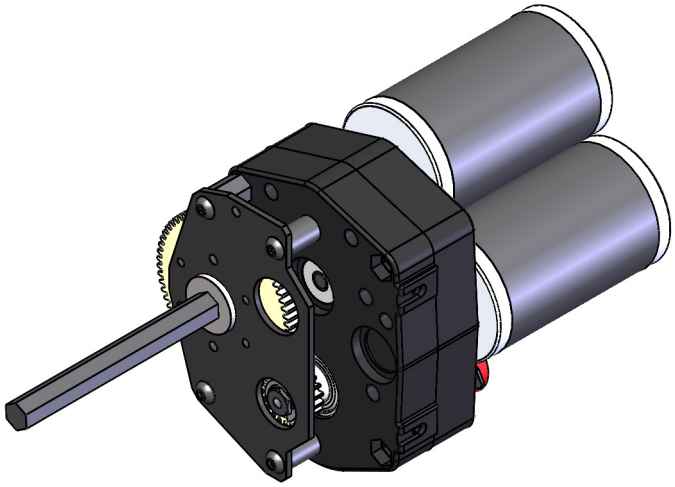
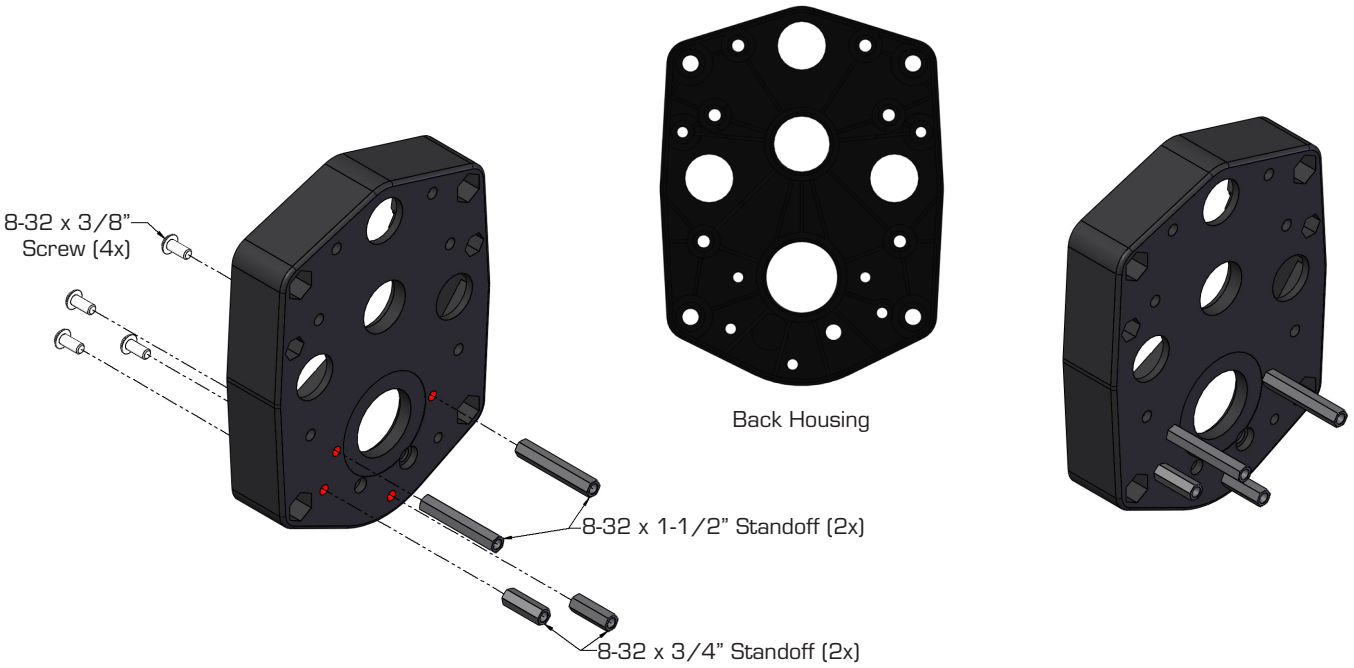
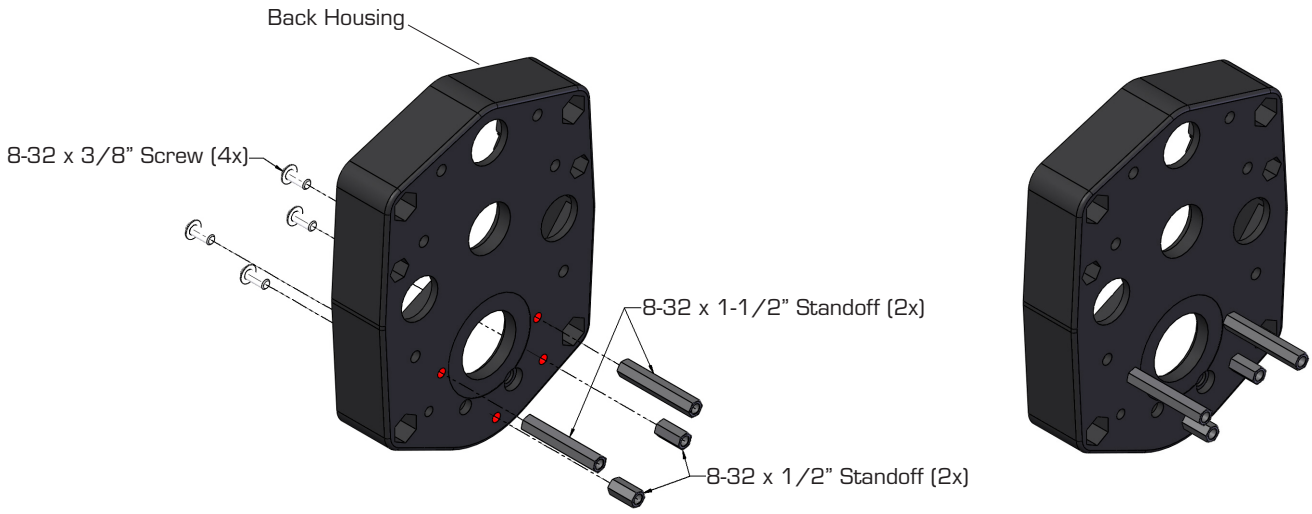
VEXpro 3 CIM Ball Shifter with 3rd Stage

