

GreyT Telescope - User Guide (Rev 1)

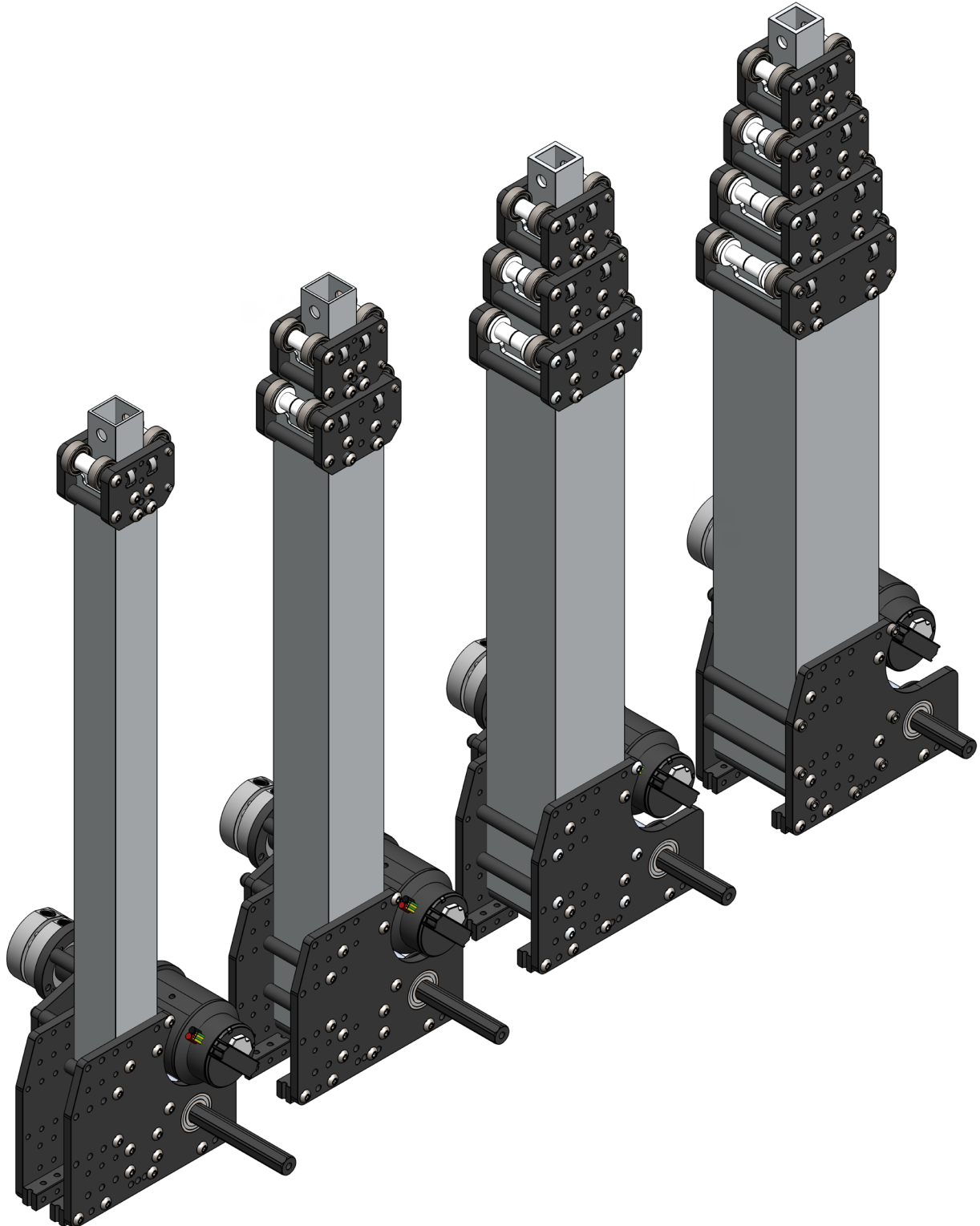




Table of Contents

What is the GreyT Telescope?	5
Calculating Tube Lengths	6
Tube Hole Patterns	7
GreyT Bottom Block Assembly Instructions	9
GreyT Bottom Block - Step 1	10
GreyT Top Block Assembly Instructions	11
GreyT Top Block - Step 1	12
GreyT Top Block - Step 2	13
GreyT Top Block - Step 3	14
Gearbox Assembly Instructions	15
Gearbox - Step 1	16
Gearbox - Step 2	17
Gearbox - Step 3	18
Gearbox - Step 4	19
Gearbox - Step 5	20
Gearbox - Step 6	21
Gearbox - Step 7	22
Gearbox - Step 8	23
Gearbox - Step 9	24
Gearbox - Step 10	29
Gearbox - Step 11	31
Telescope Assembly Instructions	32
Telescope - Step 1	33
Telescope - Step 2	34

GreyT Telescope - User Guide

(Rev 1)



Telescope - Step 3	35
Telescope - Step 4	36
Telescope - Step 5	37
Telescope - Step 6	38
Telescope - Step 7 (Non-Flipped)	40
Telescope - Step 7 (Flipped)	41
Available Kits	42
KIT-0018: GreyT 1 Stage Telescope (All .060" Wall)	43
KIT-0019: GreyT 1 Stage Telescope (All .125" Wall)	43
KIT-0020: GreyT 2 Stage Telescope (All .060" Wall)	44
KIT-0021: GreyT 2 Stage Telescope (All .125" Wall)	44
KIT-0022: GreyT 3 Stage Telescope (Mixed .060 & .125" Wall)	45
KIT-0023: GreyT 3 Stage Telescope (All .125" Wall)	45
KIT-0024: GreyT 4 Stage Telescope (Mixed .060 & .125" Wall)	46
KIT-0025: GreyT 4 Stage Telescope (All .125" Wall)	46
KIT-0026: GreyT Telescope Gearbox (Falcon, 10.61:1)	47
KIT-0027: GreyT Telescope Gearbox (Falcon, 15.34:1)	48
KIT-0028: GreyT Telescope Gearbox (Falcon, 20.25:1)	49
KIT-0029: GreyT Telescope Gearbox (Cim, 10.62:1)	50
KIT-0030: GreyT Telescope Gearbox (Cim, 15.60:1)	51
KIT-0031: GreyT Telescope Gearbox (Cim, 18.00:1)	52
WCP-0416: GreyT Telescope Gearbox (Stages #1-4)	53
WCP-0418: GreyT Telescope (Stage #1, 1.5" to 1")	54
WCP-0419: GreyT Telescope (Stage #2, 2" to 1.5")	55
WCP-0420: GreyT Telescope (Stage #3, 2.5" to 2")	56

GreyT Telescope - User Guide (Rev 1)



WCP-0421: GreyT Telescope (Stage #4, 3" to 2.5")	57
FAQ	58
Revision Table	59



What is the GreyT Telescope?

The Greyt Telescope kit lets you make a linear telescoping system with little to no effort. Up to 40 inches per stage, up to 4 stages, and more than enough power from the Falcon 500 motor. Lock your telescope in place with either the Ratchet & Pawl or the WCP Friction Brake. Use it for fast and secure climbs, or any other fine-controlled linear mechanisms.

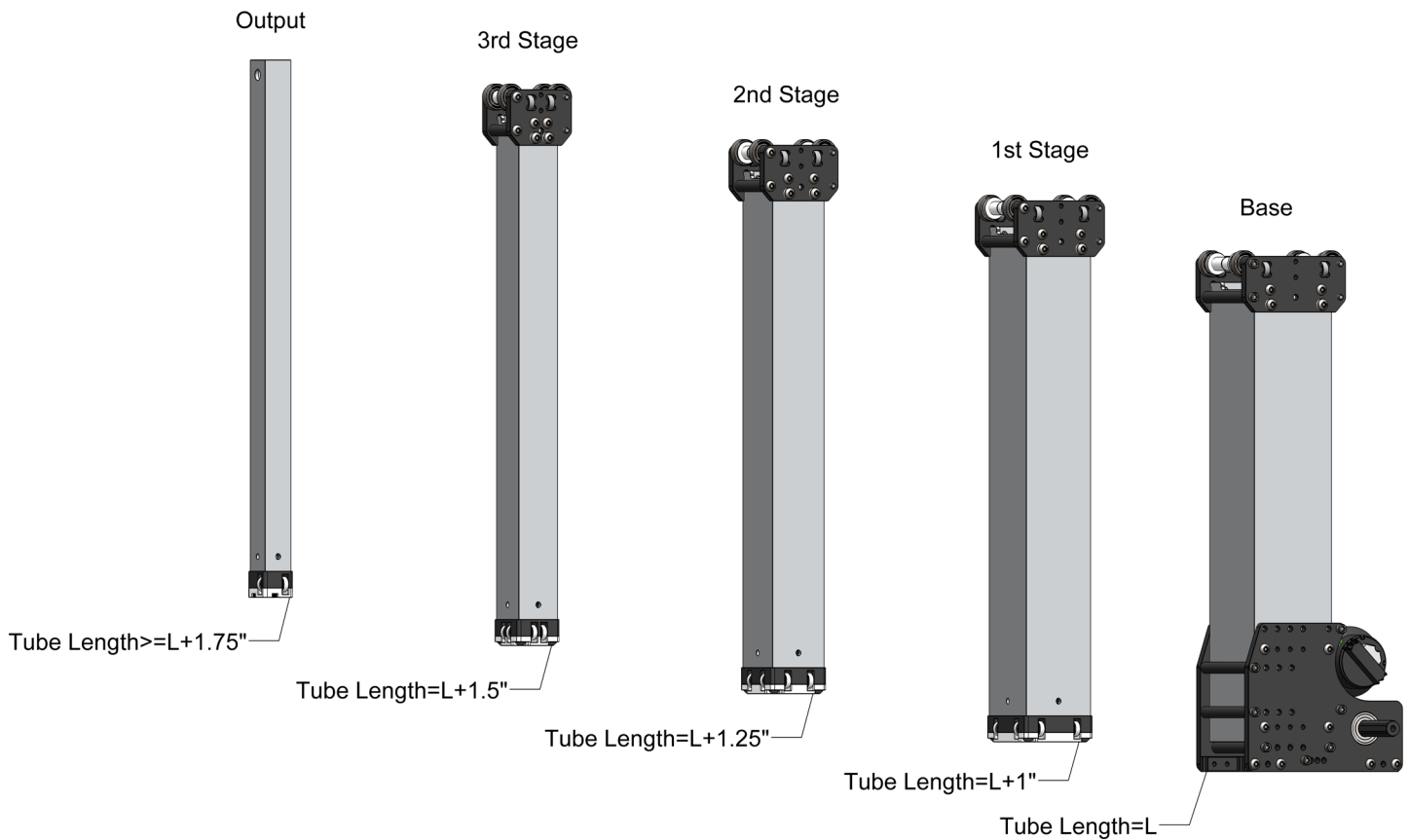
Notable features:

- Configurable, up to 4 stages.
- Easy to assemble and maintain.
- All bearings, no sliders.
- Integrated gearbox and mounting.
- Built in option for Ratchet & Pawl or WCP Friction Brake.
- Works with .060" and .125" tubing.
- No CNC machining required.
- Proper hardstops.
- Improved design, removes common failure point of internal bolts.

Calculating Tube Lengths

The image below shows the equations for calculating the length of each tube. Each of the moving stages are 1/4" longer than the preceding stage, and the first stage is 1" longer than the base tube.

Note: The max tube length for each stage (excluding the output stage) is roughly 40". This is due to the max safe extension of the CF Springs sold by WCP, which is 40".



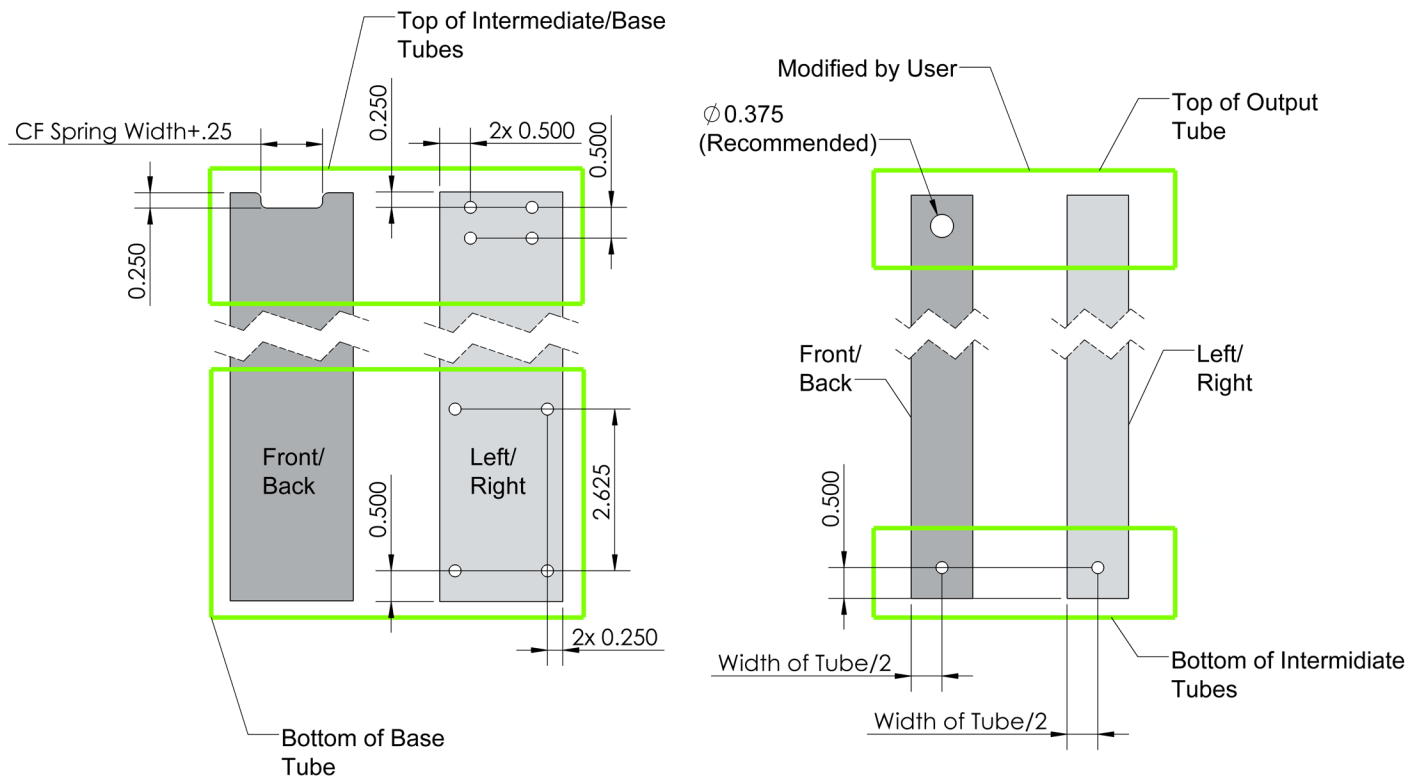


Tube Hole Patterns

The holes in the bottom of the Base Tube and top of the Intermediate/Base Tubes are used to pin the Top Blocks and Gearbox to their respective tubes. The holes in the bottom of the Intermediate Tube are used to install the Bottom Blocks, Hardstops, and CF Springs to their respective tubes. The top of the output tube will be determined by the user. This is the recommended spot for the Telescope String to anchor to, as it is the easiest place to do so.






Note: Unless otherwise specified all holes are 0.196", or clearance for #10-32 Bolts.

Note: An easy way to anchor the string to the output tube is to drill a 3/8" hole in the end of the tube and run a 3/8" OD shaft through for the string to be tied to.





Recommended Tools

Picture	Name
	Snapping Pliers for 1/2" and 3/8" Snaprings
	SAE/Inch Allen Set
	Drill
	#18 and Ltr. F Drill Bits
	5/16-18 Tap

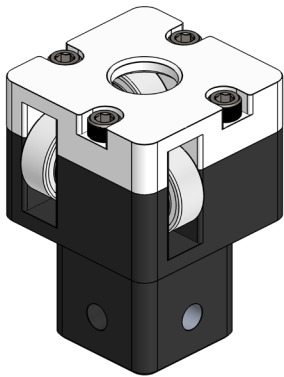


GreyT Bottom Block Assembly Instructions

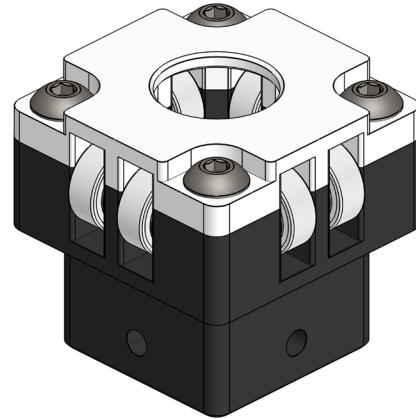
Assembly instructions are interchangeable between the 1", 1-1/2", 2", and 2-1/2" GreyT Telescope Bottom Blocks.

Note: Blue Loctite (McMaster P/N 1004A12) is recommended on all bolts that thread into a tapped hole.

