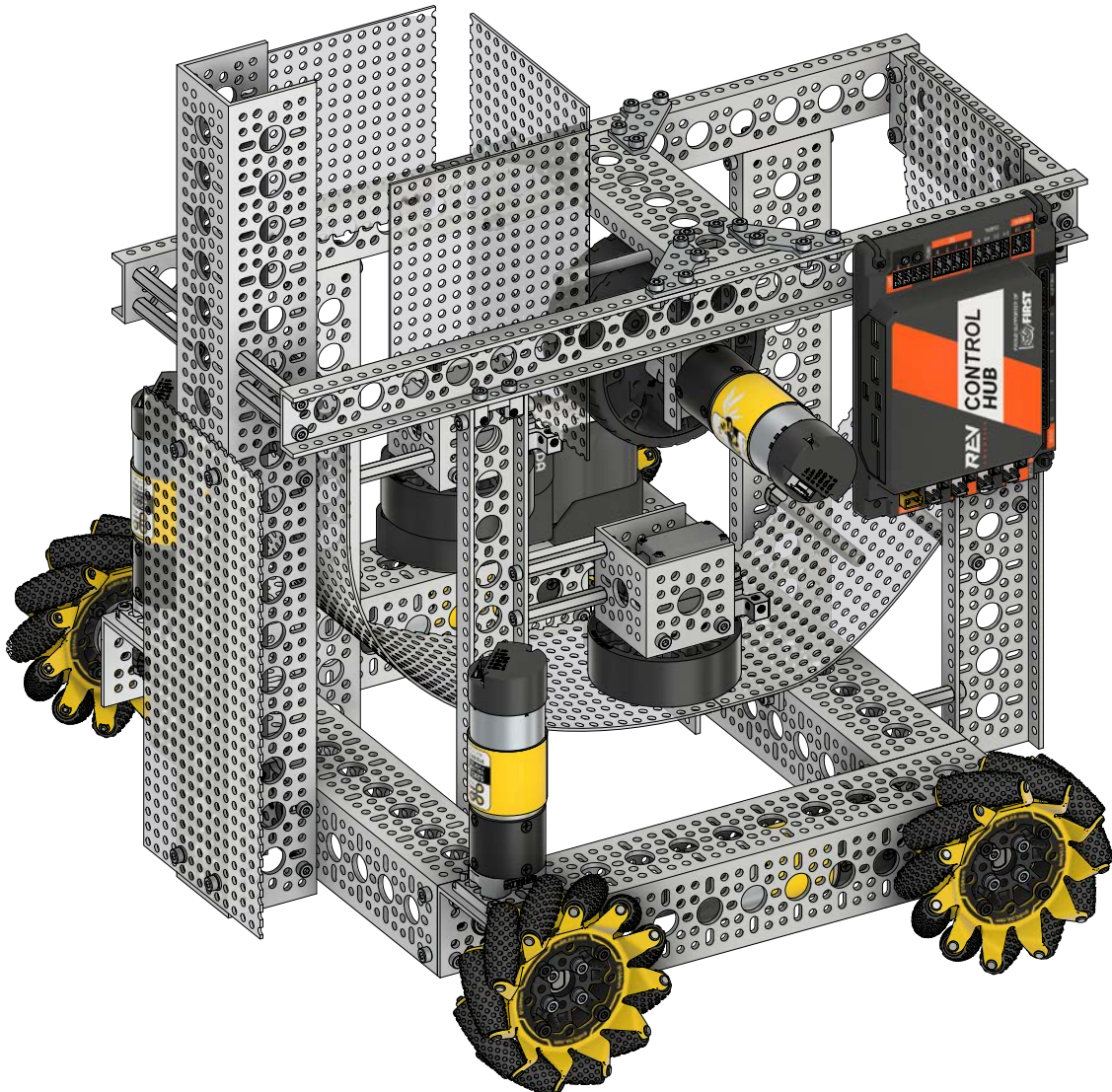




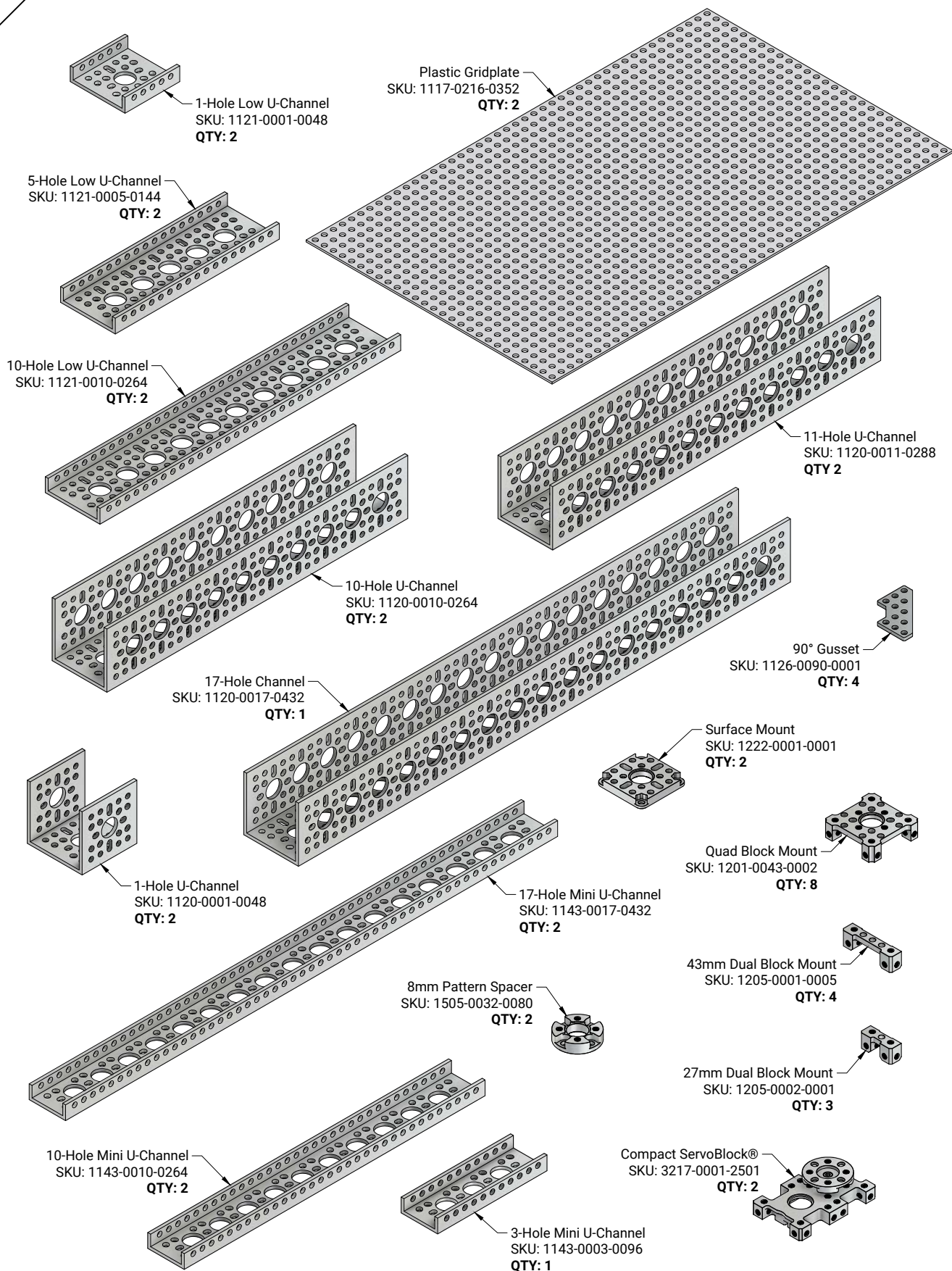
Assembly Instructions for
FTC Starter Bot with Mecanum Wheels (for DECODE™)

Built from:

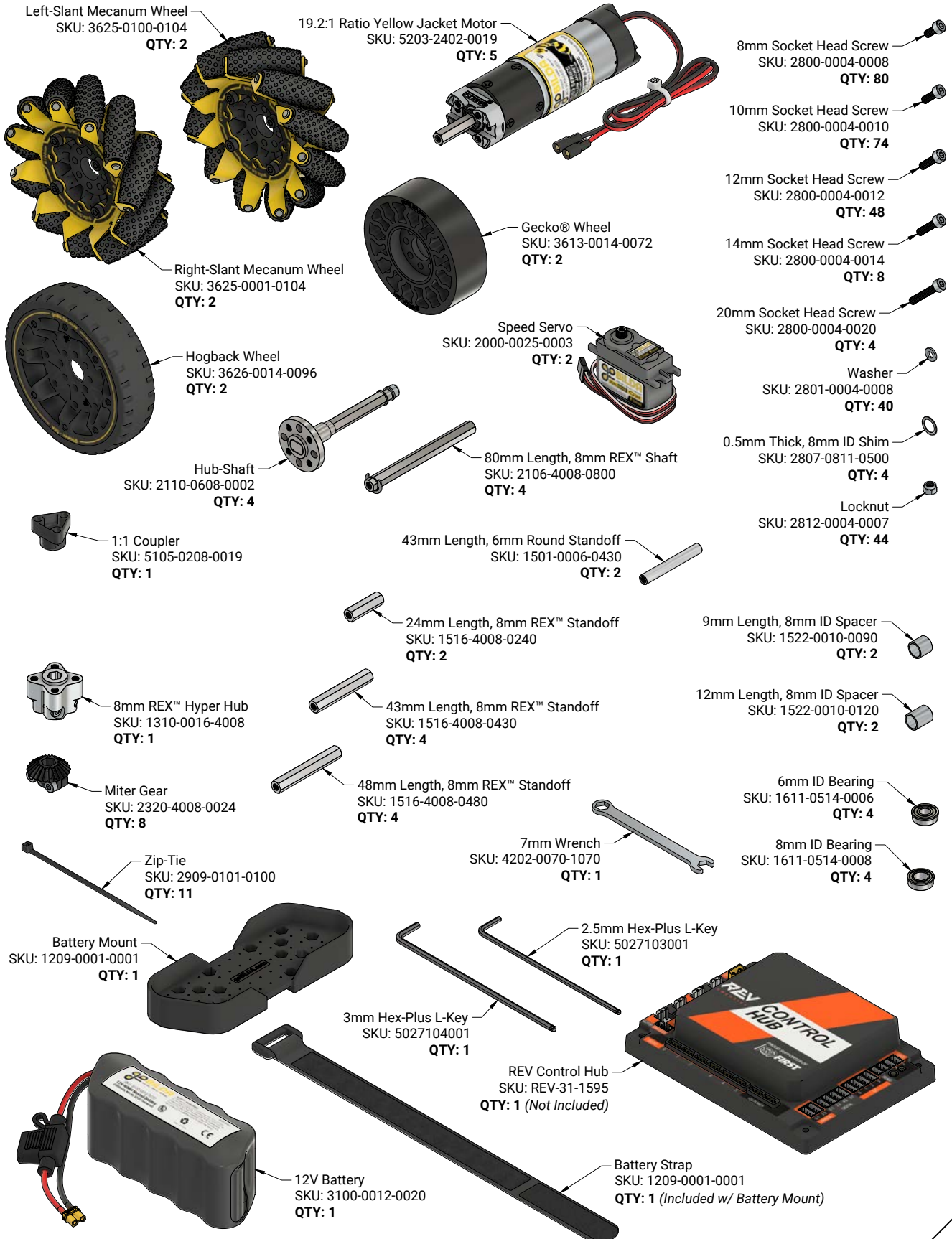
- 1 x FTC Starter Kit (SKU: 3200-4008-2526)
- 1 x Strafer® Chassis (SKU: 3209-0001-0007)
- 2 x Flat Pattern Mount (SKU: 1222-0001-0001)



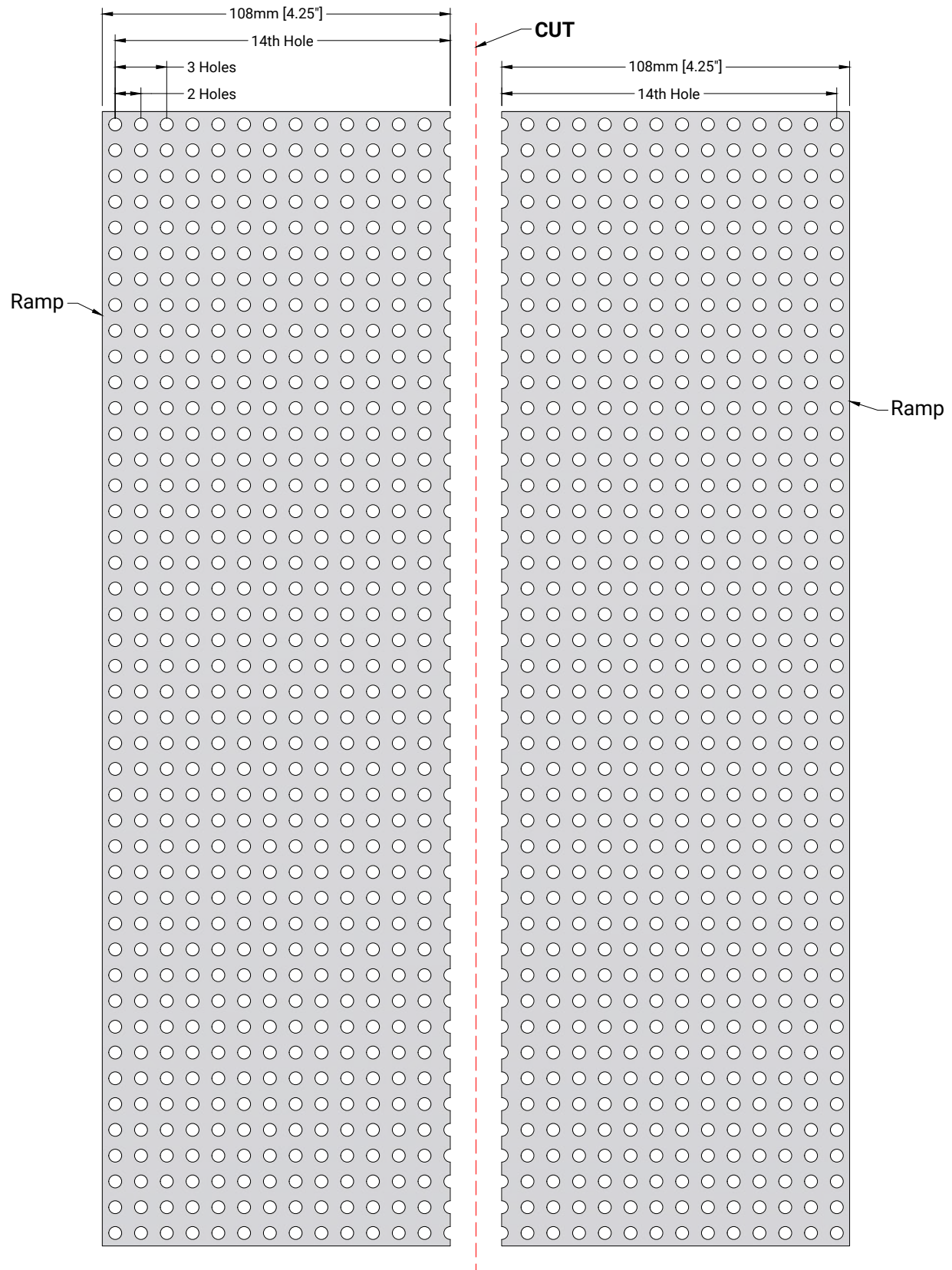
Kit Contents



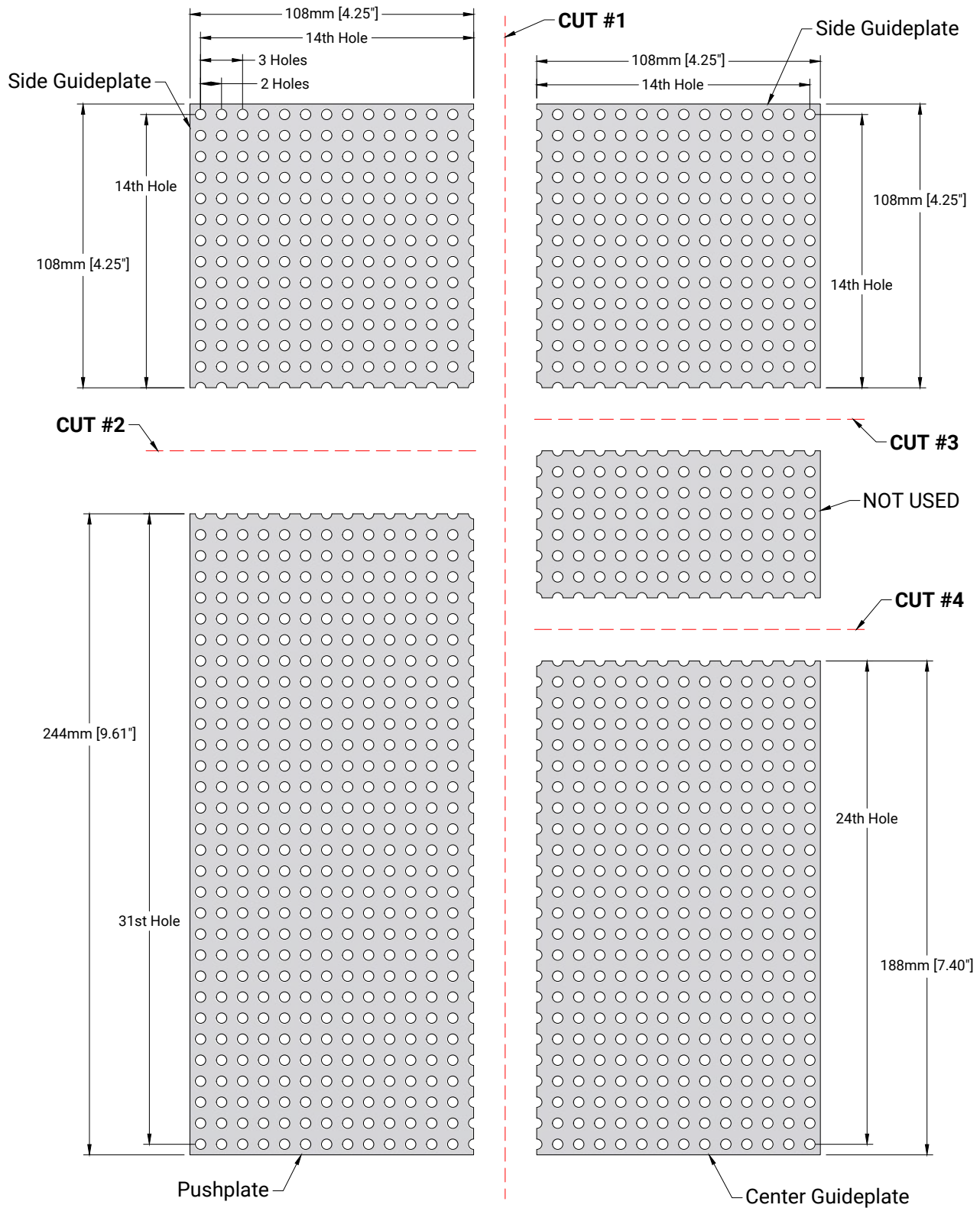
Kit Contents (Cont)



