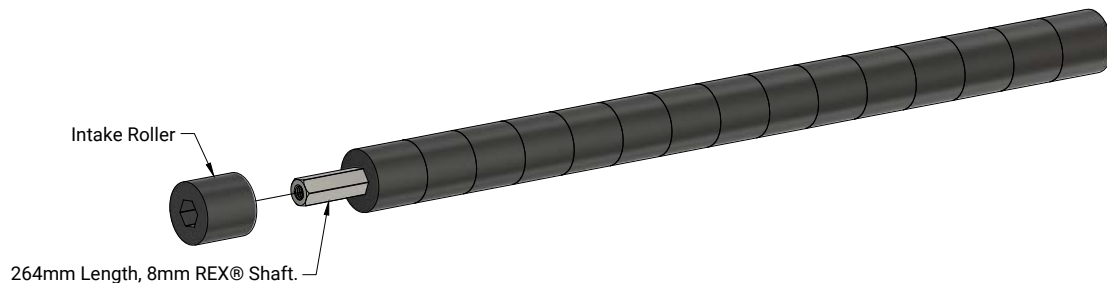
Check each Hub-Shaft to observe if it can slide up and down in the bearings. If it can, some slack can be removed by relocating the 6mm ID Shim to the other side of the 6mm ID Bearing (**FIGURE 1-A**).

**STEP 5:**

Use **four** 8mm Socket Head Screws to attach **two** Dual Block Mounts and **one** 12mm Socket Head Screw to attach **one** 24mm Length, 8mm REX® Standoff to the 15-Hole U-Channel. Note, the Standoff located in the top of the slot as shown.

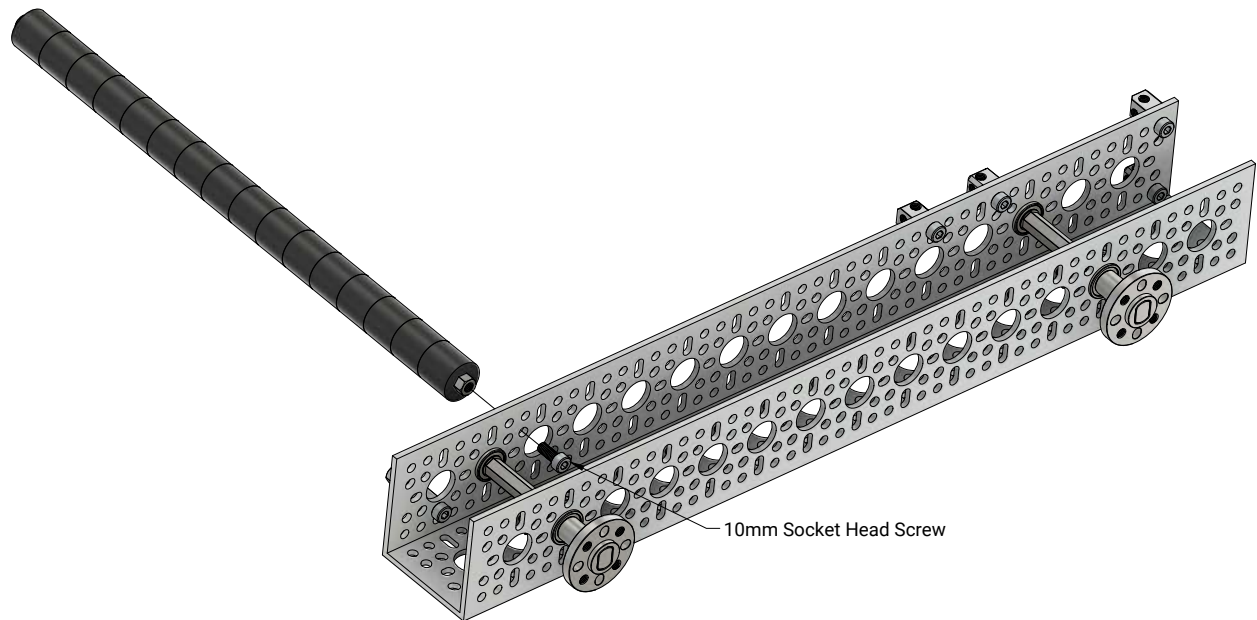
**STEP 6:**

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



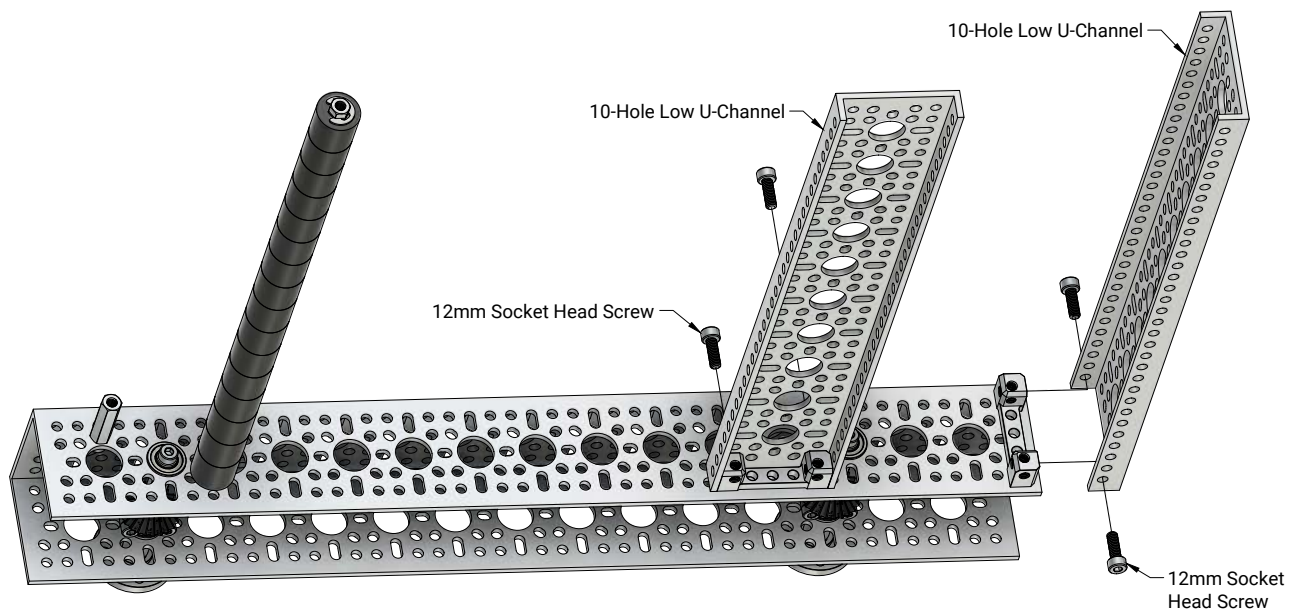
STEP 7:

Combine the subassemblies from **STEP 5** and **STEP 6** using **one** 10mm Socket Head Screw as shown.



STEP 8:

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



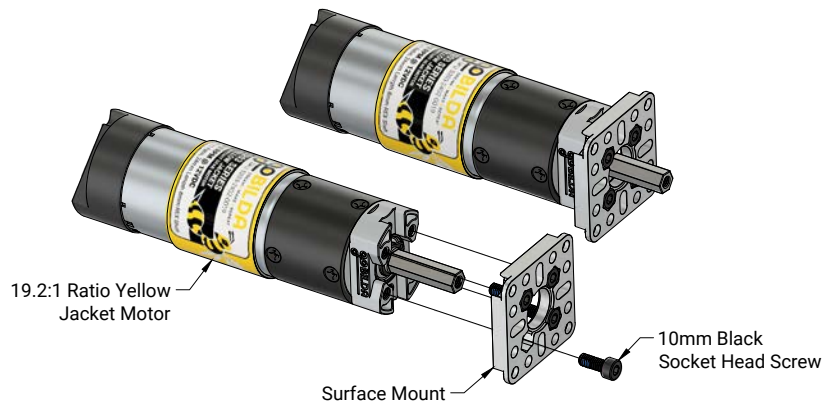
STEP 9:

Combine the subassemblies from **STEP 3** and **STEP 8** using **four** 12mm Socket Head Screws and **one** 10mm Socket Head Screw as shown.



STEP 10:

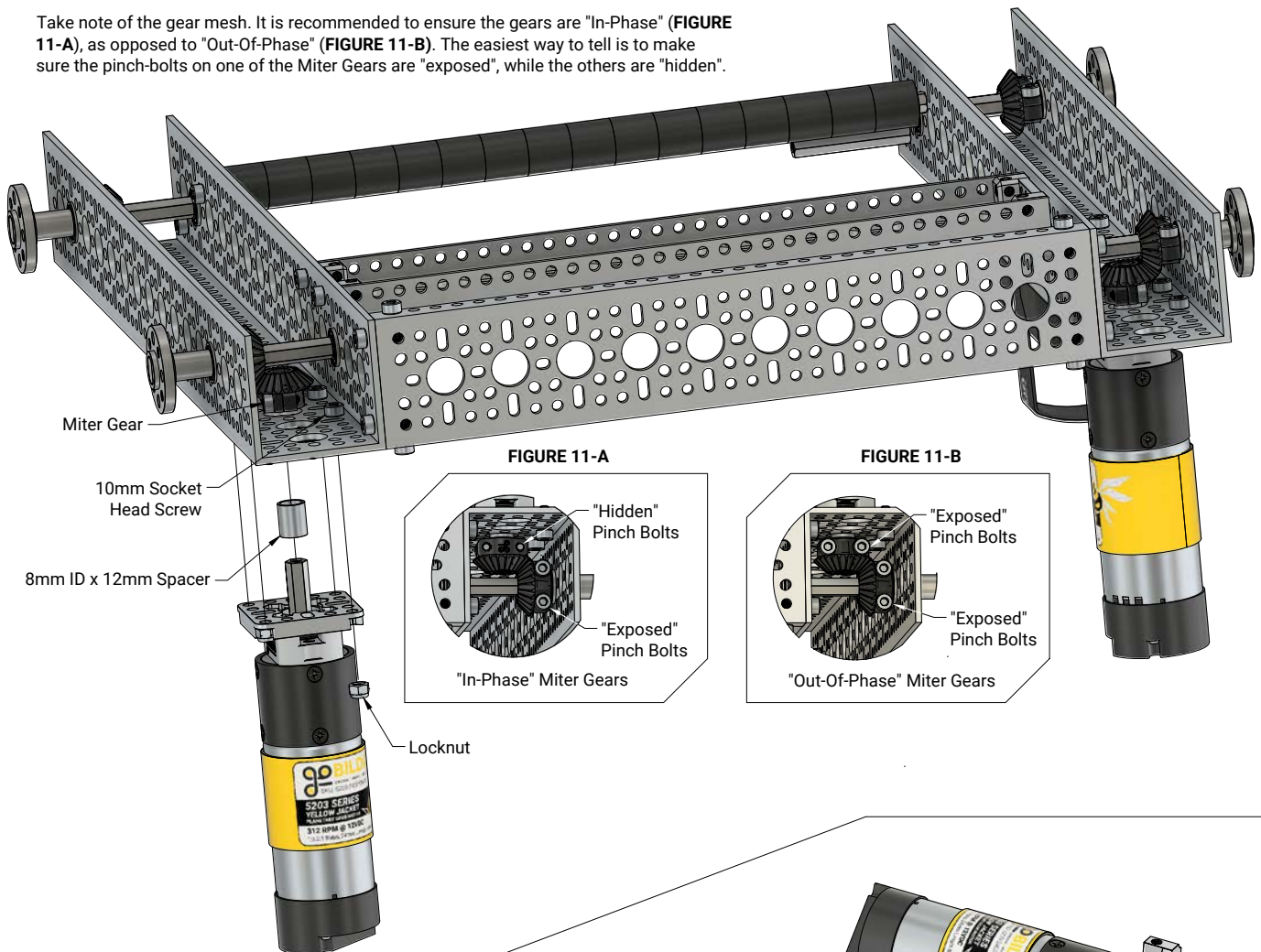
Assemble **two** 19.2:1 Ratio Yellow Jacket Motors and **two** Surface Mounts with **eight** 10mm Black Socket Head Screws as shown.



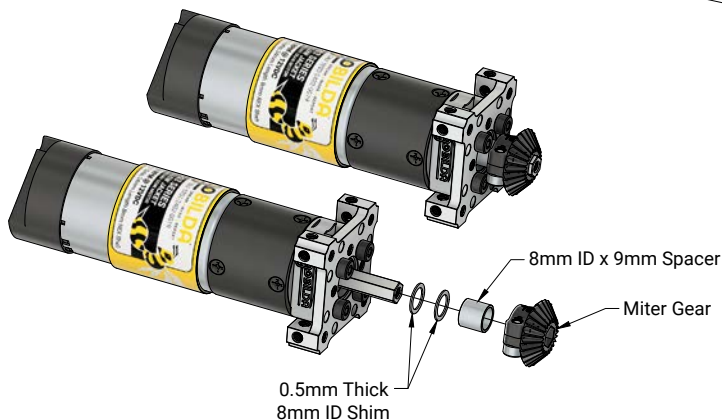
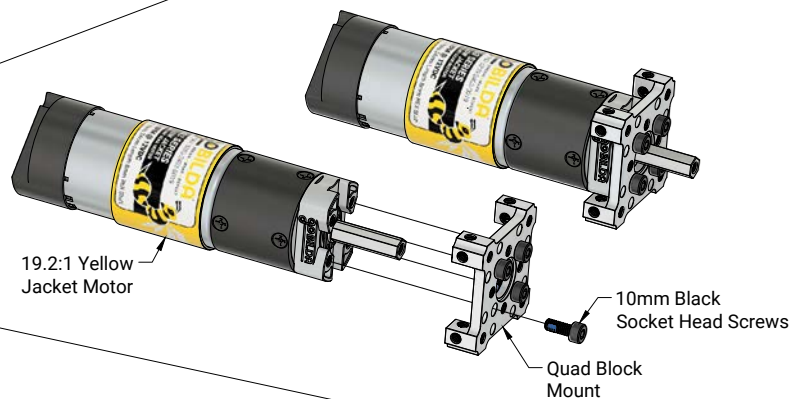
STEP 11:

Combine the subassemblies from **STEP 9** and **STEP 10** using **eight** 10mm Socket Head Screws and **eight** Locknuts while installing **two** 8mm ID x 12mm Spacers and **two** Miter Gears as shown.

Take note of the gear mesh. It is recommended to ensure the gears are "In-Phase" (**FIGURE 11-A**), as opposed to "Out-Of-Phase" (**FIGURE 11-B**). The easiest way to tell is to make sure the pinch-bolts on one of the Miter Gears are "exposed", while the others are "hidden".

**STEP 12:**

Attach **two** 19.2:1 Ratio Yellow Jacket Motors to **two** Quad Block Mounts using **eight** 10mm Black Socket Head Screws as shown

**STEP 13:**

Attach **four** 0.5mm Thick, 8mm ID Shims, **two** 8mm ID x 9mm Spacers, and **two** Miter Gears as shown.

STEP 14:

Combine the subassembly from **STEP 11** with the subassemblies from **STEP 13** using **eight** 10mm Black Socket Head Screws as shown.

Take note of the gear mesh. It is recommended to ensure the gears are "In-Phase" (**FIGURE 14-A**), as opposed to "Out-Of-Phase" (**FIGURE 14-B**). The easiest way to tell is to make sure the pinch-bolts on one of the Miter Gears is "exposed", while the others are "hidden".