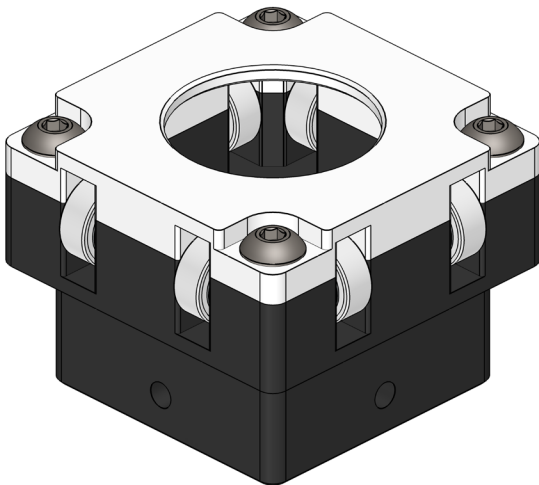
1" Tube Bottom Block



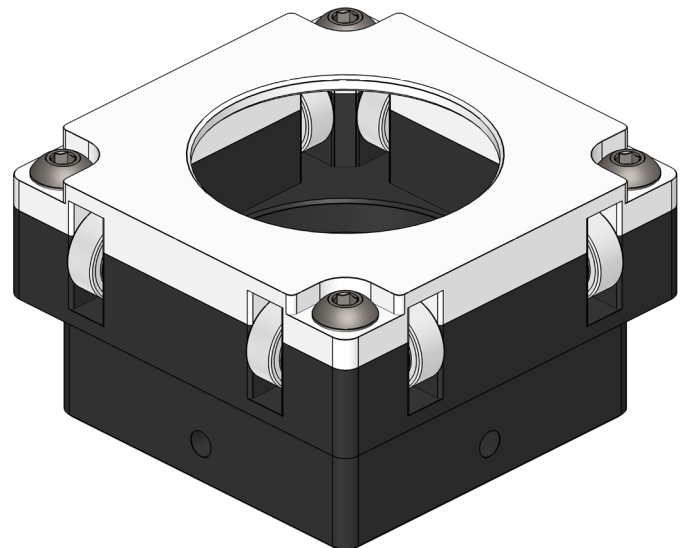
1-1/2" Tube Bottom Block



2" Tube Bottom Block



2-1/2" Tube Bottom Block

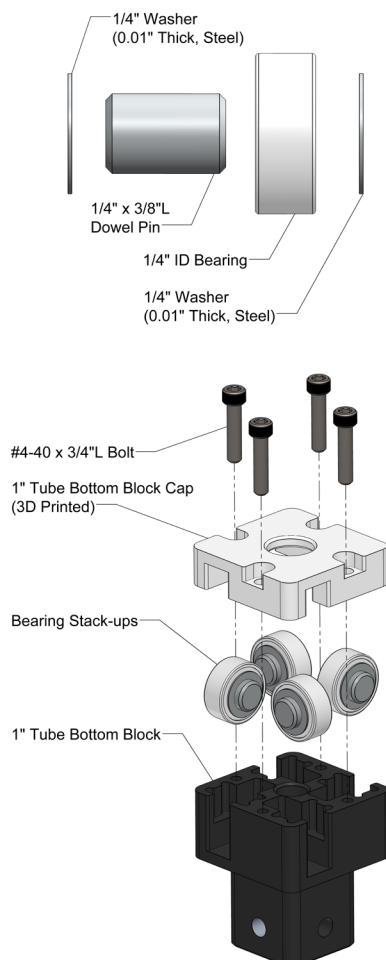


GreyT Bottom Block - Step 1

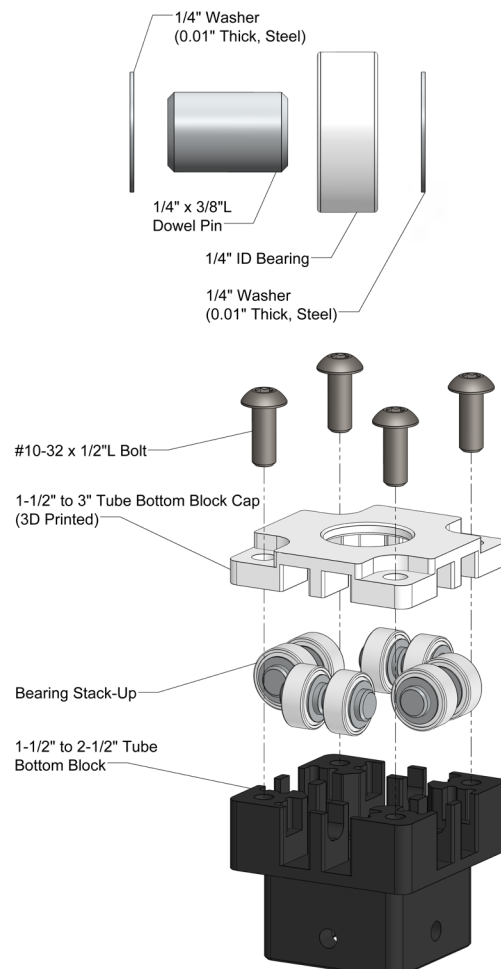
The size of the 1/4" ID bearings used in this step are determined by the wall thickness of tube you are using. For 1/8" wall tube these bearings will be 1/4" ID x 1/2" OD bearings, and for 1/16" wall tube these bearings will be 1/4" ID x 5/8" OD bearings.

There should be one Bearing Stack-Up for each slot in the GreyT Bottom Block you are assembling; 4 for the 1" Tube Bottom Block, and 8 for the 1-1/2" to 2-1/2" Tube Bottom Blocks.

1" Tube Bottom Block



1-1/2" to 2-1/2" Tube Bottom Block

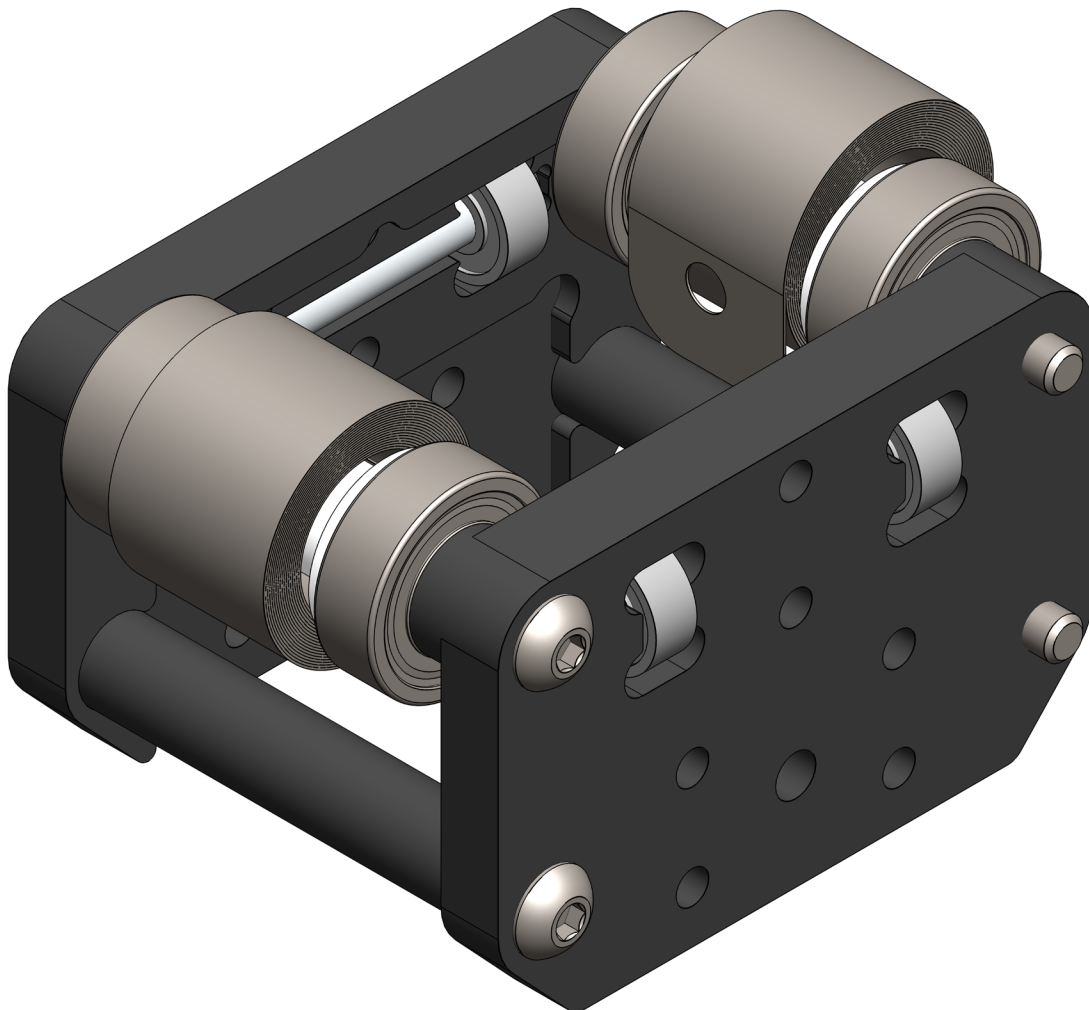




GreyT Top Block Assembly Instructions

Assembly instructions are interchangeable between all sizes of the GreyT Top Block. For the purposes of this User Guide, the 2" GreyT Top Block is used as an example.

Note: Blue Loctite (McMaster P/N 1004A12) is recommended on all bolts that thread into a tapped hole.



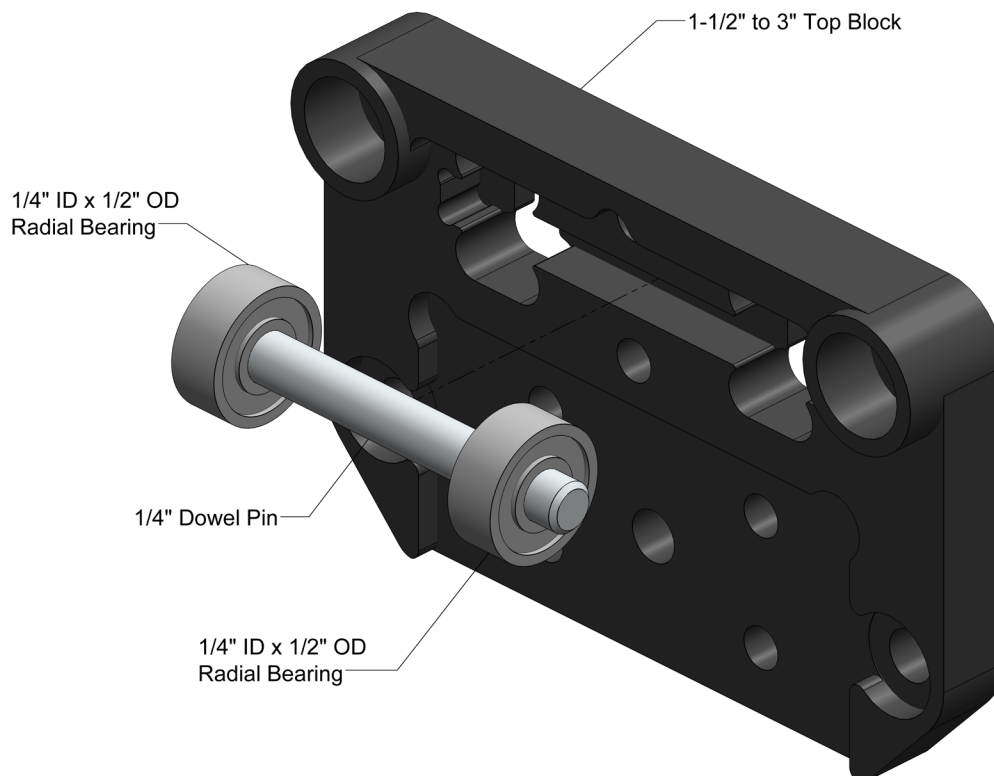
GreyT Top Block - Step 1

The 1/4" ID x 1/2" OD bearings will sit in the slots in the Top Block. A ziptie can be used to hold the 1/4" Dowel Pin in place to make assembly of the Top Block easier.