Assembly Instructions

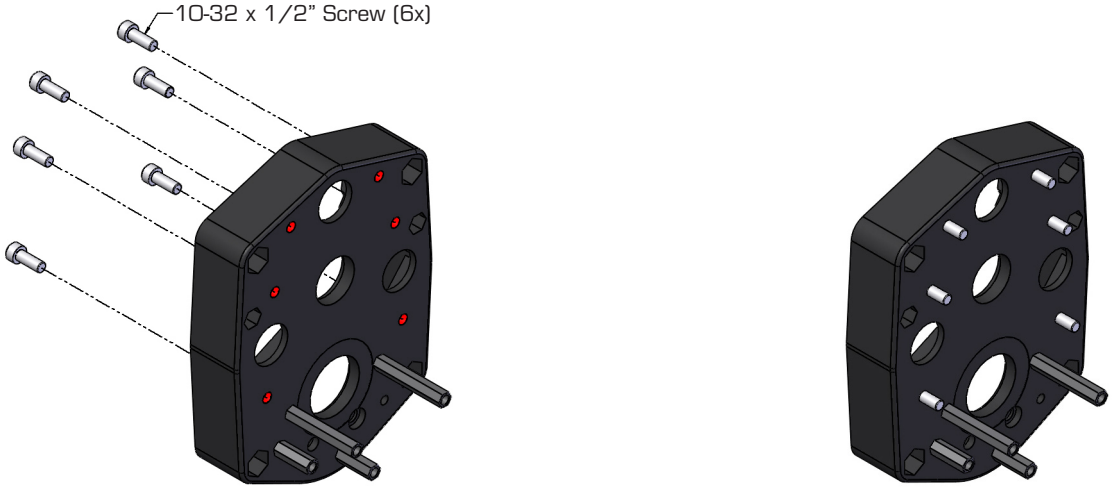




Step 1 (Grayhill Series 63R Encoder):
If using a Grayhill Series 63R encoder, use (4X) 8-32 x 3/8" screws to attach (2X) 8-32 x 1-1/2" and (2X) 8-32 x 3/4" standoffs as shown above. Use of Loctite is recommended with all screws.

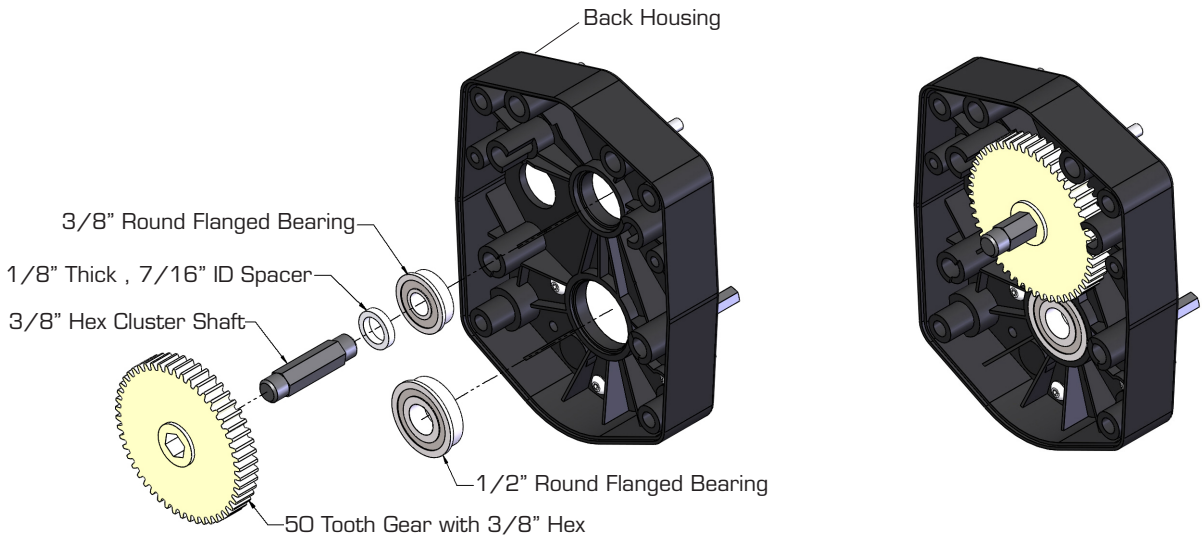


Step 1 (US Digital E4P Encoder):
If using a US Digital E4P encoder, use (4X) 8-32 x 3/8" screws to attach (2X) 8-32 x 1-1/2" and (2X) 8-32 x 1/2" standoffs as shown above. Use of Loctite is recommended with all screws.