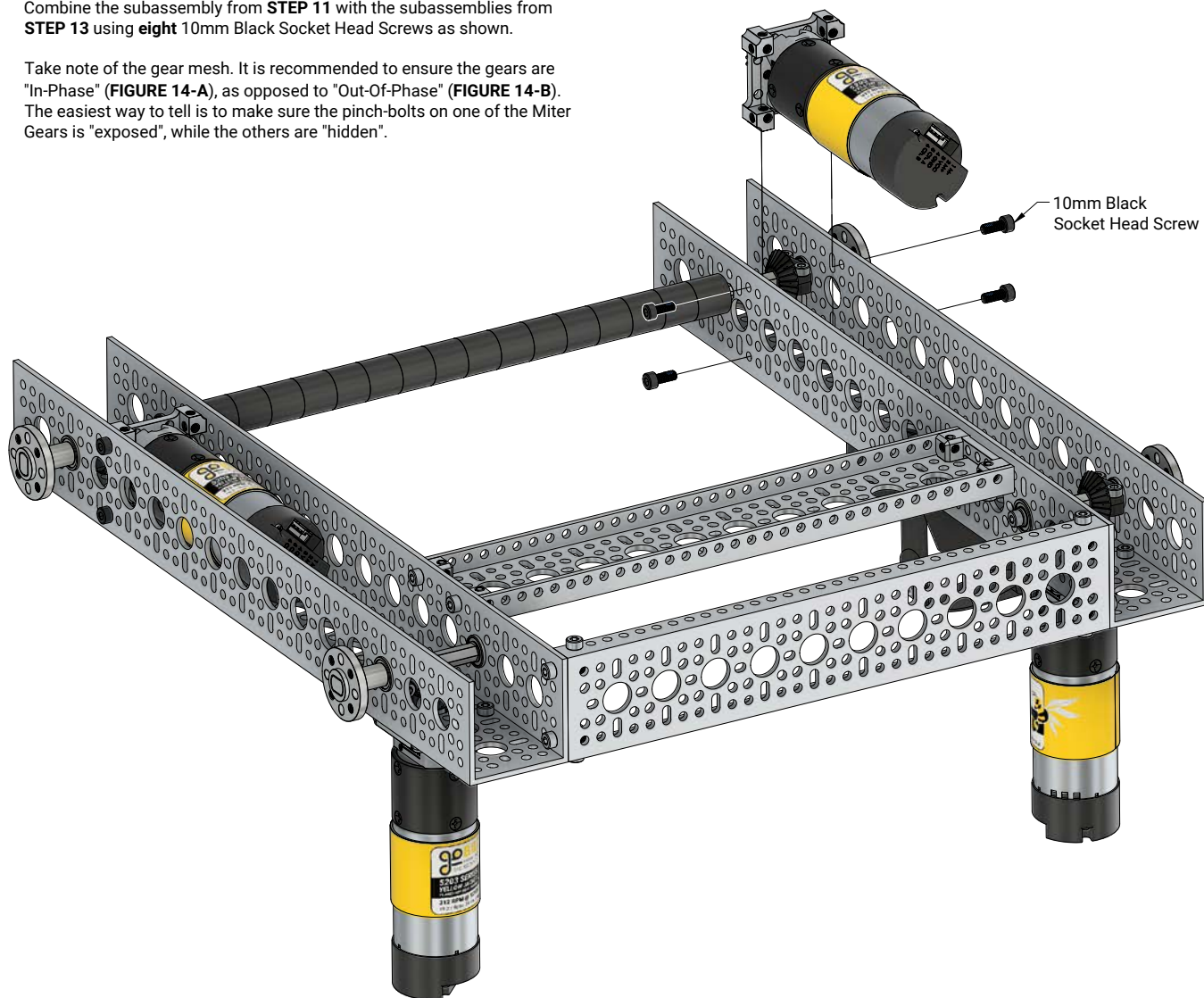


FIGURE 14-A

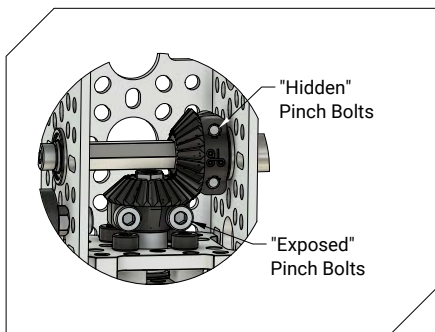
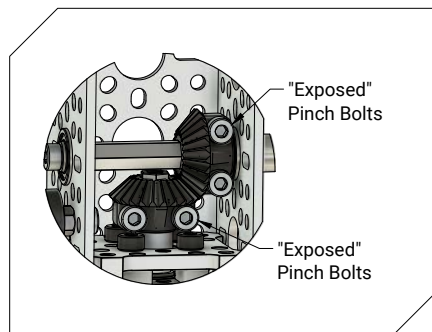
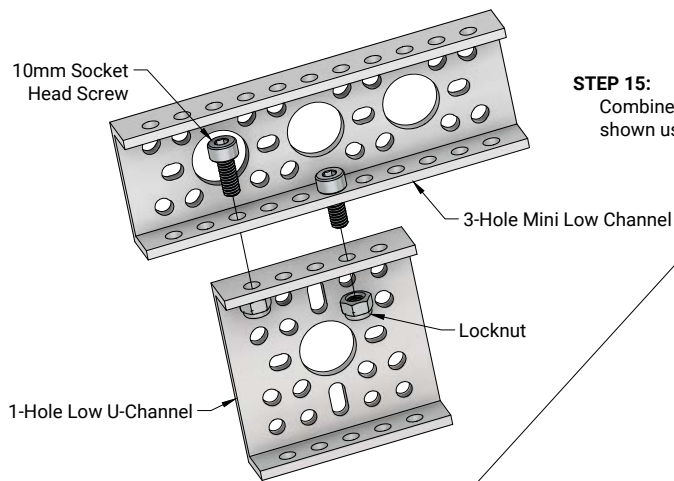


FIGURE 14-B



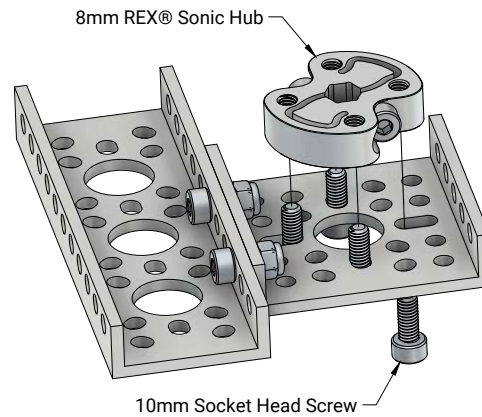


STEP 15:

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 16:

Attach **one** 8mm REX® Sonic Hub using **four** 10mm Socket Head Screws as shown. Note the orientation of the Sonic Hub.



STEP 17:

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 17-A**).

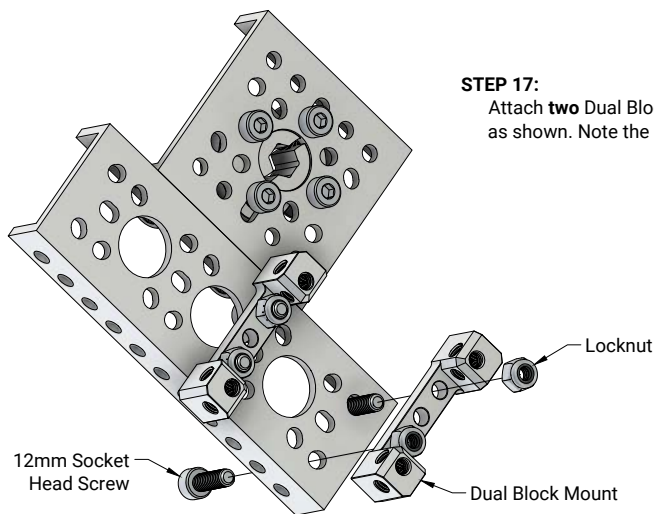
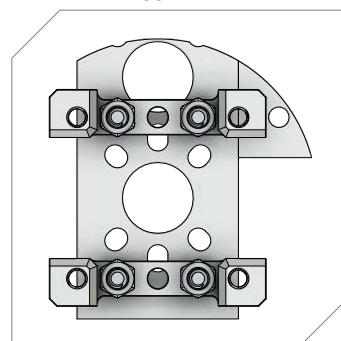
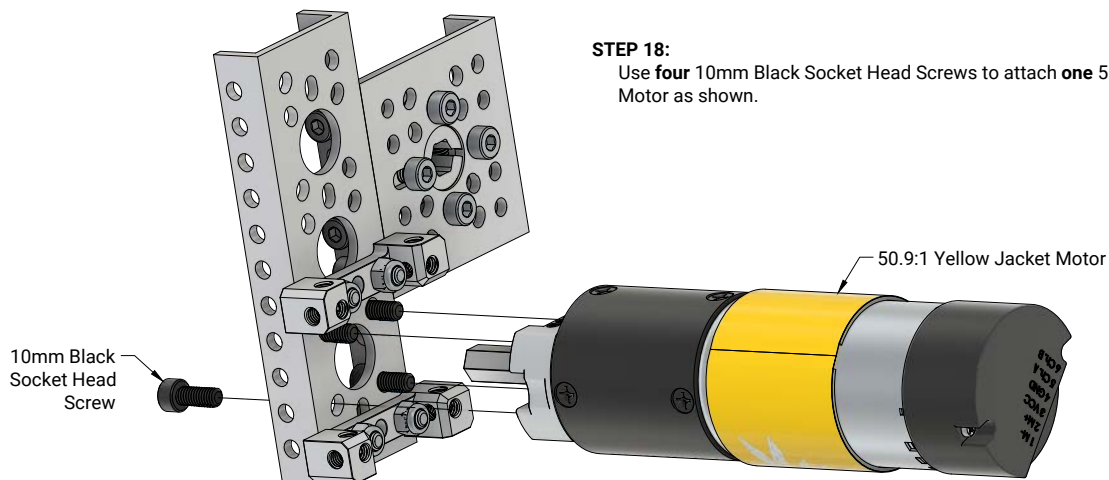


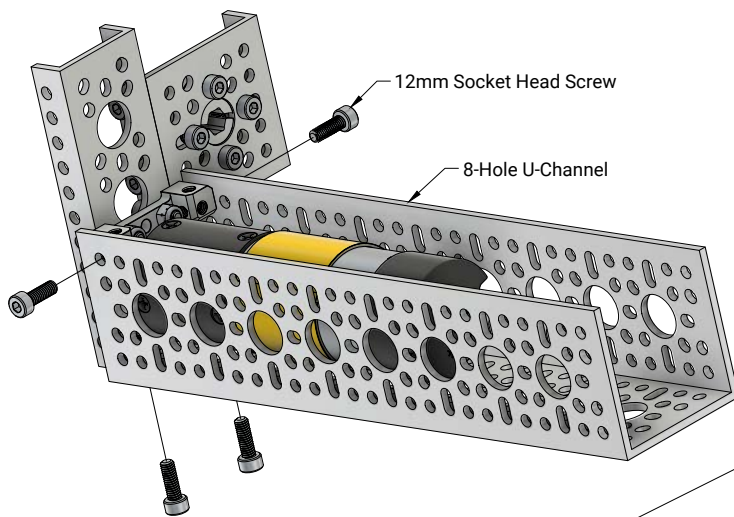
FIGURE 17-A



STEP 18:

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



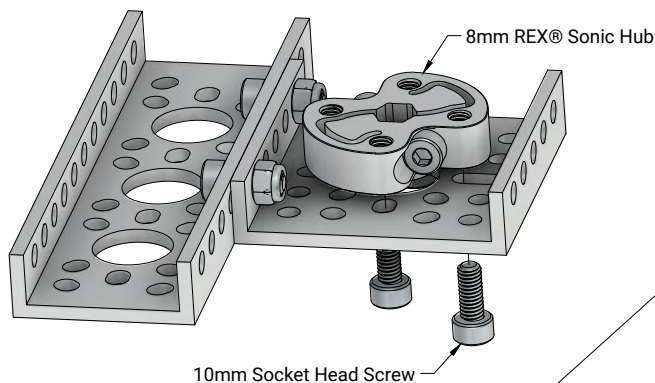
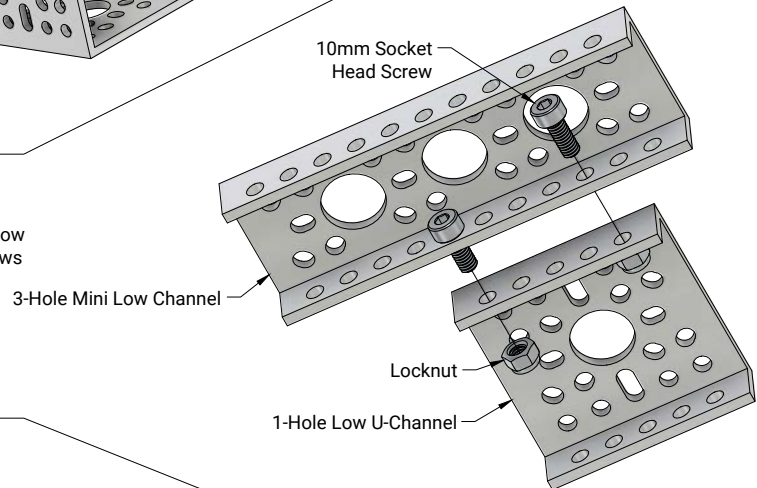


STEP 19:

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.

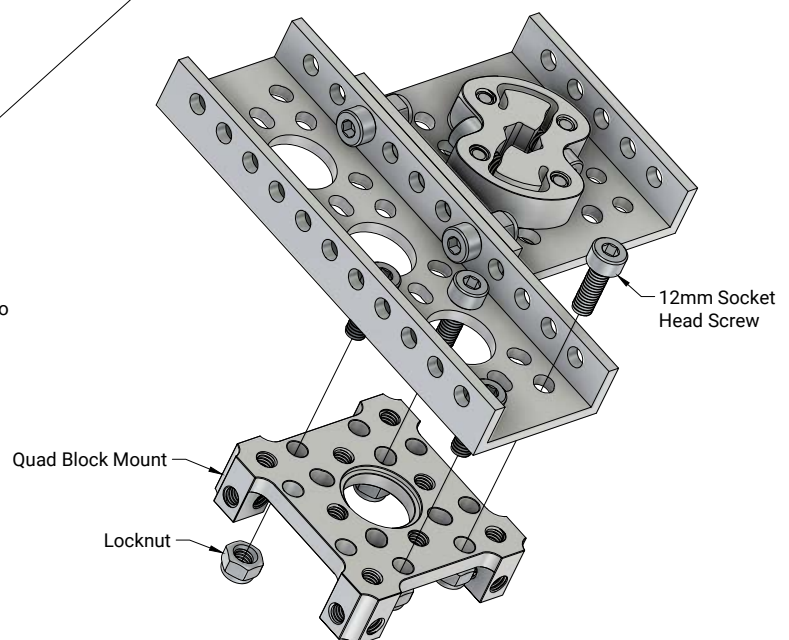


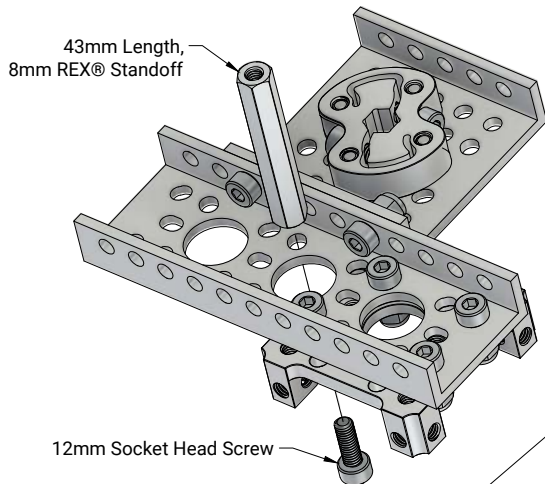
STEP 21:

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

STEP 22:

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



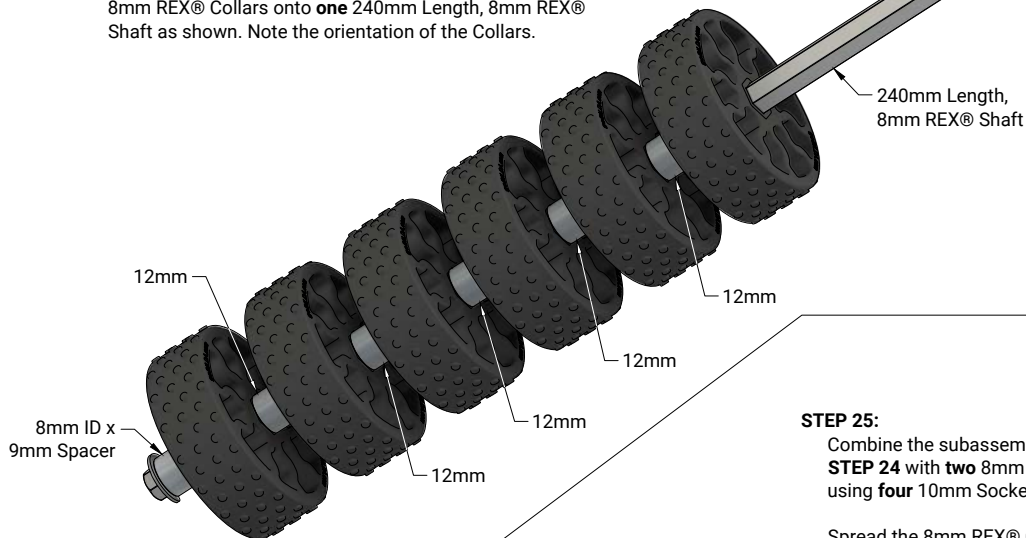
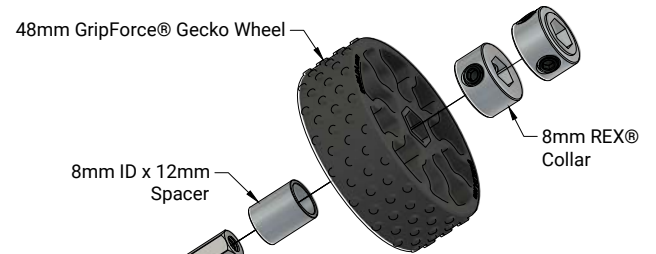


STEP 23:

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

STEP 24:

Slide **one** 8mm ID x 9mm Spacer, **six** 8mm ID x 12mm Spacers, **seven** 48mm GripForce® Gecko Wheels, and **two** 8mm REX® Collars onto **one** 240mm Length, 8mm REX® Shaft as shown. Note the orientation of the Collars.