The table below shows the Dowel Pin size used for each Top Block.

Note: This step must be repeated for both halves of the GreyT Top Block you are assembling.

Top Block Tube Size	Corresponding Dowel Pin Length
1-1/2"	1-1/4"
2"	1-3/4"
2-1/2"	2-1/4"
3"	2-3/4"





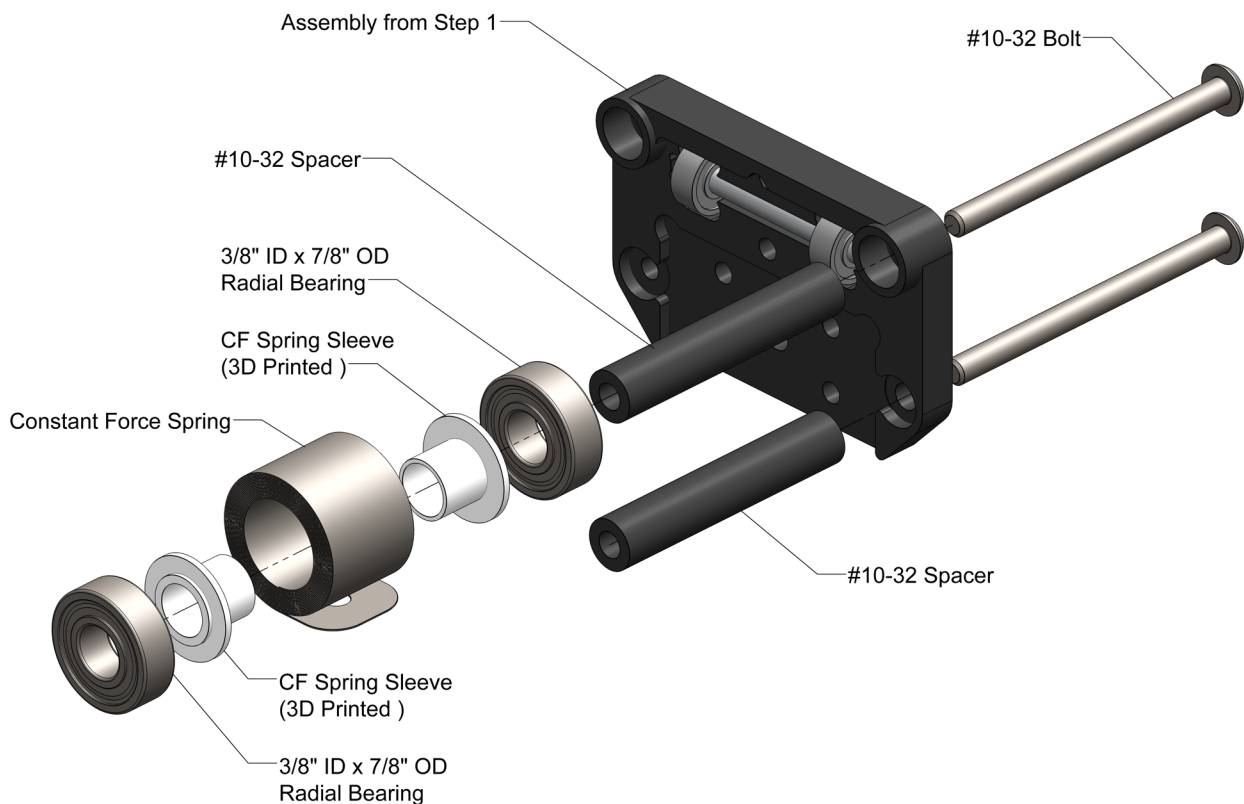
GreyT Top Block - Step 2

Slide on all components in the order shown in the image below.

The table below shows the #10-32 bolt length, #10-32 spacer length, and CF Spring width for each size Top Block.

Note: This step will be repeated for both halves of the GreyT Top Block you are assembling.

Top Block Tube Size	Bolt Length	Spacer Length	CF Spring Width
1-1/2"	2"	1-1/2"	1/2"
2"	2-1/2"	2"	3/4"
2-1/2"	3"	2-1/2"	1"
3"	3-1/2"	3"	1-1/4"

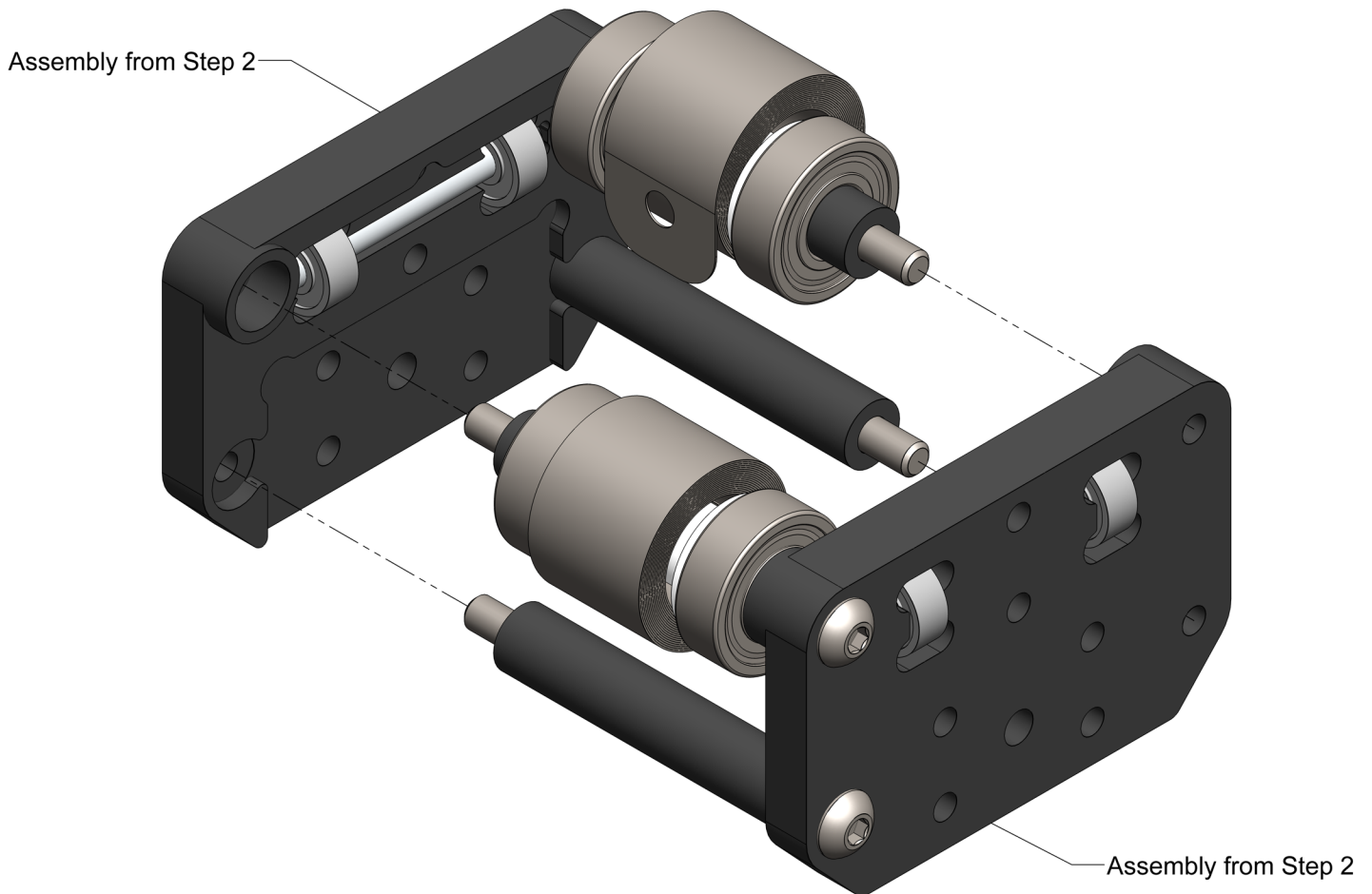




GreyT Top Block - Step 3

The assembled halves from Step 2 should bolt together. Make sure the #10-32 Spacers are fully seated in the Top Block pockets before tightening the bolts.

Warning: The Top Block must be assembled with the CF Springs in the correct orientation shown in Step 2, and in the image down below.