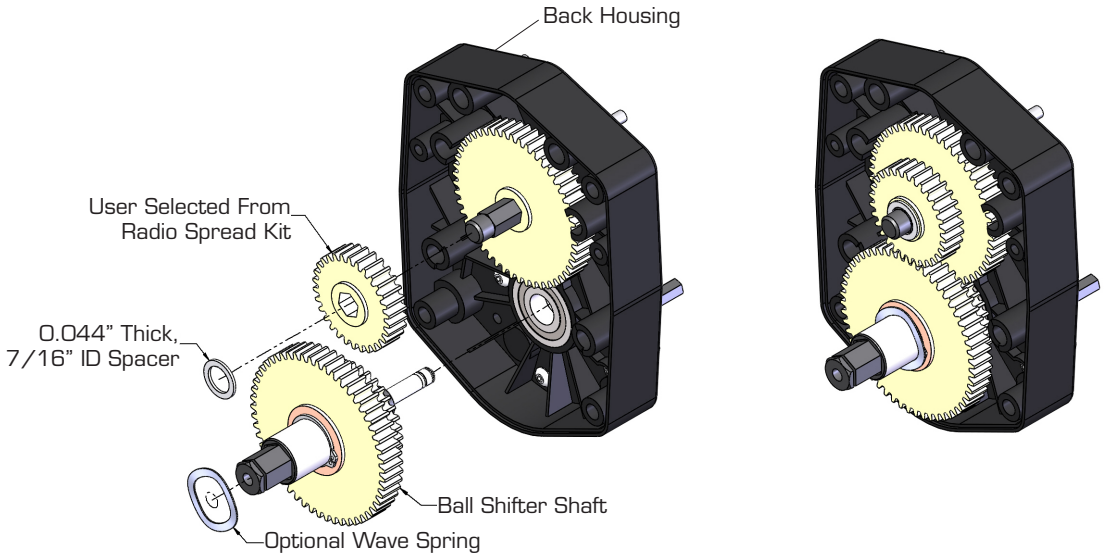
Step 2:
Insert (6X) 10-32 x 1/2" screws into the back shifter housing as shown.

Note: These screws will not be retained in this step, but will be impossible to install later with certain gear configurations.

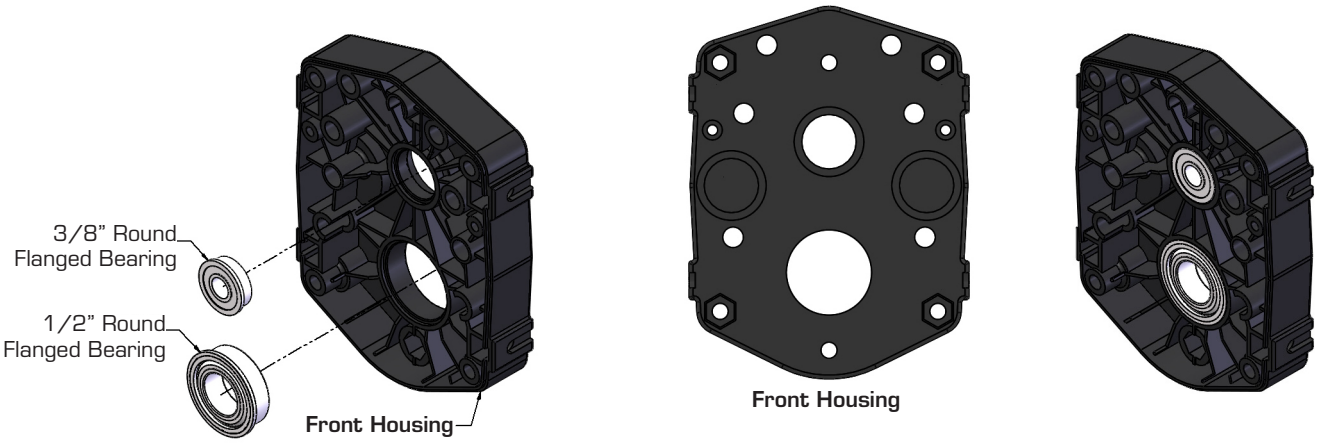


Step 3:
Insert 1/2" and 3/8" round flanged bearings, cluster shaft, 1/8" spacer, and 50 tooth gear into the back shifter housing as shown.

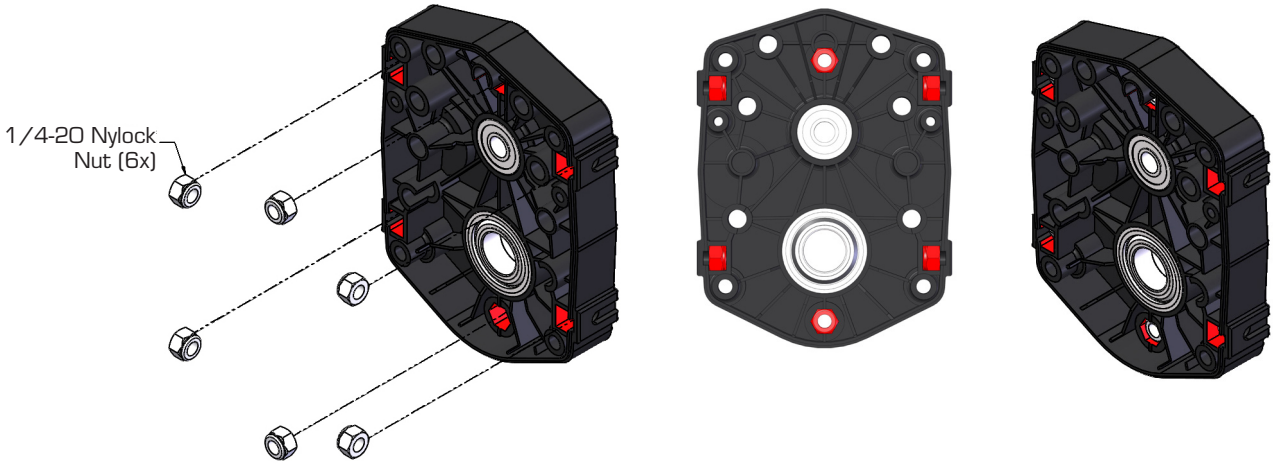
Note: The 1/8" spacer is the thicker of the two included spacers.