Plastic Gridplate #1 Cutlines



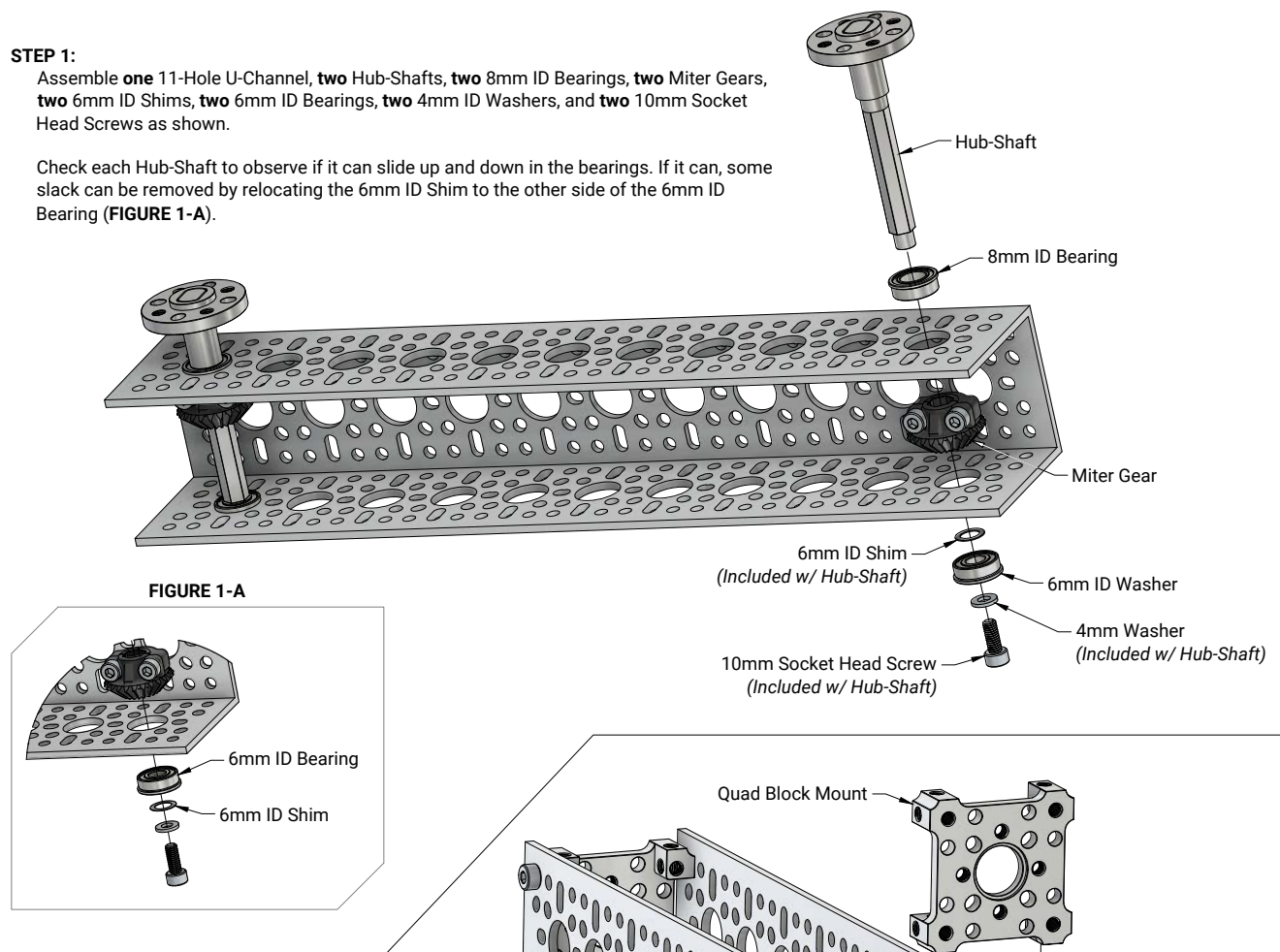
Plastic Gridplate #2 Cutlines



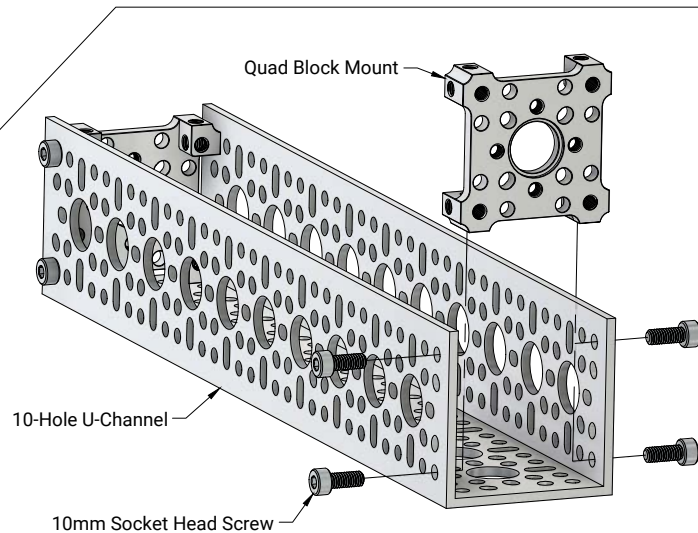
STEP 1:

Assemble **one** 11-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.

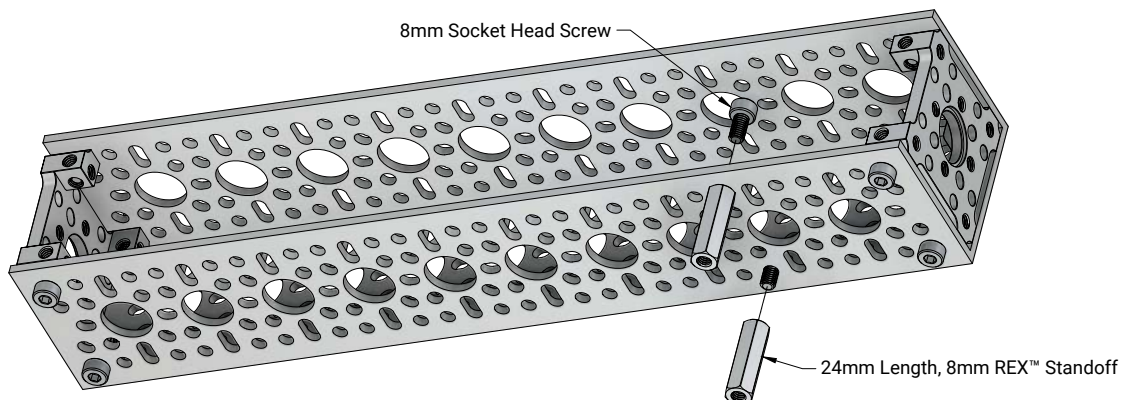
Check each Hub-Shaft to observe if it can slide up and down in the bearings. If it can, some slack can be removed by relocating the 6mm ID Shim to the other side of the 6mm ID Bearing (FIGURE 1-A).

**STEP 2:**

Use **eight** 10mm Socket Head Screws to attach **two** Quad Block Mounts to **one** 10-Hole U-Channel as shown.

**STEP 3:**

Use **two** 8mm Socket Head Screws to attach **two** 24mm Length, 8mm REX™ Standoffs as shown.



STEP 4:

Fasten **two** 1-Hole Low U-Channels using **four** 10mm Socket Head Screws and **four** Locknuts as shown.

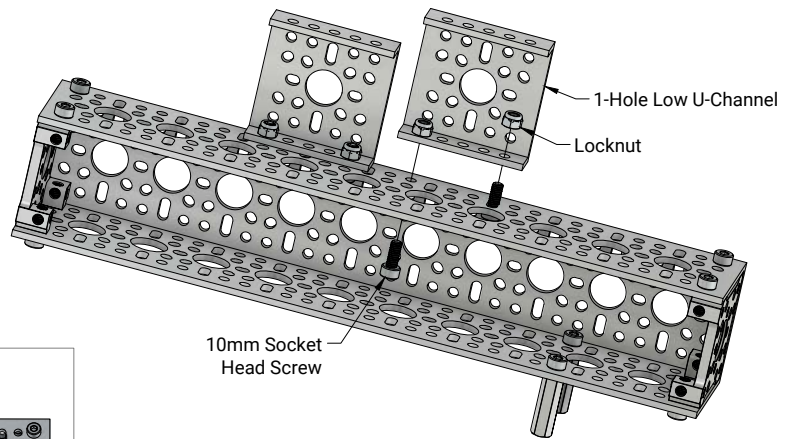
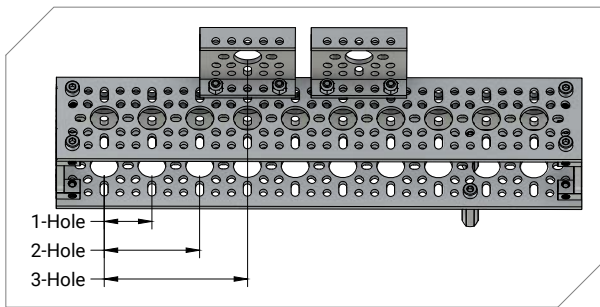
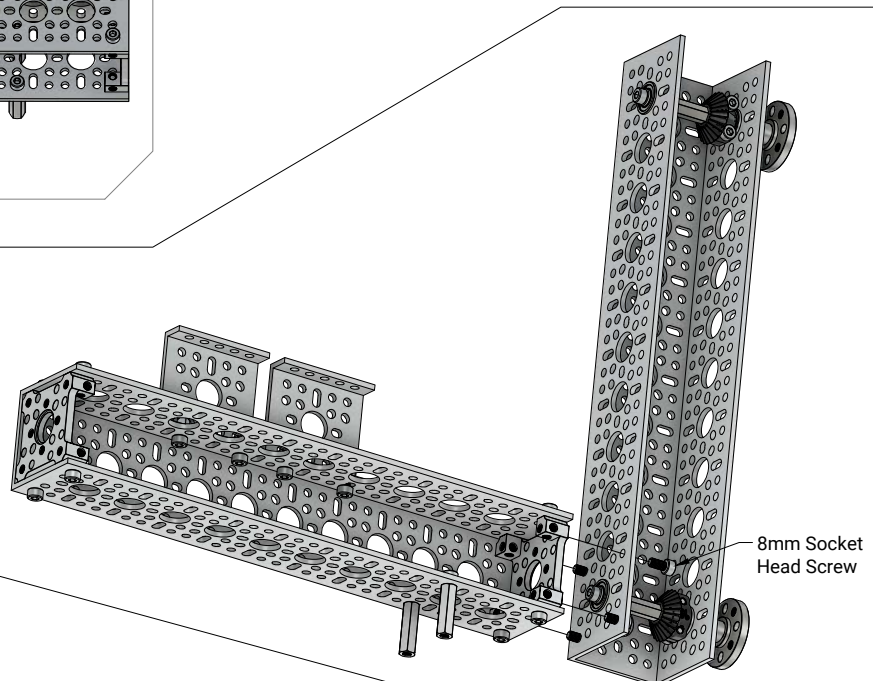


FIGURE 4-A

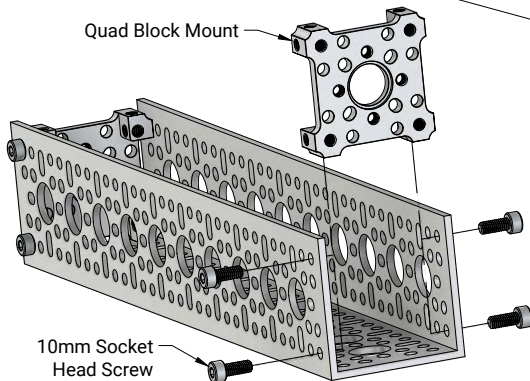


STEP 5:

Combine the subassemblies from **STEP 1** and **STEP 4** using **four** 8mm Socket Head Screws as shown.



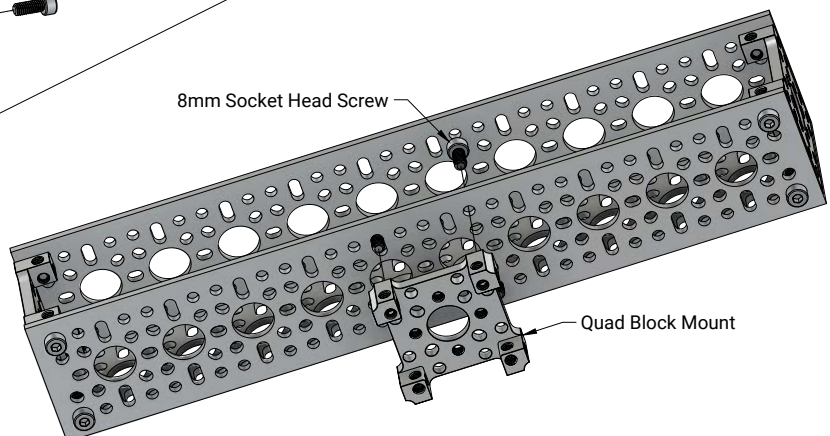
Quad Block Mount



STEP 6:

Use **eight** 10mm Socket Head Screws to attach **two** Quad Block Mounts to **one** 10-Hole U-Channel as shown.

8mm Socket Head Screw

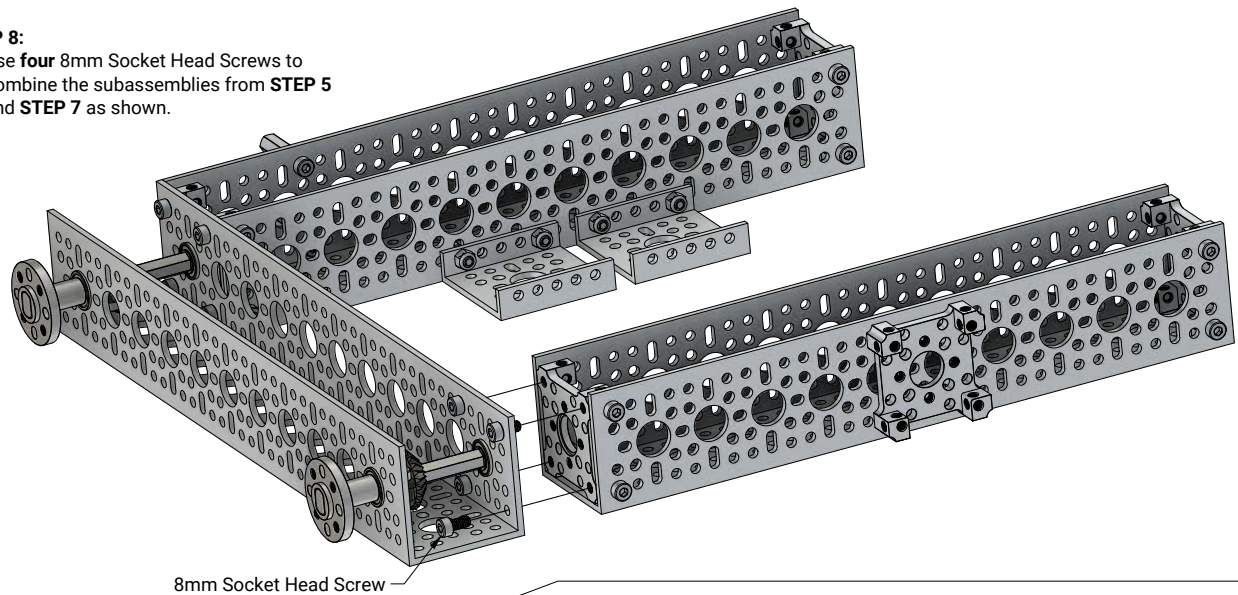


STEP 7:

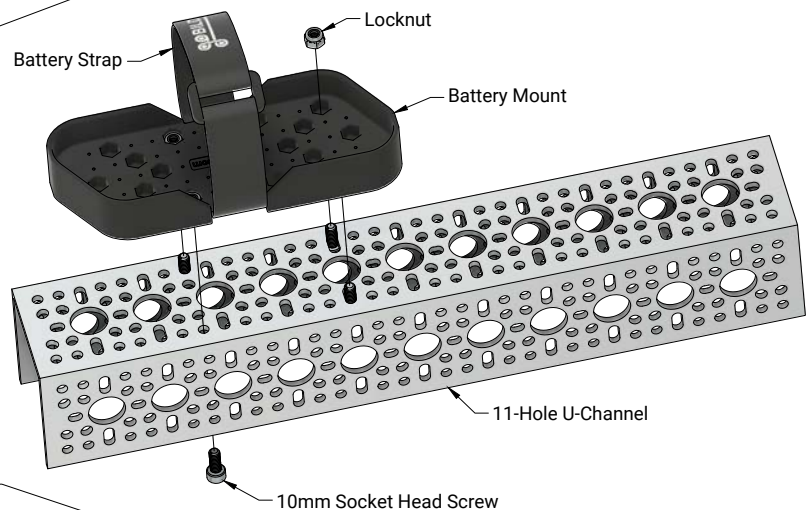
Use **four** 8mm Socket Head Screws to attach **one** Quad Block Mount as shown. Note the location. When positioned correctly, the large hole of the Quad Block Mount with *not* align with the large holes of the 10-Hole U-Channel.

STEP 8:

Use **four** 8mm Socket Head Screws to combine the subassemblies from **STEP 5** and **STEP 7** as shown.