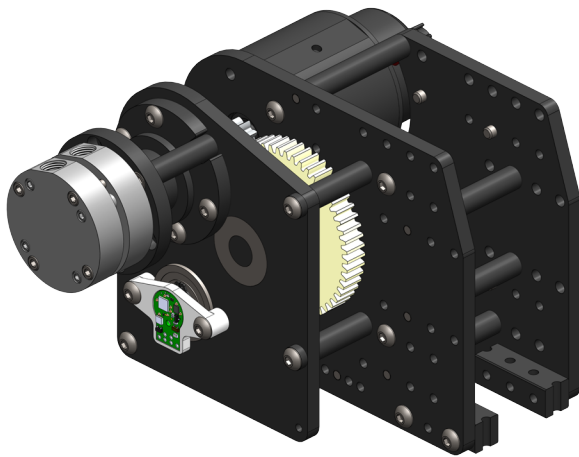


Gearbox Assembly Instructions

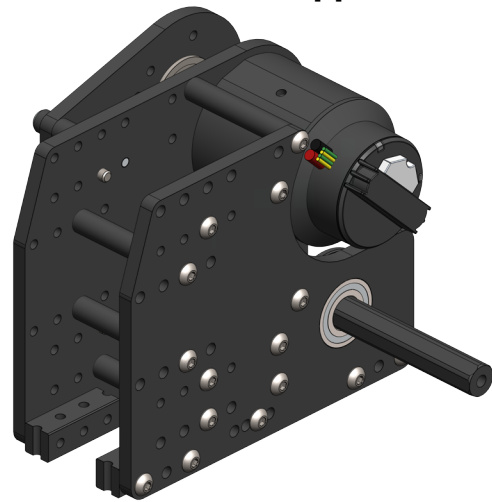
Assembly instructions are interchangeable between all configurations of the GreyT Telescope Gearbox. For the purposes of this User Guide, the 2" Base Gearbox is used as an example.

Note: Blue Loctite (McMaster P/N 1004A12) is recommended on all bolts that thread into a tapped hole.

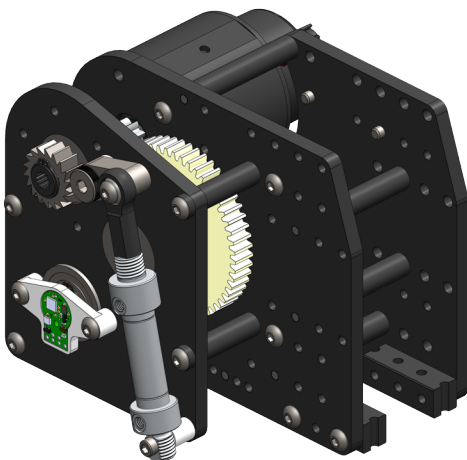
Base Non-Flipped with Brake



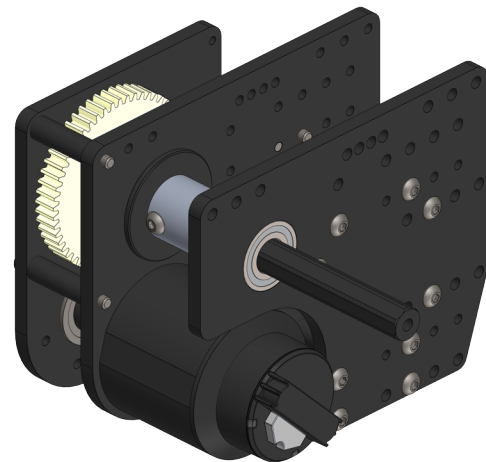
Base Non-Flipped



Base Non-Flipped with Ratchet



Base Flipped





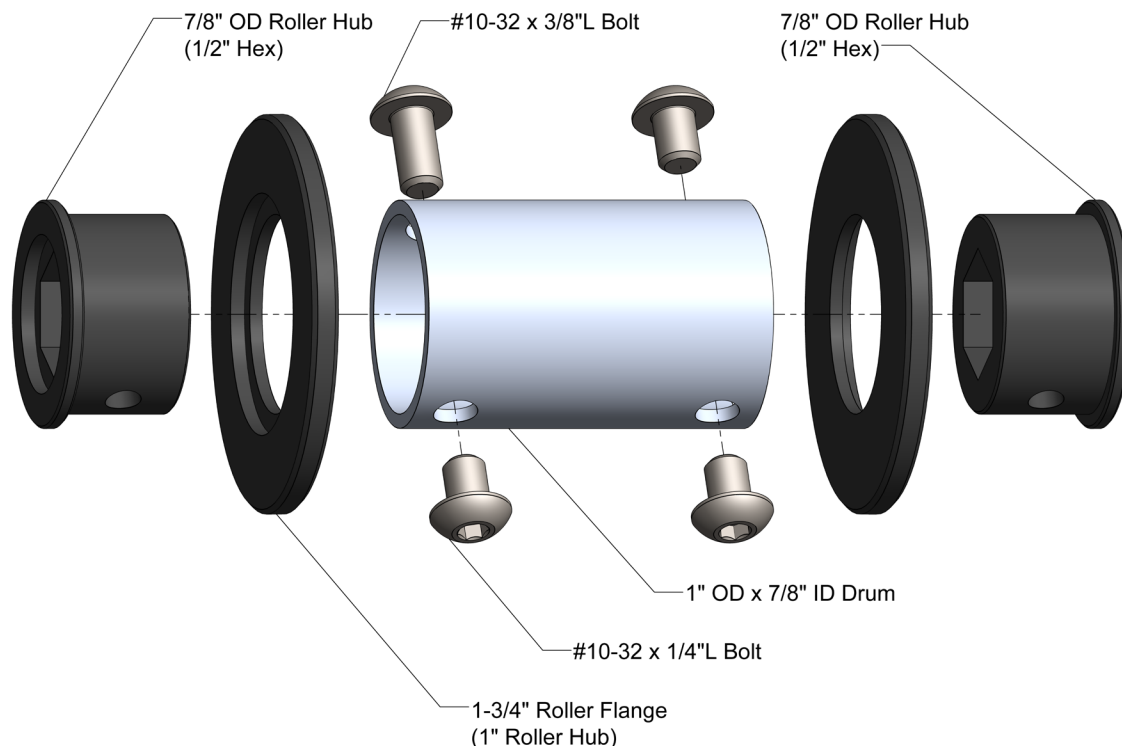
Gearbox - Step 1

The Drum must be cut to the correct length for the Gearbox Configuration you are assembling. The table down below shows the correct lengths for each base tube size.

All #10-32 bolts will thread into the 7/8" OD Roller Hubs after they have been pressed into the Drum. The Roller Hubs should be a press fit and may be pressed in with an arbor press.

Warning: When assembling the drum, it is critical that the hexes for the roller hubs are lined up. In order to do this it is recommended to press one Hub in, and then line up the second Hub with the first Hub using any long piece of 1/2" hex.

Base Tube Size	Correct Drum Tube Length
1-1/2"	1-1/16"
2"	1-9/16"
2-1/2"	2-1/16"
3"	2-9/16"