STEP 25:

Combine the subassemblies from **STEP 19**, **STEP 23**, and **STEP 24** with **two** 8mm REX® Bearings and fasten together using **four** 10mm Socket Head Screws as shown.

Spread the 8mm REX® Collars approximately 3mm apart so that one is contacting the 48mm GripForce® Gecko Wheel and the other is contacting the inner race of the 8mm REX® Bearing as shown in **FIGURE 25-A**, then tighten the set-screws.

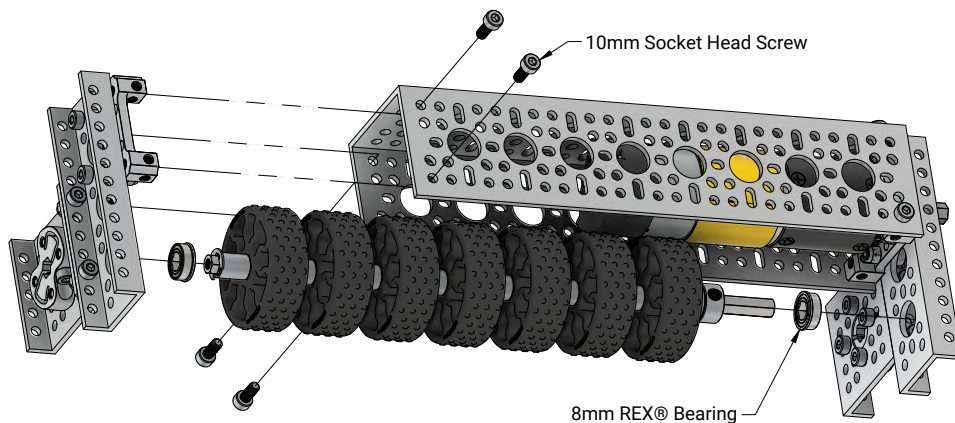
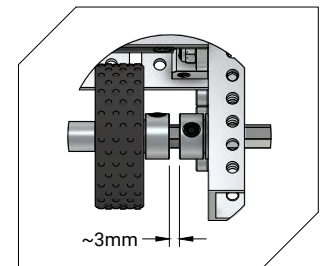
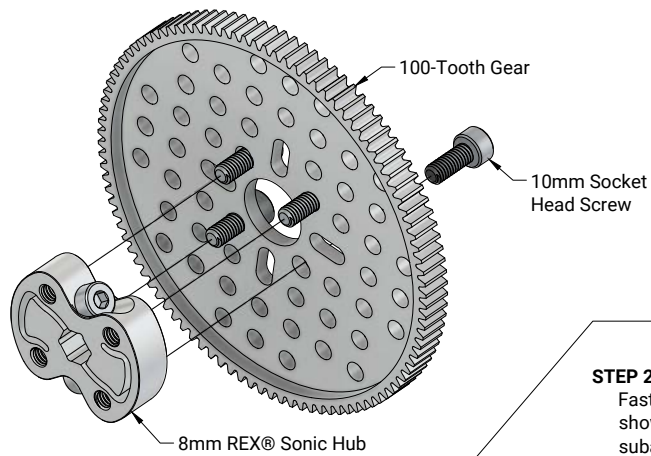


FIGURE 25-A





STEP 26:

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

STEP 27:

Fasten the subassembly from **STEP 26** to the subassembly from **STEP 25** as shown. The Sonic Hub should be spaced approximately 1mm away from the subassembly from **STEP 25** as seen in **(FIGURE 27-A)**.

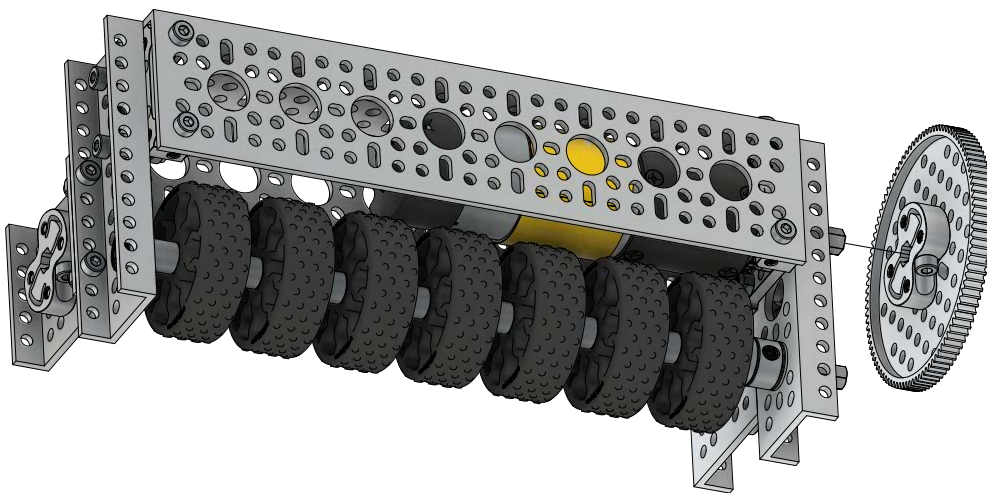
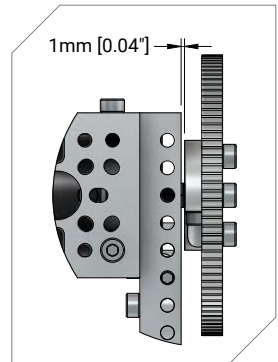


FIGURE 27-A



STEP 28:

Fasten **one** 20-Tooth Gear as shown.

Align the gears before tightening its set-screws **(FIGURE 28-A)**.

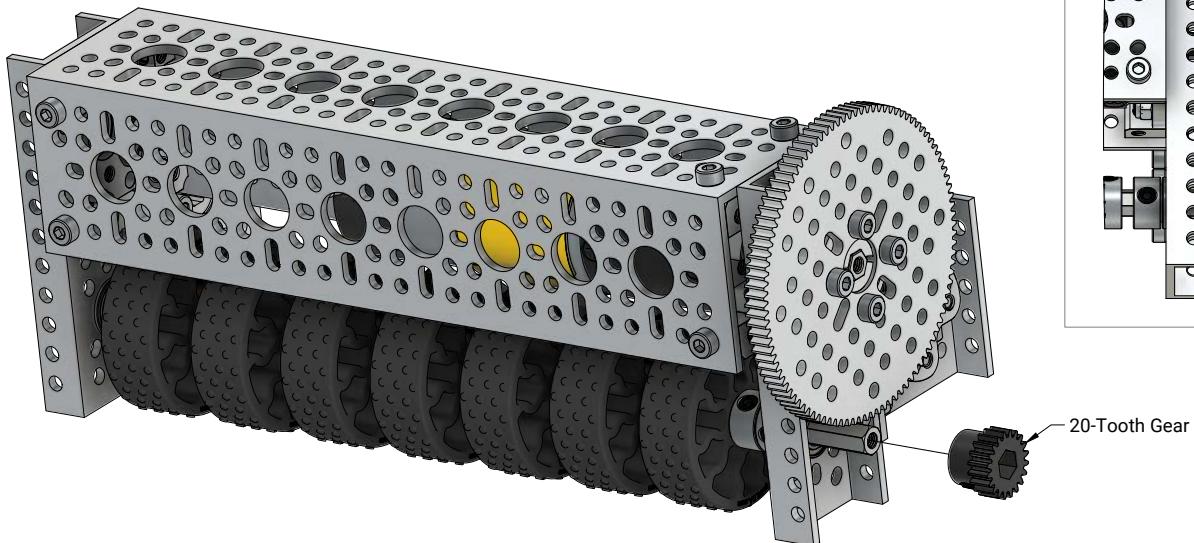
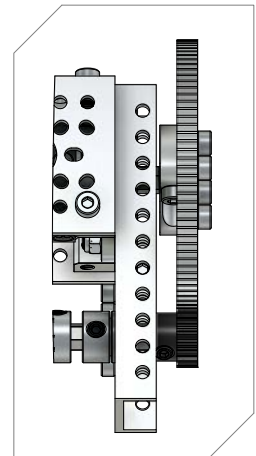
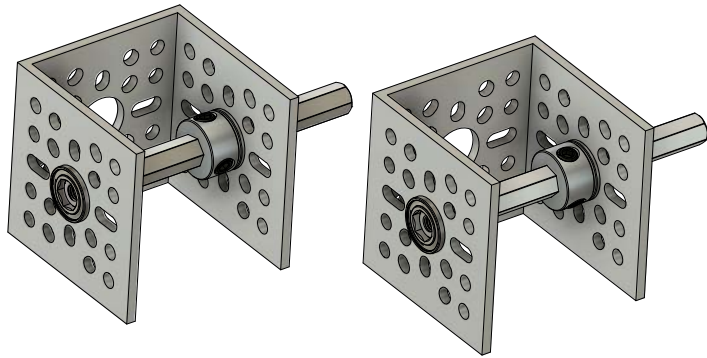


FIGURE 28-A





STEP 29:

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

FIGURE 29-A

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

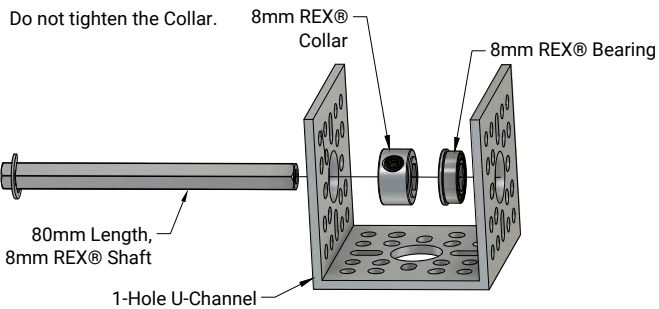


FIGURE 29-B

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

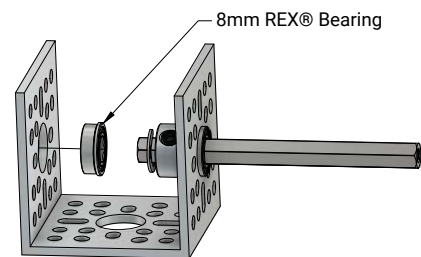
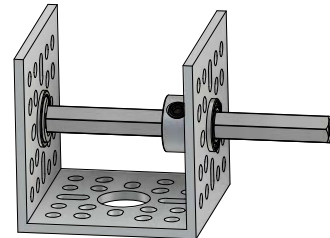


FIGURE 29-C

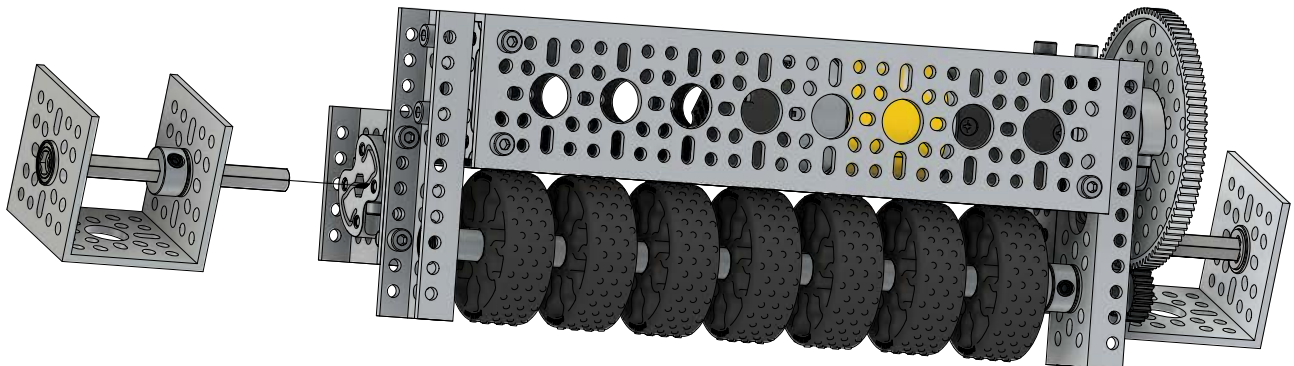
Pull the 80mm Length, 8mm REX® Shaft and the Collar against the 8mm REX® Bearings as shown, then tighten the 8mm REX® Collar in place.



STEP 30:

Combine the subassemblies from **STEP 28** and **STEP 29** as shown.

Do not tighten in place.



STEP 31:

Use **eight** 10mm Socket Head Screws and **eight** Locknuts to fasten the subassembly from **STEP 30** to the subassembly from **STEP 14** as shown.

Center the components (**FIGURE 31-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.