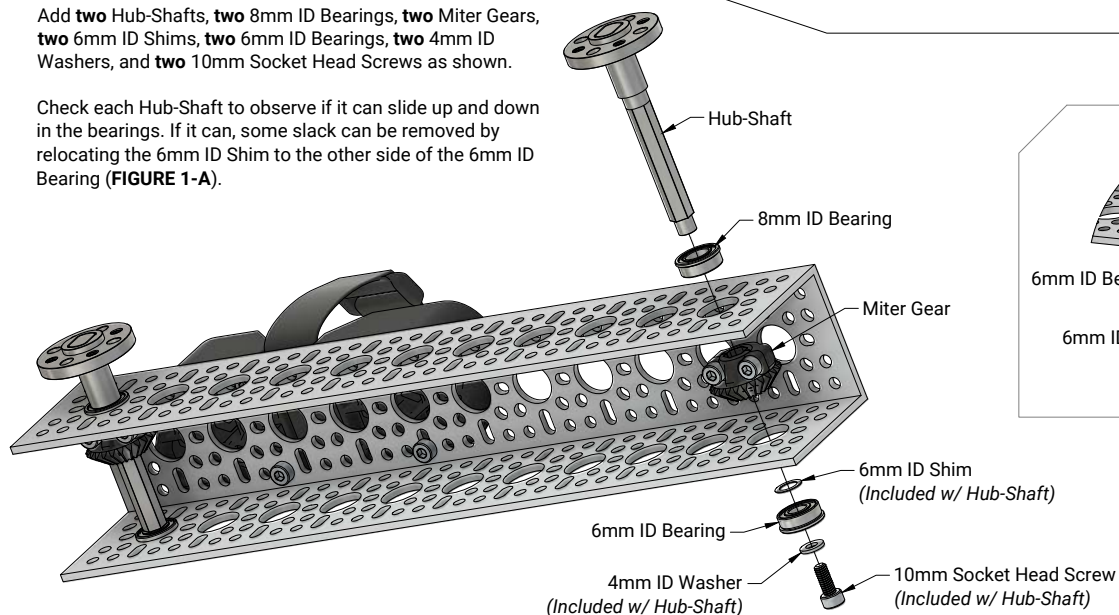
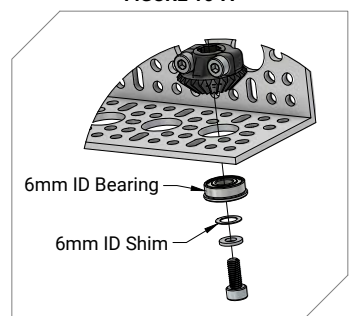
**STEP 9:**

Use **four** 10mm Socket Head Screws and **four** Locknuts to fasten **one** Battery Mount and **one** Battery Strap to **one** 11-Hole U-Channel as shown. Note the screw locations.

**STEP 10:**

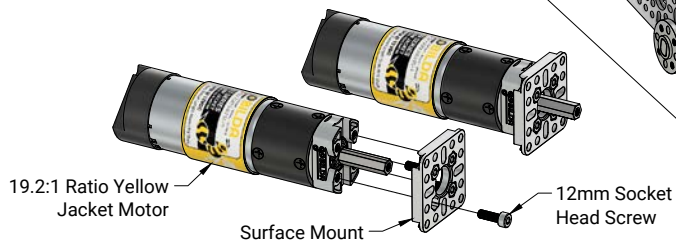
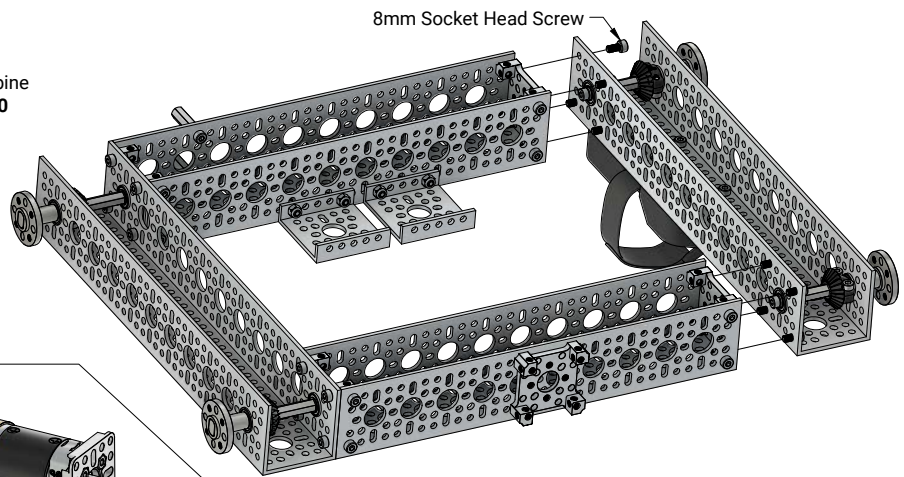
Add **two** Hub-Shafts, **two** 8mm ID Bearings, **two** Miter Gears, **two** 6mm ID Shims, **two** 6mm ID Bearings, **two** 4mm ID Washers, and **two** 10mm Socket Head Screws as shown.

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 10-A**

STEP 11:

Use **eight** 8mm Socket Head Screws to combine the subassemblies from **STEP 8** and **STEP 10** as shown.



STEP 12:

Assemble **two** 19.2:1 Ratio Yellow Jacket Motors and **two** Surface Mounts with **eight** 12mm Socket Head Screws as shown.

STEP 13:

Combine the subassemblies from **STEP 12** and **STEP 13** using **four** 10mm Socket Head Screws, **four** 14mm Socket Head Screws, and **eight** Locknuts while installing **two** 12mm Length, 8mm ID Spacers and **two** Miter Gears as shown. Note the locations of the different screws (**FIGURE 13-A**).

Take note of the gear mesh. It is recommended to ensure the gears are "in-phase" (**FIGURE 12-B**), as opposed to "out-of-phase" (**FIGURE 12-C**). 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 13-A

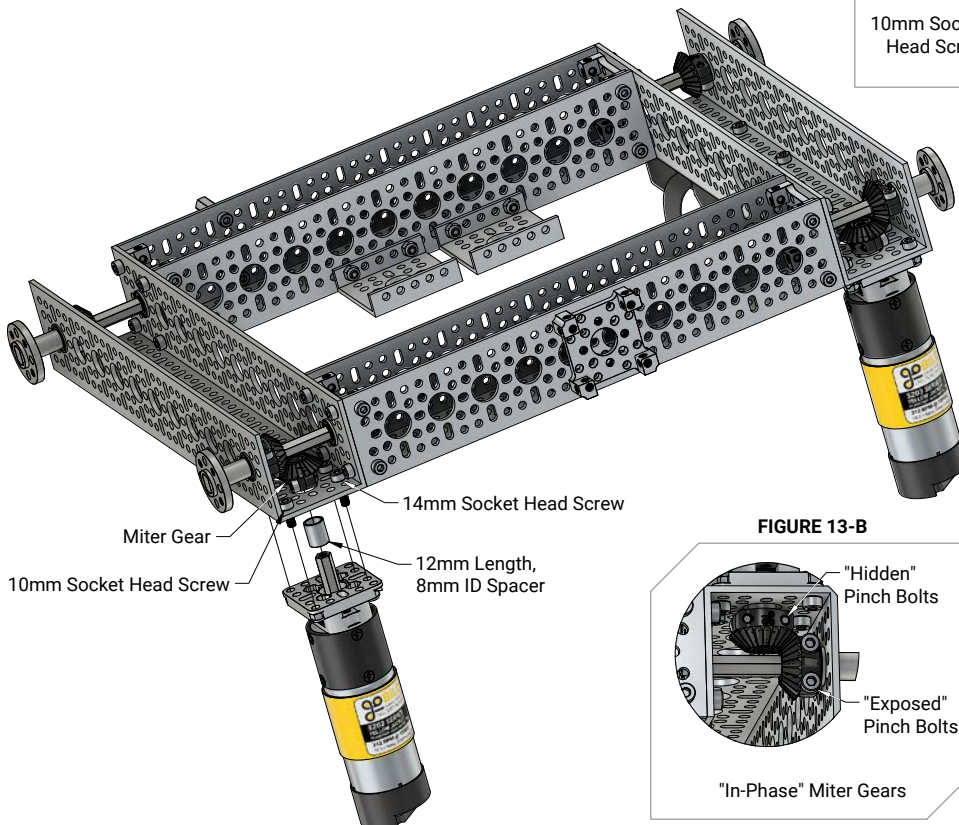
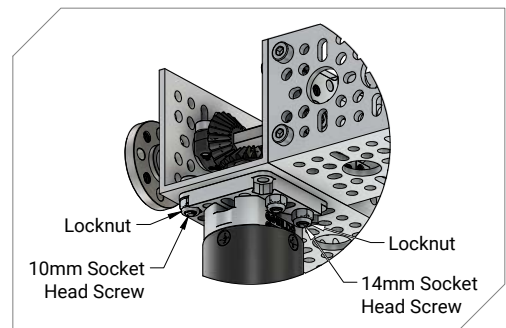


FIGURE 13-B

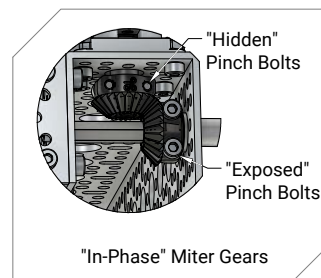
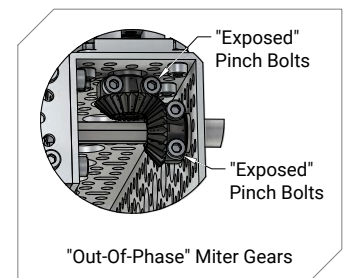
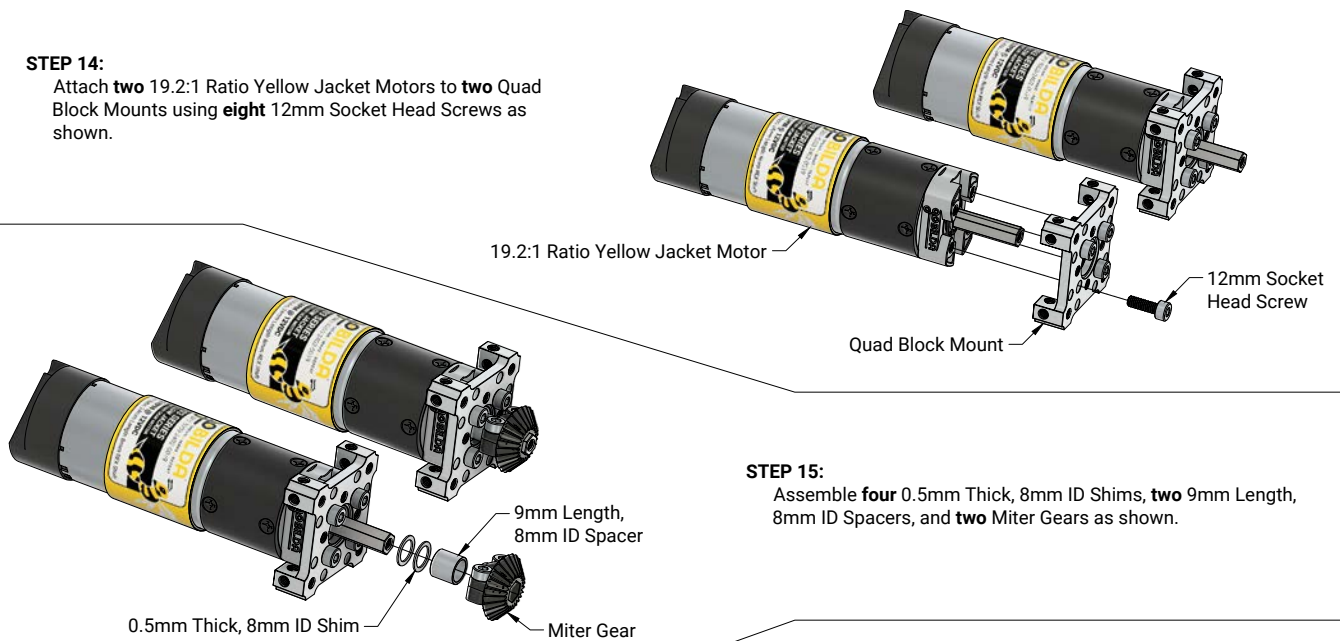


FIGURE 13-C



STEP 14:

Attach **two** 19.2:1 Ratio Yellow Jacket Motors to **two** Quad Block Mounts using **eight** 12mm Socket Head Screws as shown.



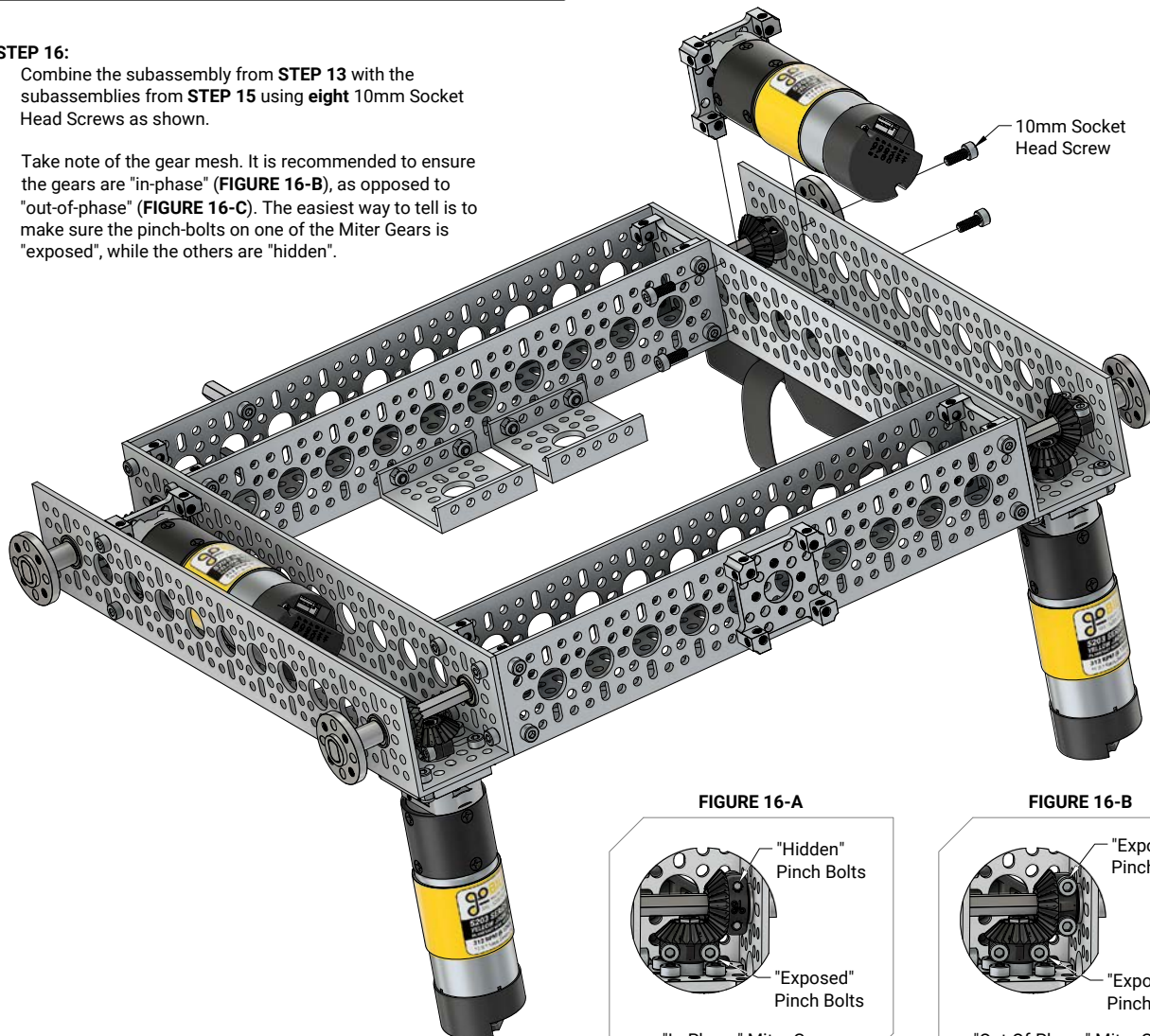
STEP 15:

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

STEP 16:

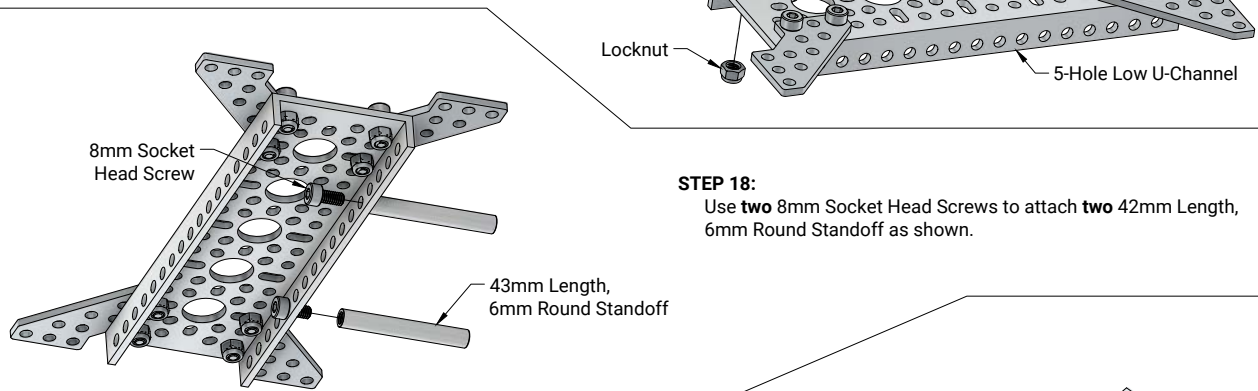
Combine the subassembly from **STEP 13** with the subassemblies from **STEP 15** using **eight** 10mm Socket Head Screws as shown.

Take note of the gear mesh. It is recommended to ensure the gears are "in-phase" (**FIGURE 16-B**), as opposed to "out-of-phase" (**FIGURE 16-C**). 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".



STEP 17:

Assemble **one** 5-Hole Low U-Channel and **four** 90° Gussets using **eight** 10mm Socket Head Screws and **eight** Locknuts as shown. Leave these screws slightly loose.