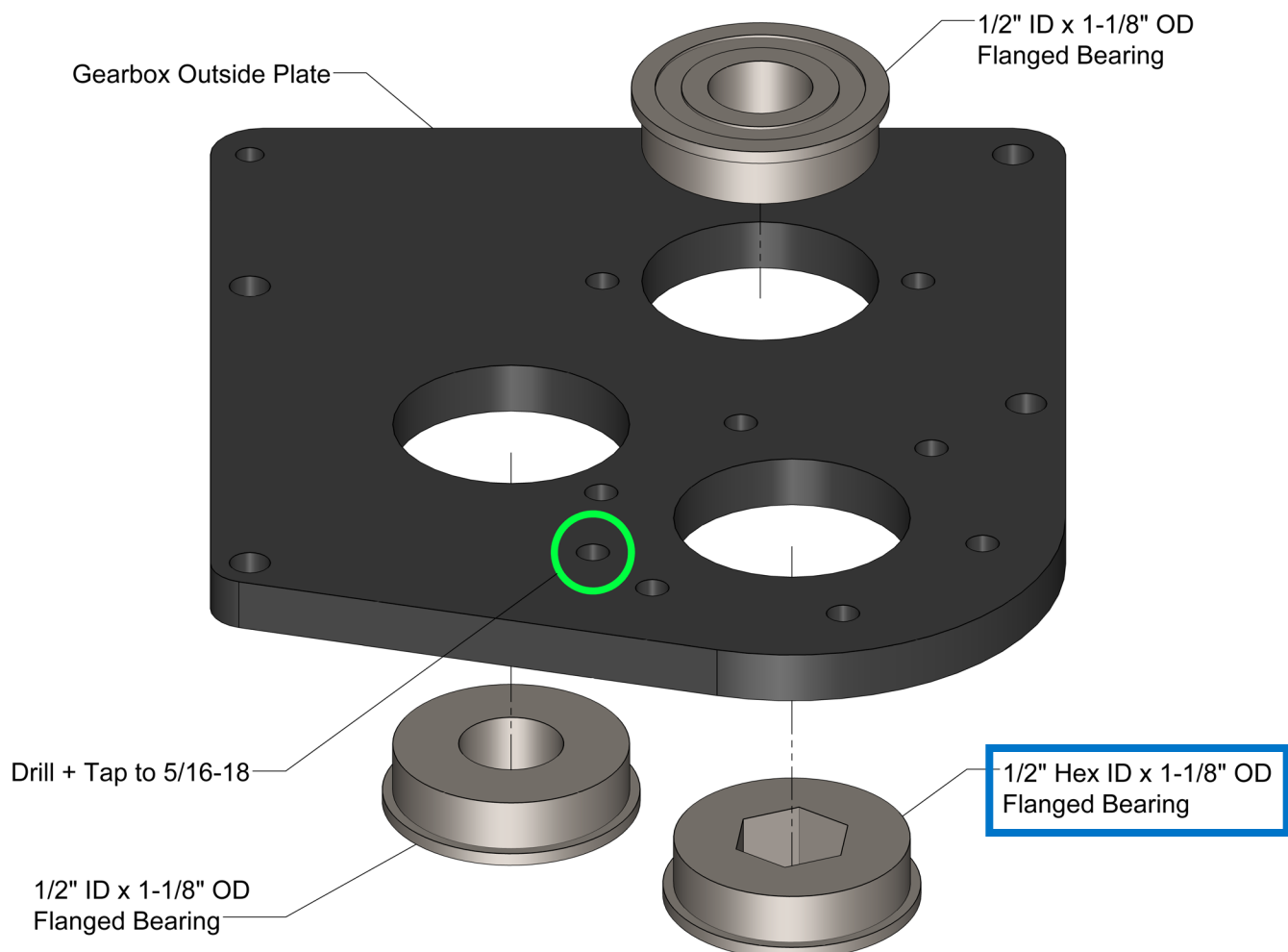


Gearbox - Step 2

These bearings will be a light press fit and may be pressed in by hand or with an arbor press. The image below shows the side the bearings must be installed from for all configurations of the Telescope Gearbox.

If you plan on assembling the Gearbox with the Ratchet & Pawl, the hole marked in green in the image below must be tapped to 5/16-18. Otherwise, that hole can be left alone.

Note: If you do not plan on assembling the Gearbox with either the Ratchet & Pawl or WCP Friction Brake, you may omit the 1/2" Hex ID x 1-1/8" OD Flanged Bearing boxed in blue in the image down below.



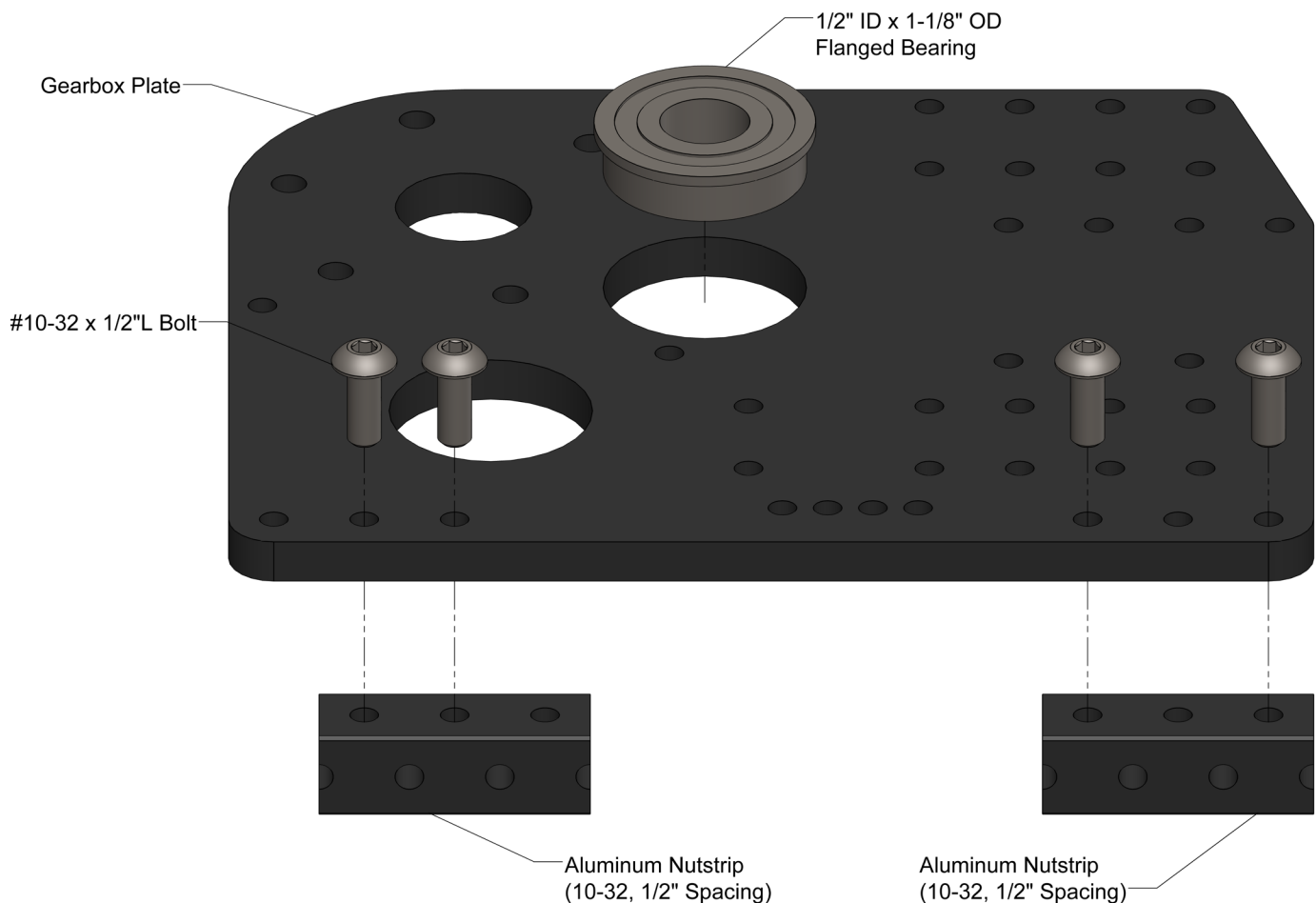


Gearbox - Step 3

The 1/2" ID x 1-1/8" OD Flanged Bearing will be a light press fit and may be pressed in by hand or with an arbor press. The image below shows the side the bearing must be installed from for all configurations of the Telescope Gearbox.

The Nutstrips used to mount the GreyT Telescope must be cut to 1-1/2" long and assembled in the orientation shown in the image below.

Note: The Nutstrips are an optional way of mounting the GreyT Telescope. If you plan on mounting the Telescope differently or are assembling the Gearbox in the Flipped configuration, you may omit the Nutstrips and associated Bolts from this step.

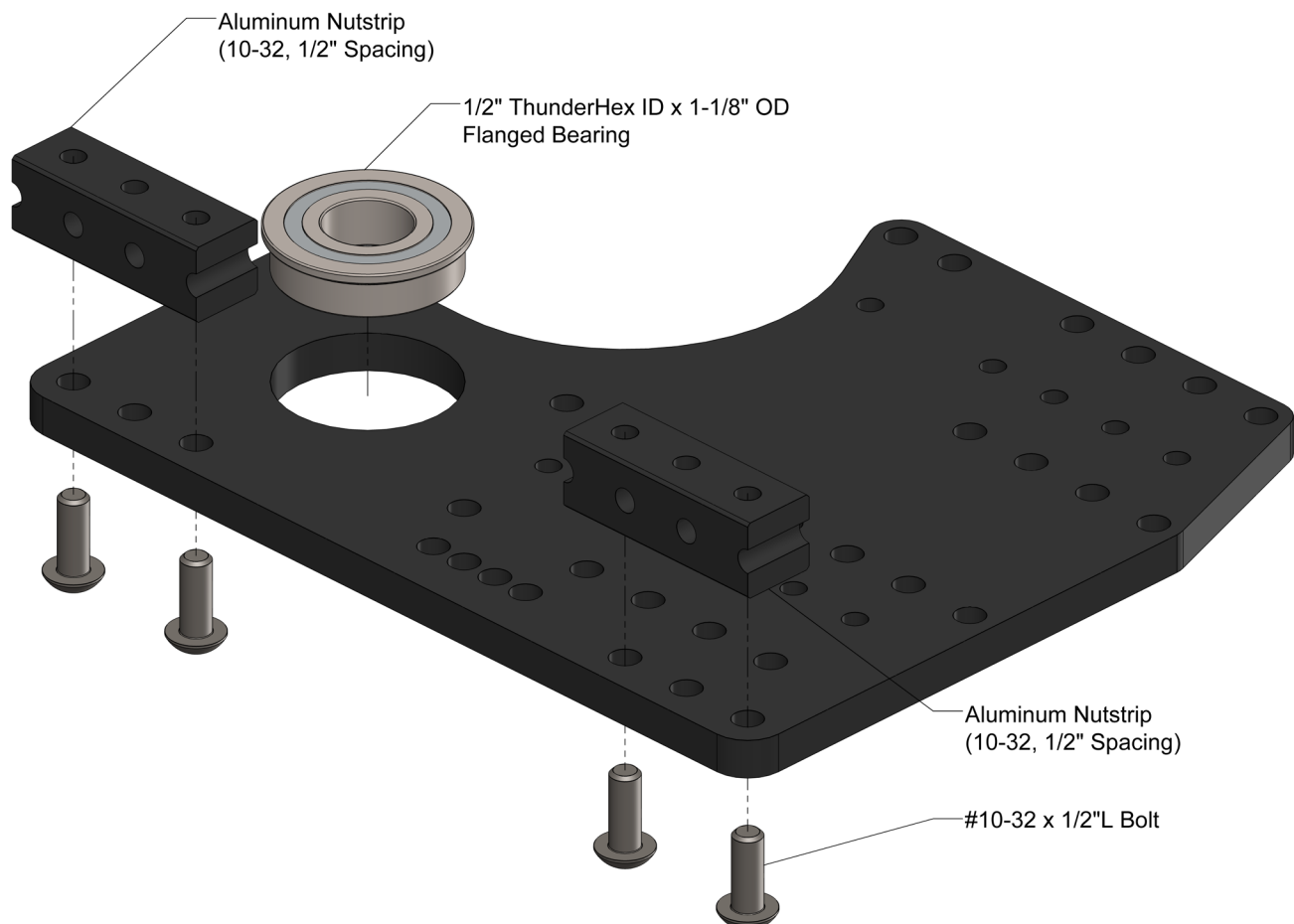


Gearbox - Step 4

The 1/2" ThunderHex ID x 1-1/8" OD Flanged Bearing will be a light press fit and may be pressed in by hand or with an arbor press. The image below shows the side the bearing must be installed from for all configurations of the Telescope Gearbox.