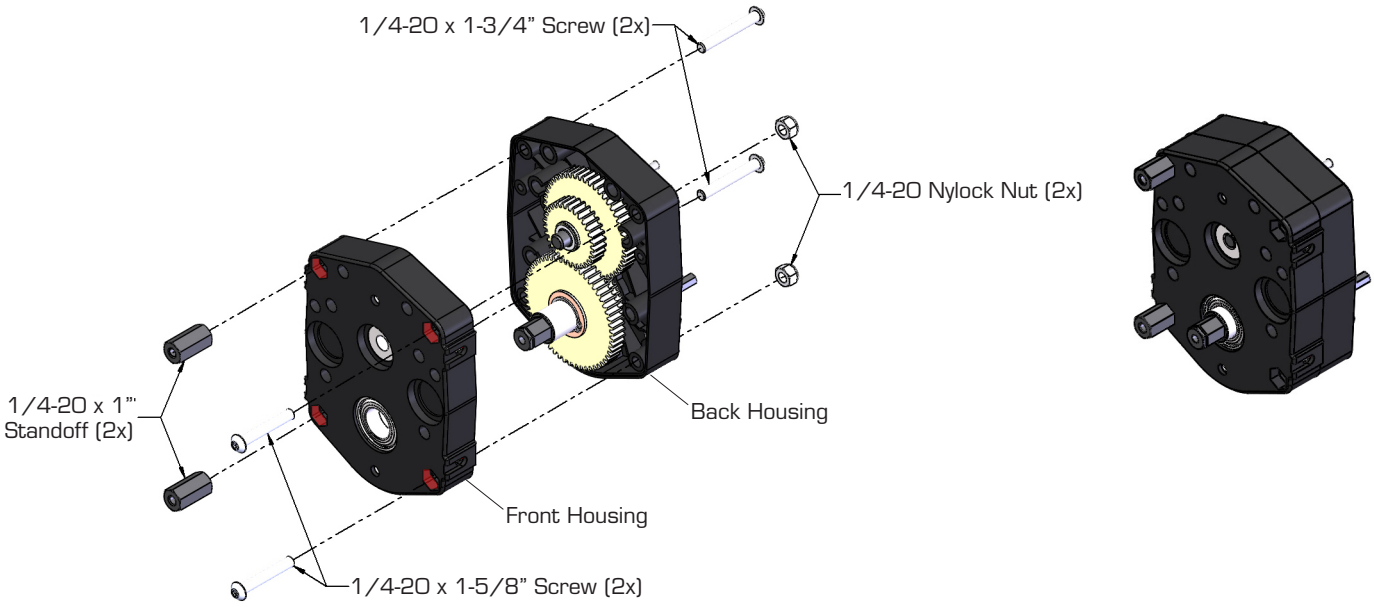
Step 4:
Install the pre-assembled ball shifter shaft, user selected gear, and .044" spacer as shown above. Installation of the included wave spring is optional. Its use may reduce "slop" along the shifter shaft but will decrease the efficiency of the gearbox. **At this point, a liberal application of white lithium grease is required on all gears.**



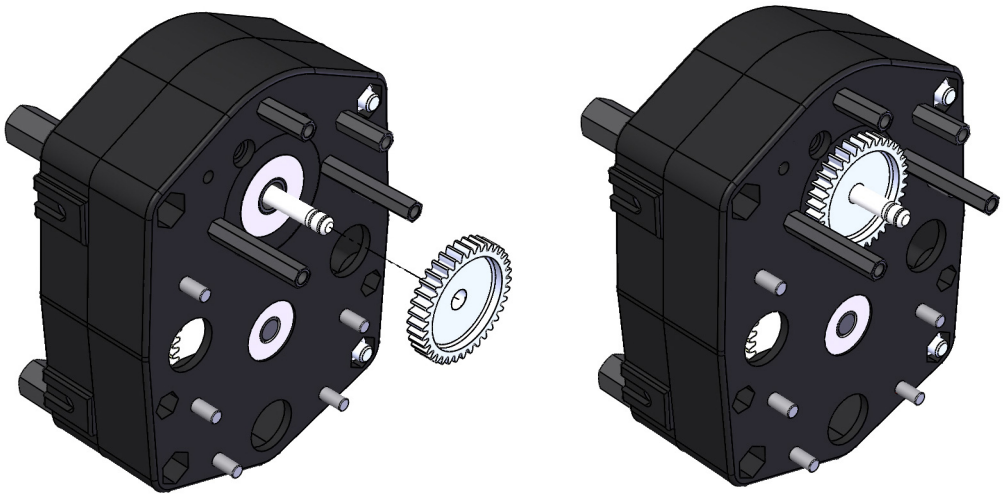
Step 5:
Insert a 3/8" bearing and a 1/2" bearing into front housing as shown above.



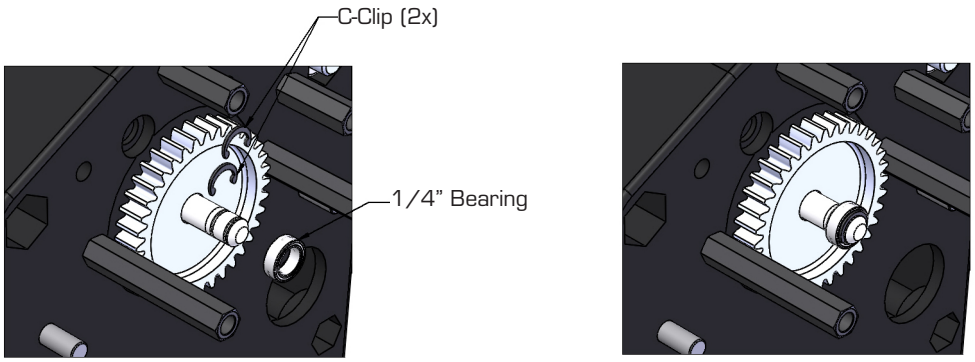
Step 6:
Insert (6X) 1/4-20 Nylock nuts into front housing as shown above.



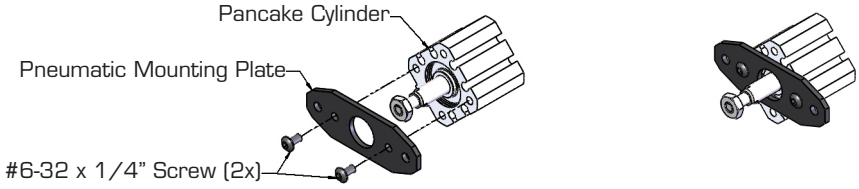
Step 7:
Connect the Front and Back Housings using (2X) 1/4-20 x 1-3/4" screws, (2X) 1/4-20 x 1" standoffs, (2X) 1/4-20 Nylock nuts, and (2X) 1/4-20 x 1-5/8" screws as shown. Use of Loctite is not recommended with Nylock nuts.



