WCP 3 CIM Flipped DS - User Guide (Rev 1)

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What is the WCP 3 CIM Flipped DS?

The WCP 3 CIM Flipped DS is the ultimate solution to space saving in FRC. Through its precision-engineered inverted motor and shifting cylinder setup and versatile idler gear technology, up to 6.5 inches of space can be freed from the center of your drivetrain, paving the way for game objects, electronics, and mechanisms to be positioned in previously unusable space.

FRC has evolved into an era of smaller, more compact robots, and in this age every cubic inch of free space counts. Not only does this gearbox remove volume limitations that teams were almost stuck with previously, but it also provides nearly endless options for gear ratios by means of a customizable third stage, allowing teams to find the perfect ratio for any wheel as small as 3.25” and as large as 8”! While designed with a West Coast Drive in mind, this shifting transmission is designed with an internal sprocket/pulley location that makes dead-axle chain runs simple and effective. The WCP 3 CIM Flipped DS is the pinnacle of compact shifting transmissions, and a must-have for any team looking to make the most out of their robot.

1. Design Notes

The Following pages will explain tools needed to assemble the gearbox and other various tidbits of information.

Note: If using the VersaBlock V2, the holes on the rear plate will be slightly off and not allow a bolt to fully go into the plate as there was a change between V1 and V2 in the hole pattern. If you are going to use the V2 of the VersaBlock please drill out the outside holes to 1/4”.

Disclamer: Teams are responsible for purchasing or making the hex shaft spacers shows as they are not included in the kit.

1.1 Tools Needed

To assemble and create the Flipped DS, Teams will need:

1. Allen Wrenches
    1. 1/8” (Mcmaster Carr P/N: 5419A33)
    2. 5/32” (Mcmaster Carr P/N: 5419A35)

2. 3/8” Open Ended Wrench (McMaster Carr P/N: 5163A14)
    1. NOTE: Any 3/8” wrench may be used

3. Loctite GlueStick - Blue (McMaster Carr P/N: 1004A12)
    1. NOTE: Apply on ALL screws that do not have a Lock Nut.

4. Snap Ring Pliers
    1. 1/2” (McMaster Carr P/N: 5449A81)
    2. 3/8” (McMaster Carr P/N: 5449A79)

Optional Tools for Assembly

1. Arbor Press
2. Drill Bits
3. Multi Tool set of Allen Wrenches

1.2 BOM (Bill of Materials)

Base Kit:

Kit #1:

- 1 x Motor Plate
- 1 x Back Plate
- 1 x Mini Plate
- 1 x 1st Stage Plate
- 4 x Motor Plate Spacers

Kit #2:

- 1 x 2nd Stage Shaft
- 2 x Long Top Spacers
- 2 x Long Bottom Spacers

Kit #3:

- 4 x FR8 Bearings
- 1 x ThunderHex Bearing
- 4 x SHCS #10-32 x 4” Bolt
- 2 x SHCS #10-32 x 1.75” Bolt
- 4 x BHCS #10-32 x .25” Bolt
- 4 x #10-32 Thin LockNut
- 2 x 1/2” Snap Ring
- 1 x 1/2” Hex Wave Washer
- 1 x 1/2” ID x 1/32” Long Fiber Washer
- 1 x 1/2” to ThunderHex Adapter

1.3 Encoders

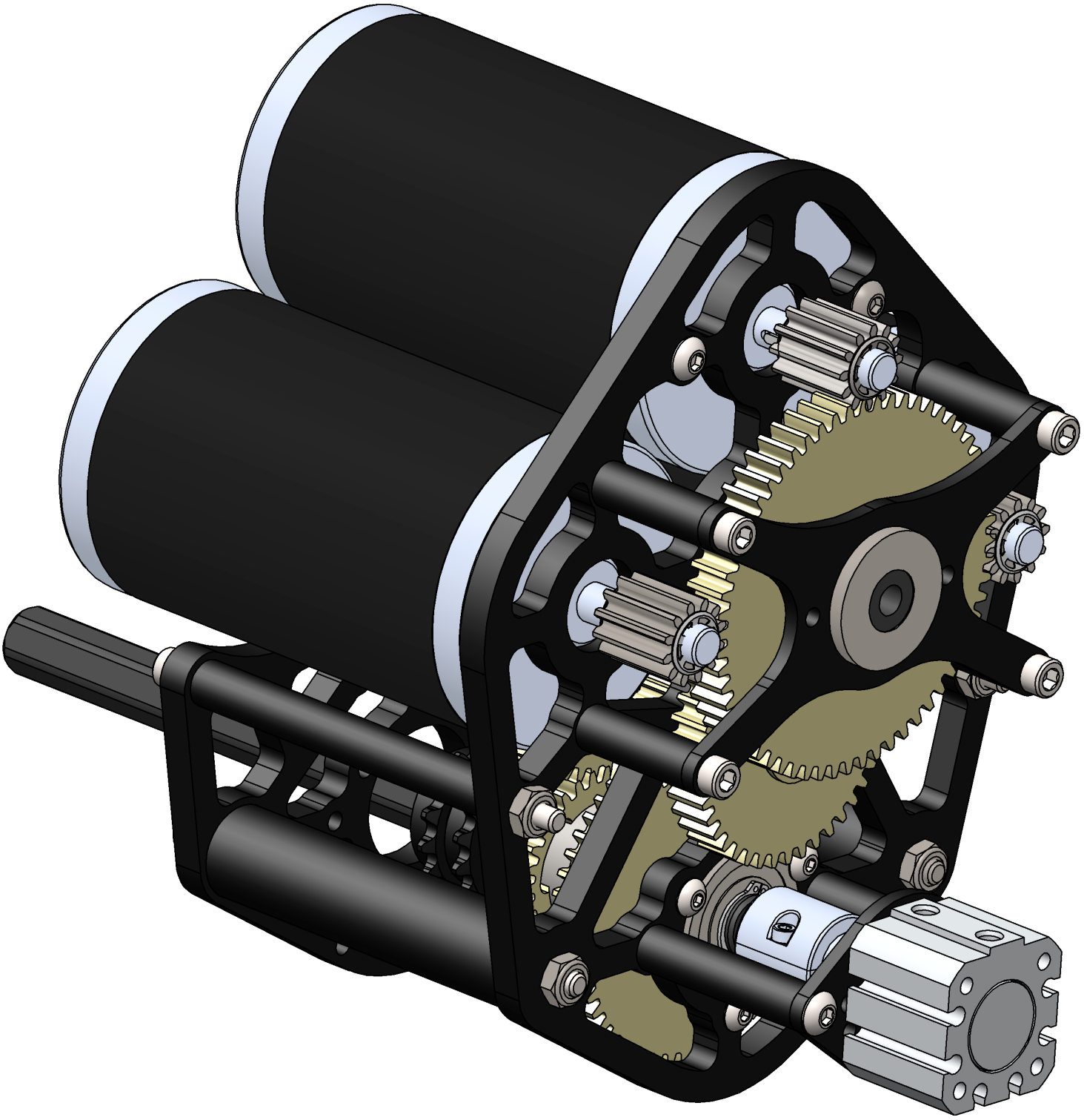
The Flipped CIM DS Supports any encoder with a 1/4” Shaft. We recommend the use of the S4T Encoder by US Digital or SRX Mag Encoder by CTRE.

2073 has created a 3D Printable Mount and Magnet setter. They can be downloaded here or under the Tech Specs section.