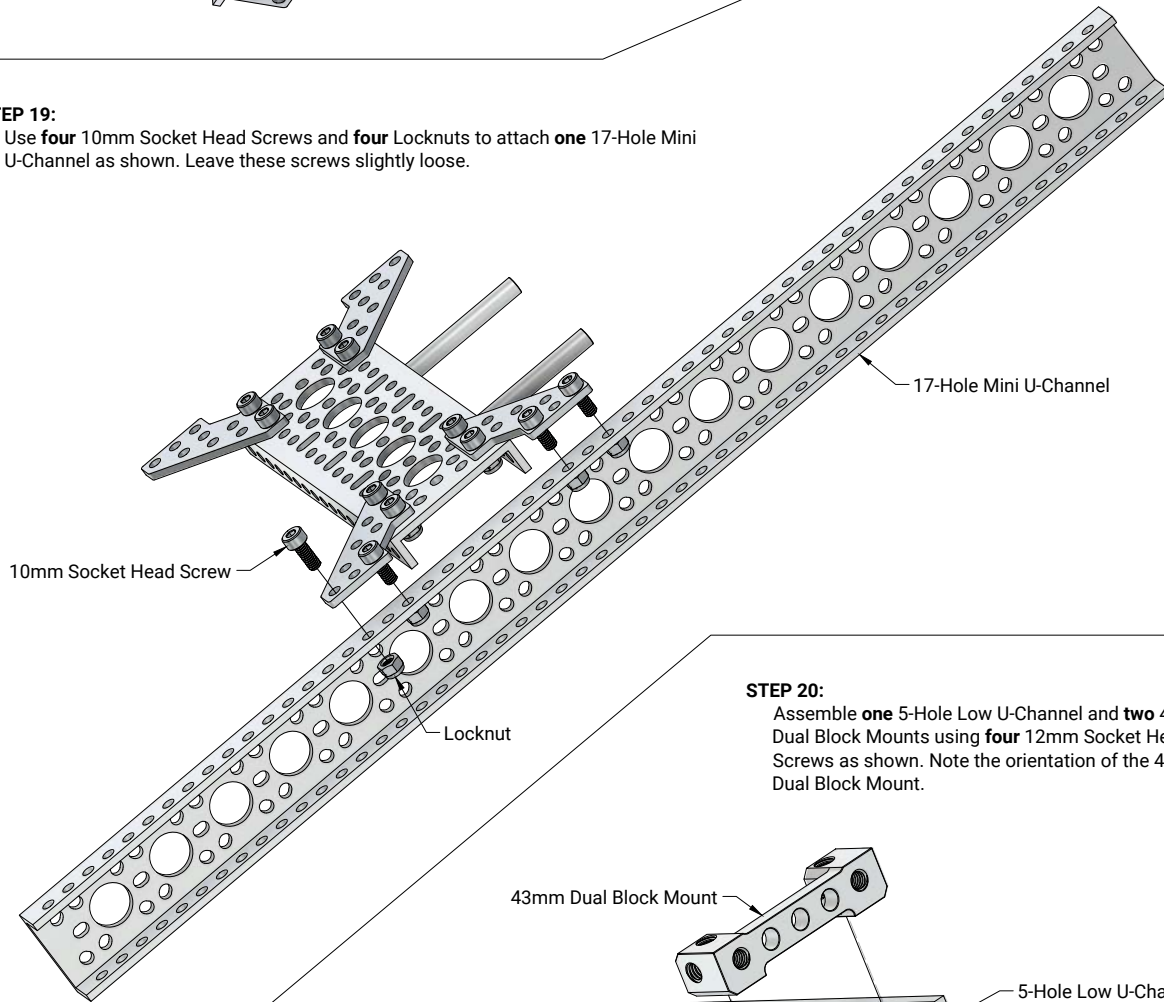


STEP 18:

Use **two** 8mm Socket Head Screws to attach **two** 42mm Length, 6mm Round Standoff as shown.

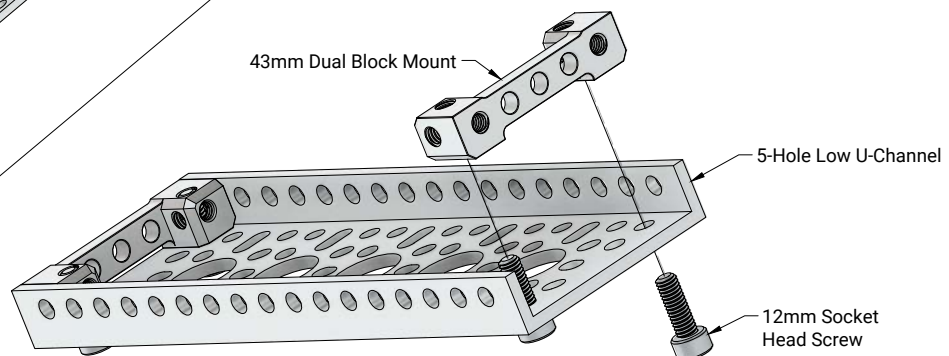
STEP 19:

Use **four** 10mm Socket Head Screws and **four** Locknuts to attach **one** 17-Hole Mini U-Channel as shown. Leave these screws slightly loose.



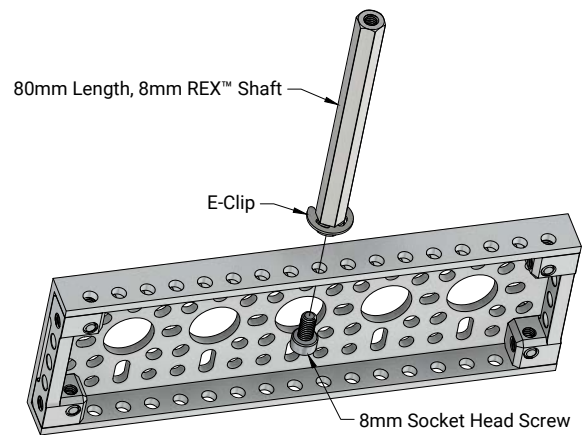
STEP 20:

Assemble **one** 5-Hole Low U-Channel and **two** 43mm Dual Block Mounts using **four** 12mm Socket Head Screws as shown. Note the orientation of the 43mm Dual Block Mount.



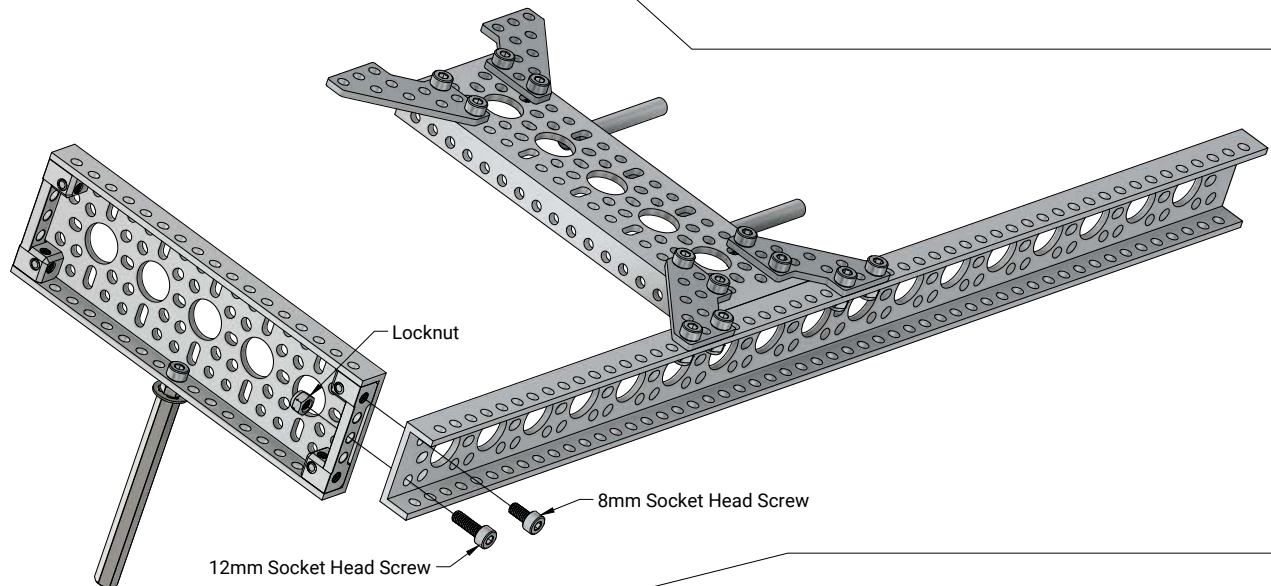
STEP 21:

Use **one** 8mm Socket Head Screw to attach **one** 80mm Length, 8mm REX™ Shaft as shown. Note the location of the E-Clip.



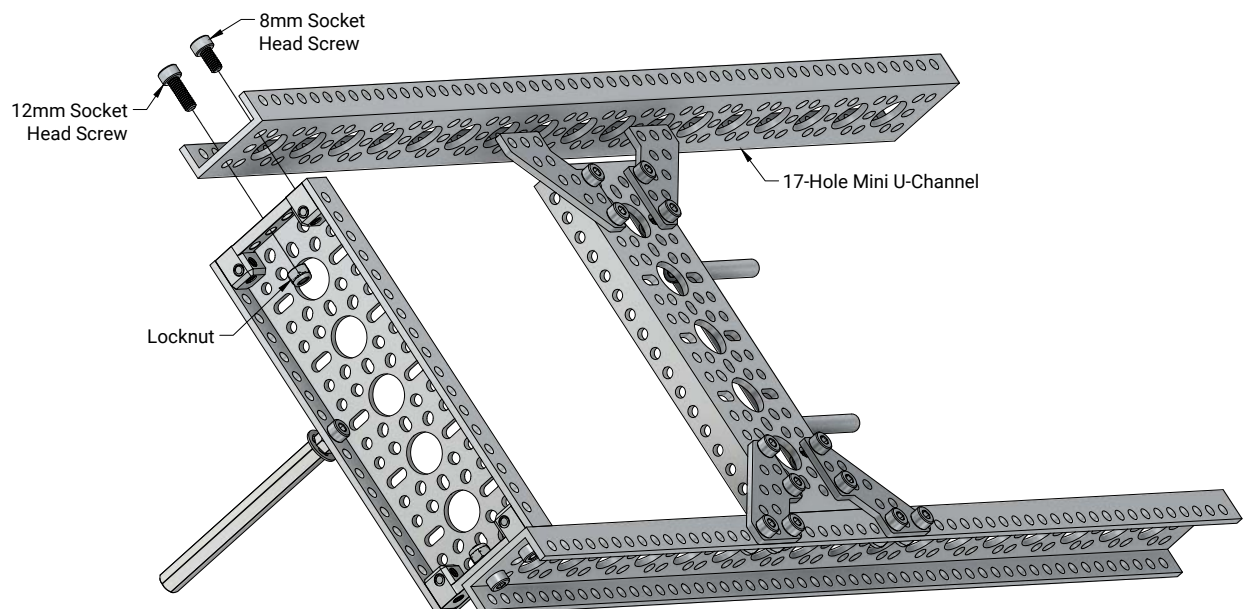
STEP 22:

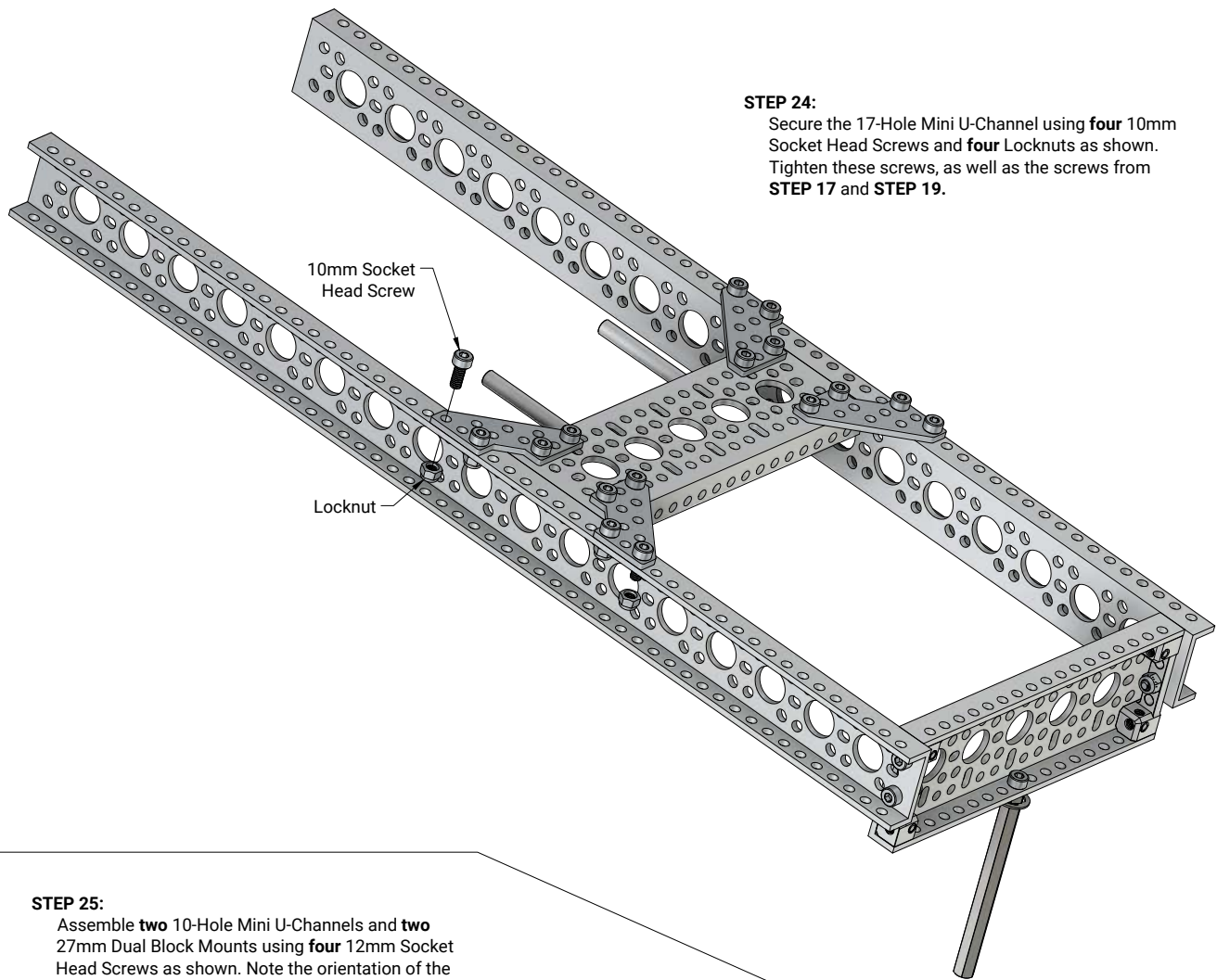
Use **one** 8mm Socket Head Screw, **one** 12mm Socket Head Screw, and **one** Locknut to attach the assembly from **STEP 19** as shown.



STEP 23:

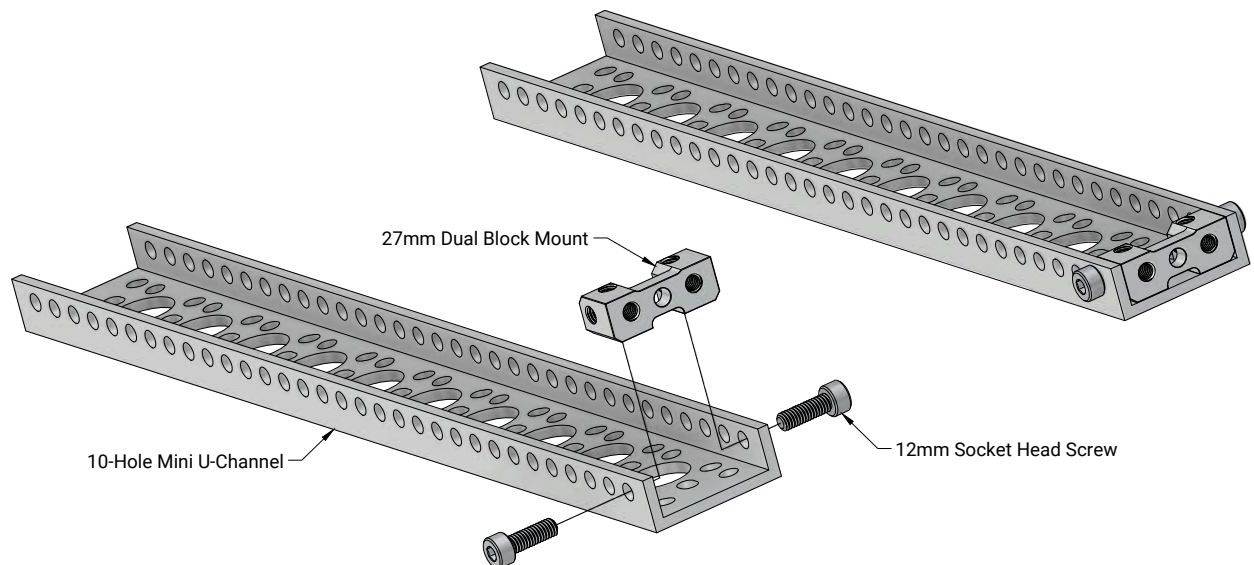
Fasten **one** 17-Hole Mini U-Channel as shown using **one** 8mm Socket Head Screw, **one** 12mm Socket Head Screw, and **one** Locknut.





STEP 25:

Assemble **two** 10-Hole Mini U-Channels and **two** 27mm Dual Block Mounts using **four** 12mm Socket Head Screws as shown. Note the orientation of the 27mm Dual Block Mount.



STEP 26:

Use **four** 8mm Socket Head Screws to combine the subassemblies from **STEP 24** and **STEP 25** as shown. Note the mounting locations (**FIGURE 26-A**).