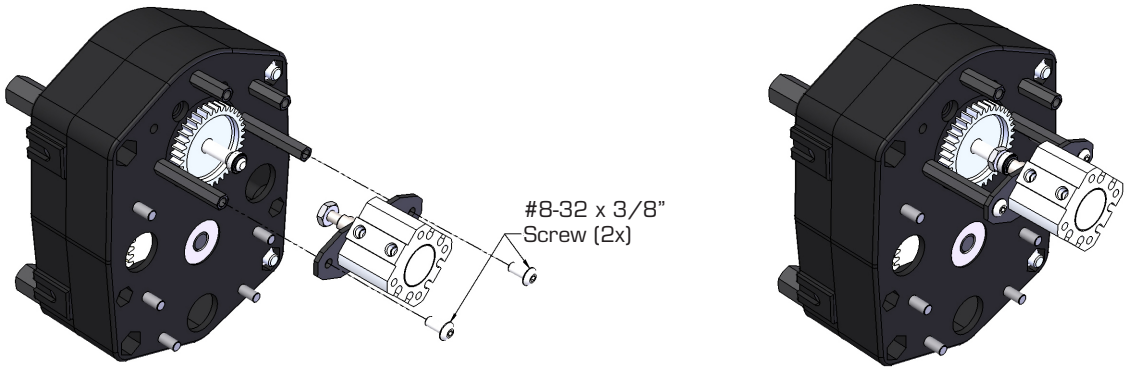
Step 8:
Insert the 36 tooth encoder gear into the rear of the shifter shaft. Insertion will require a light press. It is recommended that a deep socket be used to press the gear in. Slide a deep socket over 1/4" shaft and apply force to socket to press in the gear.



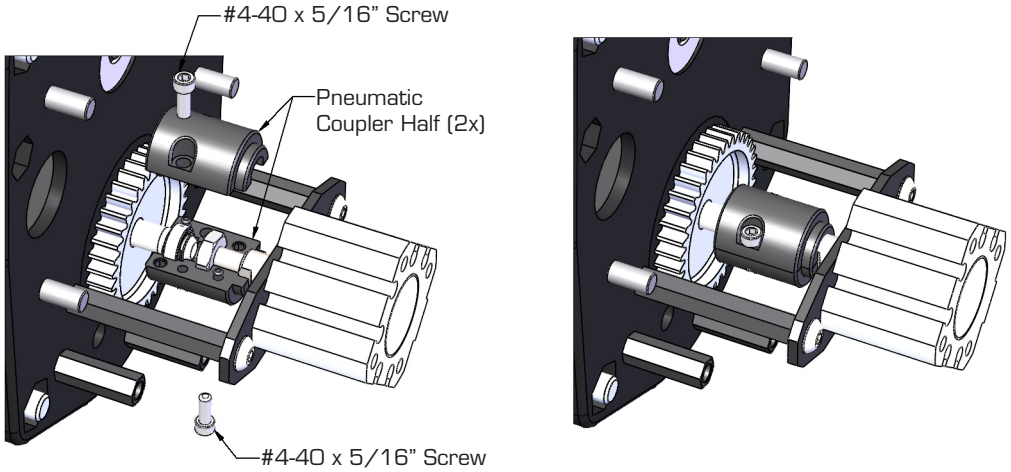
Step 9:
Snap the first C-Clip into the groove closest to the encoder gear. After the first C-Clip is installed, slide the 1/4" bearing onto the shaft and install the second C-Clip to retain the bearing.



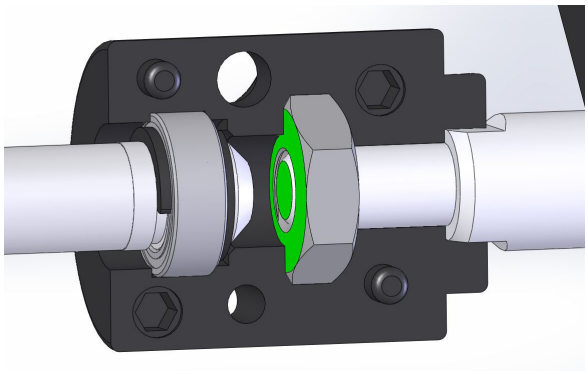
Step 10:
Install choice of pneumatic fittings. Then use (2X) 6-32 x 1/4" screws to attach the pneumatic mounting bracket to the pancake cylinder as shown.



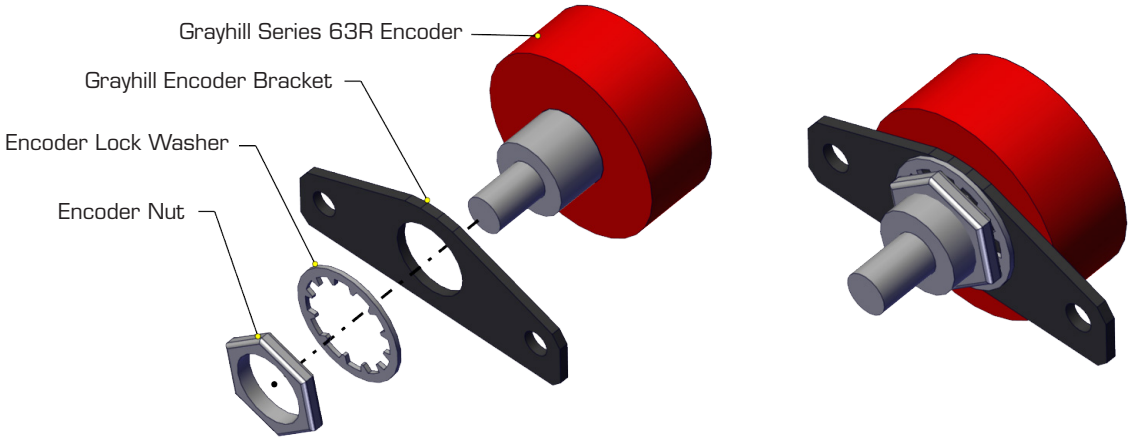
Step 11:
Use (2X) 8-32 x 3/8" to mount the assembly from Step 10 as shown.