The Nutstrips used to mount the GreyT Telescope must be cut to 1-1/2" long and assembled in the orientation shown in the image below.

Note: Just like in the previous step, the Nutstrips in this step are completely optional. If you plan on using a different mounting method or are assembling the Gearbox in the Flipped configuration, you may omit the Nutstrips and associated bolts from this step.

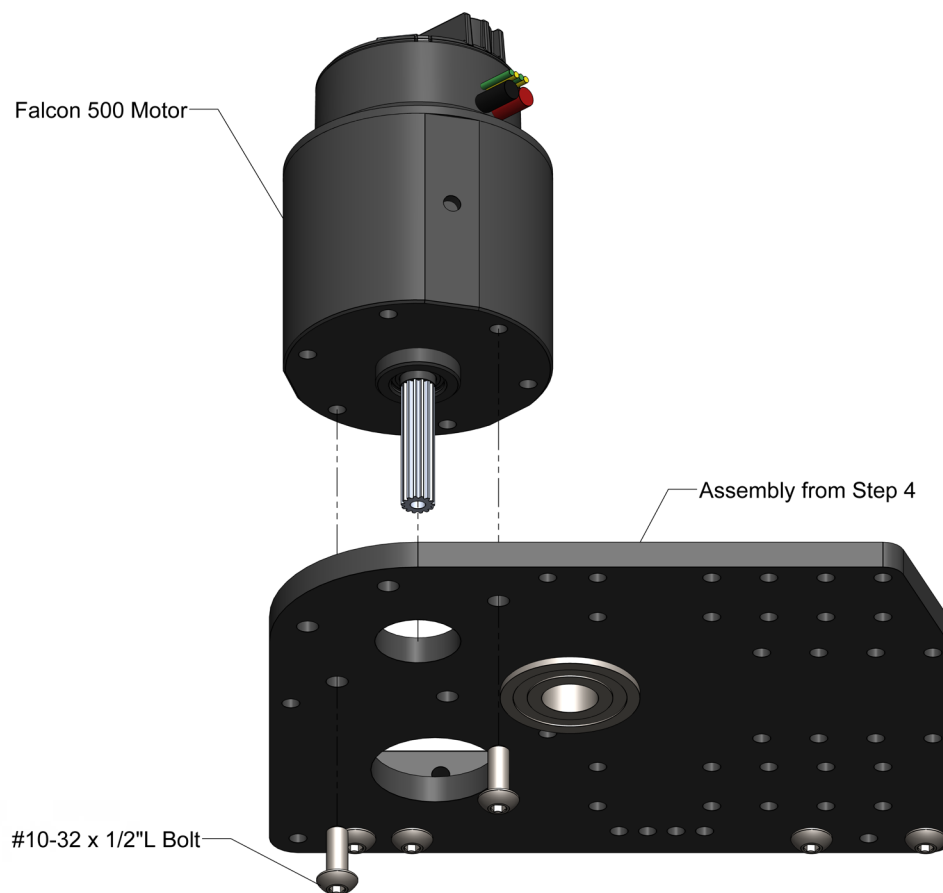




Gearbox - Step 5

The Falcon 500 Motor is installed using two #10-32 x 1/2" L bolts.

Warning: It is critical that the bolts used to install the Falcon 500 Motor do not thread more than 1/4" into the Motor.

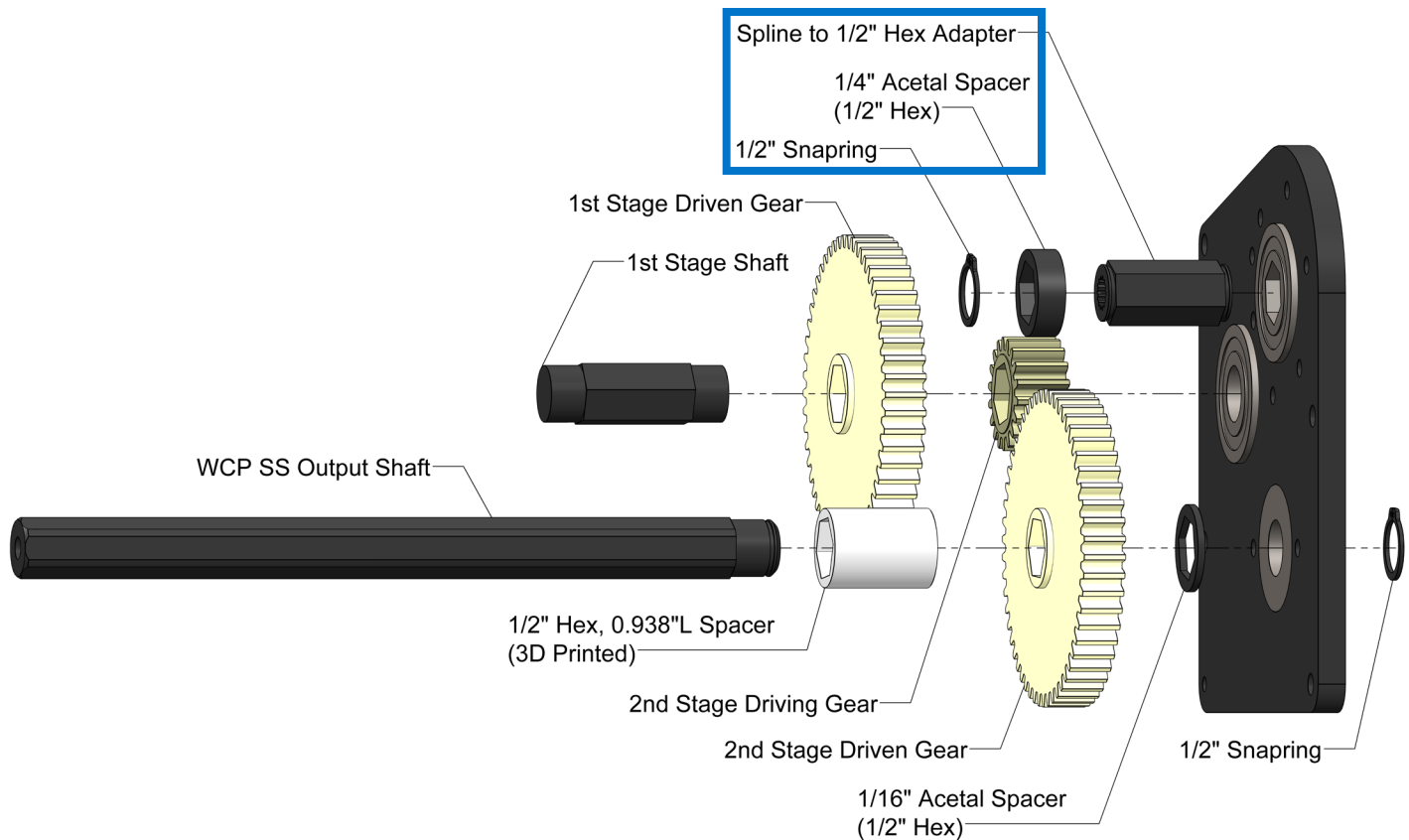




Gearbox - Step 6

Slide on all components in the order shown in the image below. If you plan on using a CTRE Mag Encoder on the Output Shaft, you must drill out the shaft and press in the 1/4" OD x 1/2" L Magnet.

Note: If you do not plan on assembling the Gearbox with either the optional Friction Brake or Ratchet & Pawl, you may omit the parts boxed in blue in the image down below.