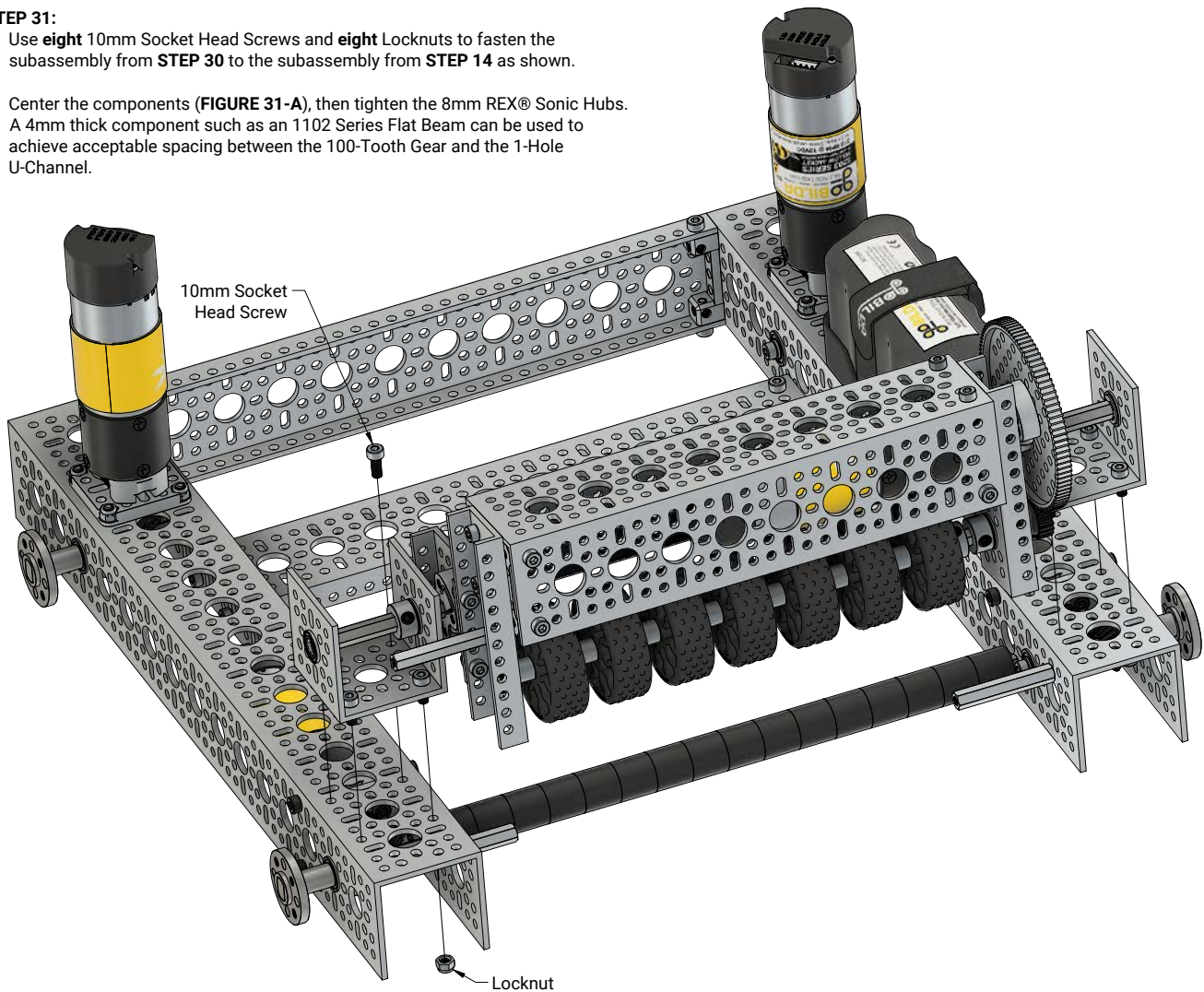


FIGURE 31-A

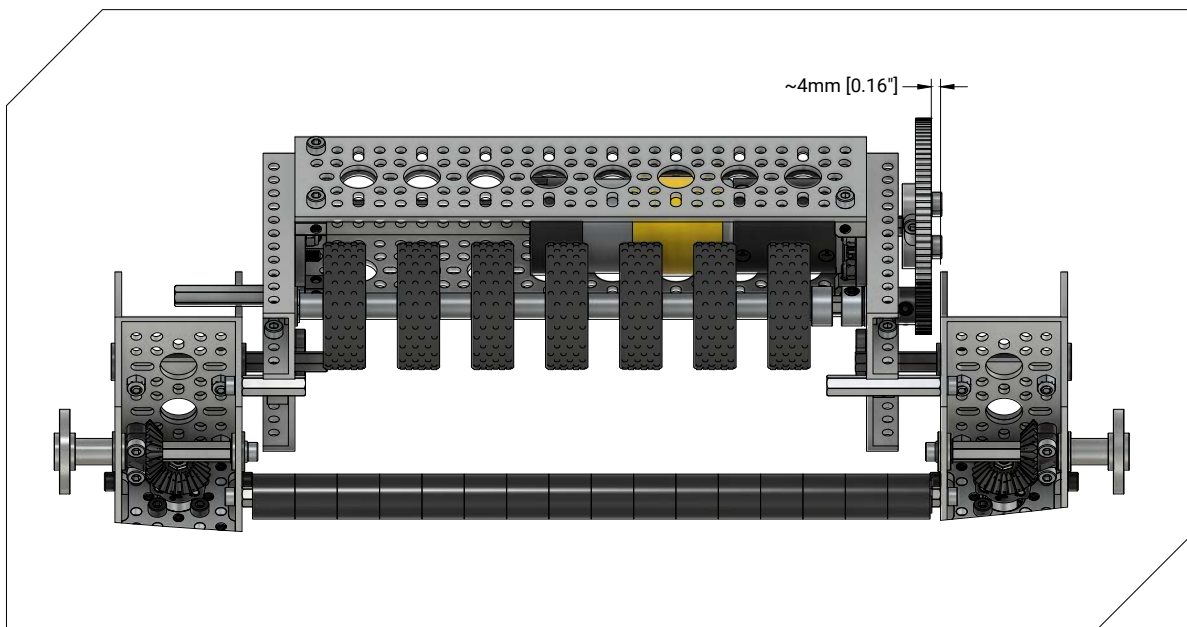
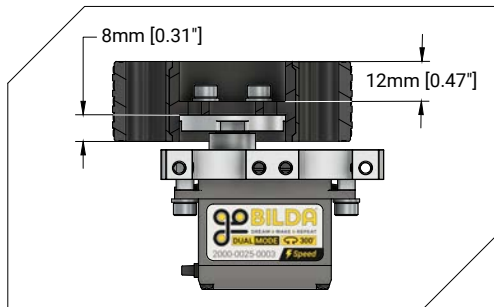




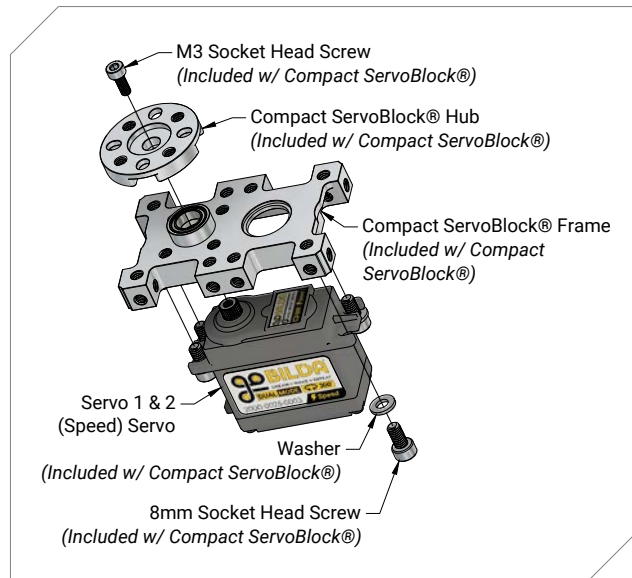
FIGURE 32-B



STEP 32:

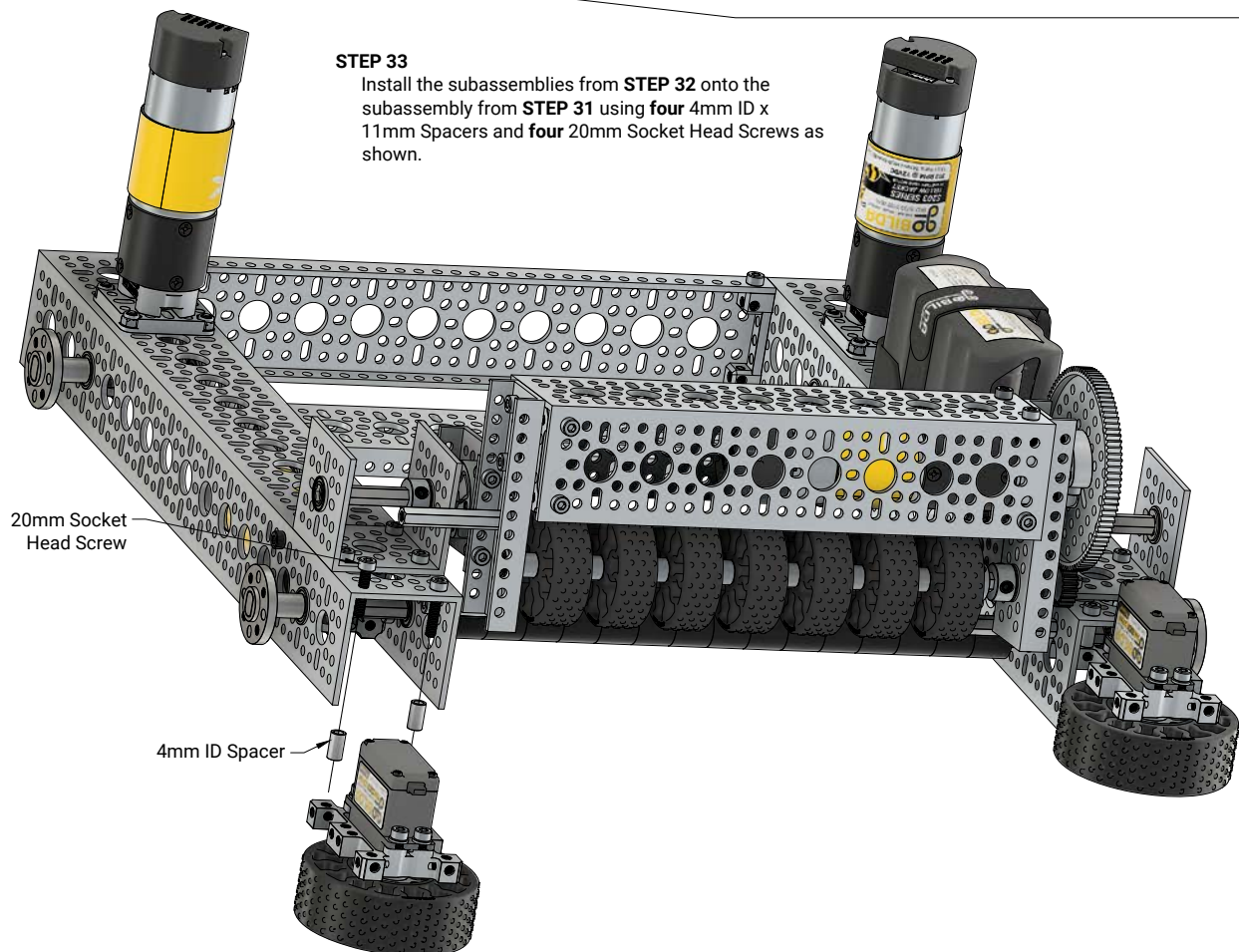
Install **two** Servo 1 & 2 (Speed) Servos in **two** Compact ServoBlocks® (**FIGURE 32-A**) and attach **two** 72mm GripForce® Gecko Wheels as shown (**FIGURE 32-B**) using **eight** Washers and **eight** 10mm Socket Head Screws.

FIGURE 32-A



STEP 33

Install the subassemblies from **STEP 32** onto the subassembly from **STEP 31** using **four** 4mm ID x 11mm Spacers and **four** 20mm Socket Head Screws as shown.

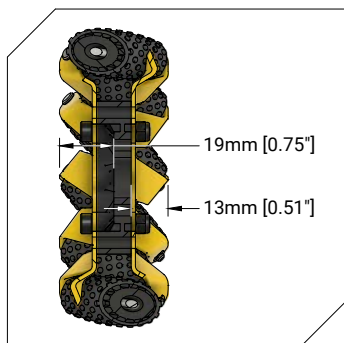
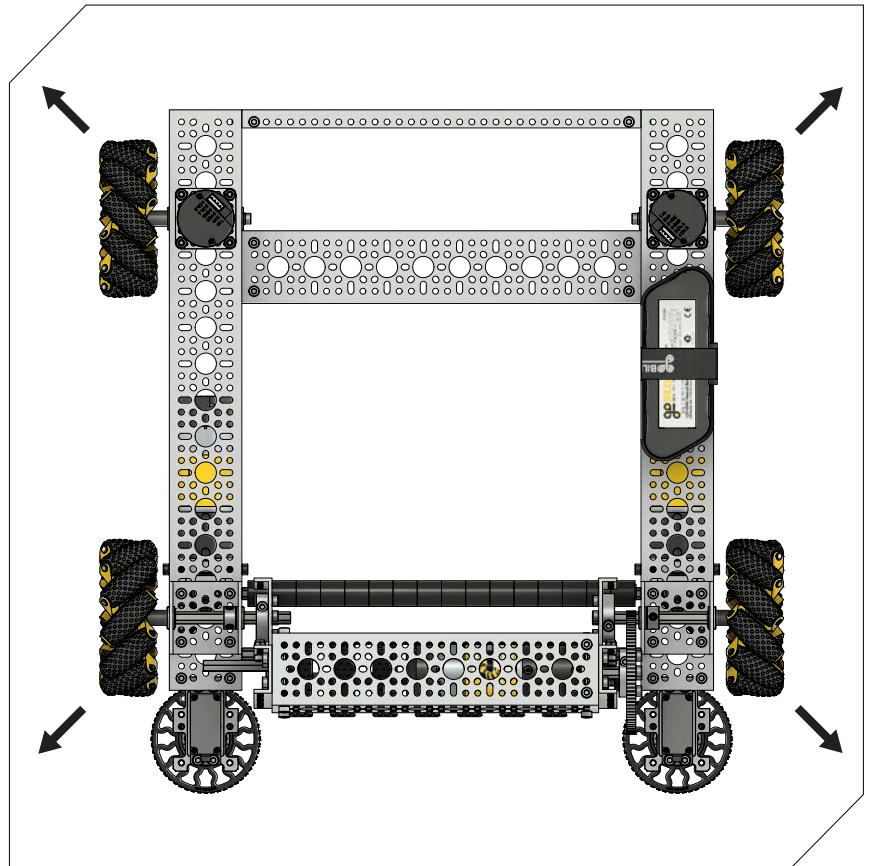
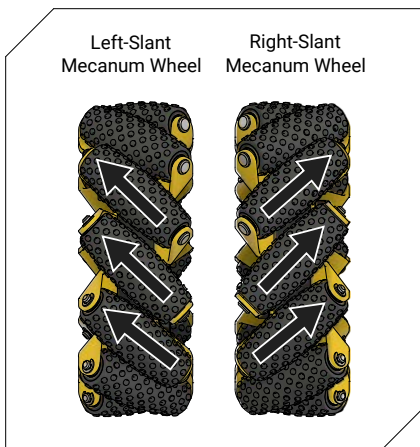


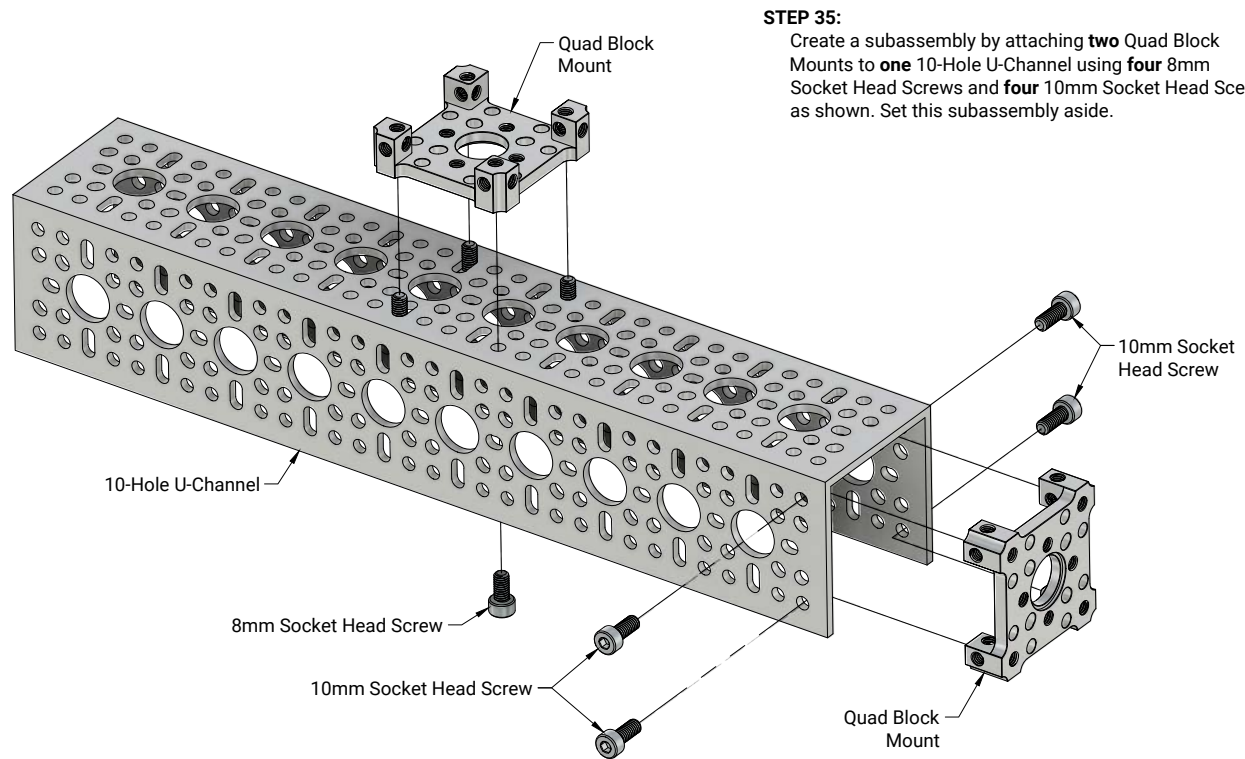
STEP 34:

Attach **two** Right-Slant Mecanum Wheels and **two** Left-Slant Mecanum Wheels using **sixteen** 10mm Black Socket Head Screws as shown.