2. WCD Setups with Chain & Timing Belts

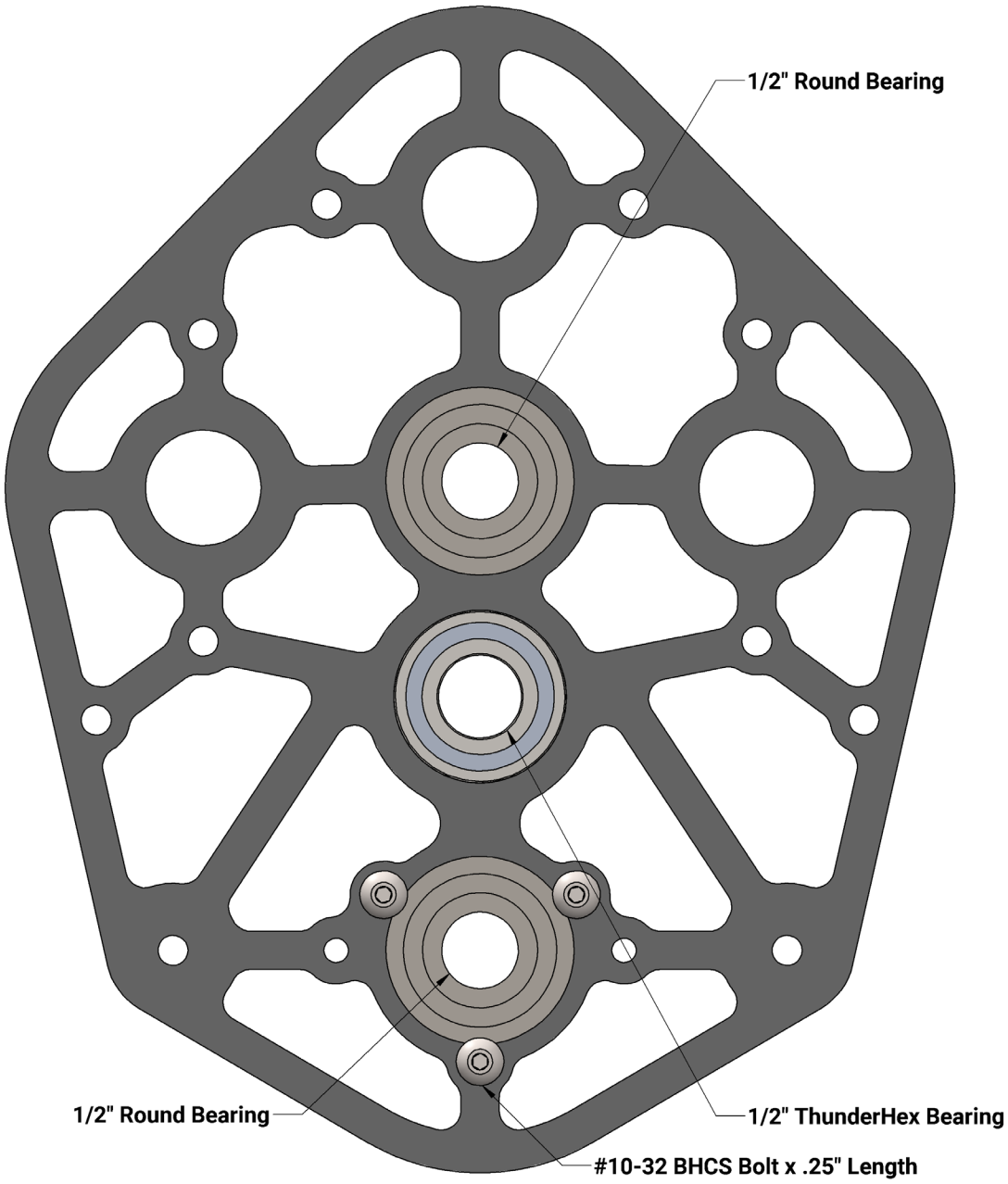
This Section in the future will include spacing and recommended Setups. This section is TBD.

3. Assembly of Base Kit



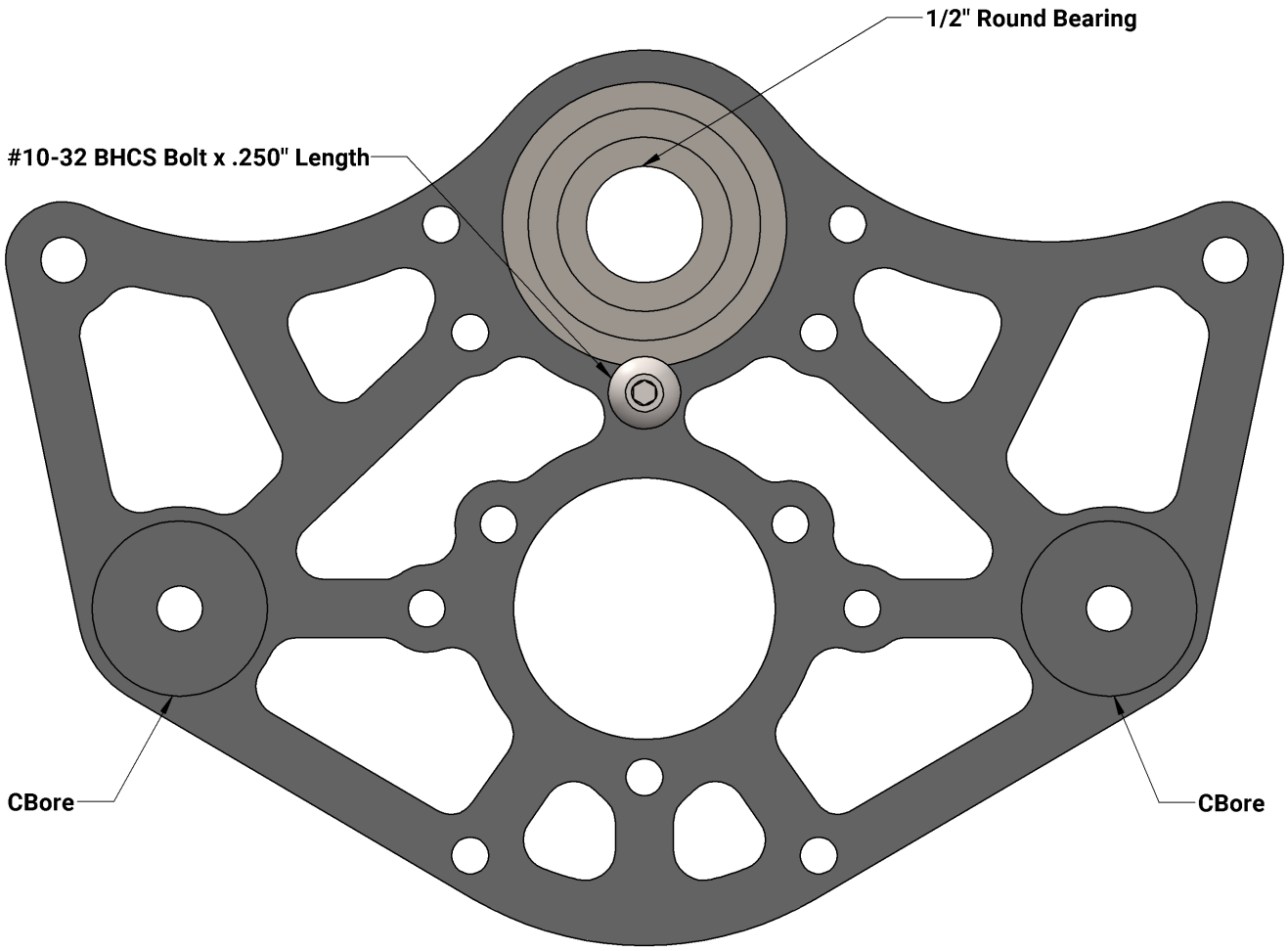
3.1 Front Plate Bearings

The Motor Plate will come with bearings pressed in. The middle bearing should have flange facing the cbore side. The two bearings top and bottom of the middle bearings should have their flanges facing you. Insert three #10-32 BHCS Bolts x .250” into the 3 holes shown.



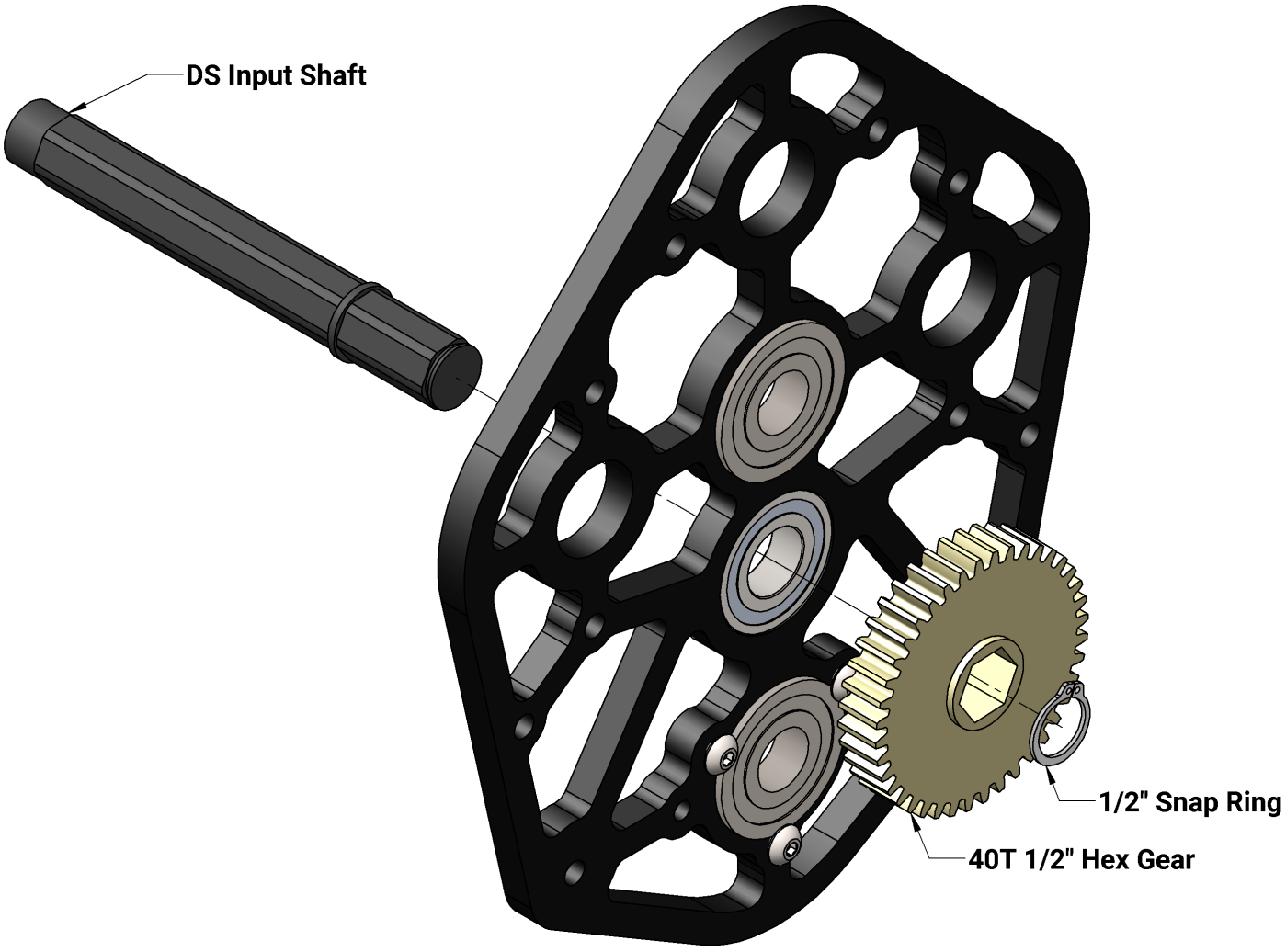
3.2 Back Plate Bearings

The back plate will come with bearing pressed in. The bearing flange should be on the side with only two cbores. Insert one #10-32 BHCS Bolt x .250” into the hole shown.