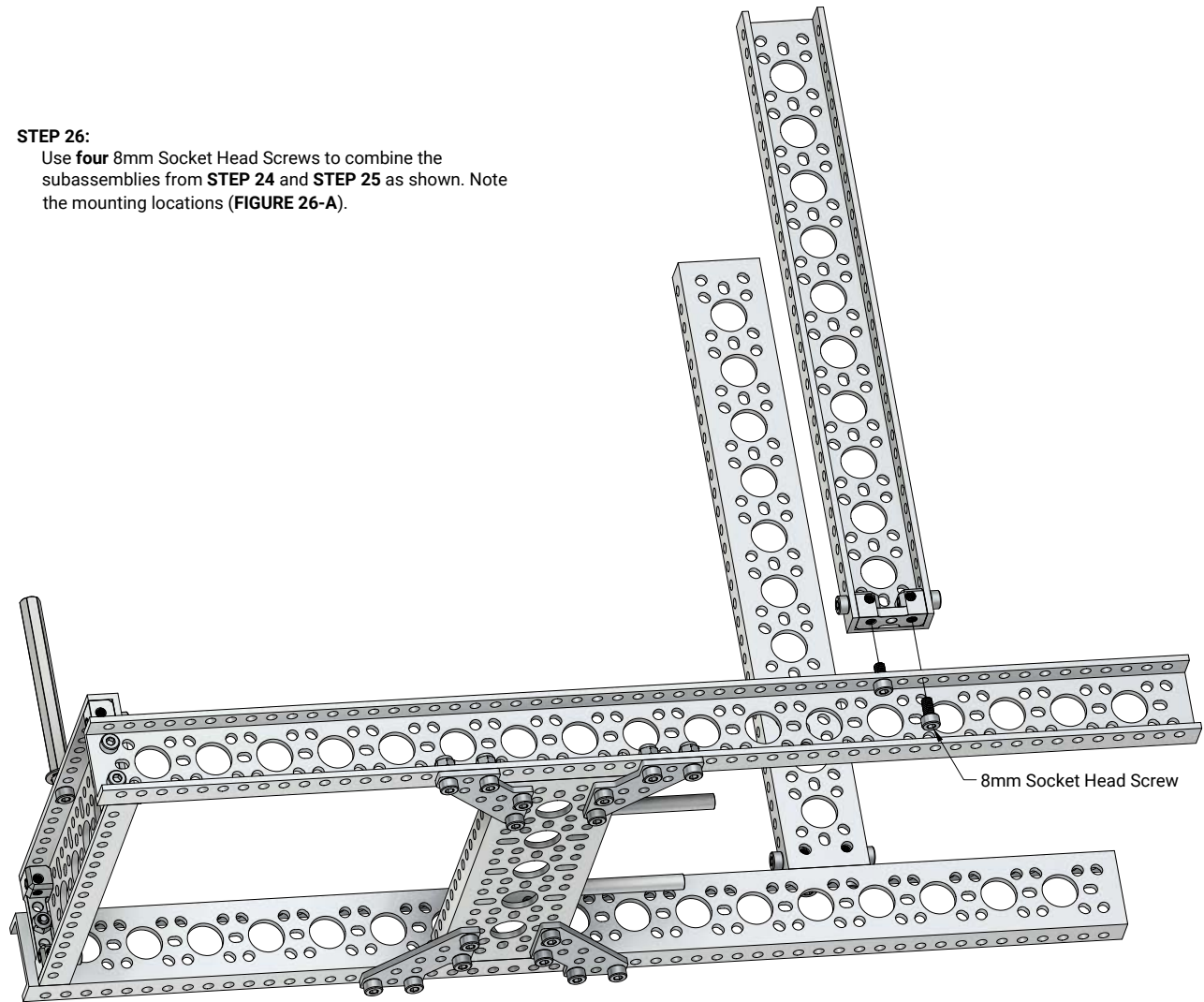
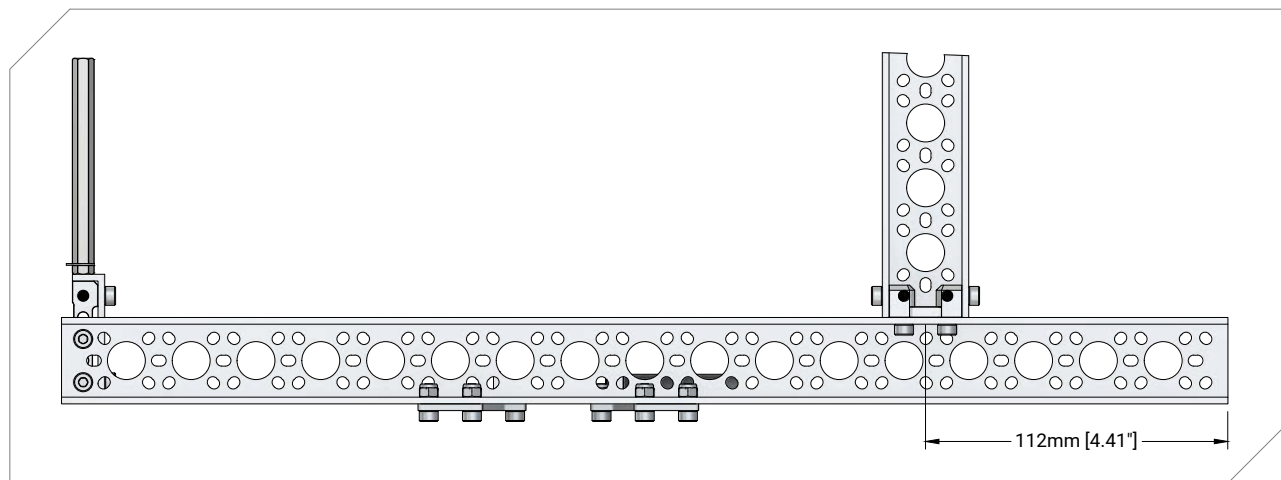
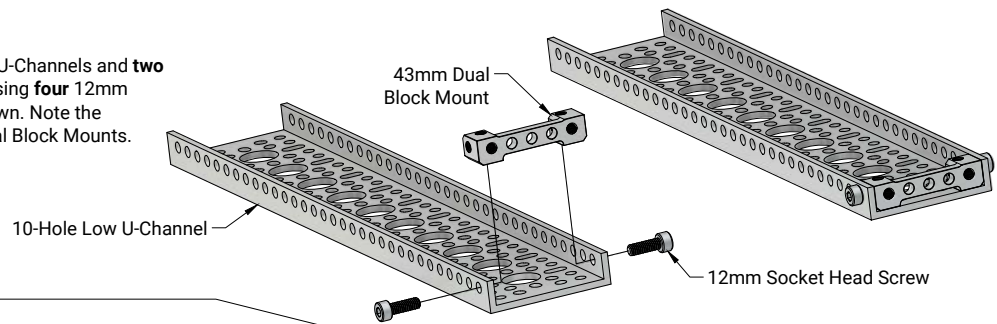


FIGURE 26-A



STEP 27:

Assemble **two** 10-Hole Low U-Channels and **two** 43mm Dual Block Mounts using **four** 12mm Socket Head Screws as shown. Note the orientation of the 43mm Dual Block Mounts.



STEP 28:

Use **four** 8mm Socket Head Screws to combine the subassemblies from **STEP 26** and **STEP 27** as shown. Note the different mounting locations (**FIGURE 28-A**).

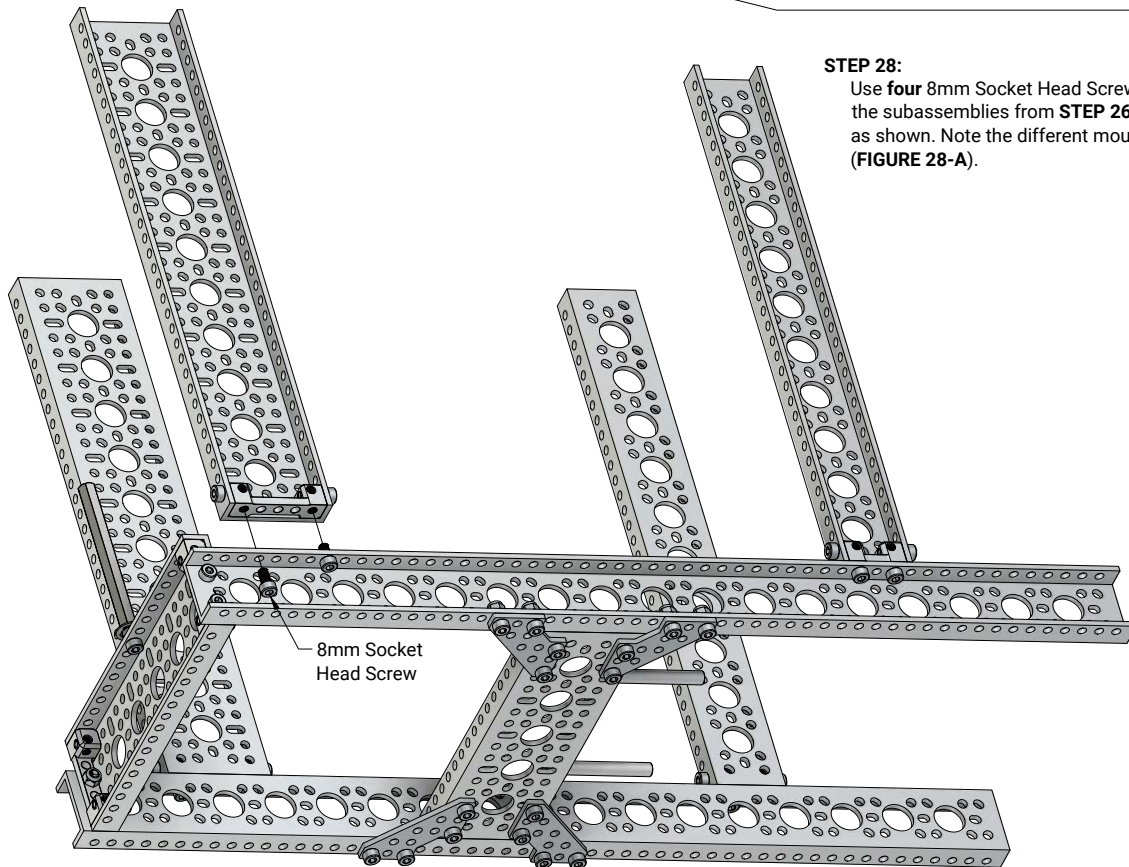
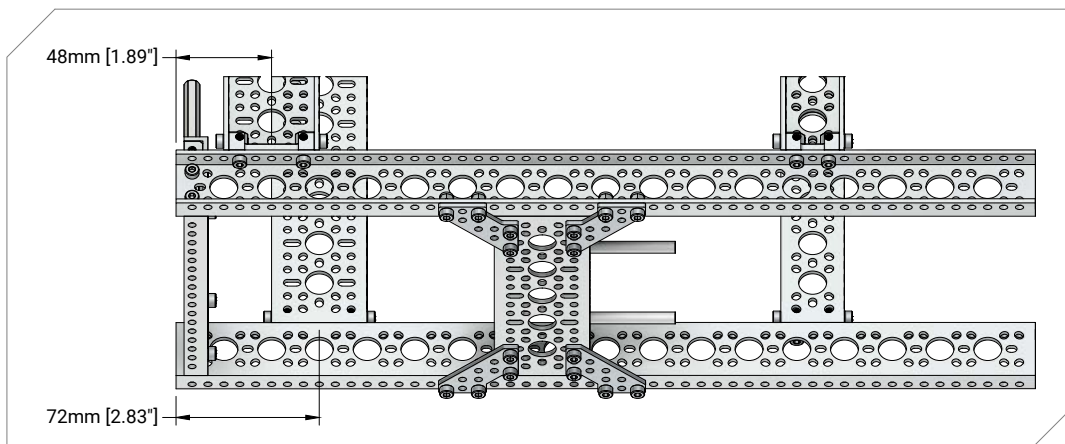
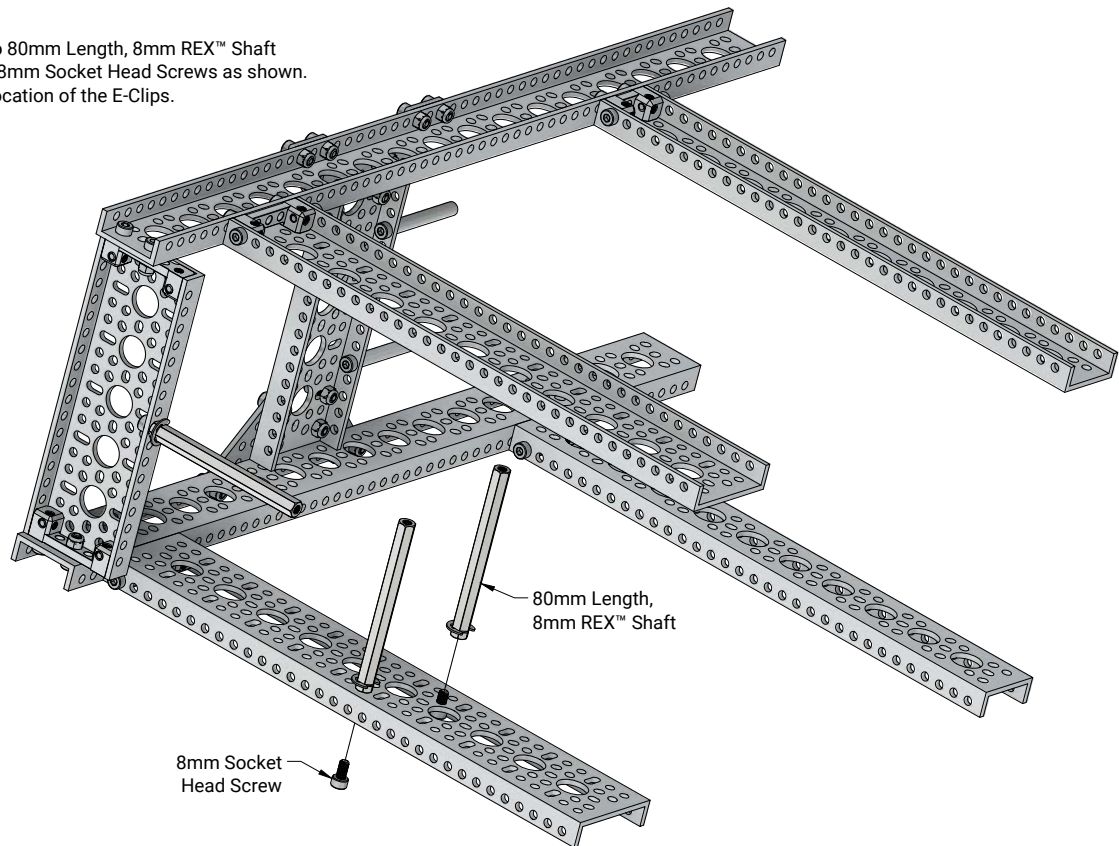


FIGURE 28-A



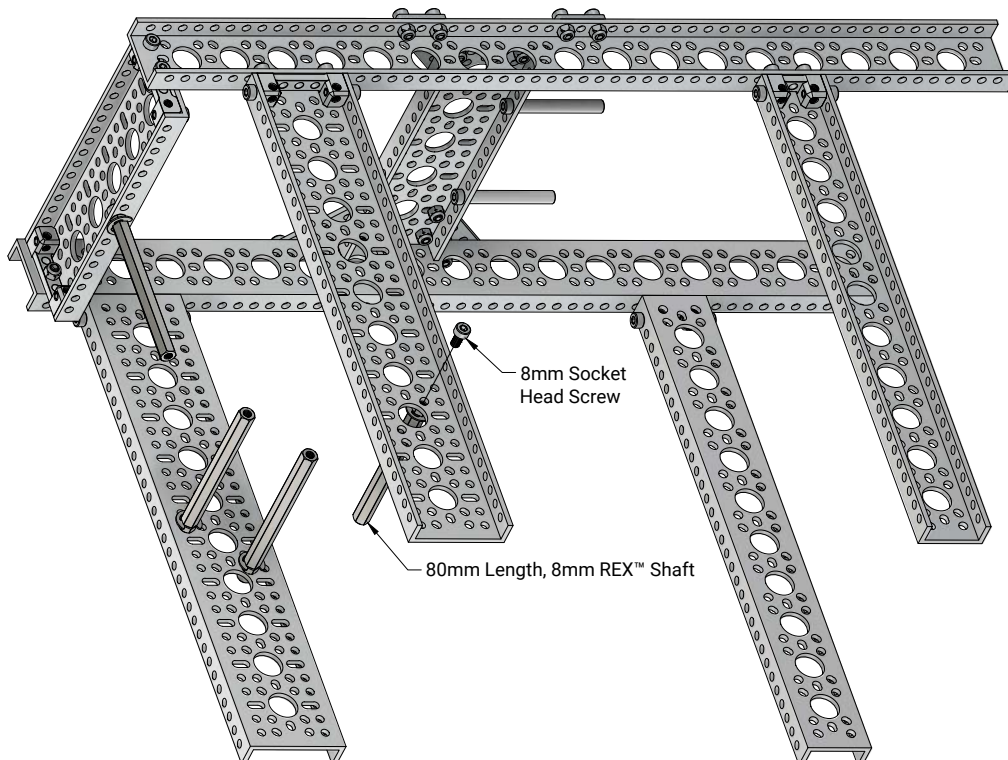
STEP 29:

Attach **two** 80mm Length, 8mm REX™ Shaft using **two** 8mm Socket Head Screws as shown. Note the location of the E-Clips.



STEP 30:

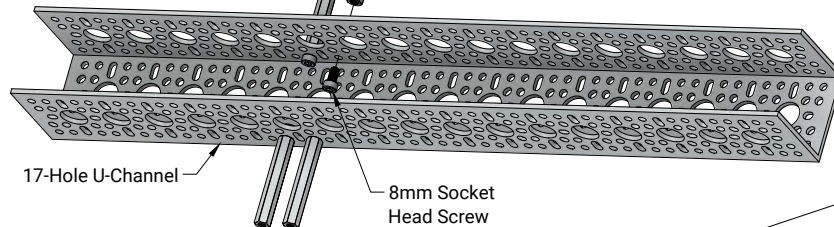
Fasten **one** 80mm Length, 8mm REX™ Shaft using **one** 8mm Socket Head Screw as shown. Note the location of the E-Clip.



48mm Length, 8mm REX™ Standoff

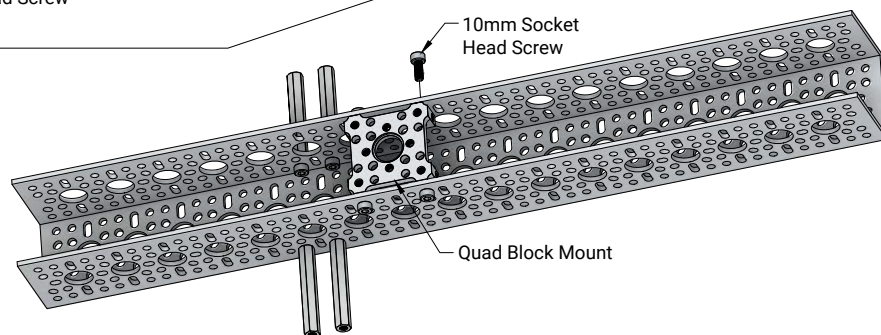
STEP 31:

Mount **four** 48mm Length, 8mm REX™ Standoffs to **one** 17-Hole U-Channel using **four** 8mm Socket Head Screws as shown.



STEP 32:

Use **four** 10mm Socket Head Screws to attach **one** Quad Block Mount as shown.