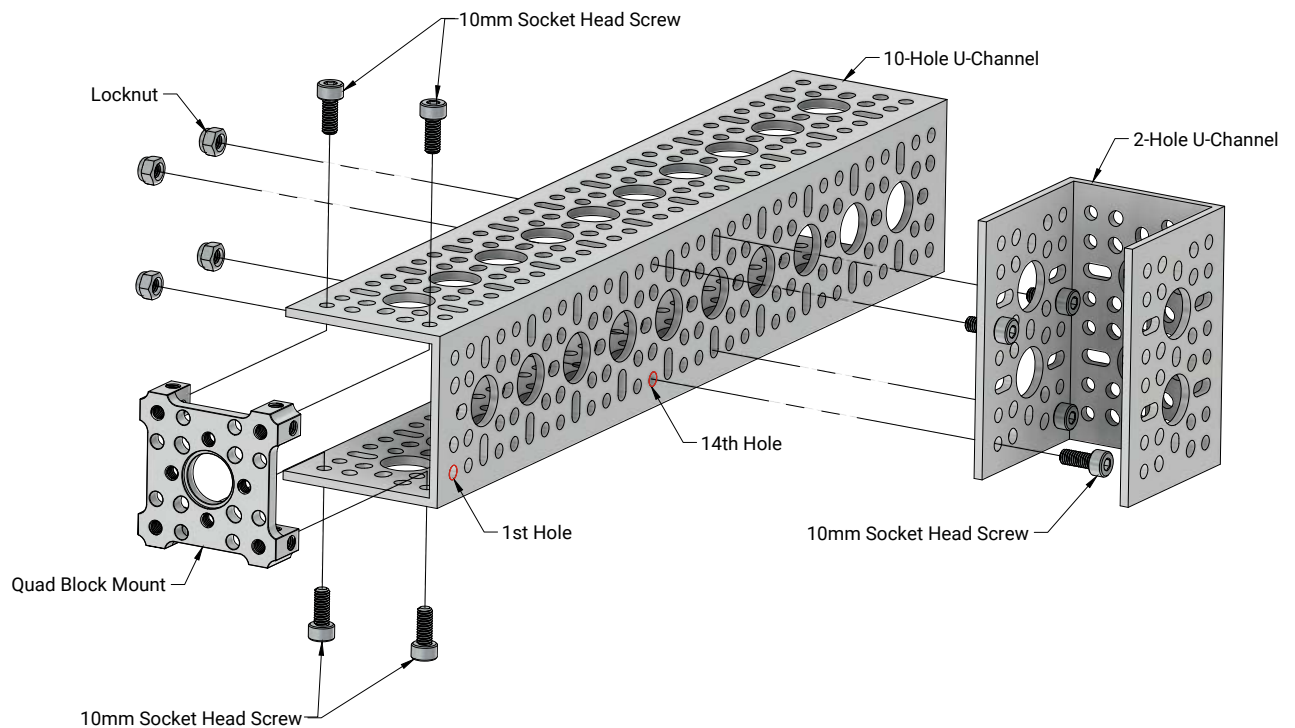
The Mecanum Wheels should mount to the Hub-Shafts with the “deep” side of the Mecanum Wheels facing out (**FIGURE 34-A**).

Note the configuration of the differently slanted wheels. In the correct configuration, the rollers on the wheels will point out diagonally from the center of the robot when viewed from above (**FIGURE 34-C**)

**FIGURE 34-C****FIGURE 34-A****FIGURE 34-B**

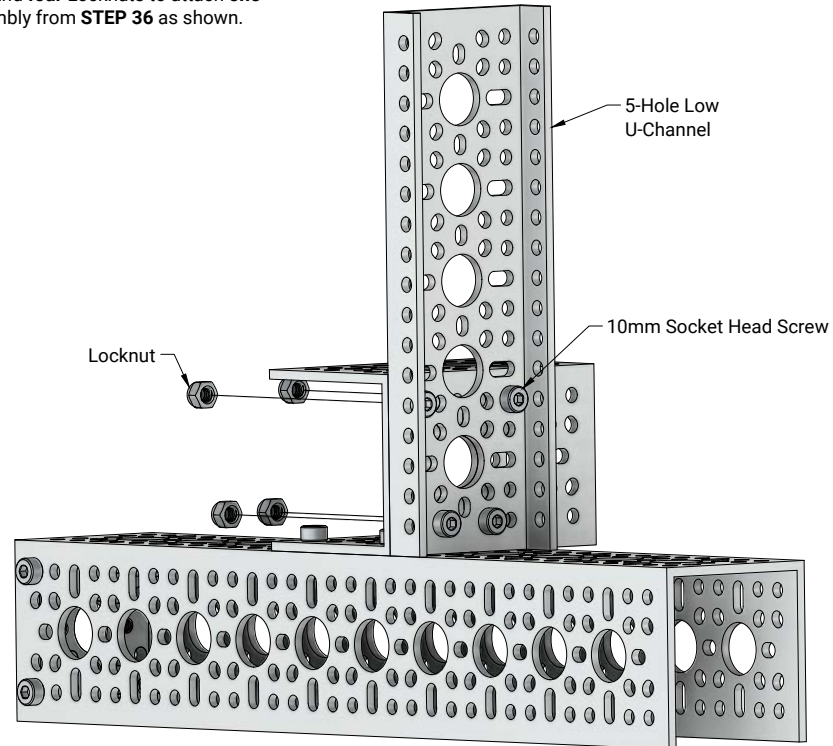


STEP 36:
Create another subassembly by combining **one** Quad Block Mount, **one** 2-Hole U-Channel, and **one** 10-Hole U-Channel, using **eight** 10mm Socket Head Screws and **four** Locknuts as shown.



STEP 37:

Use **four** 10mm Socket Head Screws and **four** Locknuts to attach **one** 5-Hole Low U-Channel to the subassembly from **STEP 36** as shown. Note the locations of the screws.



STEP 38:

Convert **one** 19.2:1 Ratio Yellow Jacket Motor to a 1:1 Ratio Yellow Jacket Motor using **one** Conversion Coupler (**FIGURE 38-A**, **FIGURE 38-B**). Attach the 1:1 Yellow Jacket Motor to **one** Quad Block Mount using **four** 12mm Socket Head Screws as shown.

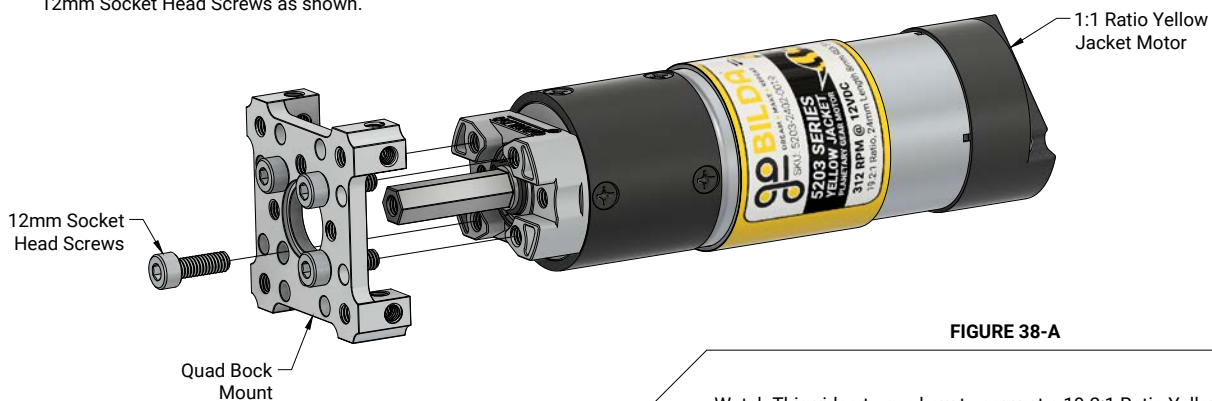


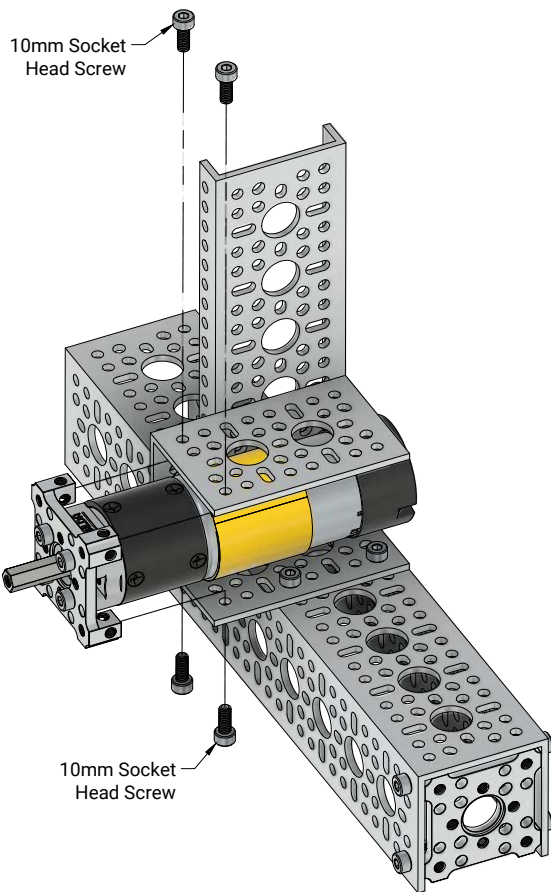
FIGURE 38-A

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 38-B



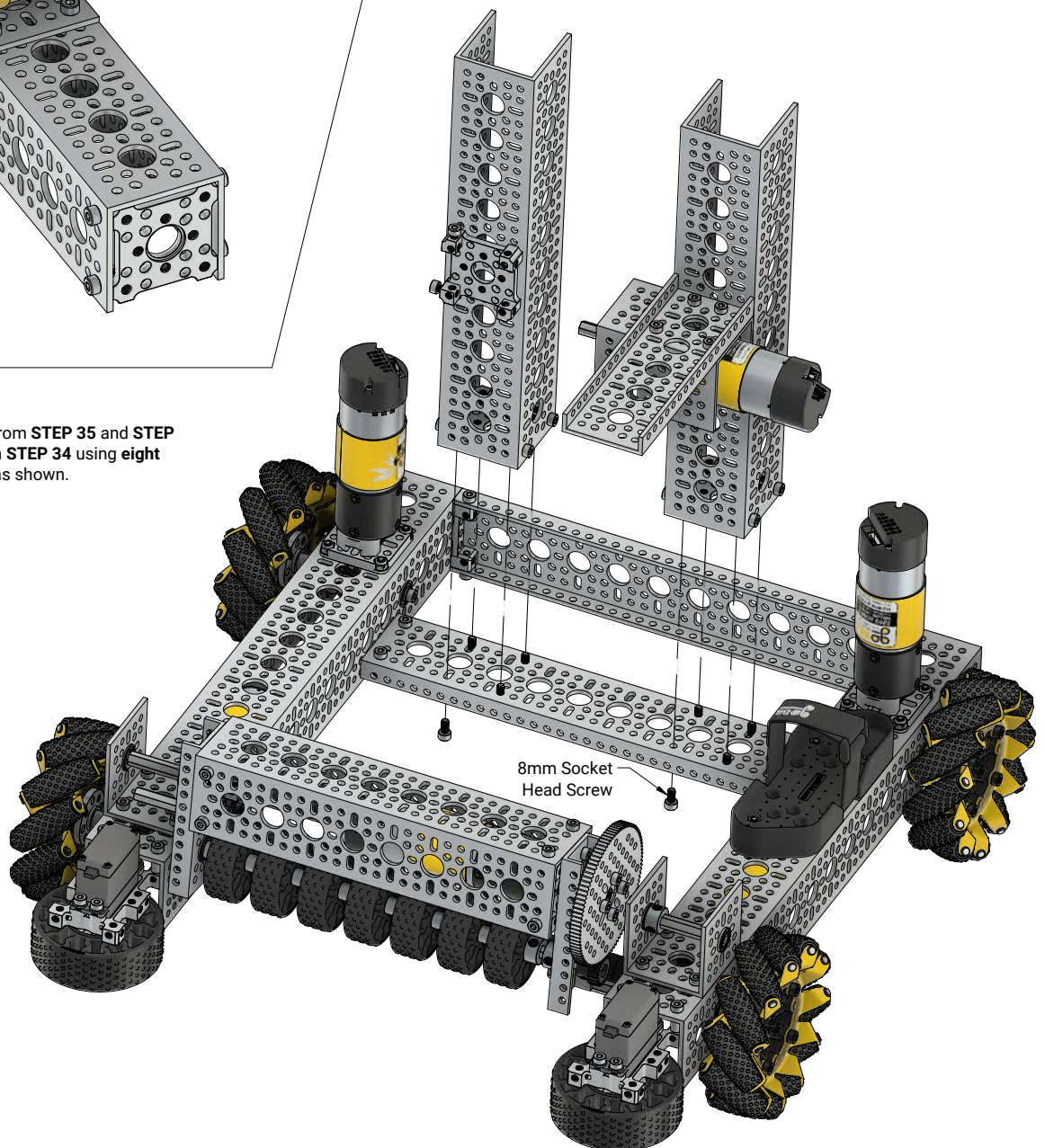


STEP 39:

Combine the subassembly from **STEP 37** with the subassembly from **STEP 38** using **four** 10mm Socket Head Screws.

STEP 40:

Attach the subassemblies from **STEP 35** and **STEP 39** to the subassembly from **STEP 34** using **eight** 8mm Socket Head Screws as shown.



STEP 41:

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
41-A**). Note the location of the Gridplates in relation to the
10-Hole U-Channel.

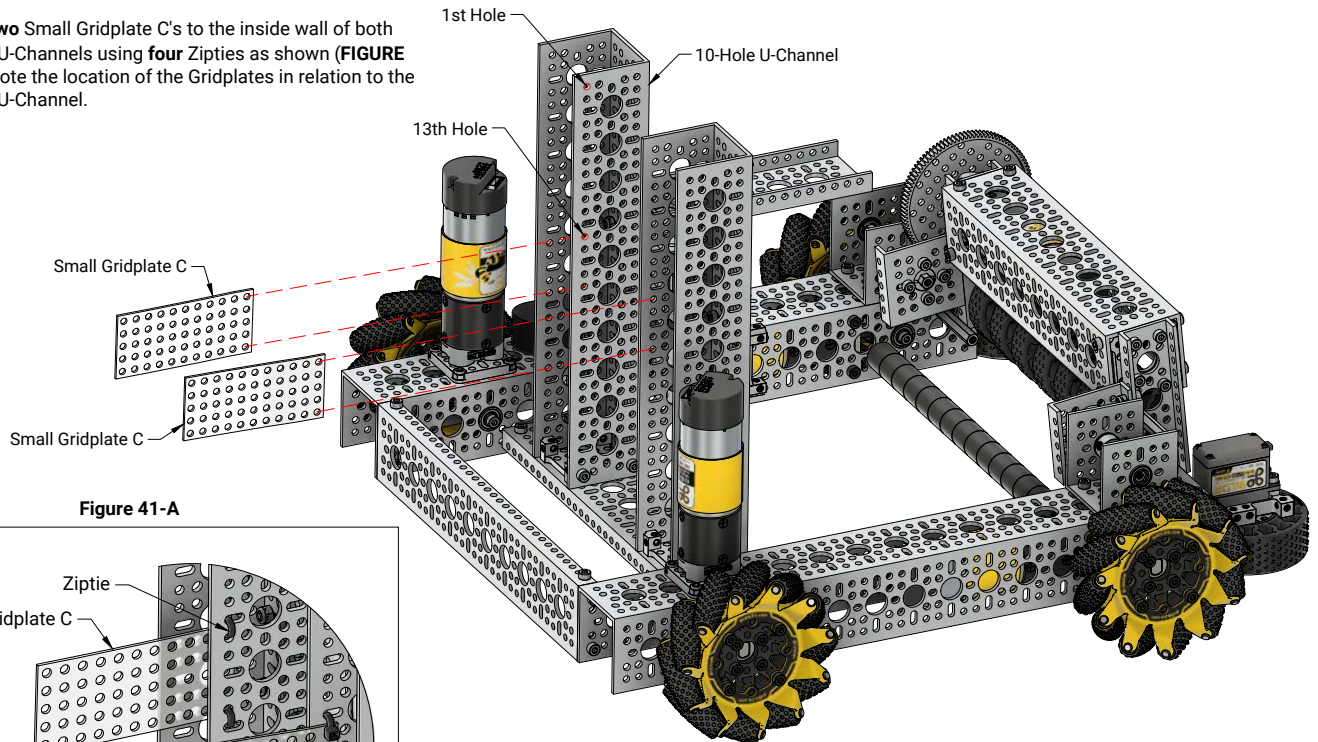
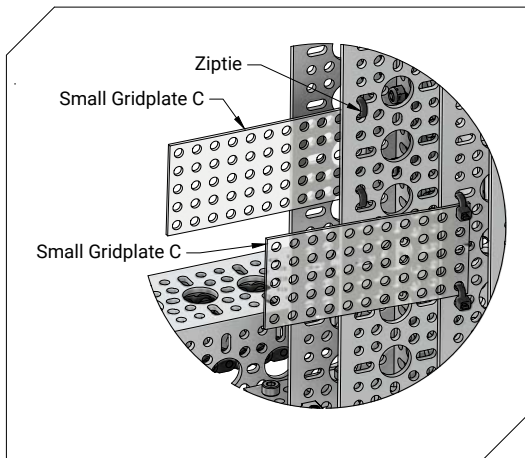


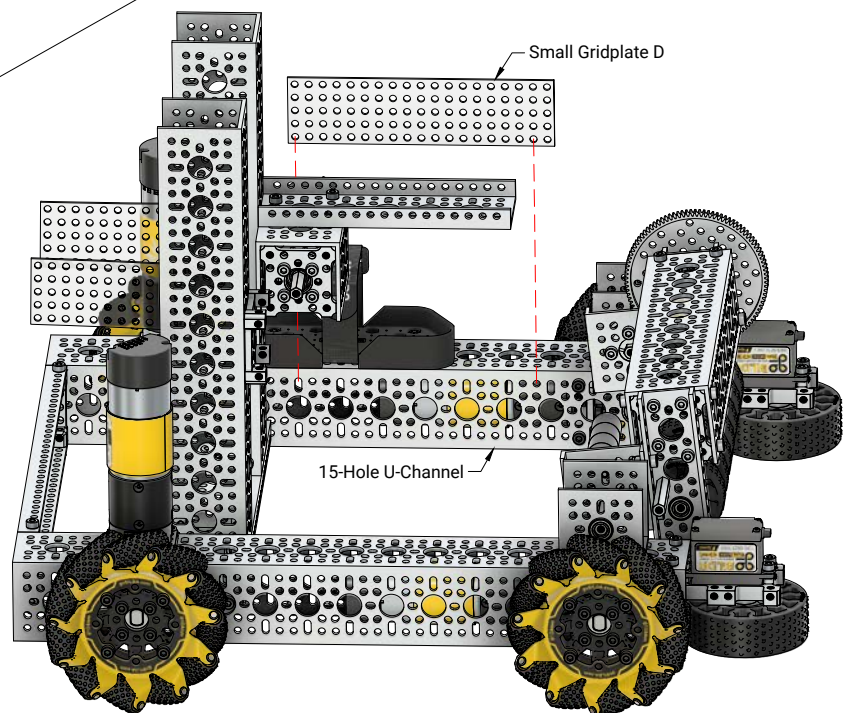
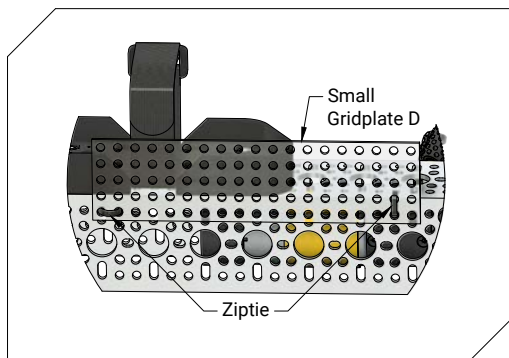
Figure 41-A



STEP 42:

Use **two** Zipties to attach **one** Small Gridplate D to the
15-Hole U-Channel as shown (**FIGURE 42-A**).