3.3 2nd Stage Shaft Assembly

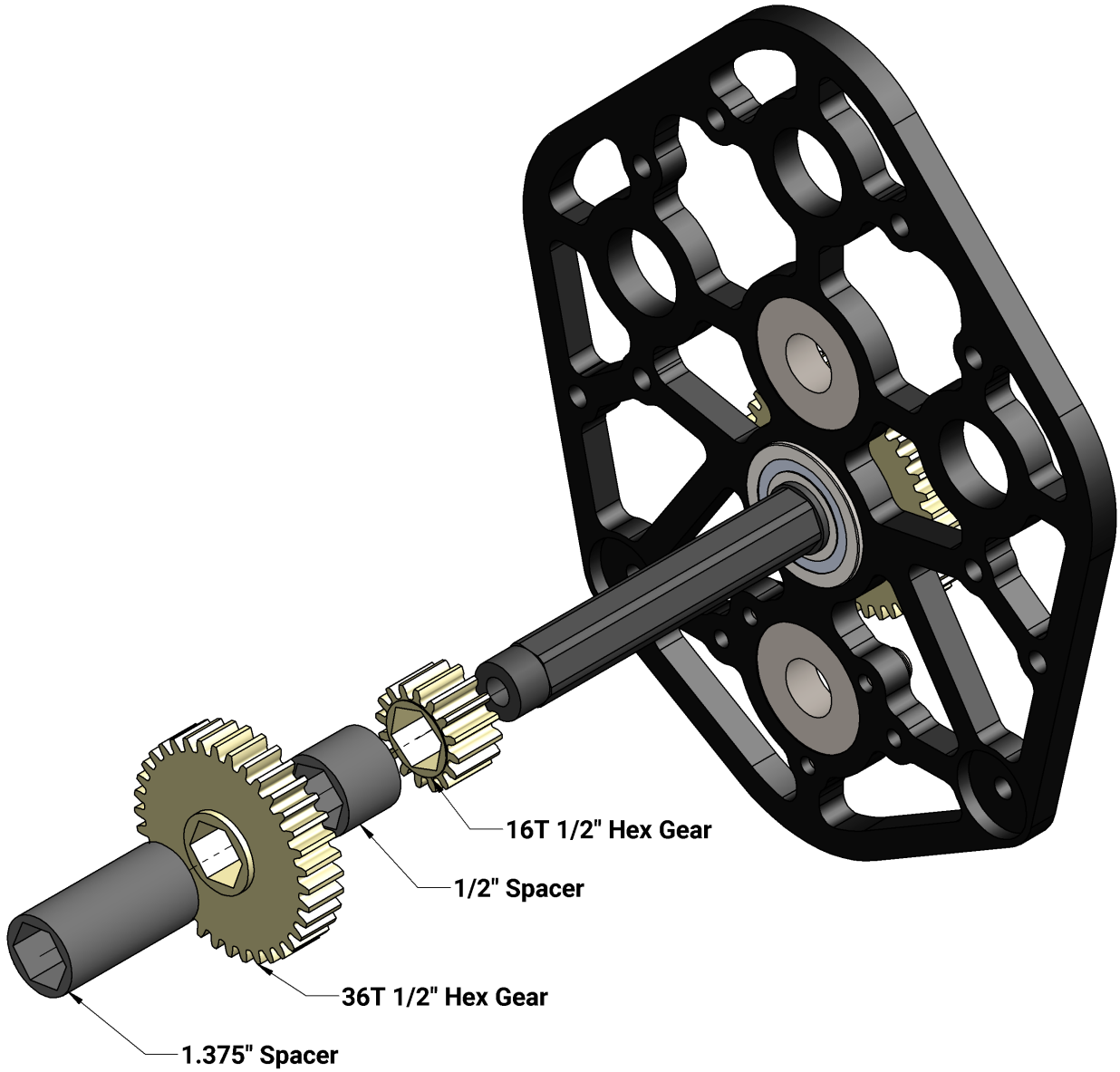
Insert the 2nd stage shaft from the rear of the motor plate. Ensure that the integrated spacer on the shaft is flat against the ThunderHex bearing. Slide the 40t 1/2” Hex Gear over the shaft and secure it with a 1/2” Snap Ring.



3.4 Internal 2nd Stage Shaft Assembly

Slide the components in this order onto the 2nd stage shaft

1. Low Gear (Input Gear): For example the 16T 1/2” Hex Gear
2. 1/2” Spacer
3. High Gear (Input Gear): For example the 36T 1/2” Hex Gear
4. 1-3/8” Spacer



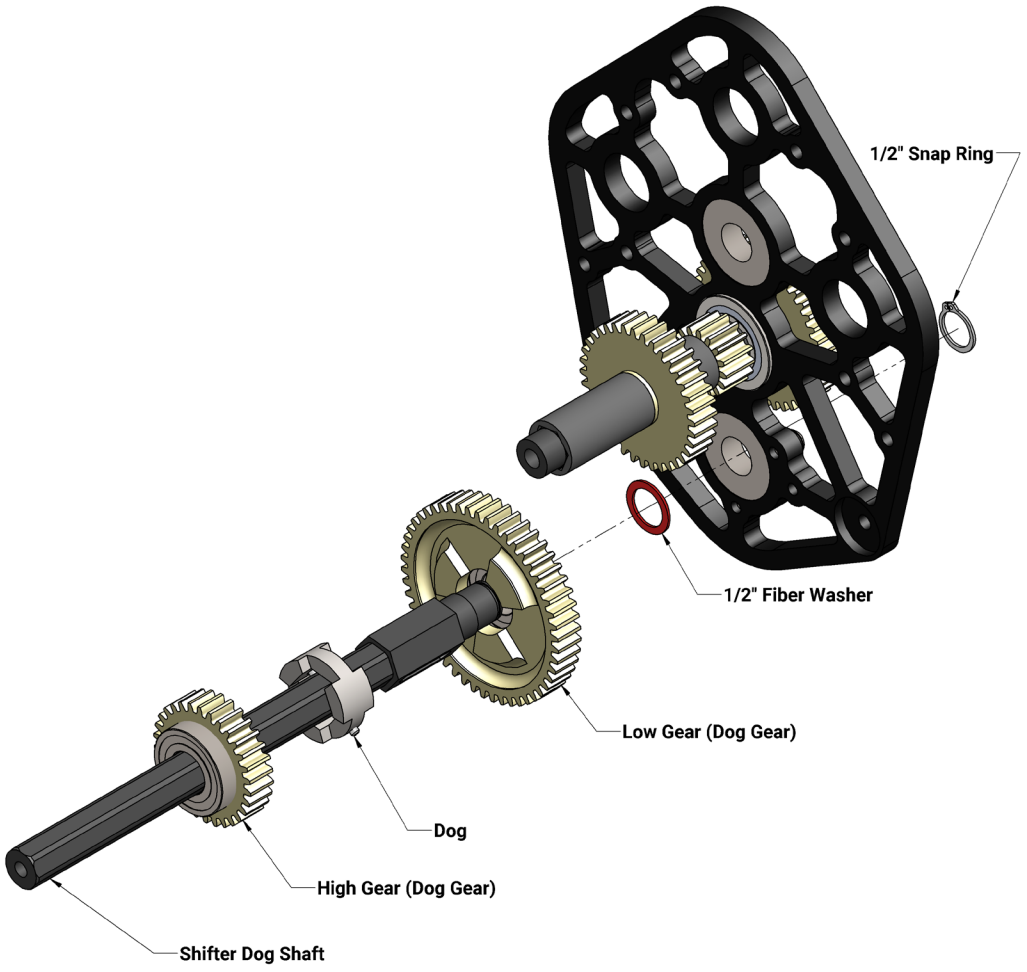
3.5 DOG Shaft Assembly

The Shifter DOG Shaft comes assembled with the DOG and #4-40 bolt. To assemble the rest of the DOG Shaft, follow the steps in order below:

1. On the side closest to the plate, slide the Low Gear (Dog Gear) onto the shaft and the 1/2” fiber washer behind the Dog gear.
    1. NOTE: The fiber washer is very important and must be used.
    2. NOTE: DOG Gears come assembled with ThunderHex Bearings

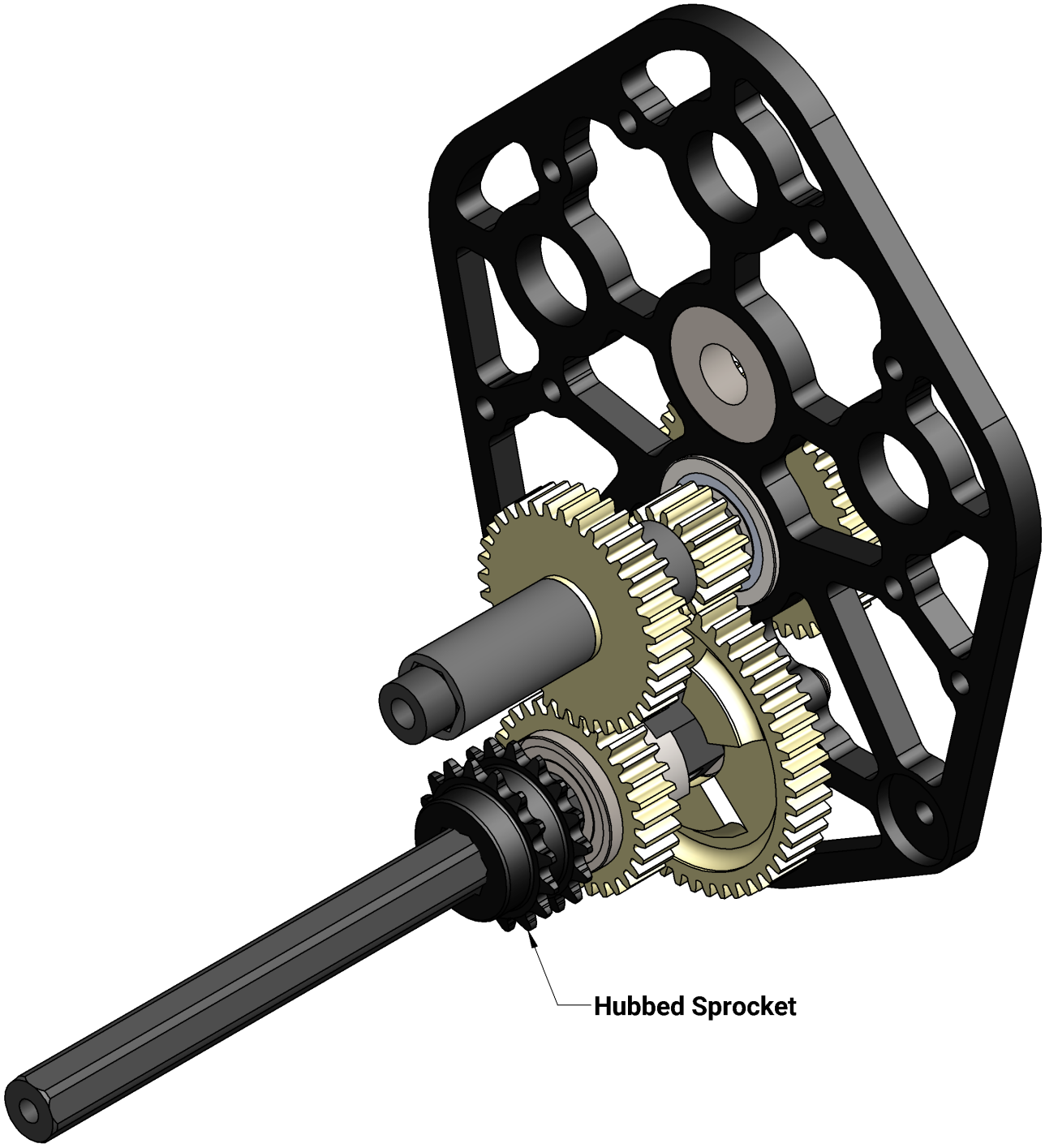
2. On the opposite side place the High Gear (Dog Gear) onto the shaft