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



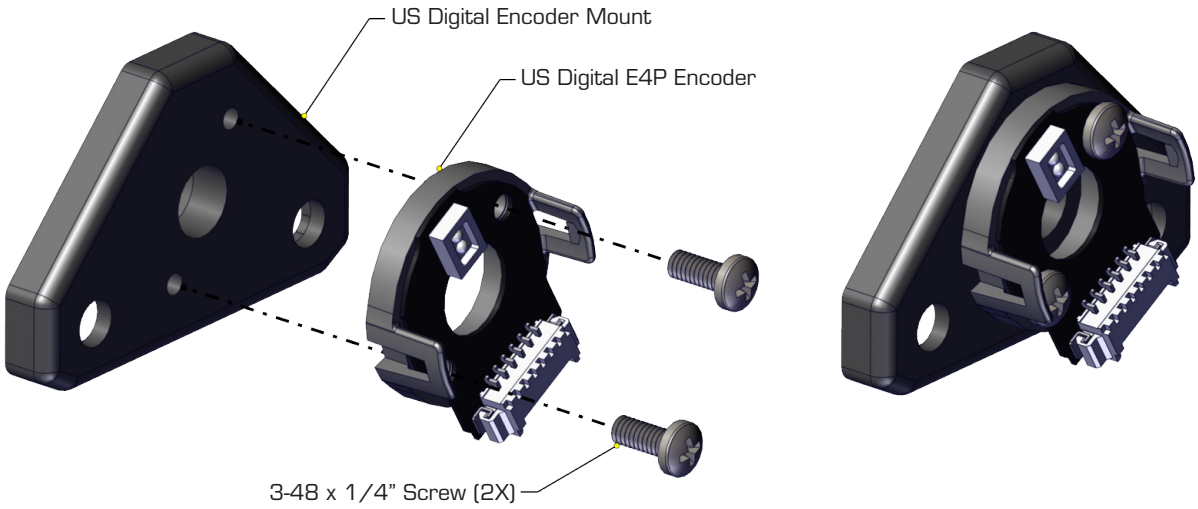
Step 12:
Use a pneumatic coupler half (both halves are identical) to capture the pancake cylinder rod and the bearing installed in Step 9 as shown. Then use (2X) 4-40 x 5/16" screws to attach the two halves as shown.



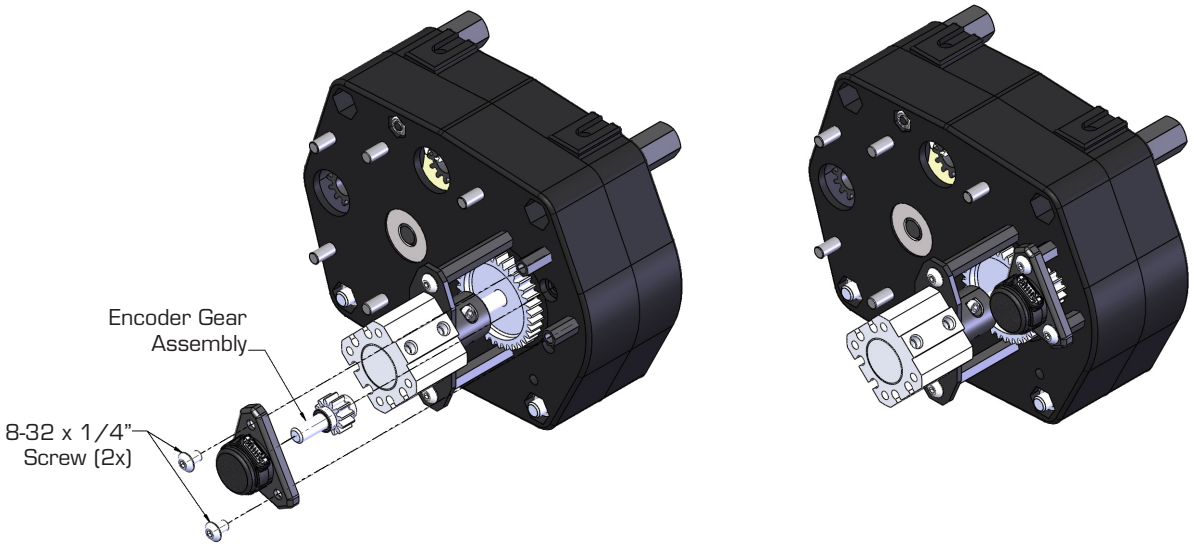
Step 13 (Grayhill Series 63R Encoder):
If using a Grayhill Series 63R encoder (not included), use the nut and lock washer included with the encoder to mount it to the Encoder Mounting Bracket as shown.

Step 14 (Grayhill Series 63R Encoder):
Press the 12 tooth encoder gear on the input shaft of the encoder, this will be a light press fit. Use (2X) 8-32 x 3/8" screws to mount the encoder assembly from Step 11 as shown. After the encoder is mounted, adjust the position of the 12 tooth gear to ensure it is not rubbing on the rear housing.

Note: The ratio between the output shaft and the encoder is 3:1. For each revolution of the output shaft, the encoder will make 3 revolutions.