FIGURE 42-A



STEP 43:

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.

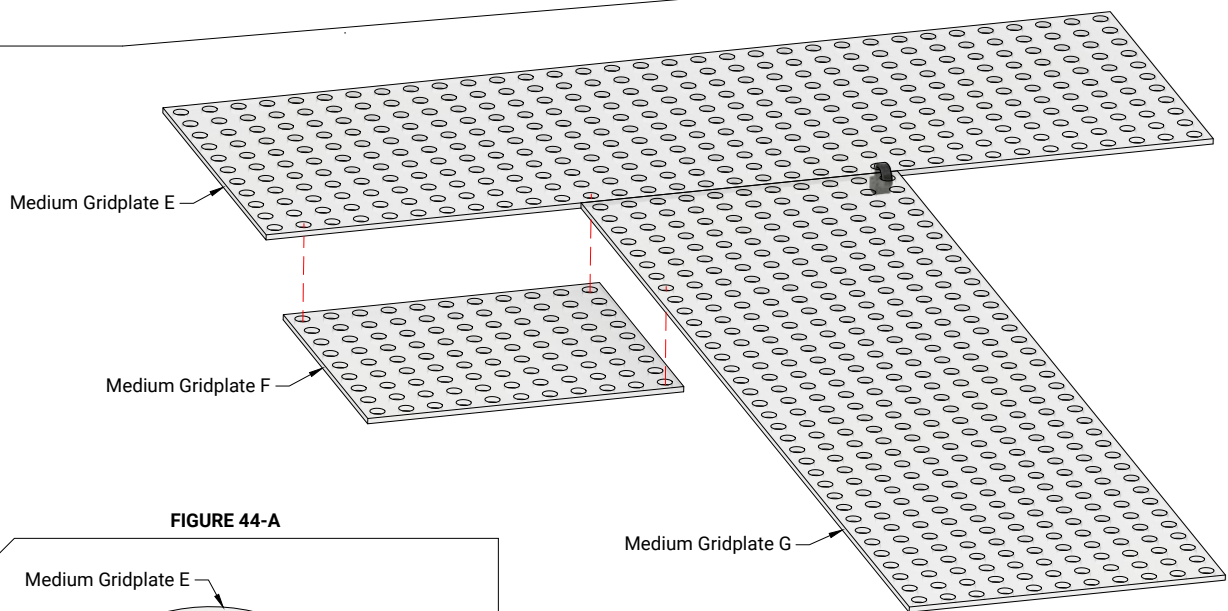
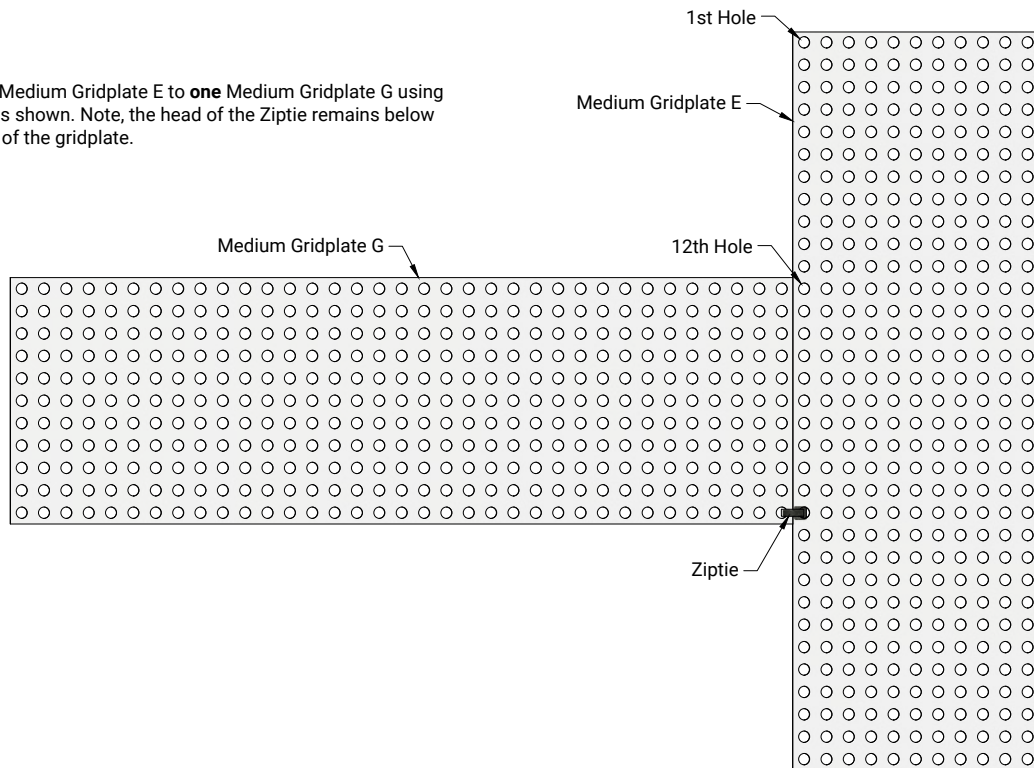
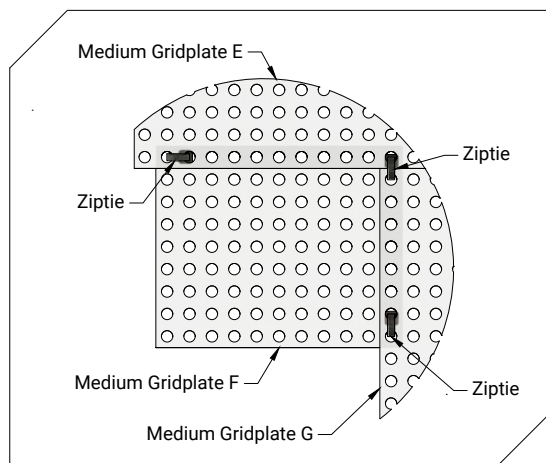


FIGURE 44-A



STEP 44:

Secure **one** Medium Gridplate F to the bottom edges of the subassembly from **STEP 43** using **three** Zipties as shown (**FIGURE 44-A**). Note, all Ziptie heads are below the surface of the Gridplates.

STEP 45:

Fasten **three** 43mm Length, 6mm Round Standoffs and **six** washers using **three** 10mm Socket Head Screws to the subassembly from **STEP 44** in the locations shown (**FIGURE 45-A**).

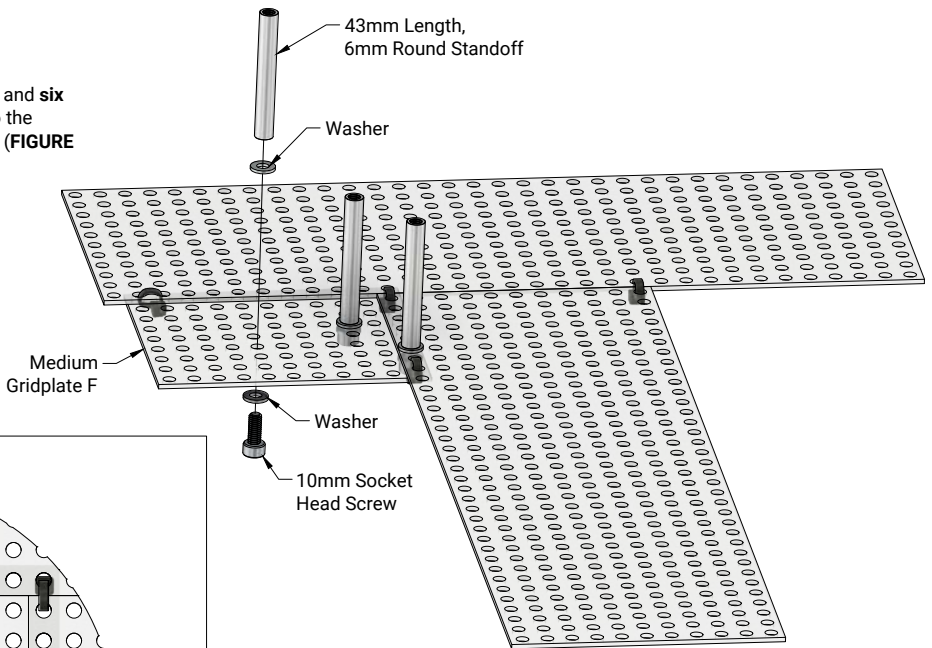
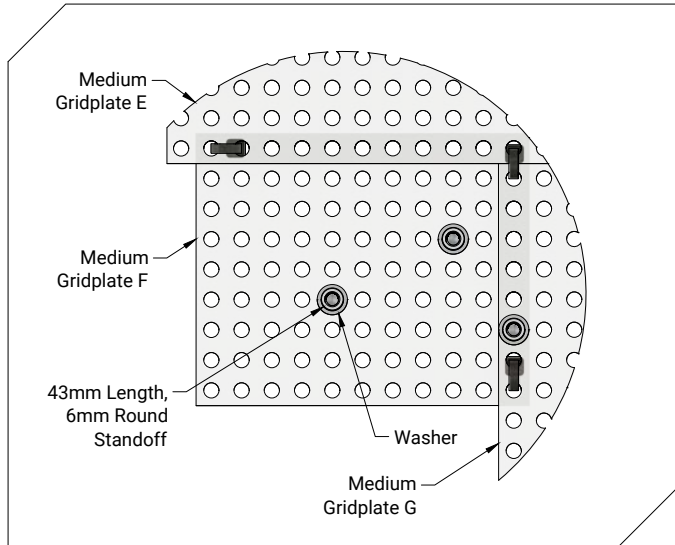
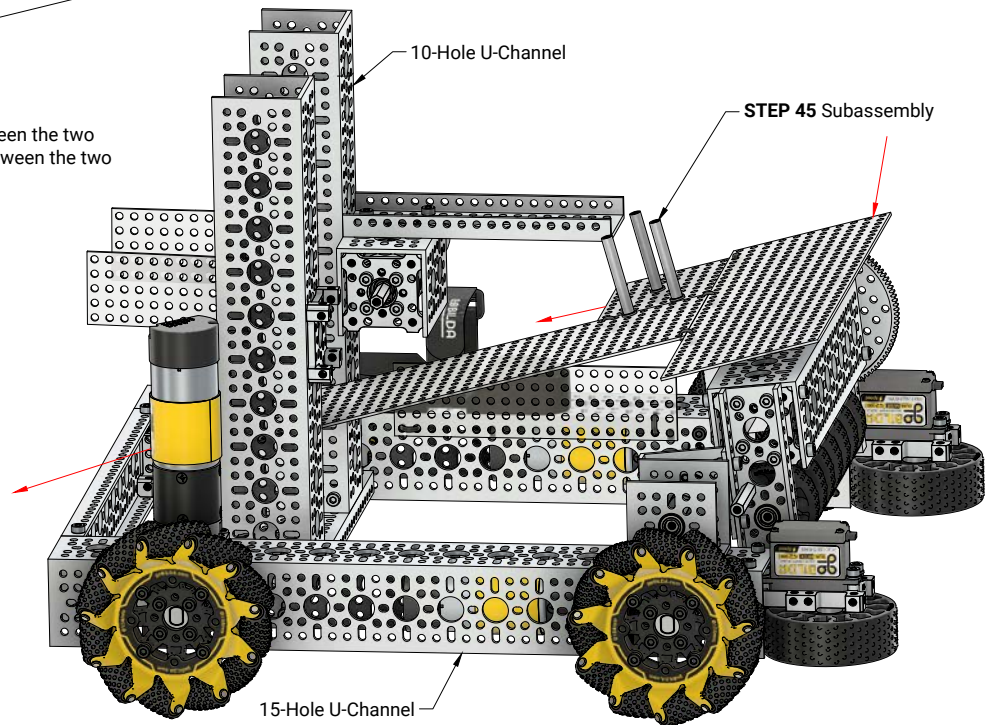


FIGURE 45-A



Step 46:

Slide the subassembly from **STEP 45** between the two vertical 10-Hole U-Channels, then down between the two horizontal 15-Hole U-Channels.



STEP 47:

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 47-A** and **FIGURE 47-B**). Note that in (**FIGURE 47-A**), one Ziptie passes through both the 15-Hole U-Channel and Small Gridplate D.