Locknut

Washer

10mm Socket Head Screw

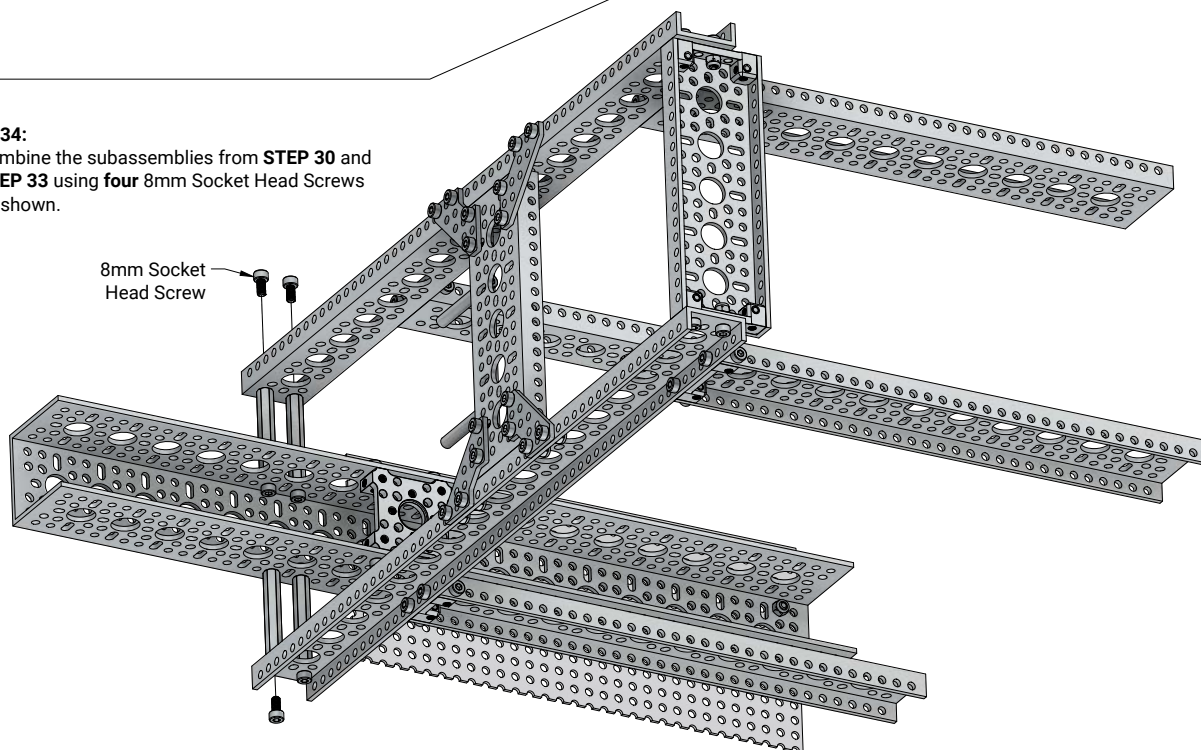
Pushplate

STEP 33:

Attach **one** Pushplate using **four** 10mm Socket Head Screws, **four** Washers, and **four** Locknuts as shown.

STEP 34:

Combine the subassemblies from **STEP 30** and **STEP 33** using **four** 8mm Socket Head Screws as shown.



STEP 35:

Combine the subassemblies from **STEP 16** and **STEP 34**:

Use **four** 10mm Socket Head Screws as shown in **FIGURE 35A**. Note that the 17-Hole U-Channel will *not* align with the bottom of the 10-Hole U-Channel when installed correctly.

Use **four** 10mm Socket Head Screws and **four** Locknuts as shown in **FIGURE 35B**.

Use **two** 8mm Socket Head Screws as shown in **FIGURE 35C**.

Use **two** 10mm Socket Head Screws and **two** Locknuts as shown in **FIGURE 35D**.

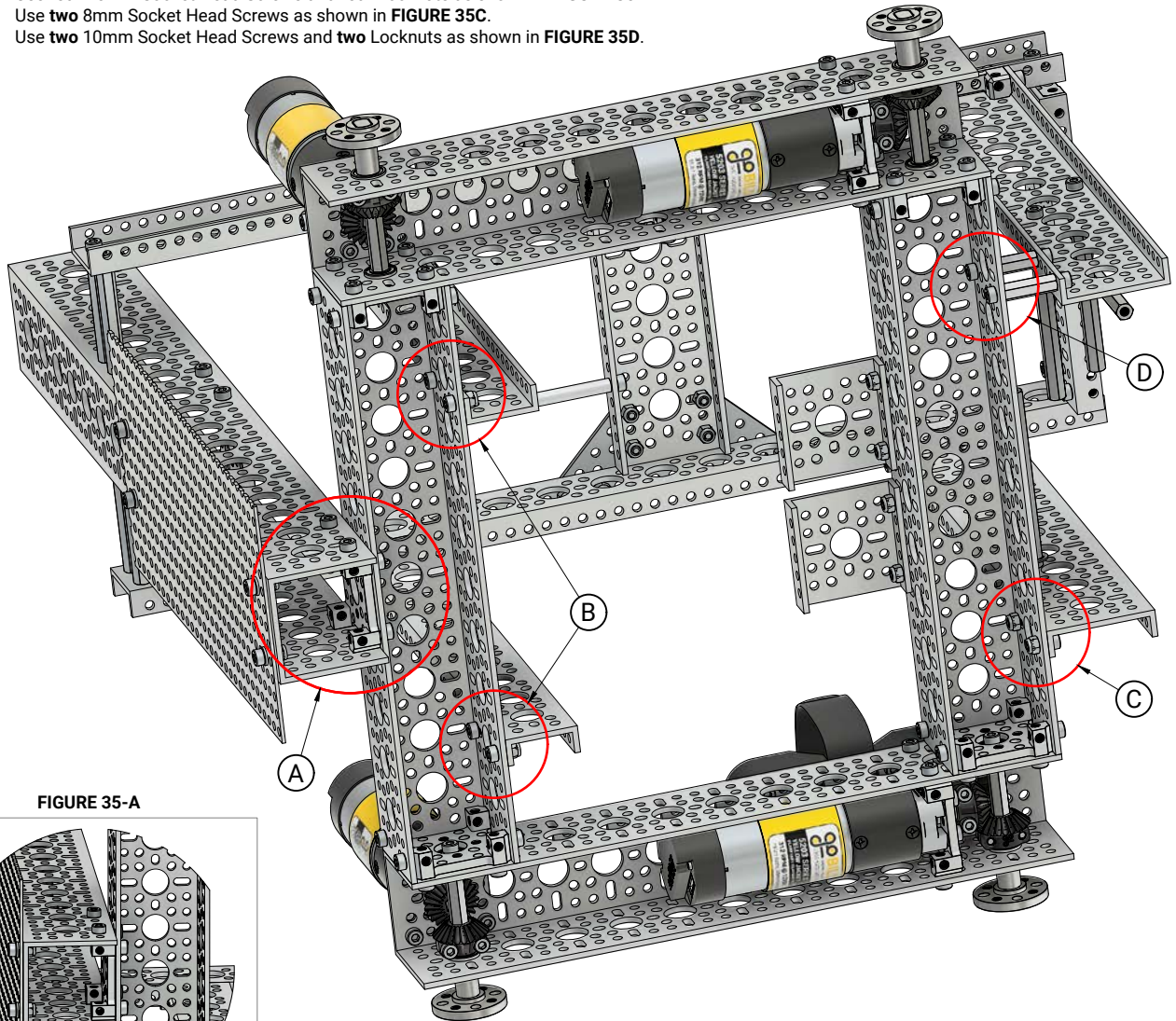


FIGURE 35-A

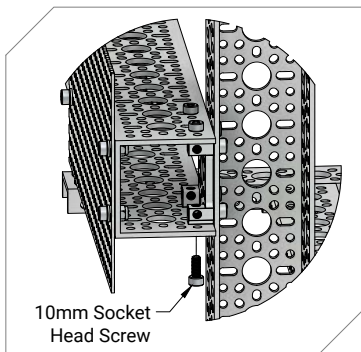


FIGURE 35-B

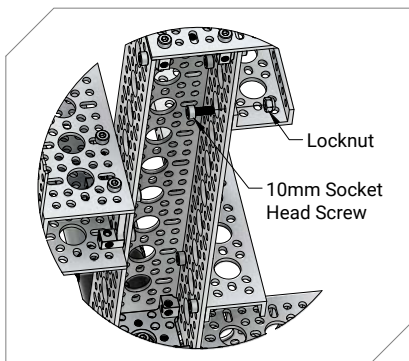


FIGURE 35-C

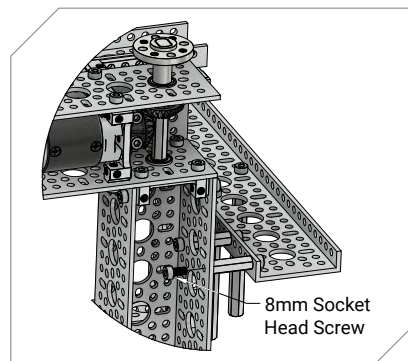
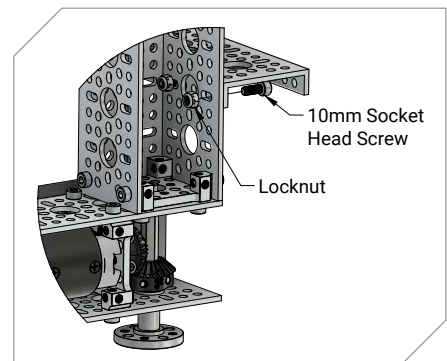


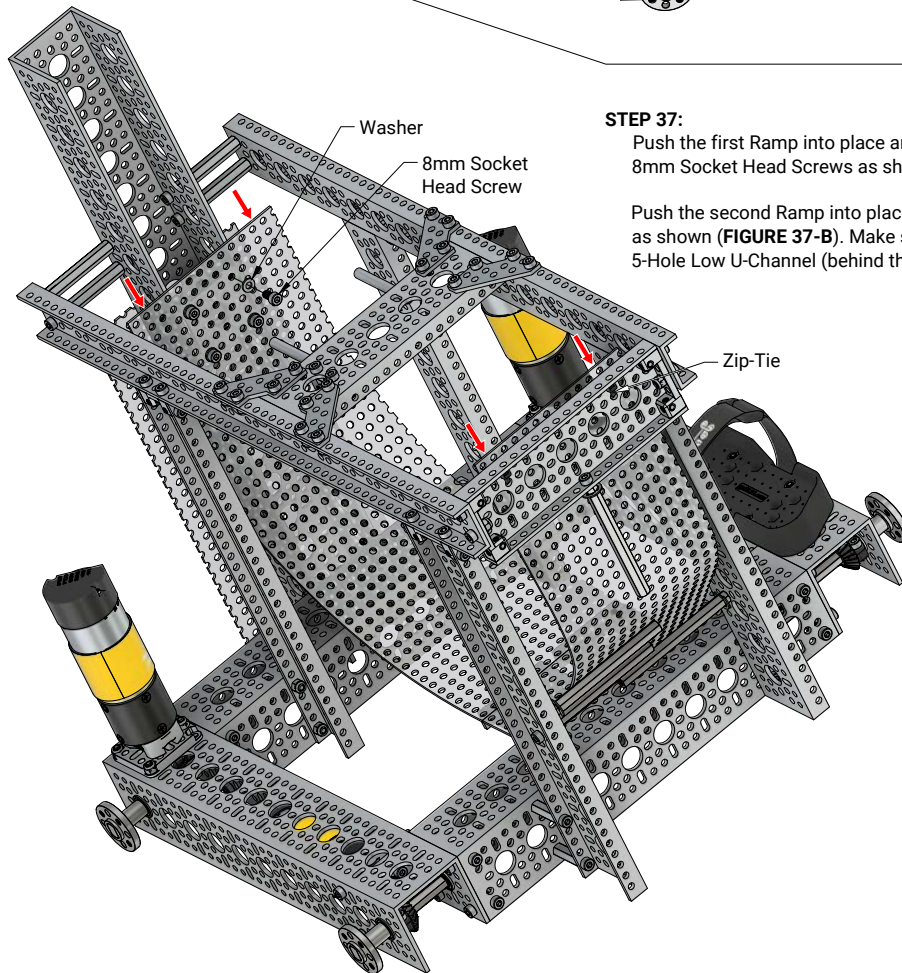
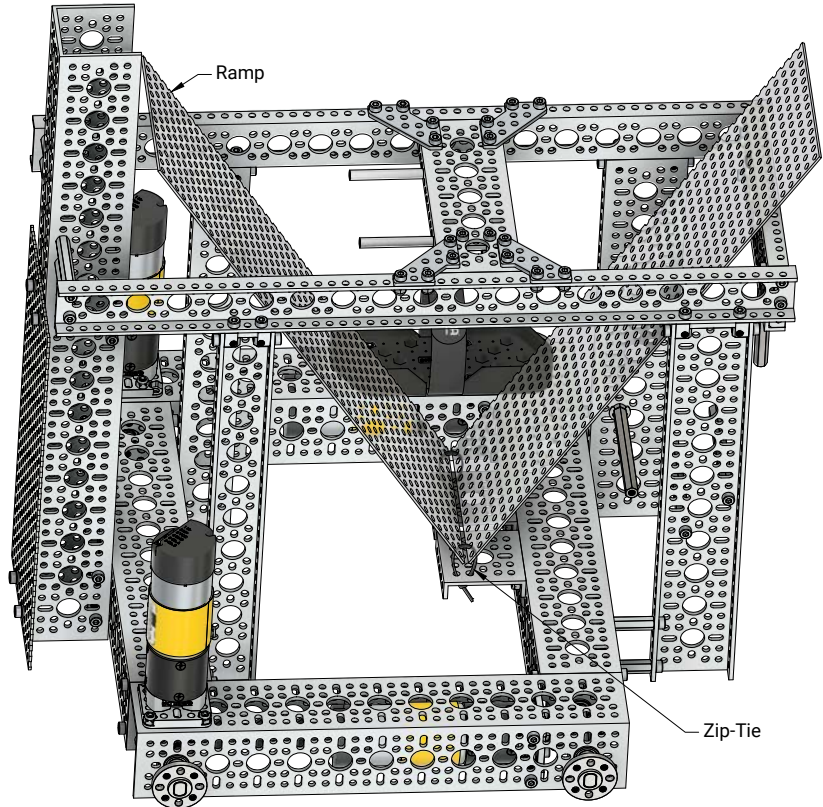
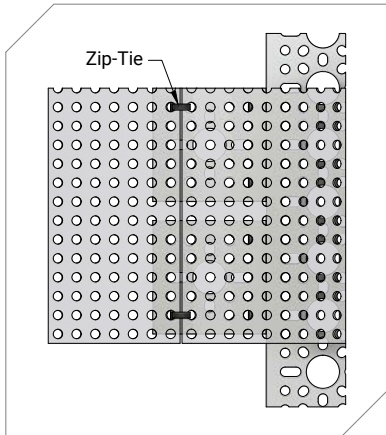
FIGURE 35-D



STEP 36:

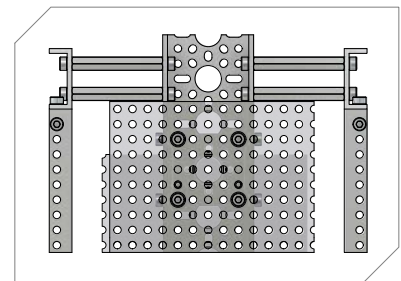
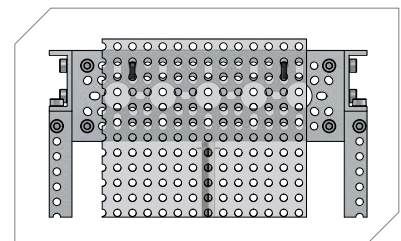
Use **two** Zip-Ties to fasten **two** Ramps in place as shown.

Make sure the "heads" of the Zip-Ties are below the 1-Hole Low U-Channel and that the Ramps both bend into position and lie flat against the 1-Hole Low U-Channels (**FIGURE 36-A**).

FIGURE 36-A**STEP 37:**

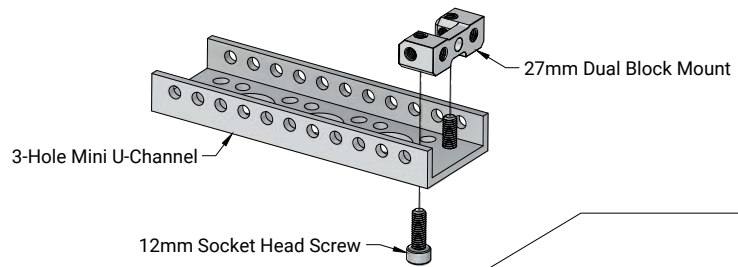
Push the first Ramp into place and fix in place using **four** Washers and **four** 8mm Socket Head Screws as shown. (**FIGURE 37-A**).

Push the second Ramp into place and fasten in position using **two** Zip-Ties as shown (**FIGURE 37-B**). Make sure the heads of the Zip-Ties are within the 5-Hole Low U-Channel (behind the ramp).

FIGURE 37-A**FIGURE 37-B**

STEP 38:

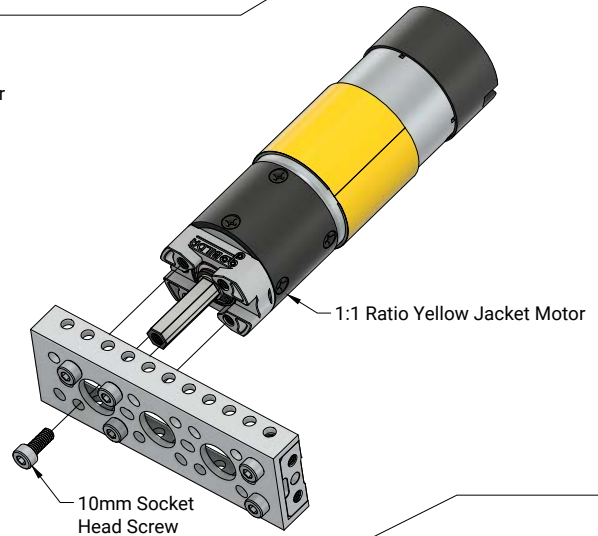
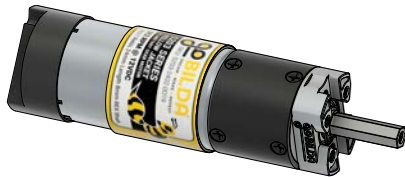
Attach **one** 27mm Dual Block Mount to **one** 3-Hole Mini U-Channel as shown using **two** 12mm Socket Head Screws. Note the orientation of the 27mm Dual Block Mount.

**STEP 39:**

Convert **one** 19.2:1 Ratio Yellow Jacket Motor to a 1:1 Ratio Yellow Jacket Motor using **one** 1:1 Coupler (**FIGURE 39-A**). Attach the 1:1 Ratio Yellow Jacket Motor using **four** 10mm Socket Head Screws as shown.