3. Secure DOG Shaft with 1/2” Snap Ring



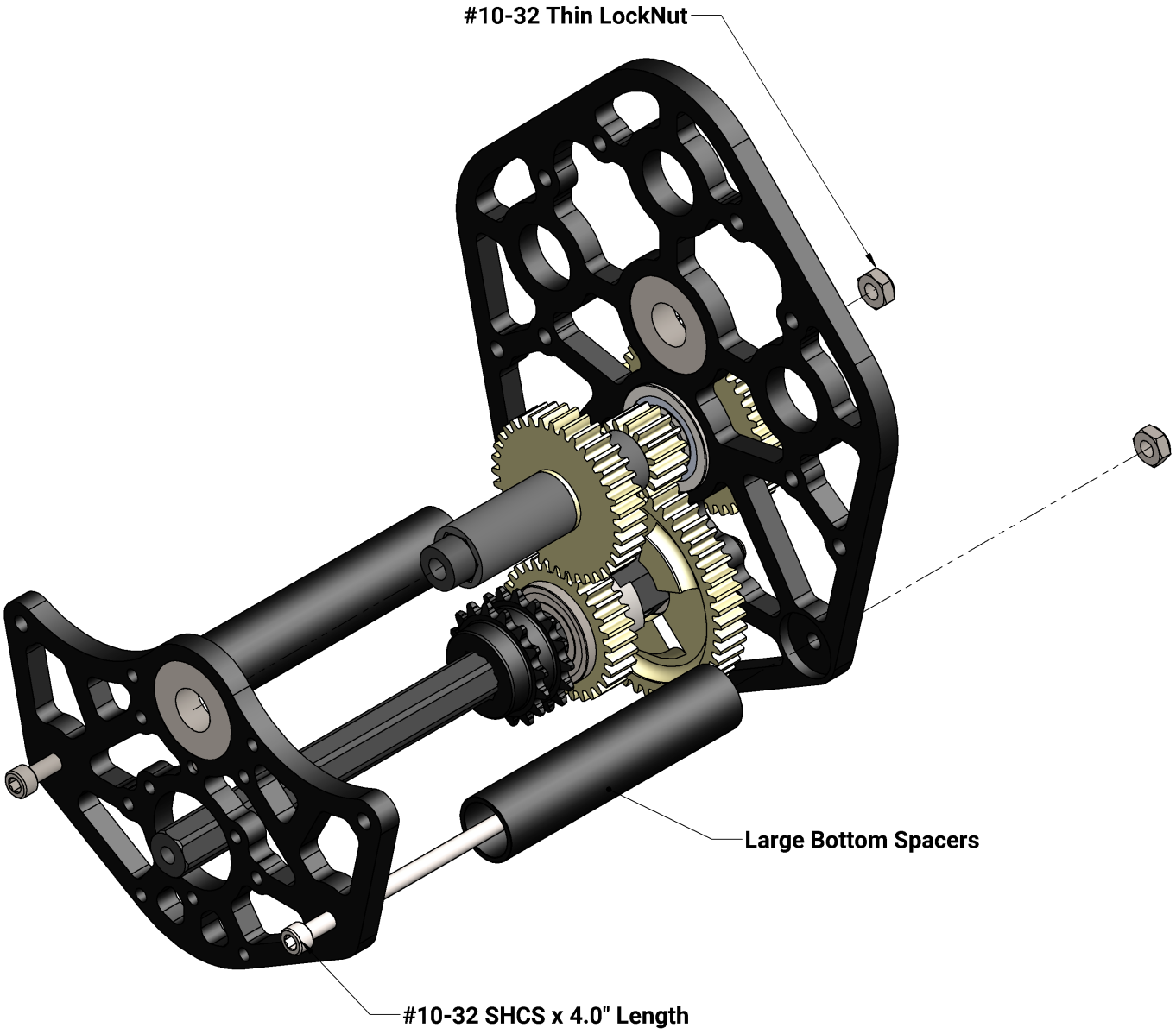
3.6 Hubbed Sprocket

Slide your choice of hubbed sprocket onto the DOG shaft

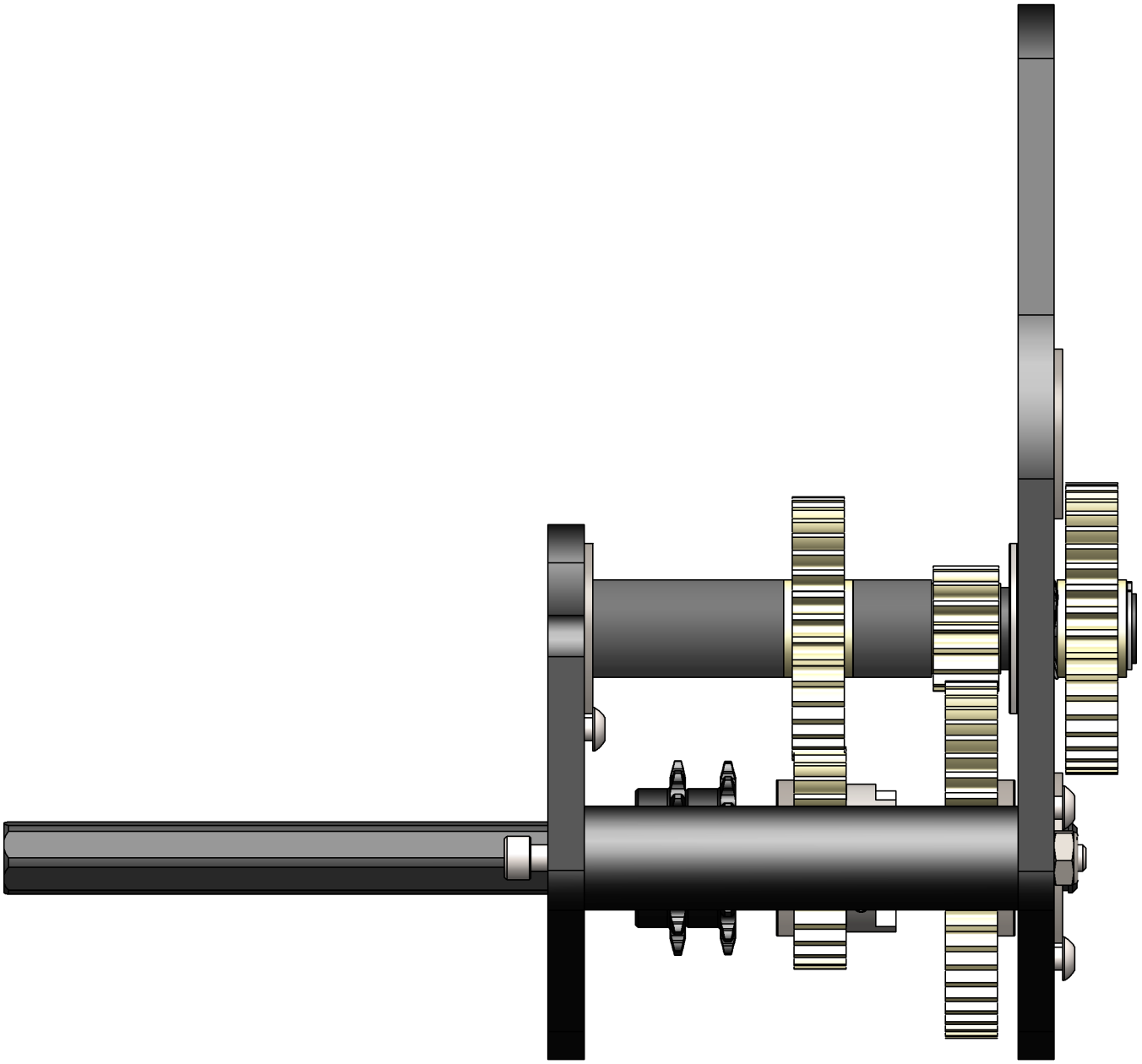


3.7 Mate Motor Plate with Rear Plate

Put large bottom spacers into CBore on the motor plate. Then align the 2nd stage shaft and the DOG shifter shaft with the 1/2” round bearing and bottom hole respectively. Slide 2 x #10-32 SHCS x 4” bolt through the rear plate into the holes on the front plate and secure with #10-32 slim LockNut.