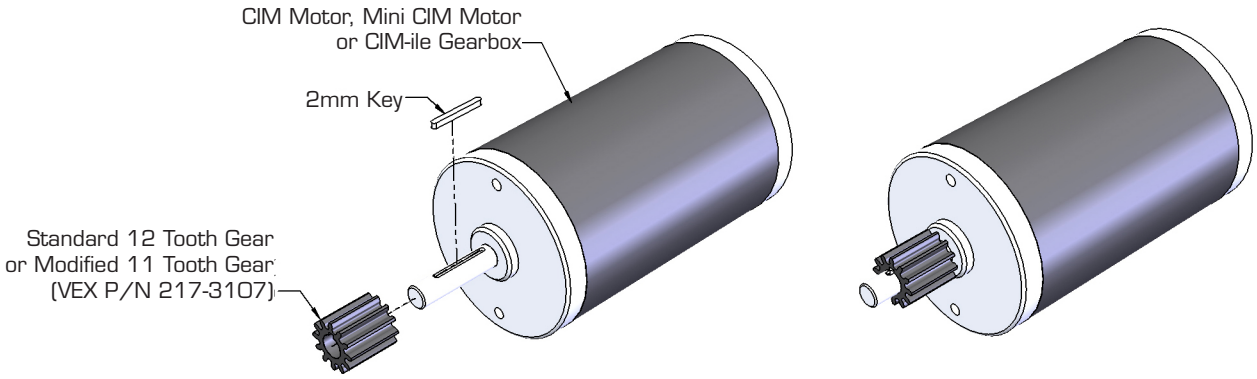


Step 13 (US Digital E4P Encoder):
Use the (2X) 3-48 x 1/4" screws included with the E4P Encoder to mount the encoder to the US Digital encoder mount as shown.



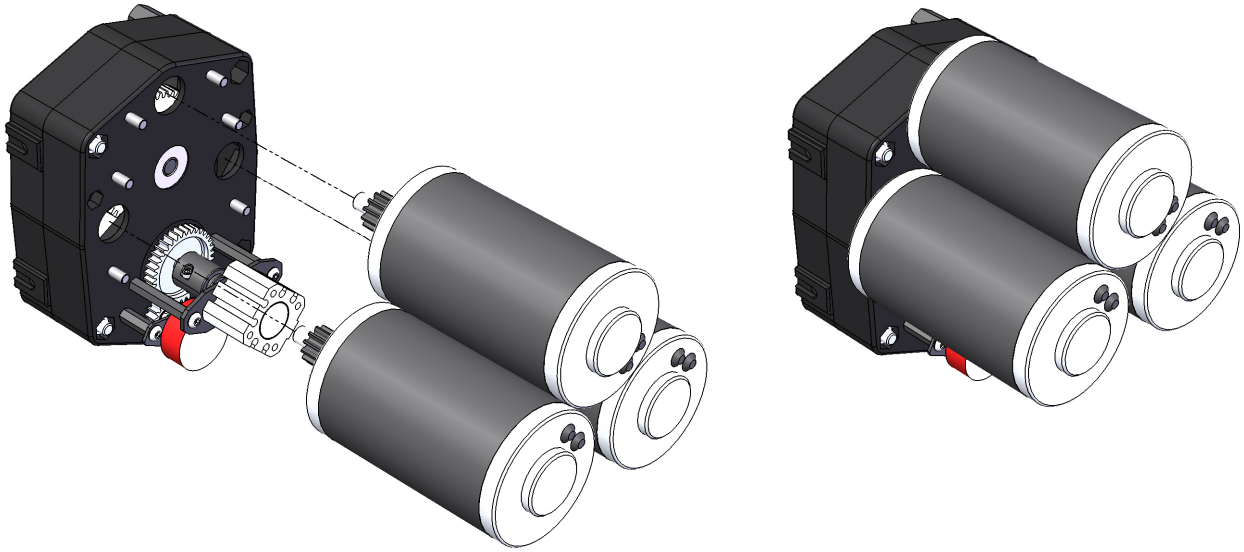
Step 14 (US Digital E4P Encoder):
Insert the encoder gear assembly into the E4P encoder then use (2X) 8-32 x 1/4" screws to mount the assembly from Step 11 as shown above. Once the encoder is mounted, follow US Digital's instructions for further encoder assembly.

Note: The ratio between the output shaft and the encoder is 3:1. For each revolution of the output shaft, the encoder will make 3 revolutions.

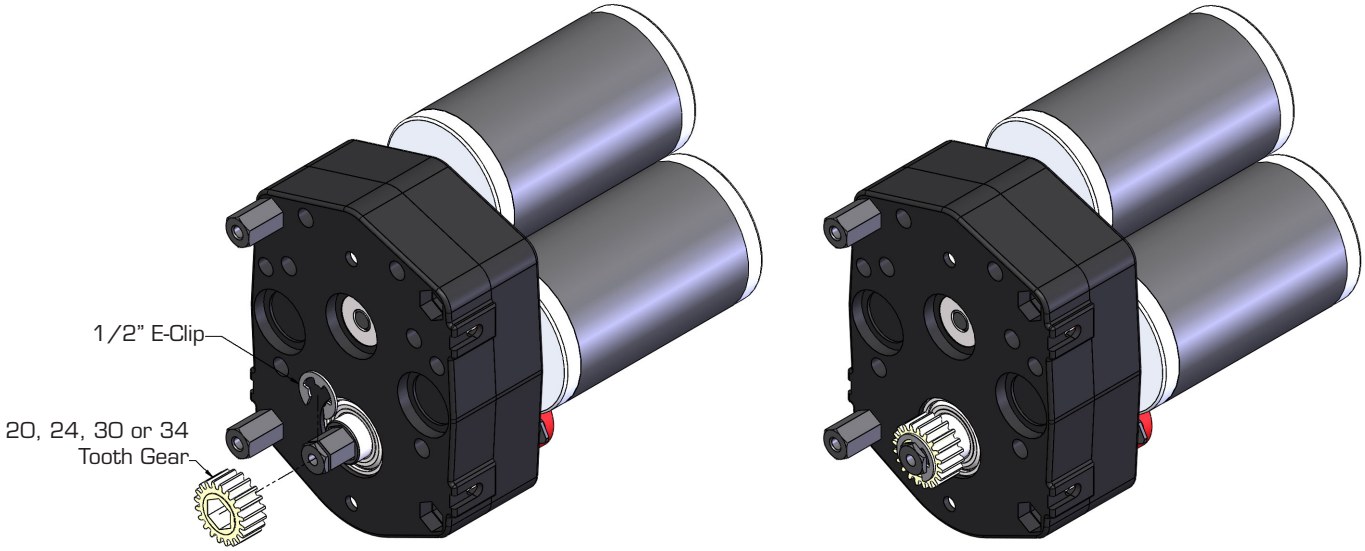


Step 15:
Insert a 2mm key into the keyway of the motor and slide the 12 tooth or modified 11 tooth pinion gear on as shown. Repeat for total motor assemblies.