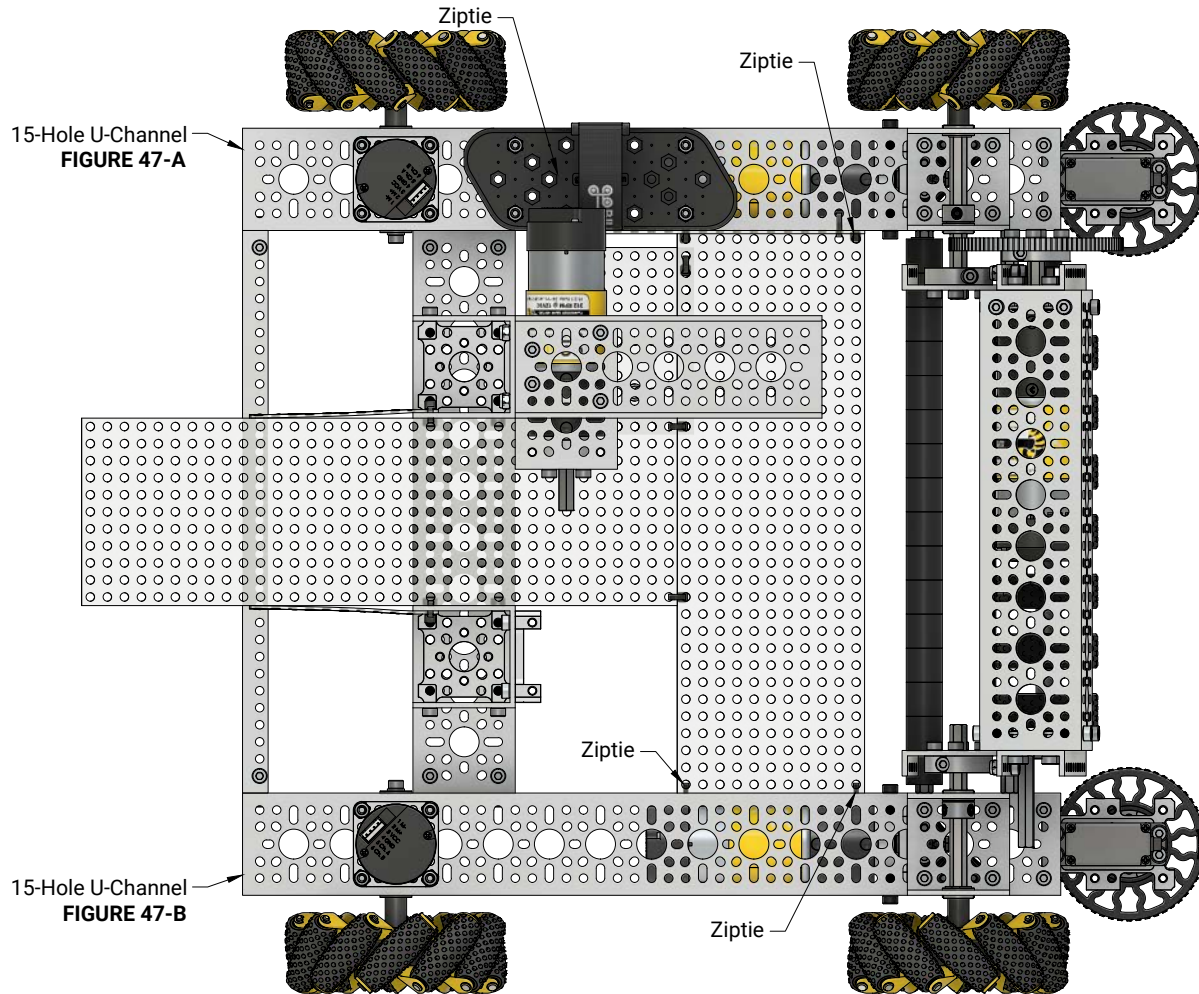


FIGURE 47-A

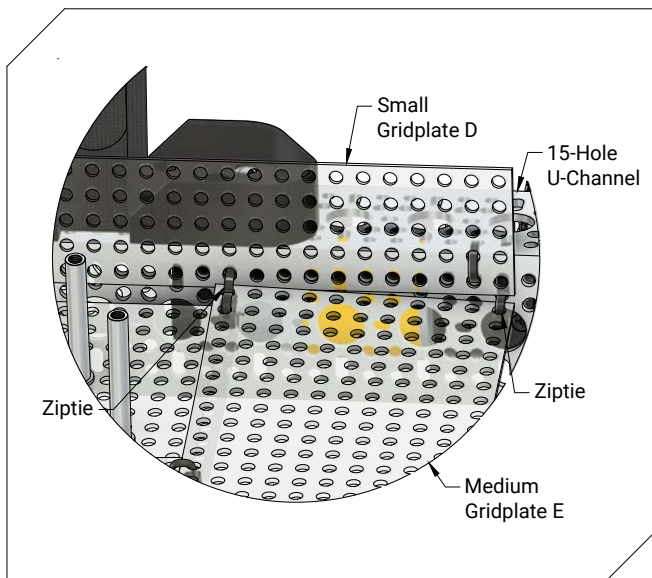
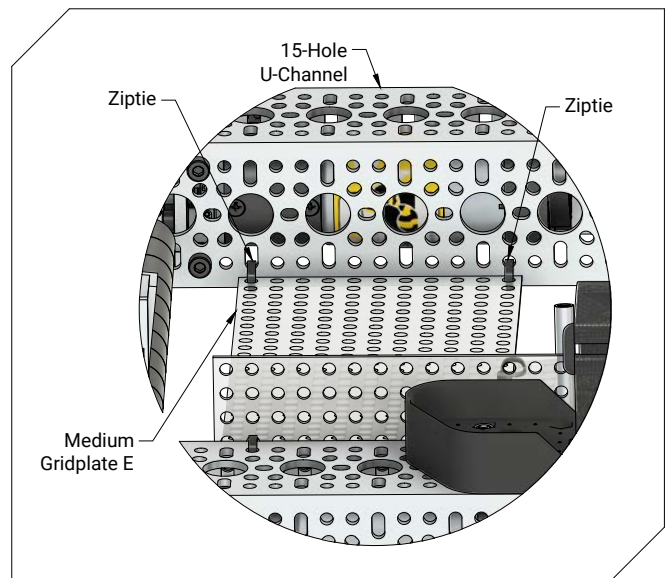
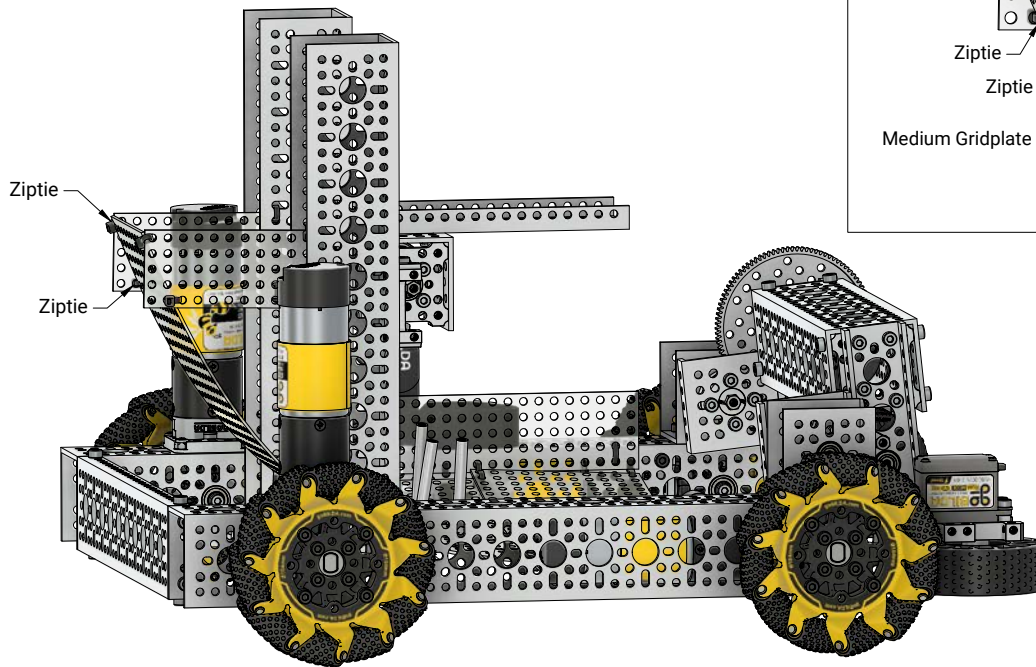
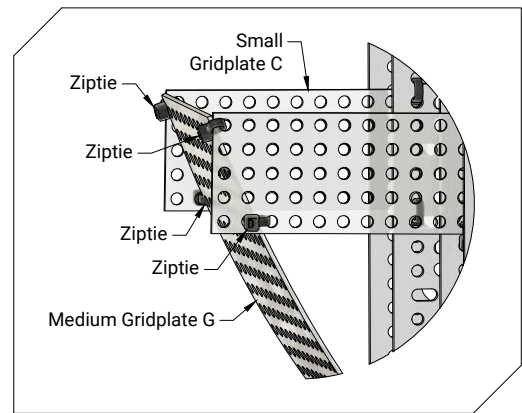


FIGURE 47-B

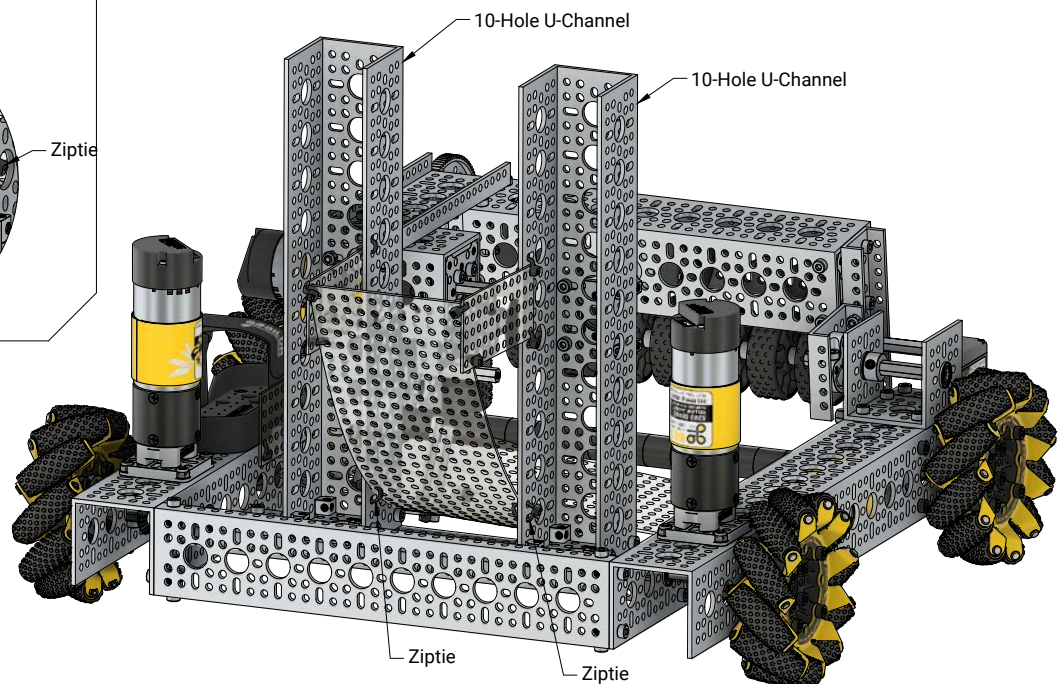
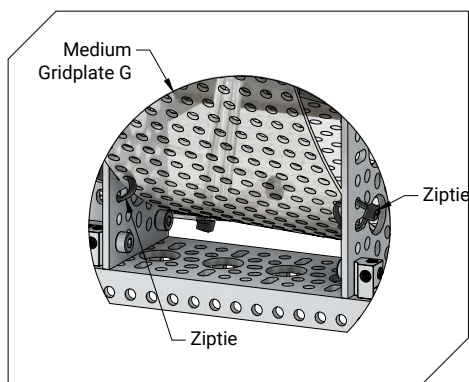


STEP 48:

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 48-A).

FIGURE 48-A**STEP 49:**

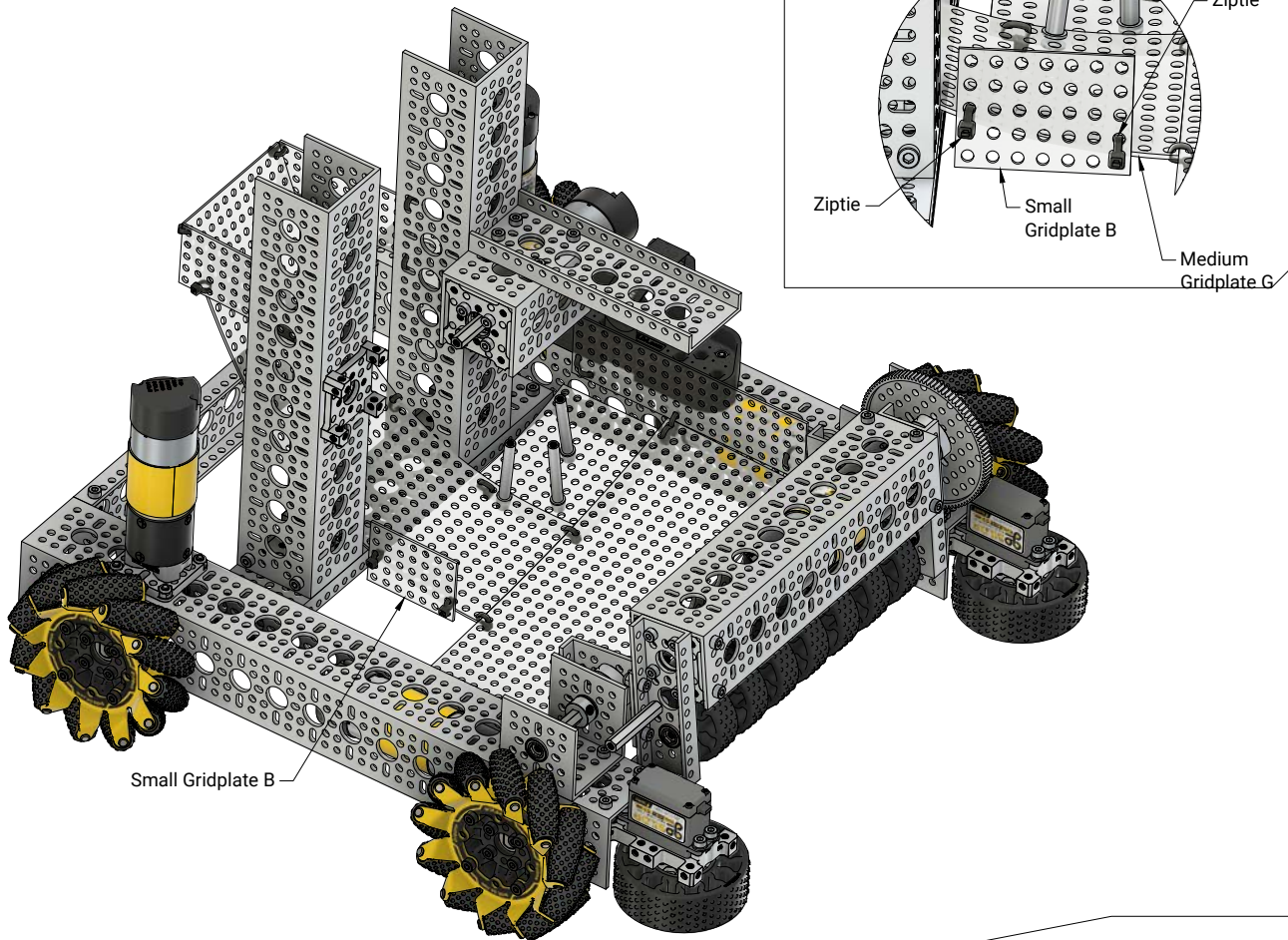
Use **two** Zipties to secure the middle of Medium Gridplate G to the walls of the two vertical 10-Hole U-Channels as shown (FIGURE 49-A).

FIGURE 49-A

STEP 50:

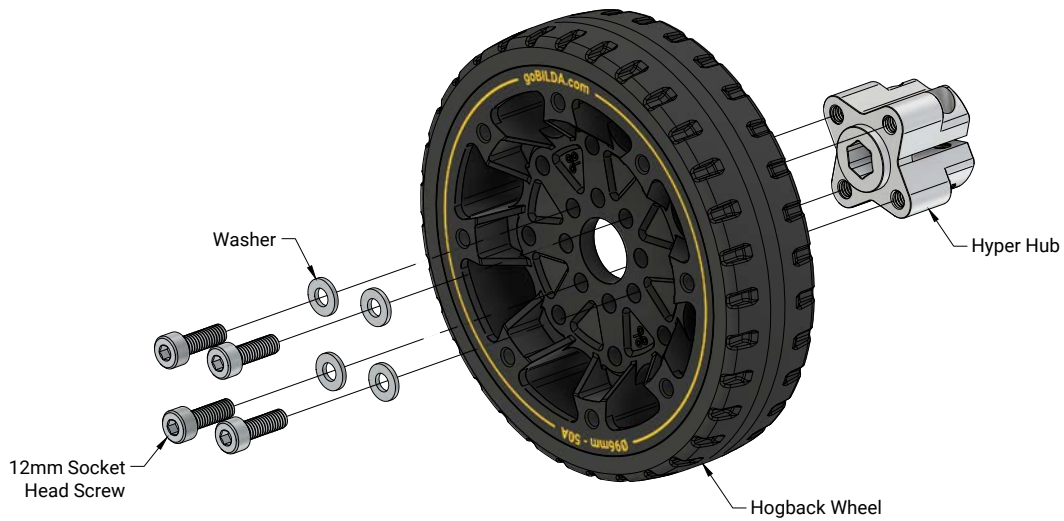
Mount **one** Small Gridplate B to the side of Medium Gridplate G using **two** Zipties as shown (**FIGURE 50-A**).