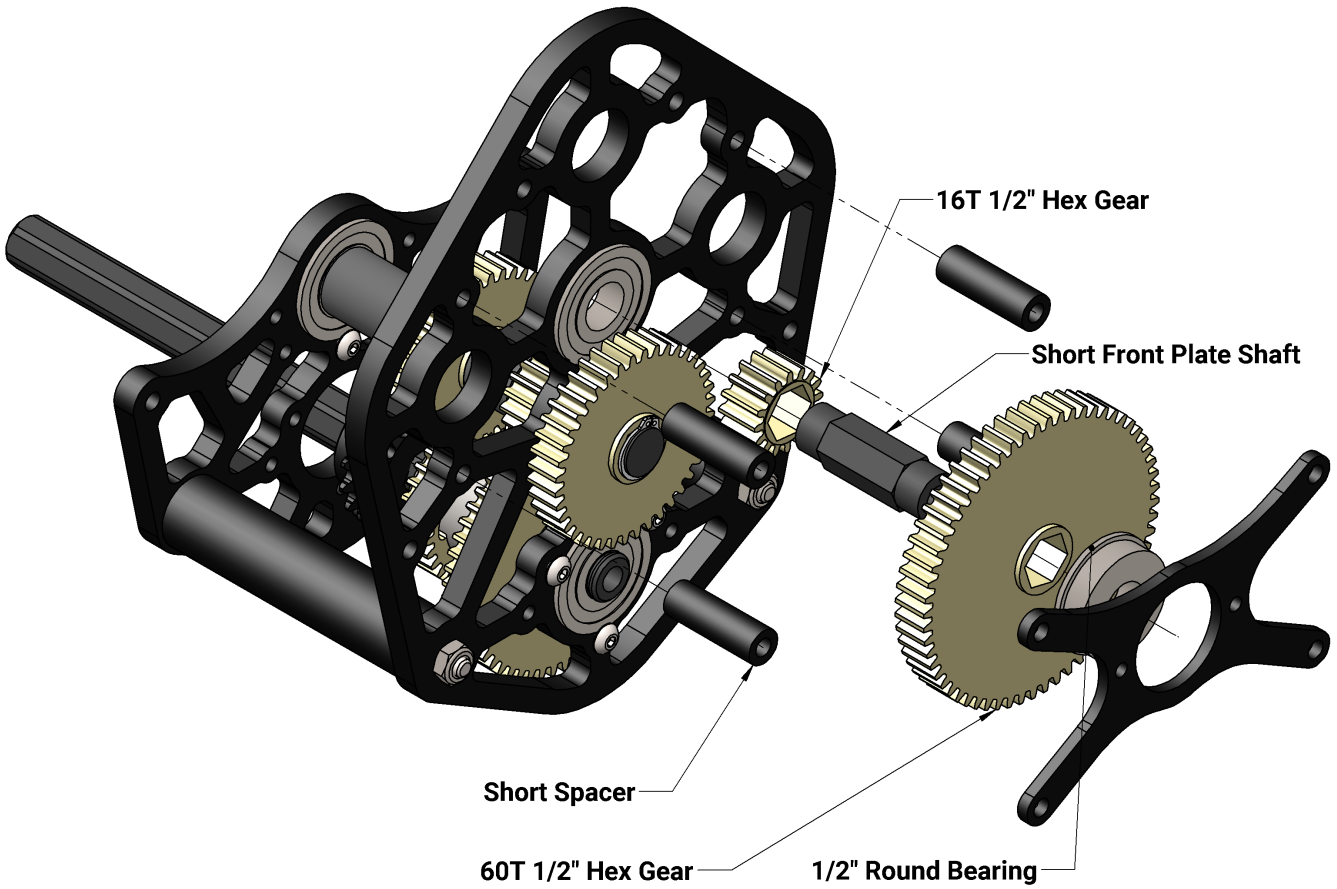


3.7 Mate Motor Plate with Rear Plate (Continued)

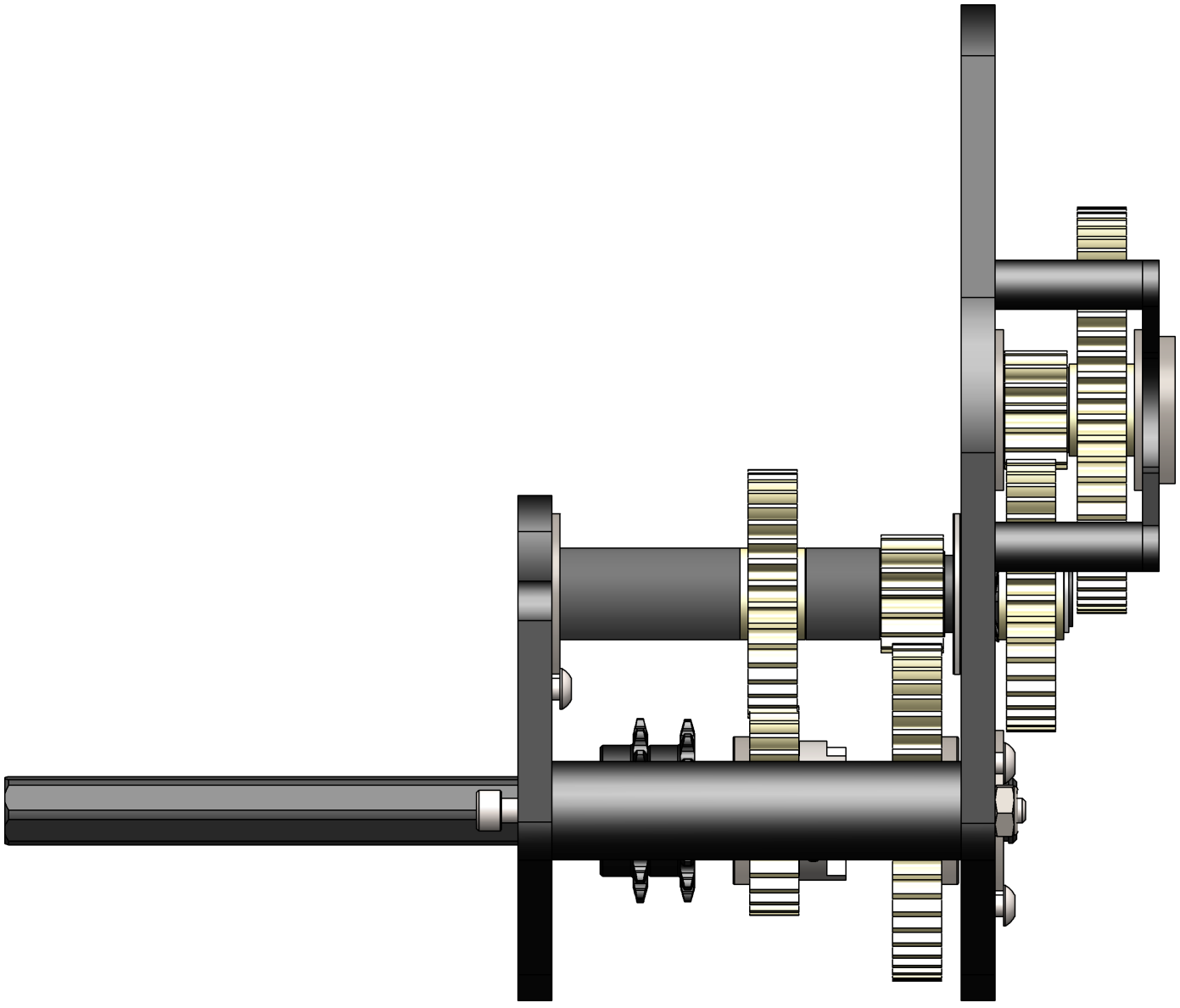


3.8 Mini Plate

Put short front plate shaft into the motor plate 1/2” round bearing. Slide the 16T 1/2” Hex Gear followed by the 60T 1/2” Hex Gear over the shaft. Slide the mini plate onto the shaft. The 1/2” round bearing will already be pressed into the plate. Place short spacers under holes on mini plate.

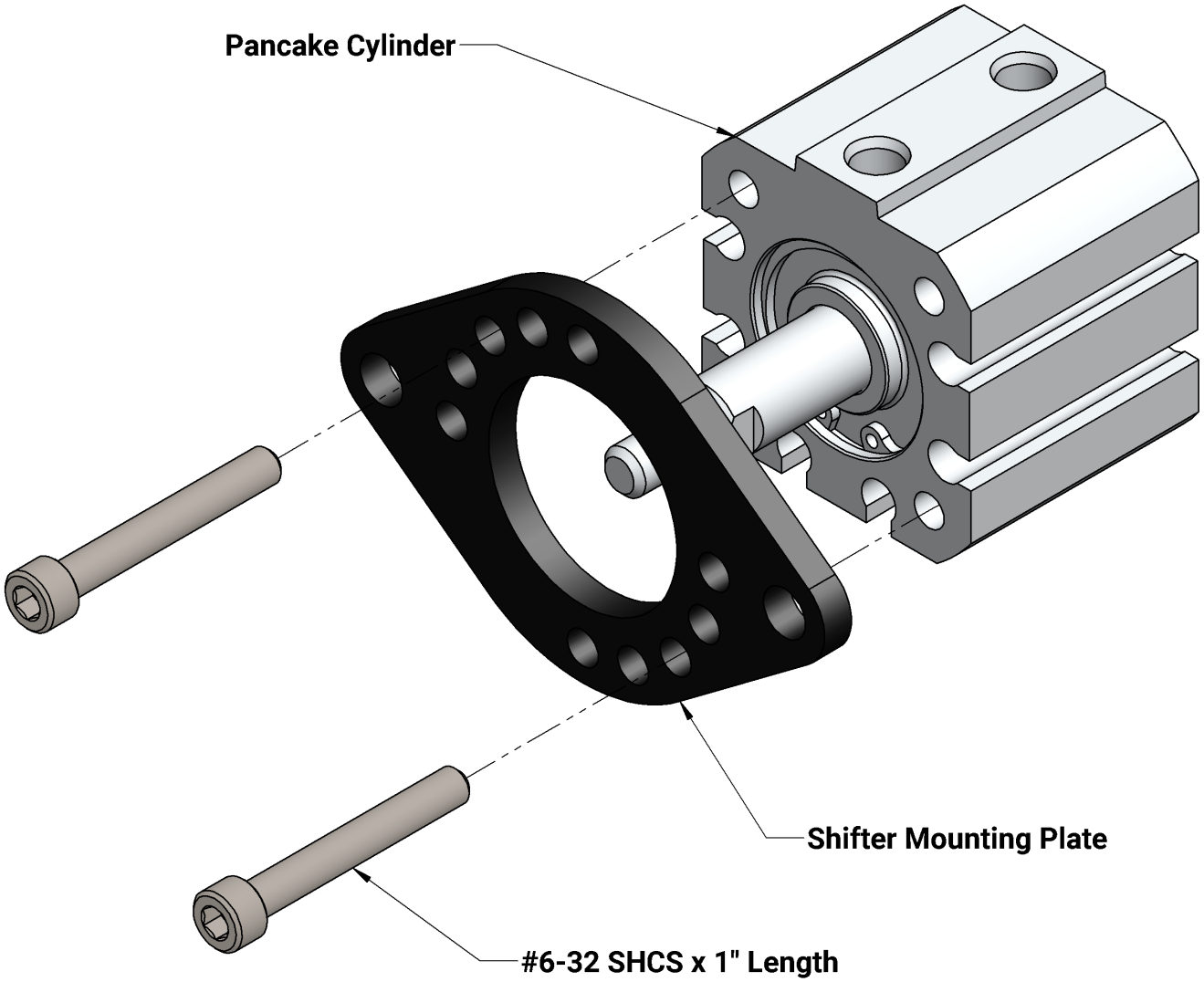


3.8 Mini Plate (Continued)



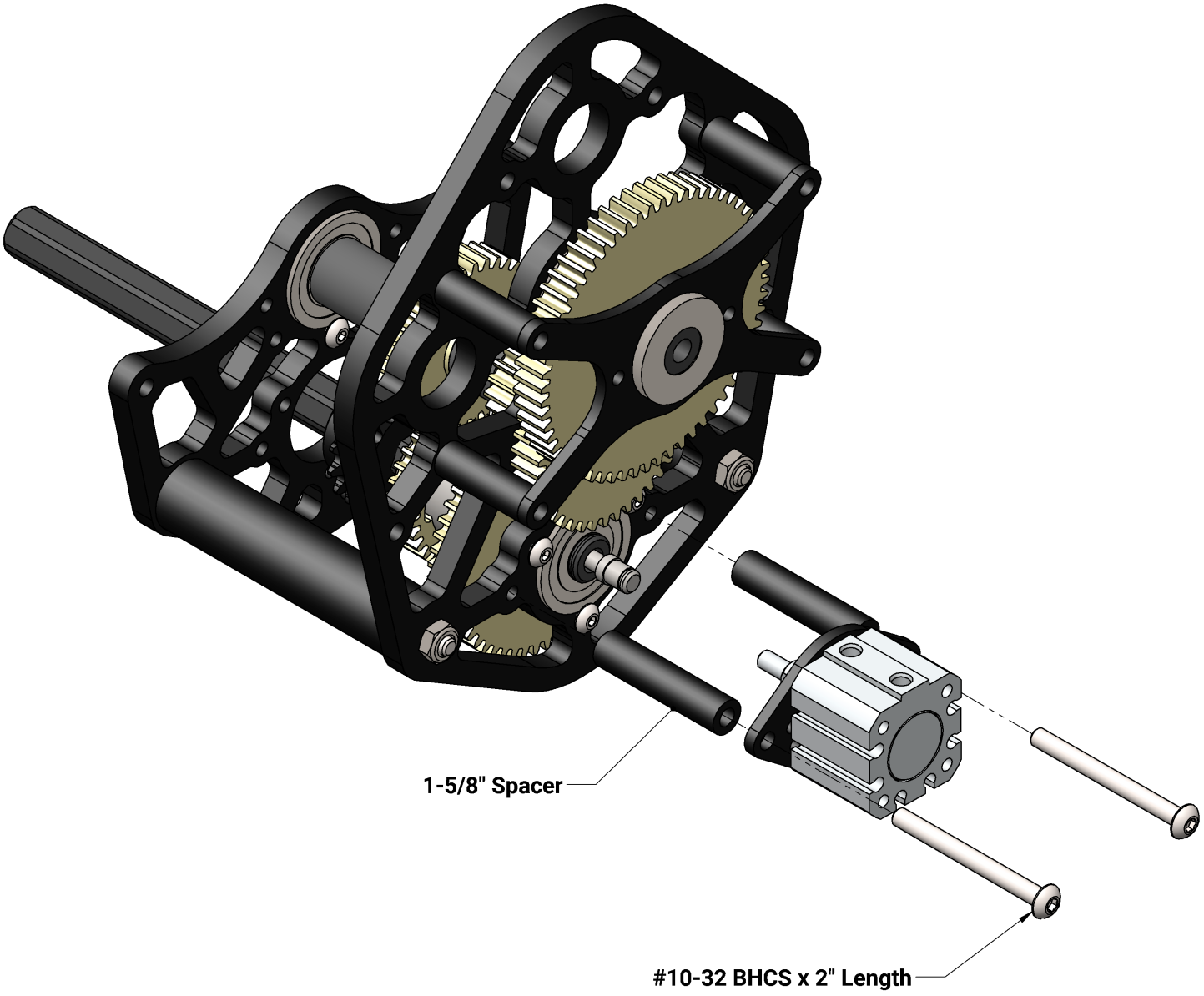
3.9 Pneumatic Shifter Plate

Put the shifter mounting plate onto the pankcake cylinder and secure with encluded #6-32 SHCS x 1” bolts.