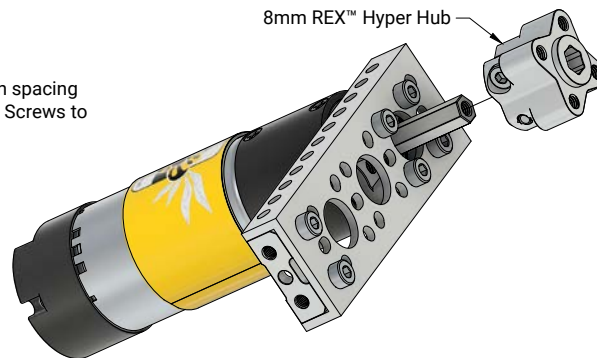
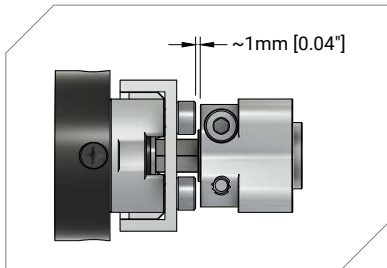
FIGURE 39-A

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>

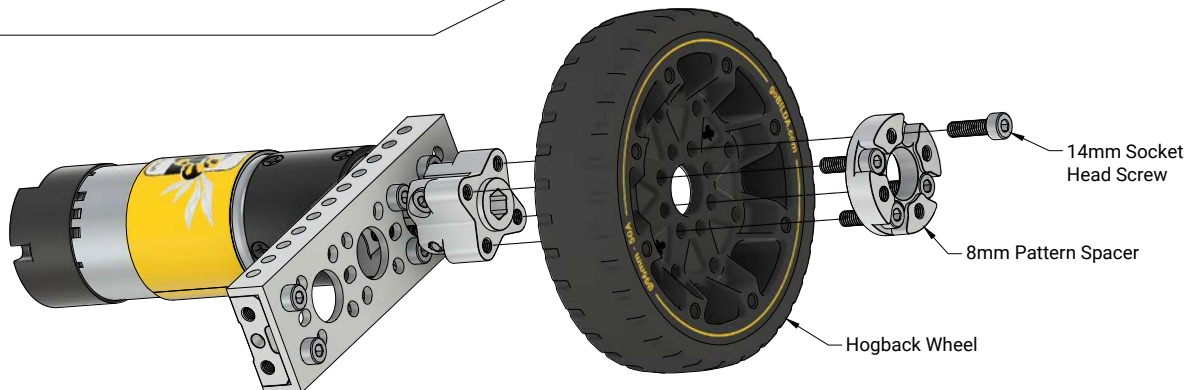
**STEP 40:**

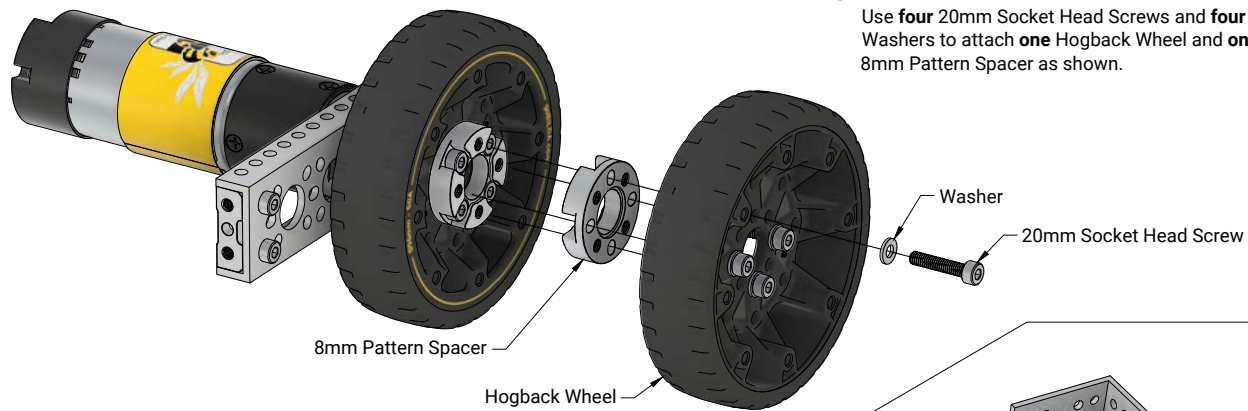
Attach **one** 8mm REX™ Hyper Hub as shown.

A credit card is approximately 1mm thick and can be helpful in spacing the 8mm REX™ Hyper Hub away from the 10mm Socket Head Screws to achieve proper alignment.

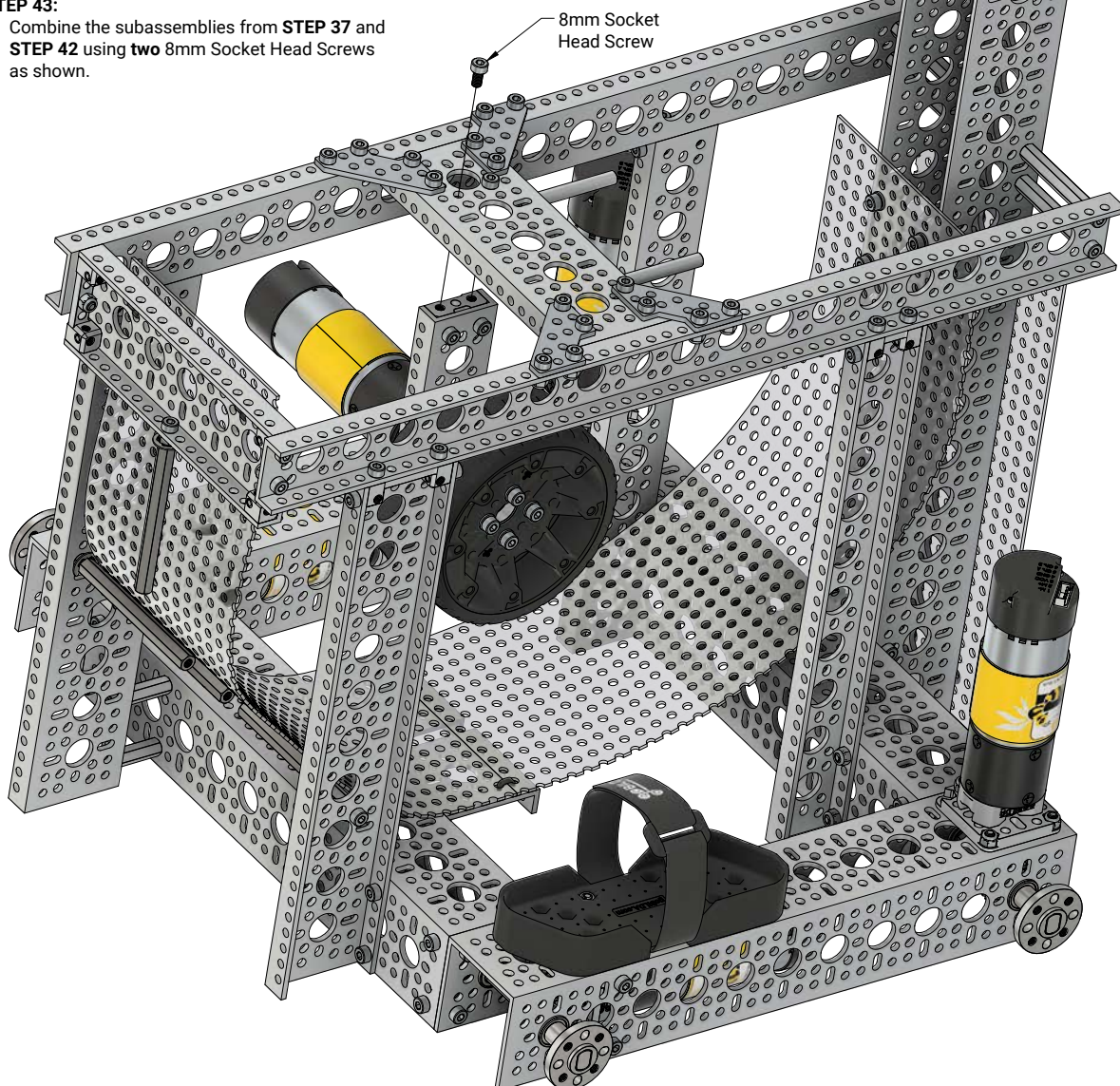
FIGURE 40-A**STEP 41:**

Attach **one** Hogback Wheel and **one** 8mm Pattern Spacer using **four** 14mm Socket Head Screws as shown.



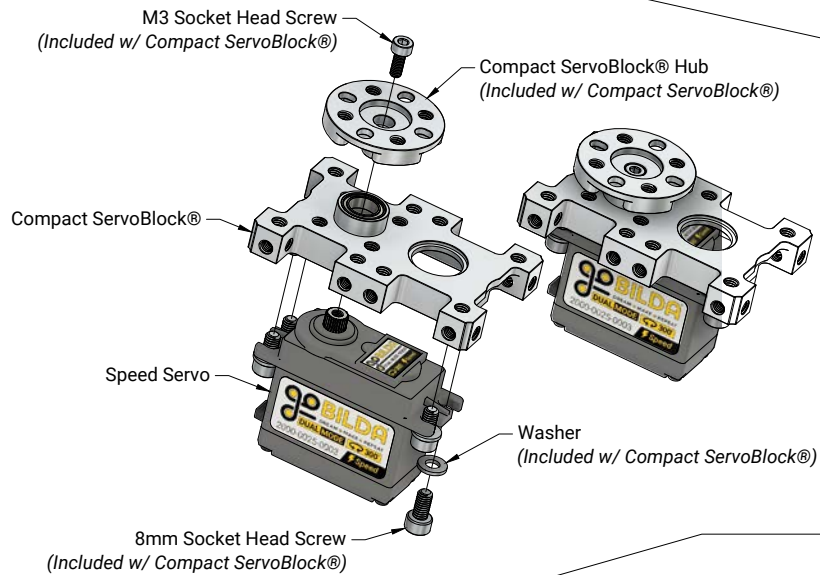
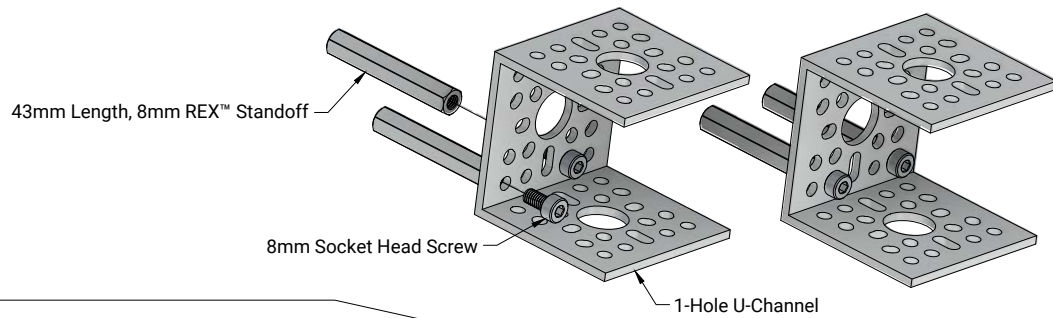


STEP 43:
Combine the subassemblies from **STEP 37** and **STEP 42** using **two** 8mm Socket Head Screws as shown.



STEP 44:

Assemble **two** 1-Hole U-Channels and **four** 43mm Length, 8mm REX™ Standoffs as shown using **four** 8mm Socket Head Screws.

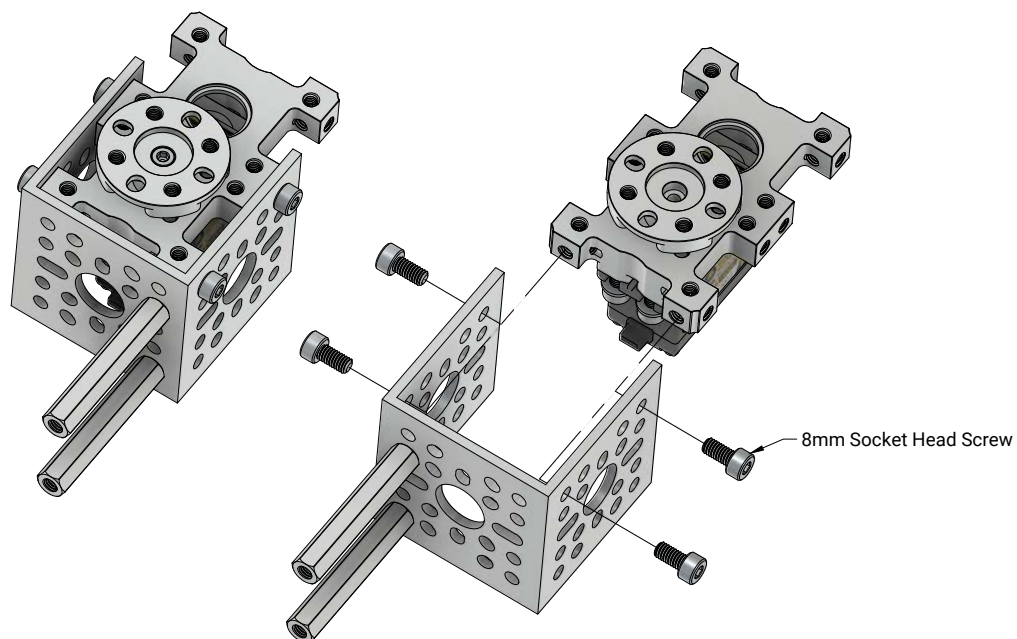


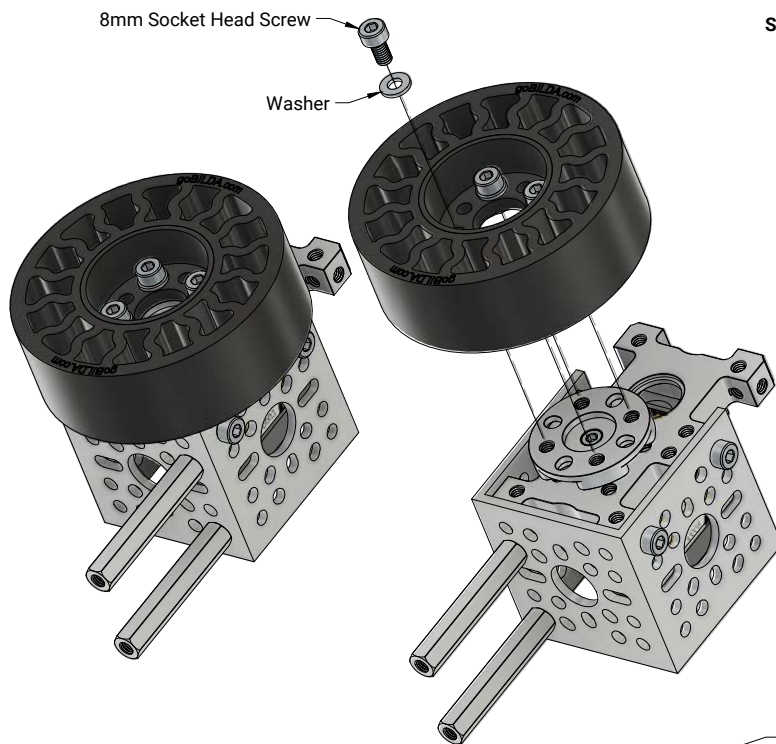
STEP 45:

Assemble **two** Compact ServoBlocks® with **two** Speed Servos as shown.

STEP 46:

Combine the assembled ServoBlocks® with the 1-Hole U-Channels from **STEP 44** as shown using **eight** 8mm Socket Head Screws.

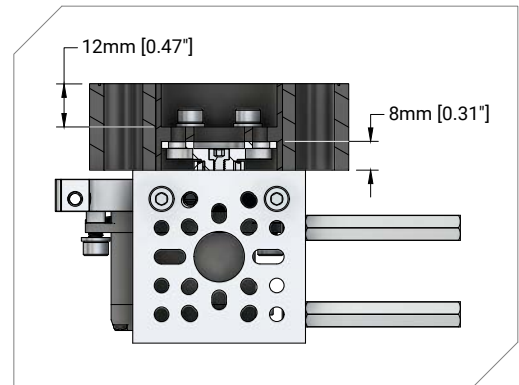




STEP 47:

Attach **two** Gecko® Wheels with **eight** 8mm Socket Head Screws and **eight** Washers as shown.

FIGURE 47-A



STEP 48:

Attach the assemblies from **STEP 43** and **STEP 47** using **four** 8mm Socket Head Screws as shown. Note the locations (**FIGURE 48-A**).

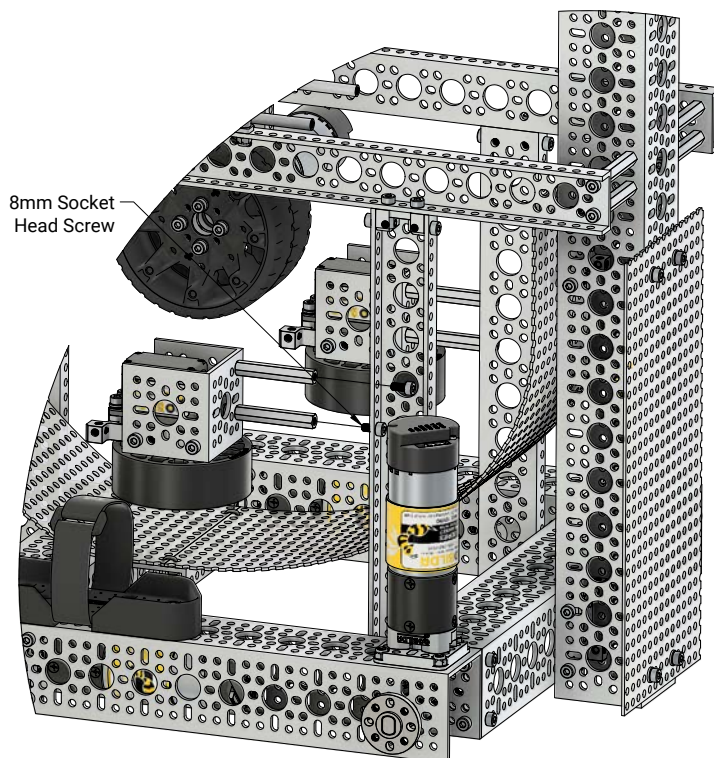
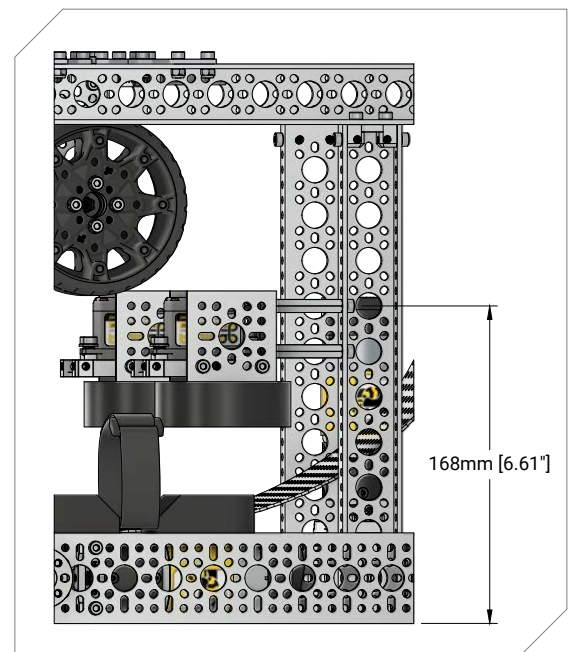


FIGURE 48-A



STEP 49:

Fasten **two** Side Guideplates using **four** Zip-Ties as shown.