FIGURE 50-A



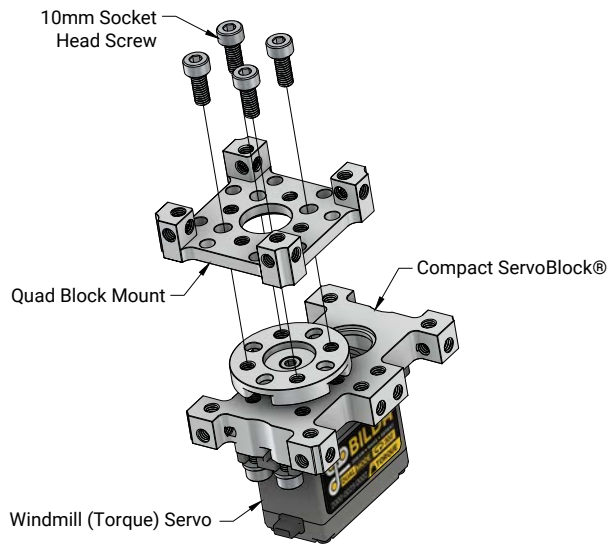
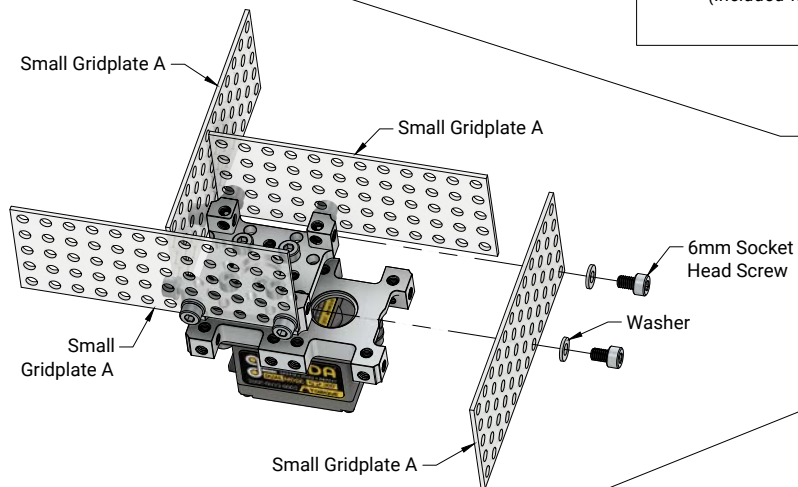
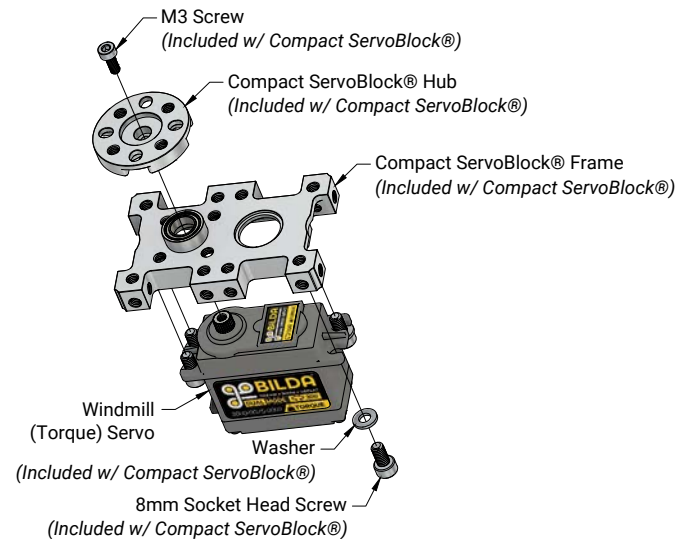
STEP 51:

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



STEP 52:

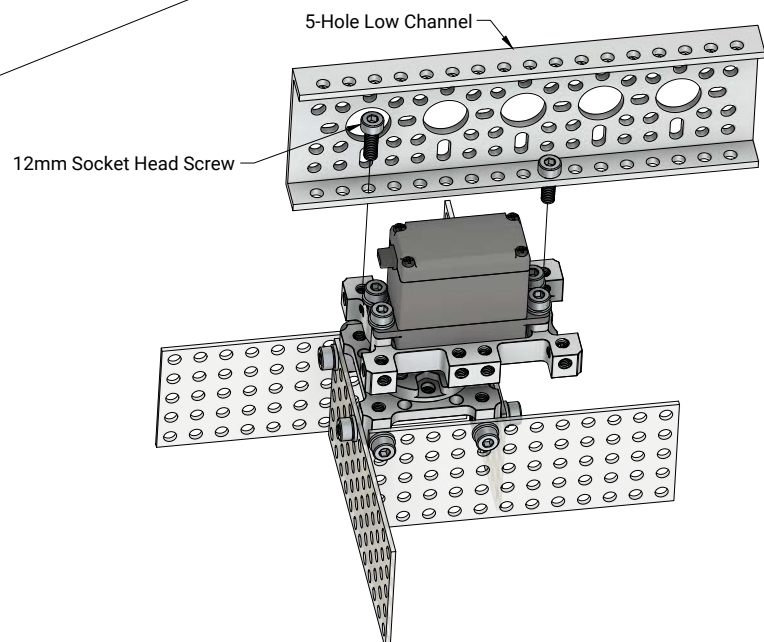
Install **one** Windmill (Torque) Servo in **one** Compact ServoBlock® (**FIGURE 52-A**) and attach **one** Quad Block Mount using **four** 10mm Socket Head Screws

**FIGURE 52-A****STEP 53:**

Attach **four** Small Gridplate A to the subassembly from **STEP 52** using **eight** Washers and **eight** 6mm Socket Head Screws as shown.

STEP 54:

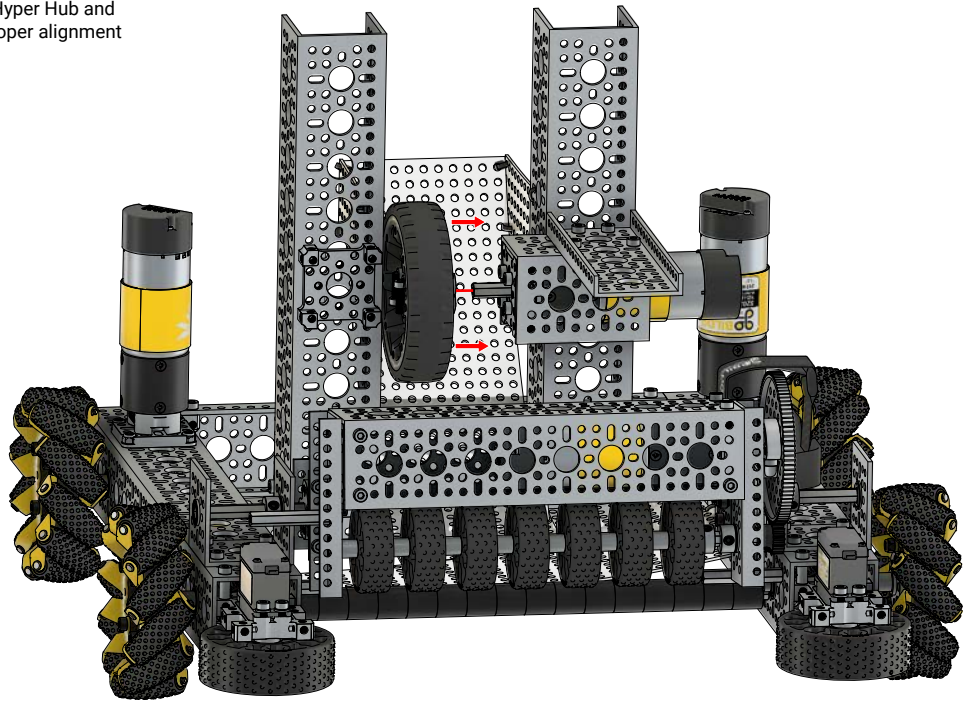
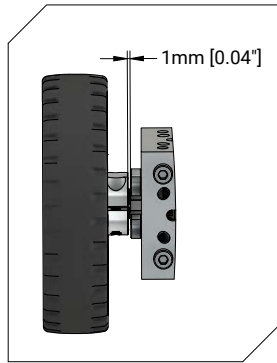
Combine the subassembly from **STEP 53** with **one** 5-Hole Low Channel using **two** 12mm Socket Head Screws as shown.



STEP 55:

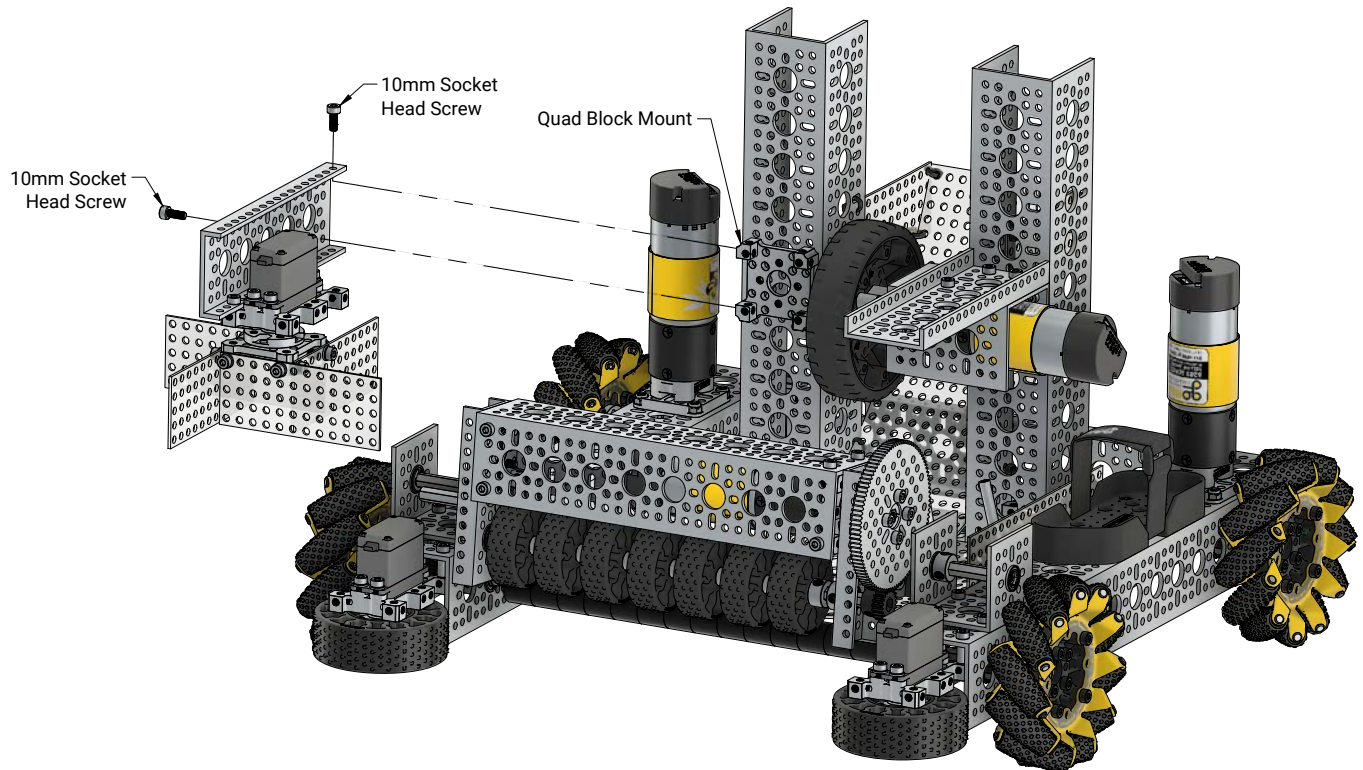
Install the subassembly from **STEP 51** onto the Yellow Jacket Motor Shaft, then tighten the Hyper Hub in place. Leave approximately 1mm gap between the Hyper Hub and the 12mm Socket Head Screws to achieve proper alignment (**FIGURE 55-A**).

FIGURE 55-A



STEP 56:

Attach the subassembly from **STEP 54** to the Quad Block Mount using **two** 10mm Socket Head Screws as shown.



STEP 57

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 57-A**).

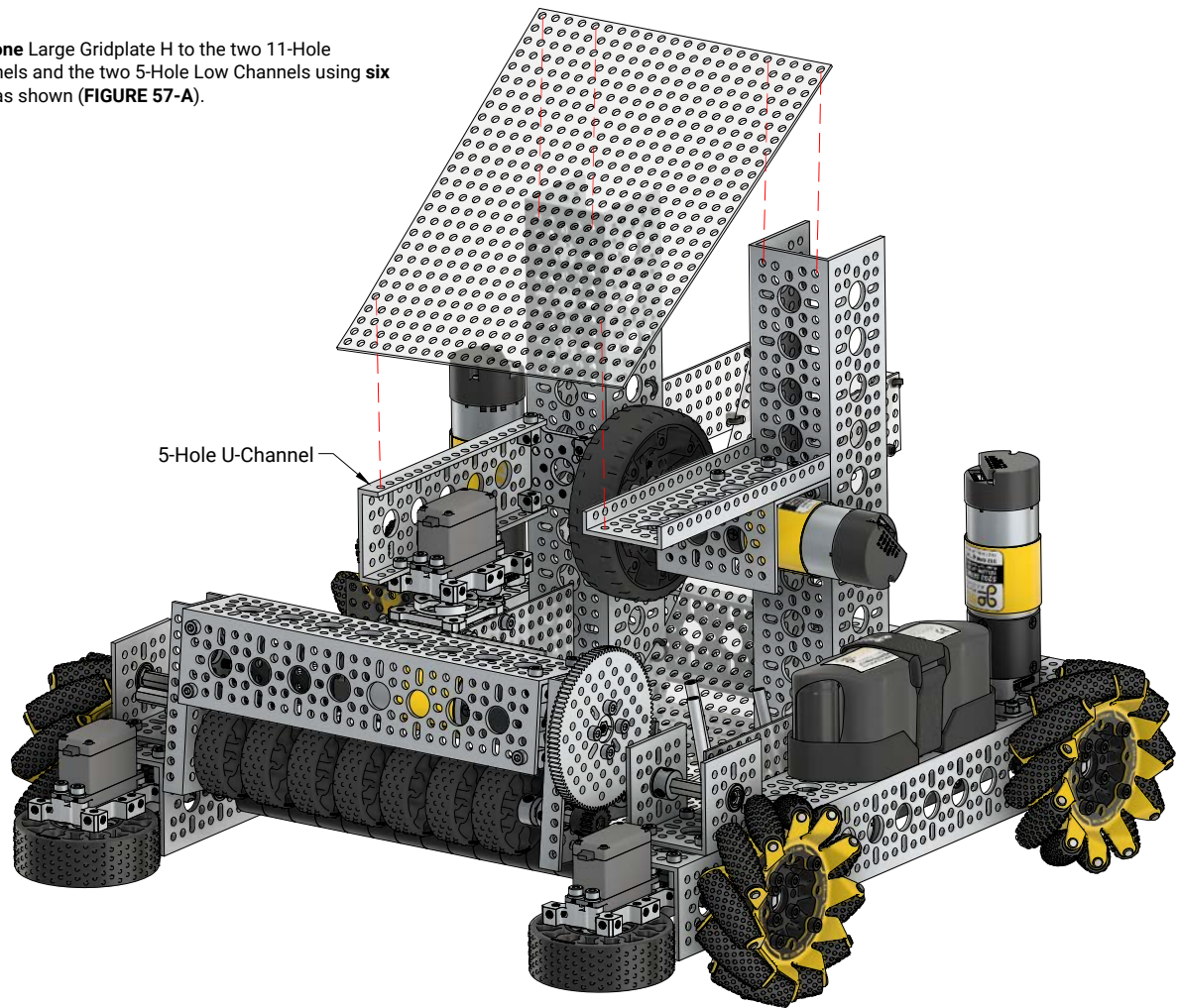
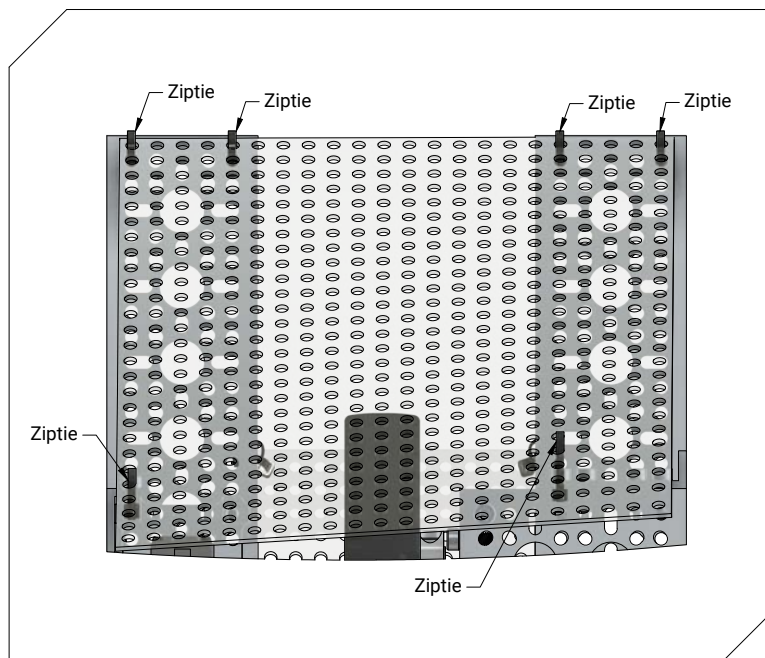


FIGURE 57-A



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!