3.10 Pneumatic Cylinder onto Motor Plate

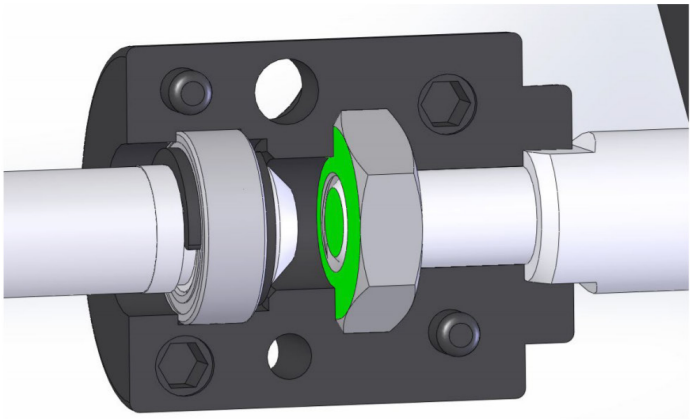
Secure the pneumatic shifter plate onto the motor plate using the included #10-32 BHCS x 2” bolt and the 1-5/8” spacers.

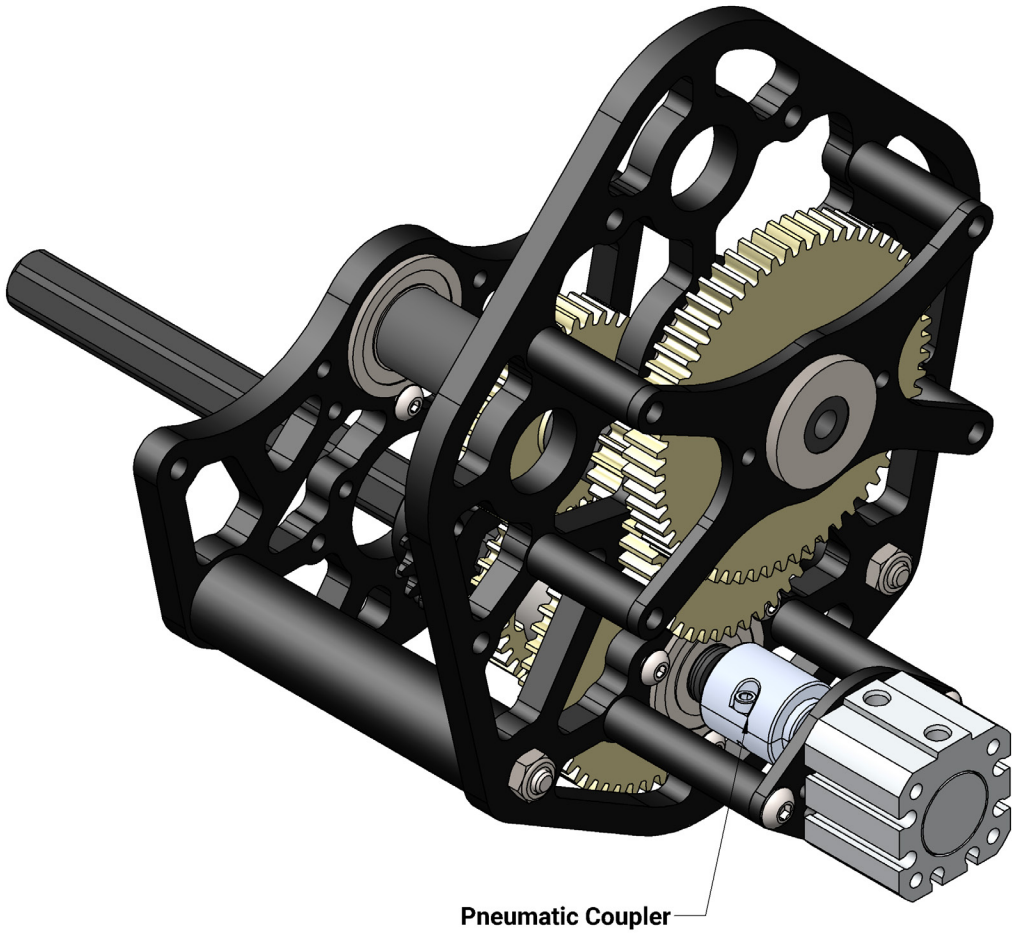


3.11 Pneumatic Coupler

Ensure that the hex nut is flush with the end of the piston rod. Then close coupler with the encluded #4-40 bolts

IMPORTANT: The hex nut MUST BE FLUSH with the end of the piston rod as illustrated.





3.11 More Shifter Information

For more information and detail instructions on how to mount the pancake cylinder and the pneumatic coupler please refer to these instructions:

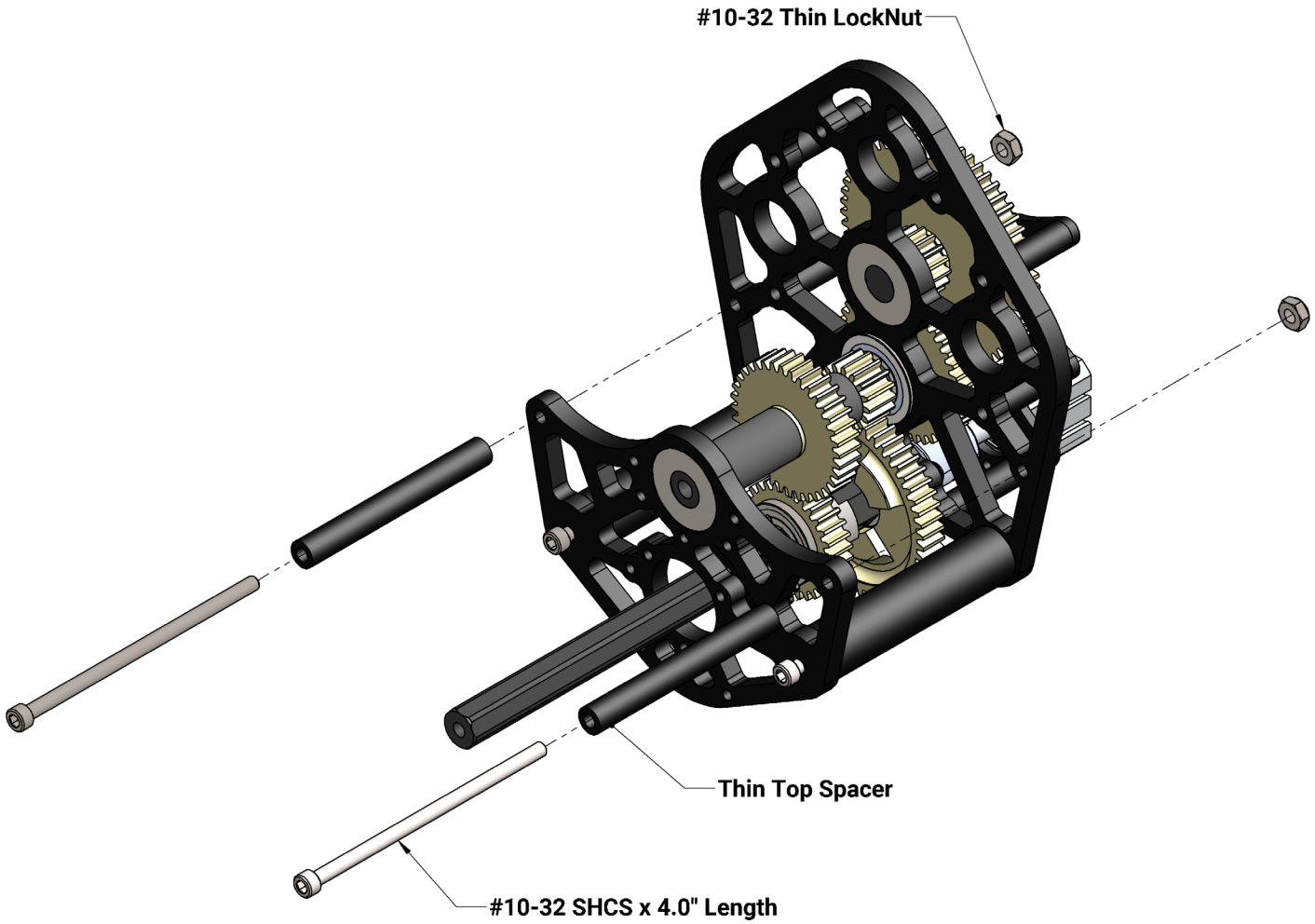
https://content.vexrobotics.com/vexpro/pdf/217-3423-WCP-DS-Assy-Instr-Rev2.pdf