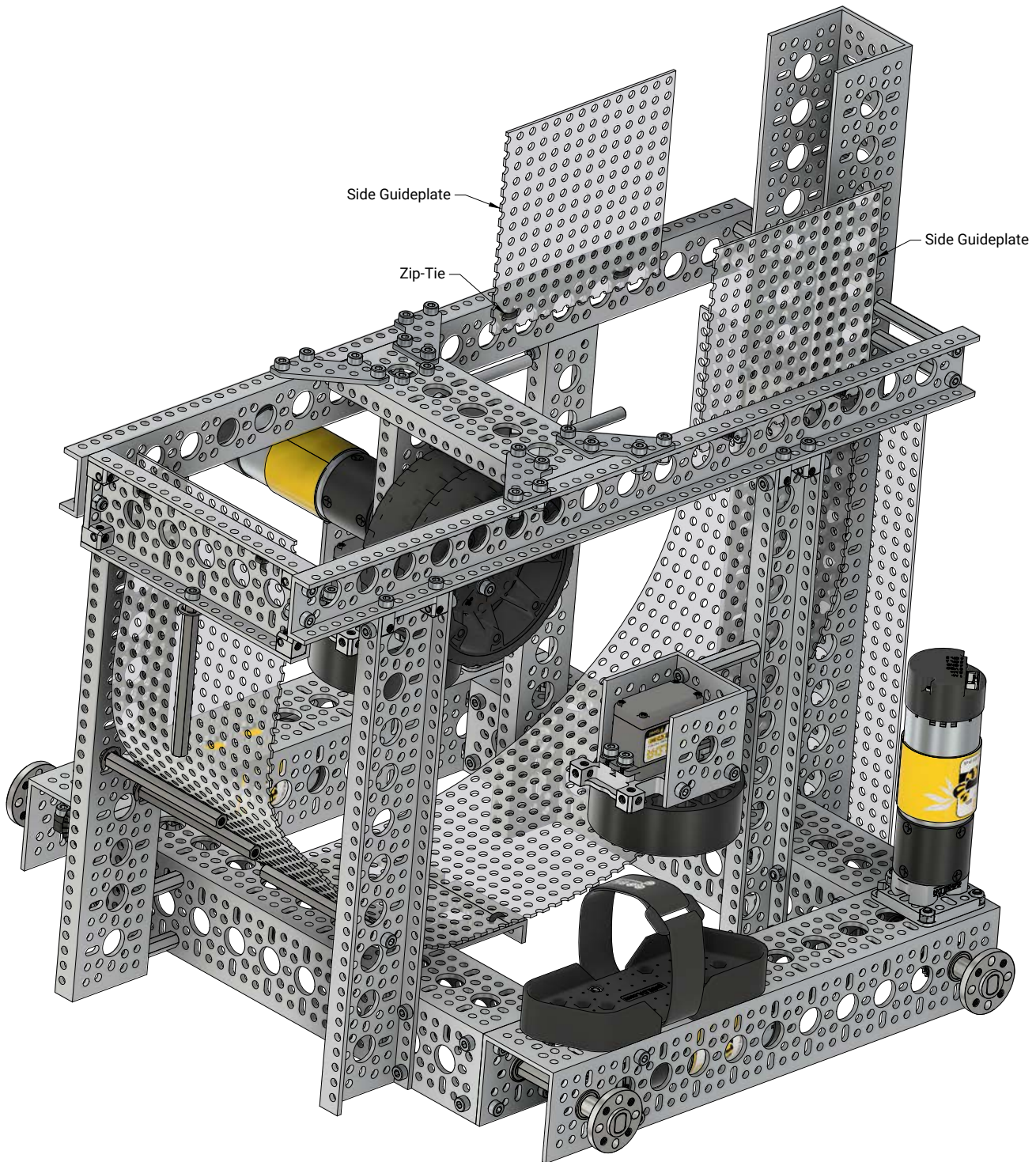
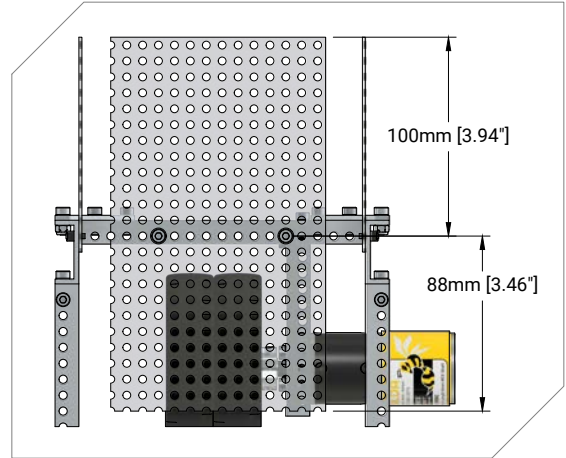
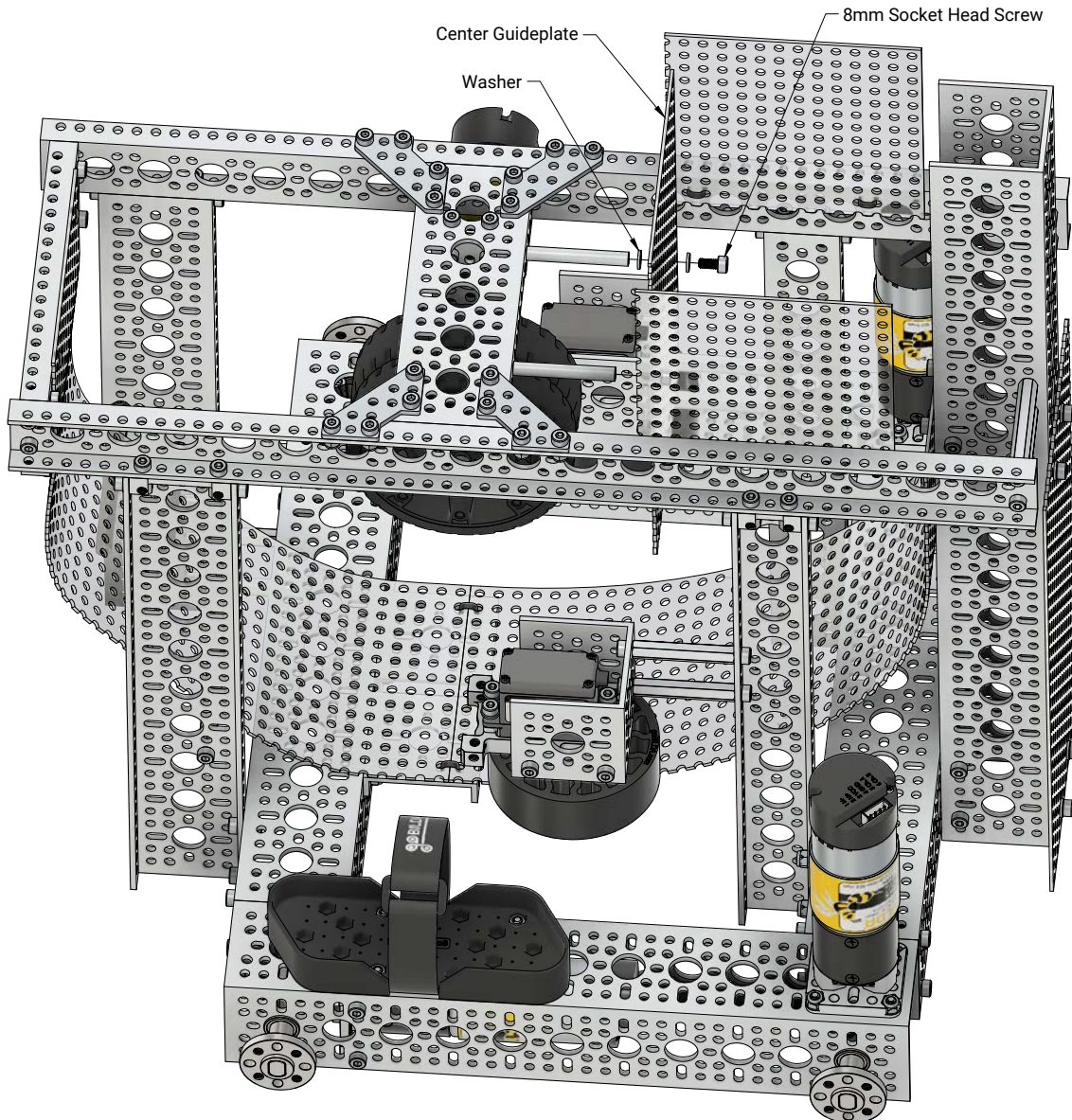


FIGURE 50-A



STEP 50:

Use **two** 8mm Socket Head Screws and **four** Washers to fasten **one** Center Guideplate as shown. The height should match the Side Guideplates (**FIGURE 50-A**).



STEP 51:

Attach **two** Right-Slant Mecanum Wheels and **two** Left-Slant Mecanum Wheels using **sixteen** Washers and **sixteen** 12mm Socket Head Screws as shown.

The Mecanum Wheels should mount to the Hub-Shafts from the "shallow" side of the Mecanum Wheels (**FIGURE 51-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 51-C**).

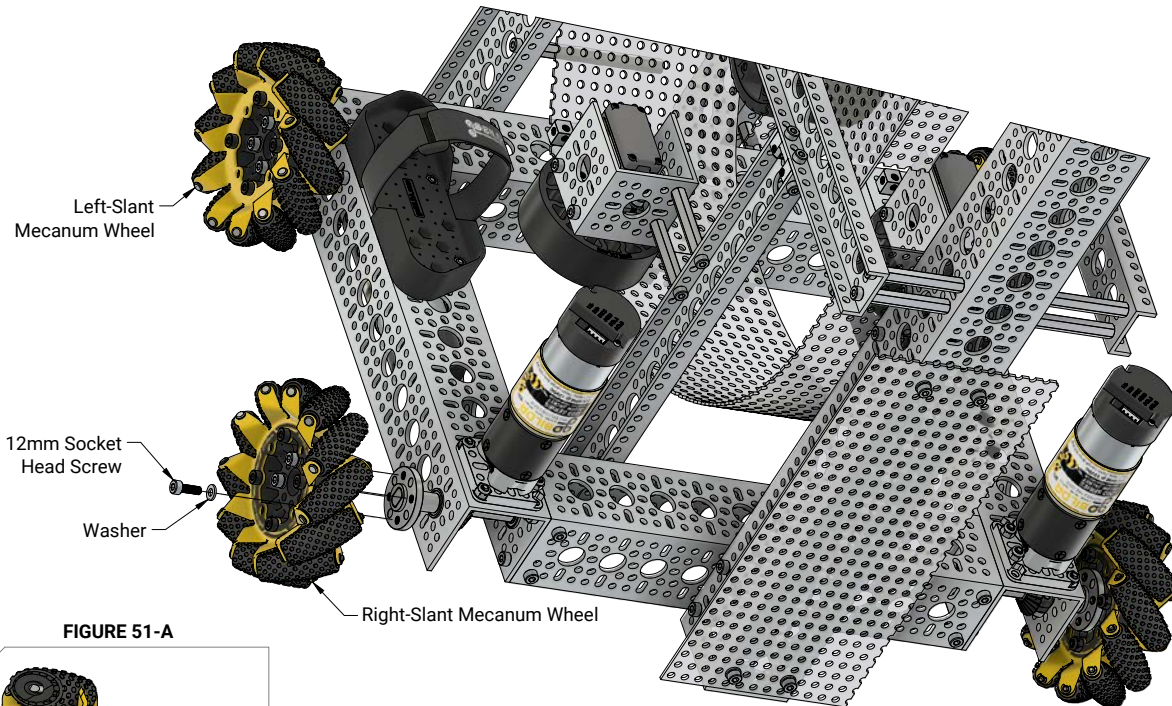


FIGURE 51-A

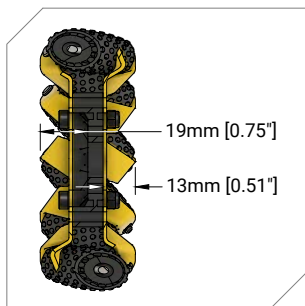


FIGURE 51-B

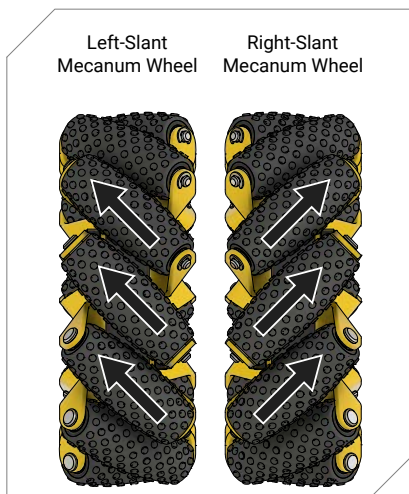
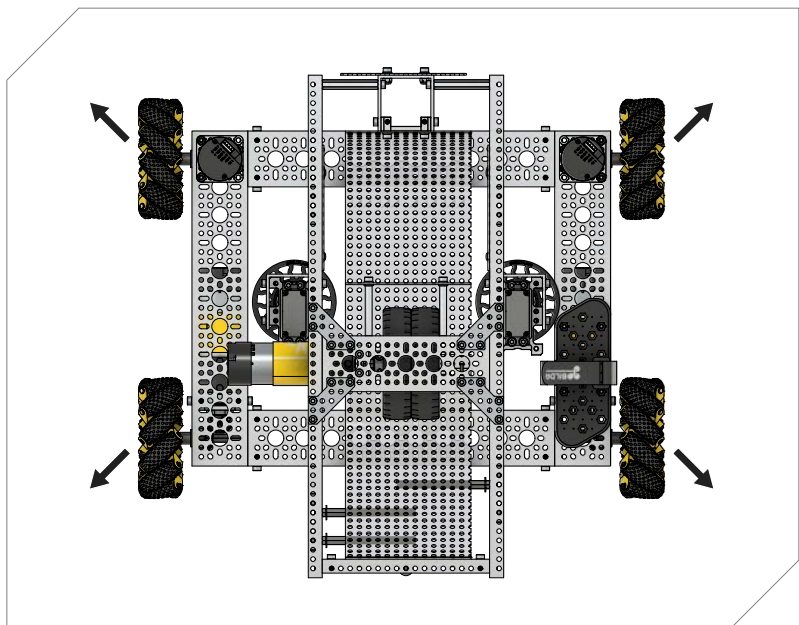
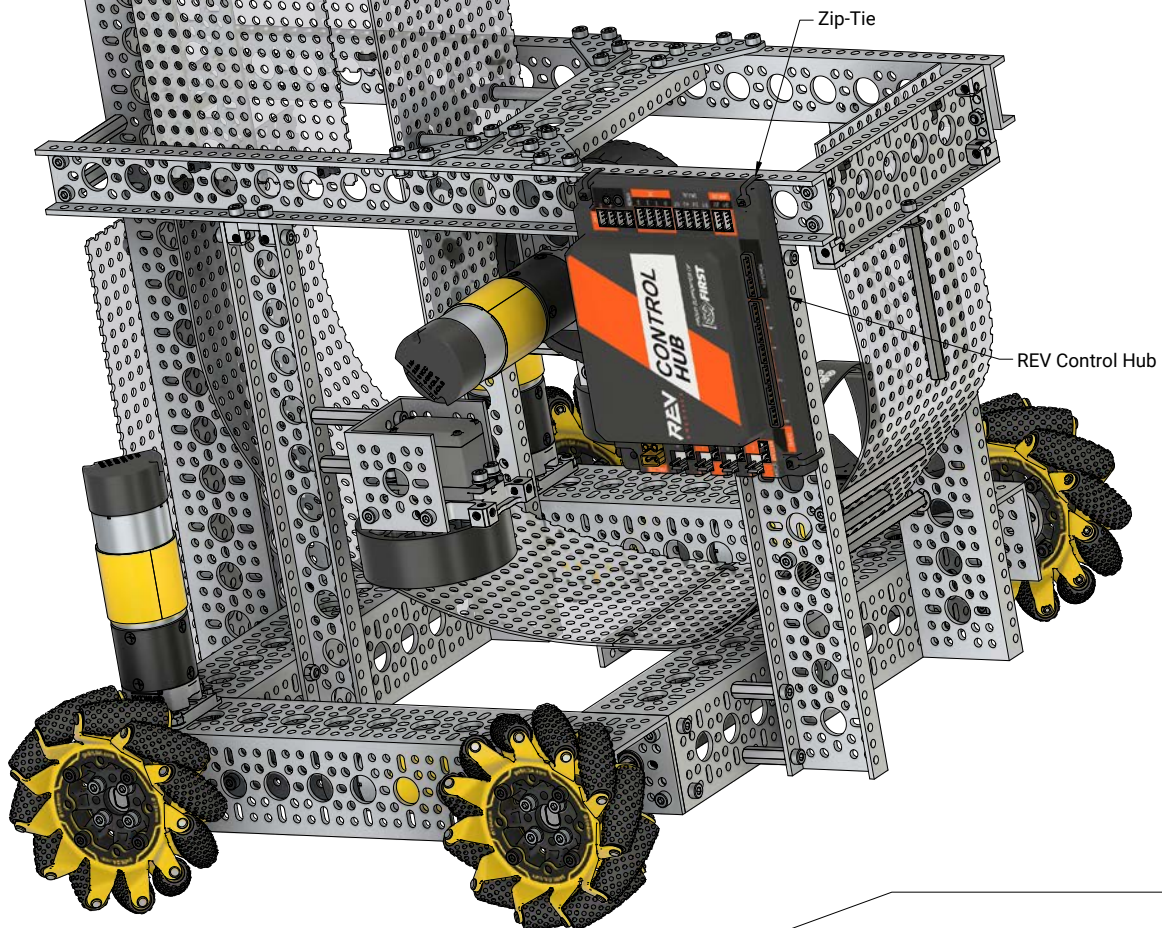


FIGURE 51-C



STEP 52:

Use **three** Zip-Ties to fasten your REV Control Hub as shown.



STEP 53:

Install **one** 12V Battery as shown.



Great Job!

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!