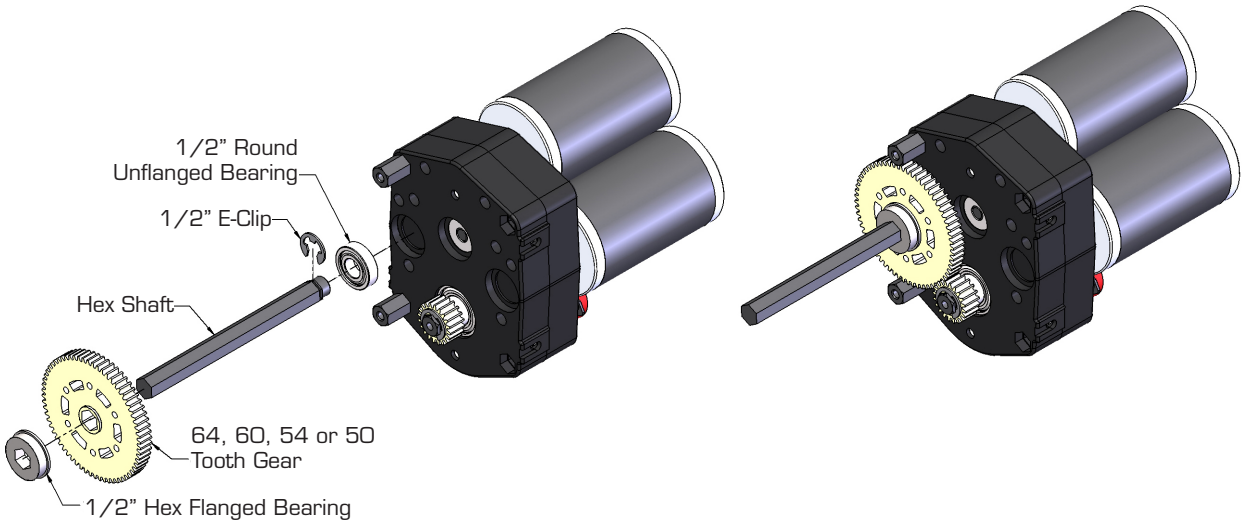
Note: Pinion gear is retained by the front and back housing. No retaining ring or collar is needed. Using a retaining collar will bind the gear box.



Step 16:
Use the (6X) 10-32 x 1/2" screws from Step 2 to mount (3X) motor assemblies from Step 16.

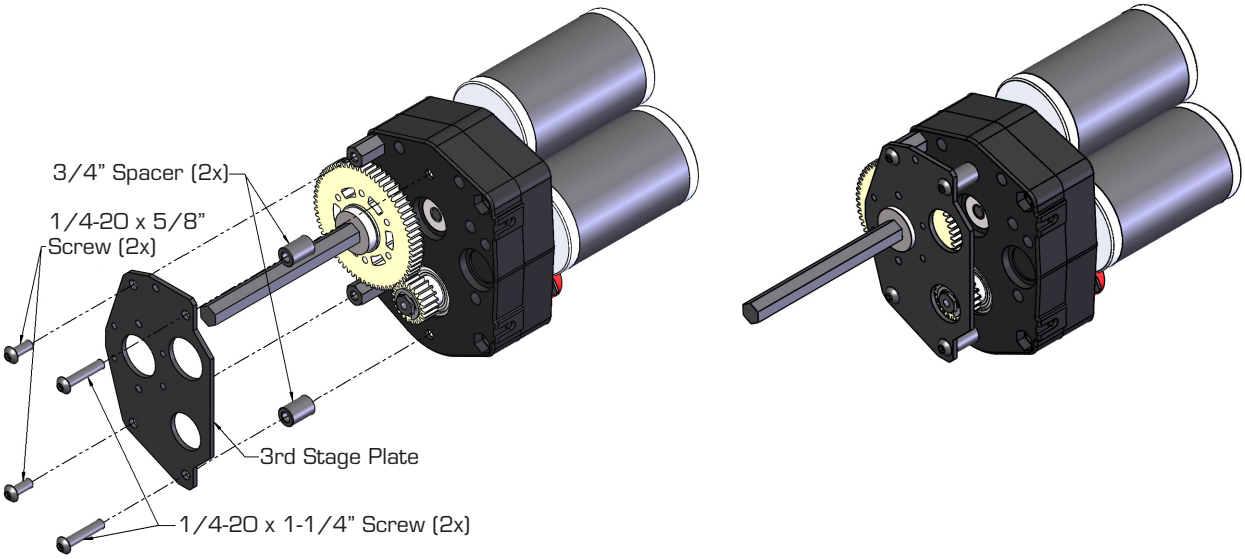


Step 17:
Install a 20, 24, 30, or 34 tooth gear. Insert a 1/2" E-Clip to retain the gear as shown.



Step 18:
Install a 1/2" unflanged bearing, hex output shaft, E-Clip, a 64, 60, 54, or 50 tooth gear, and a 1/2" flanged hex bearing as shown.

Note: The sum of the teeth of the two gears installed in Step 17 must be equal to 84 teeth.



Step 19:
Install (2X) 3/4" spacers, 3rd Stage Plate, (2X) 1/4-20 x 5/8" screws, and (2X) 1/4-20 x 1-1/4" screws as shown.