Note:

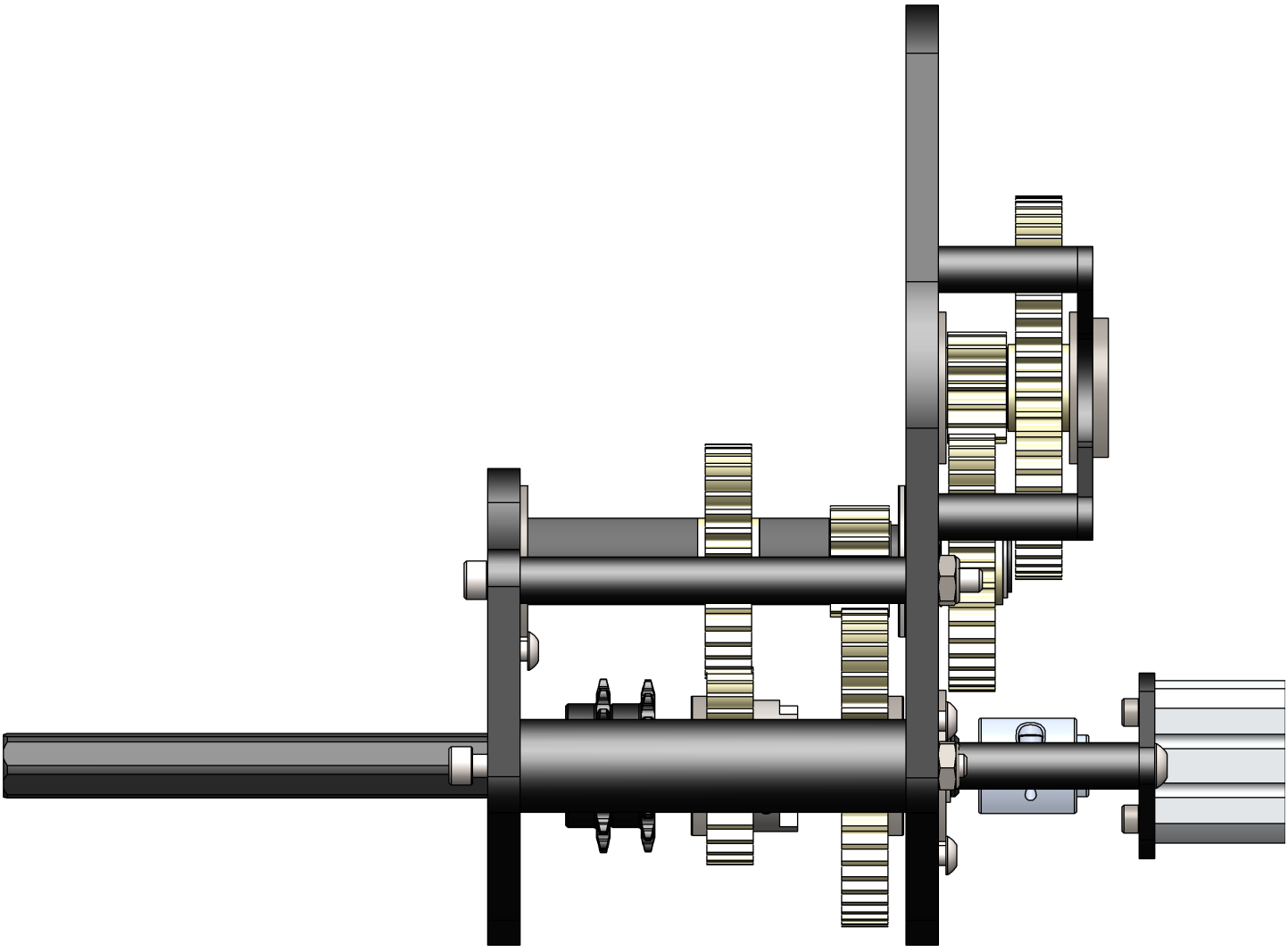
- This setup requires:
  - WCP DS - Pneumatic Hardware Kit (P/N: 217-3496)
  - Pancake Pneumatic Cylinder, 3/4” Bore, 1/2” Travel (P/N: 217-2778)

3.12 Thin Top Spacer

Slide the thin top spacer between the motor plate and the rear plate. Secure using 2 x #10-32 SHCS x 4” bolt and #10-32 thin LockNut.

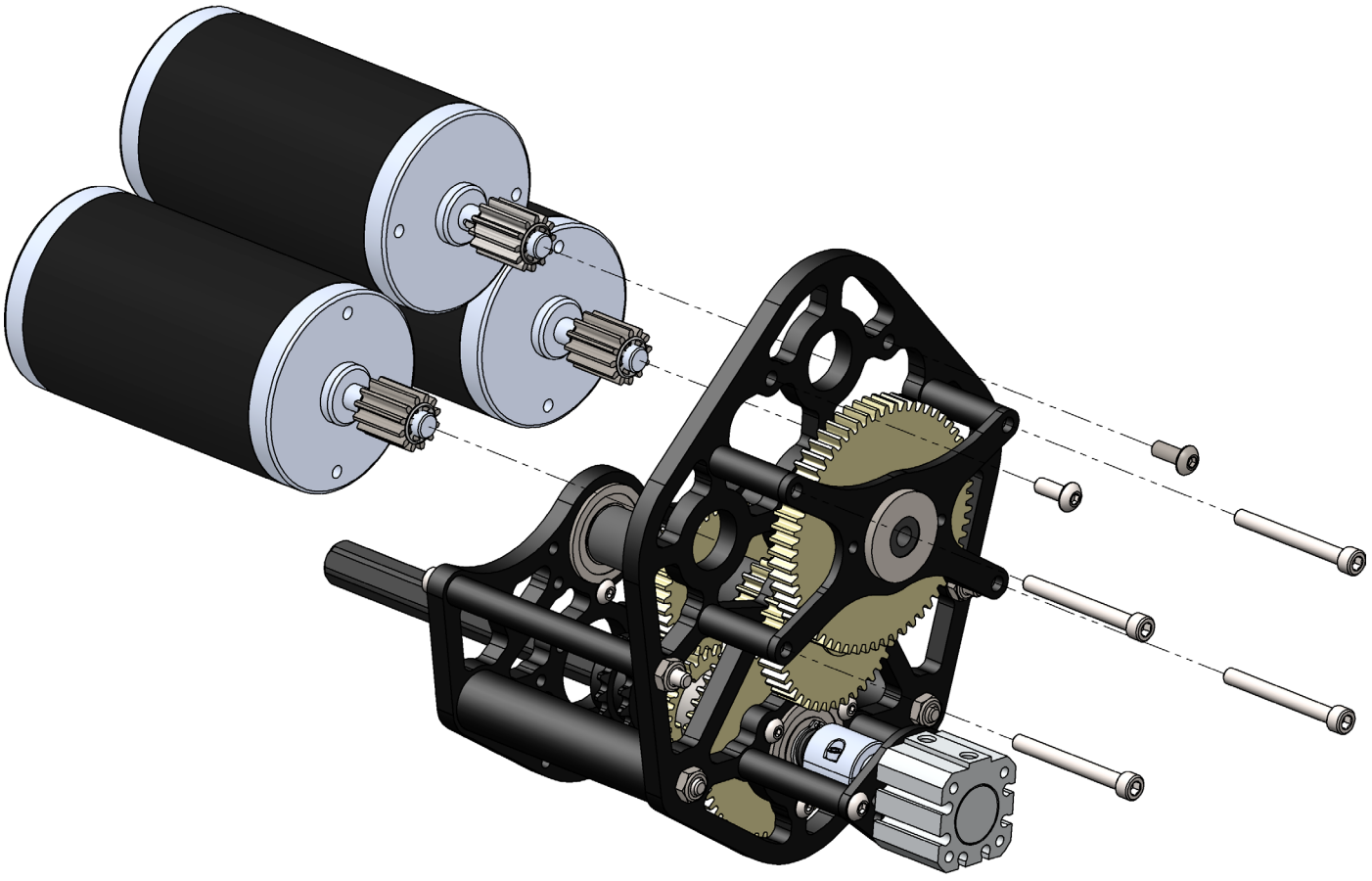


3.12 Thin Top Spacer (Continued)



3.13 Motor Mounting and Securing Mini Plate

Insert all 3 motors into the CIM locating holes on the motor plate. Secure the bottom 2 motors with 4 x #10-32 SHCS x 1-3/4” bolt through the mini plate holes. Attach the top motor by inserting the 2 x #10-32 BHCS x 1/2” bolt through the motor plate directly into the motors.



Fully Assembled