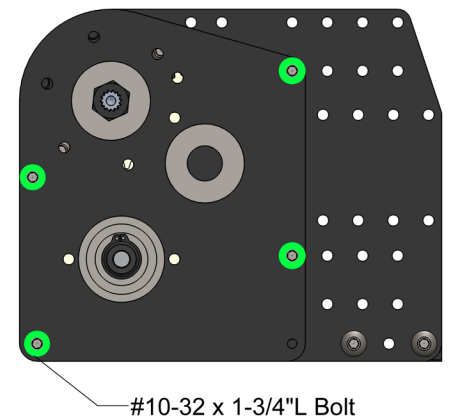
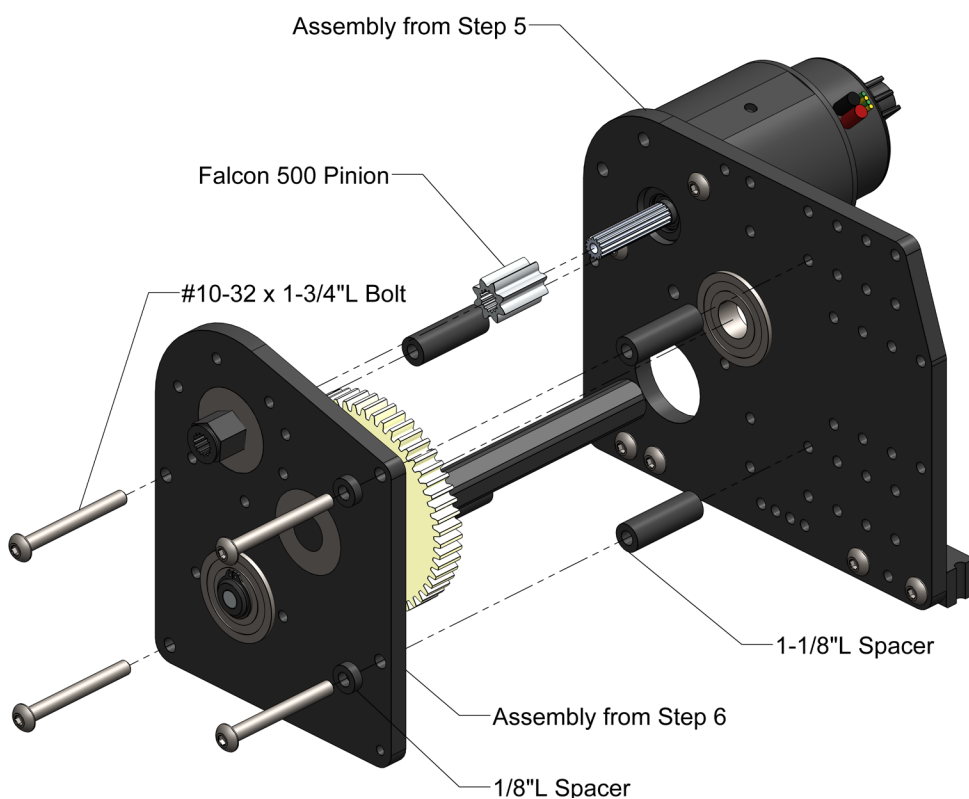




Gearbox - Step 7

Bolt the two halves of the Gearbox together using the #10-32 x 1-3/4" L bolts. The image down below shows the bolt locations marked out in green.

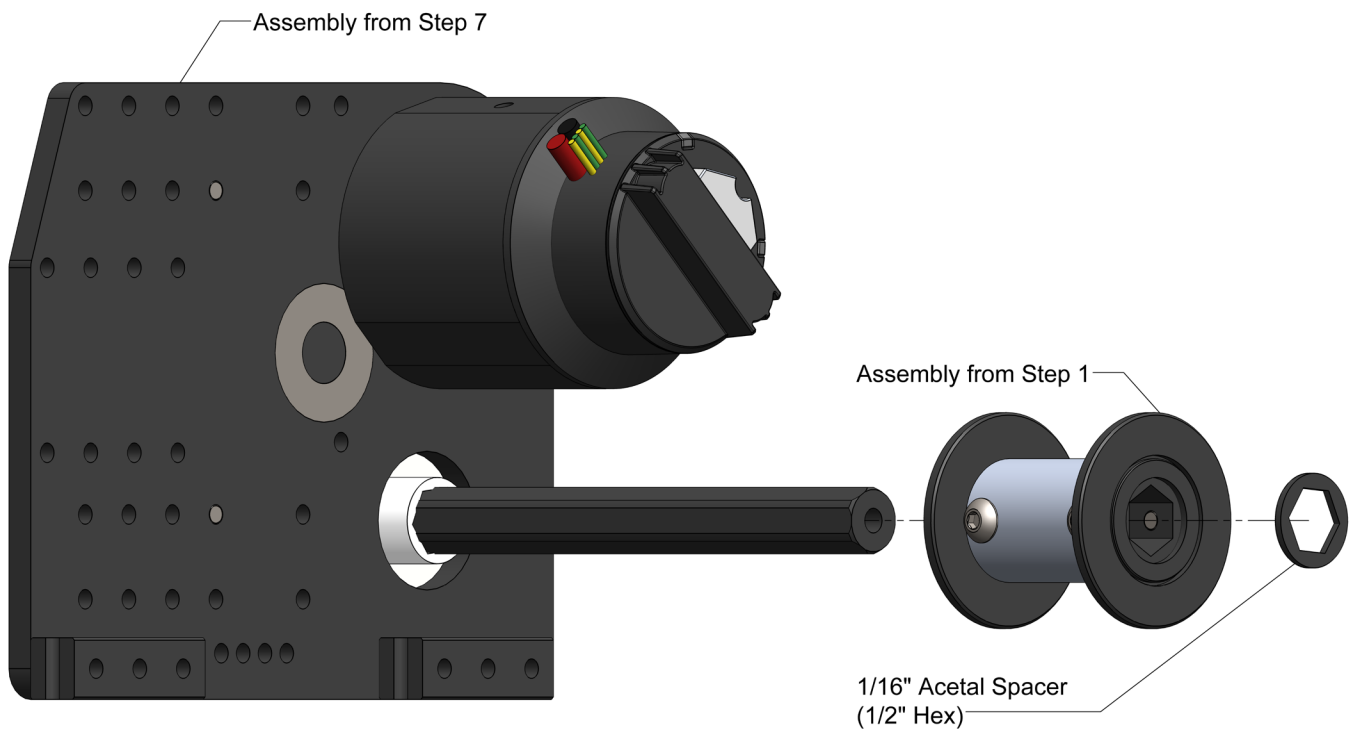
Note: If you are assembling either the Flipped or Non-Flipped configurations of the 1-1/2" Base Gearbox, you can omit the 1/8" L spacers. For those configurations of the Telescope, those bolts will act as pins that hold the 1-1/2" Base Tube in place.





Gearbox - Step 8

Slide the assembled Drum from Step 1 onto the output shaft. You may have to loosen the #10-32 x 3/8" L bolt in order to do this. Once the Drum is in place, check that the flange does not rub against the Gearbox Plate when the output shaft is spun by hand.



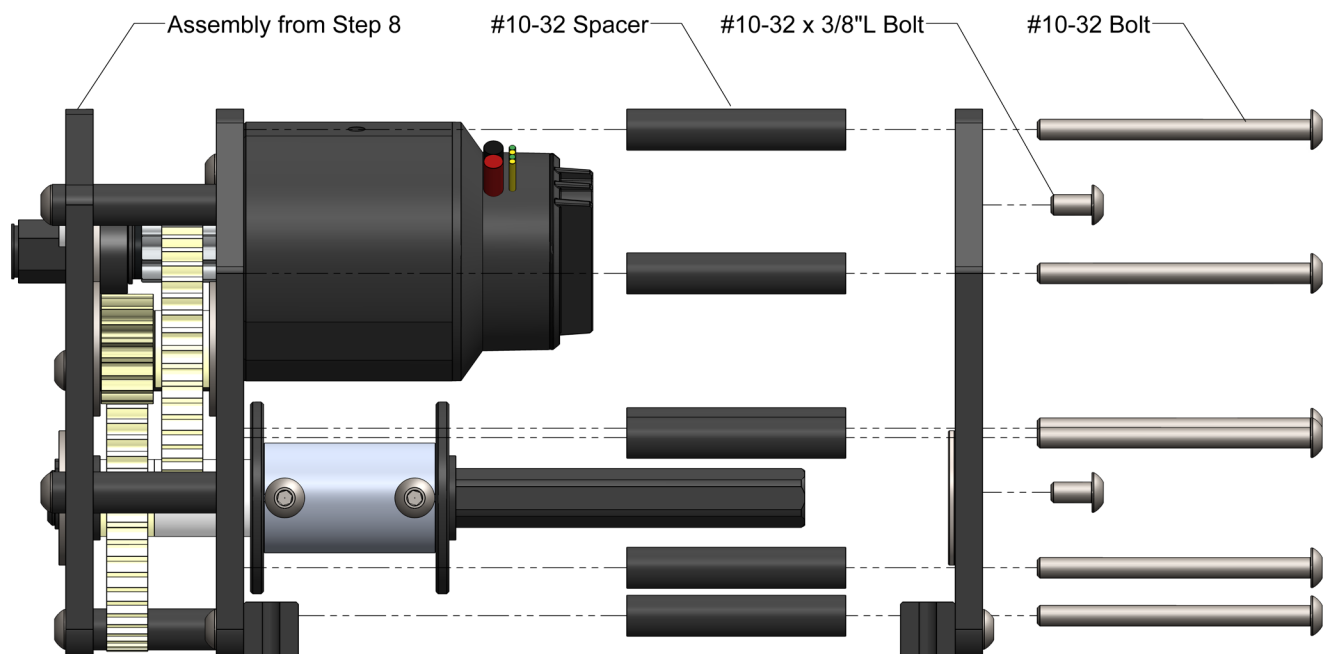


Gearbox - Step 9

Bolt the two halves of the gearbox together. The bolt locations for the different Gearbox configurations are shown on the following four pages.

When the Gearbox is fully assembled, make sure the Drum Flanges do not rub against the Gearbox Plates when the Output Shaft is spun by hand.

Note: Unless otherwise specified, the bolt locations are the same across both the Non-Flipped and Flipped configurations.



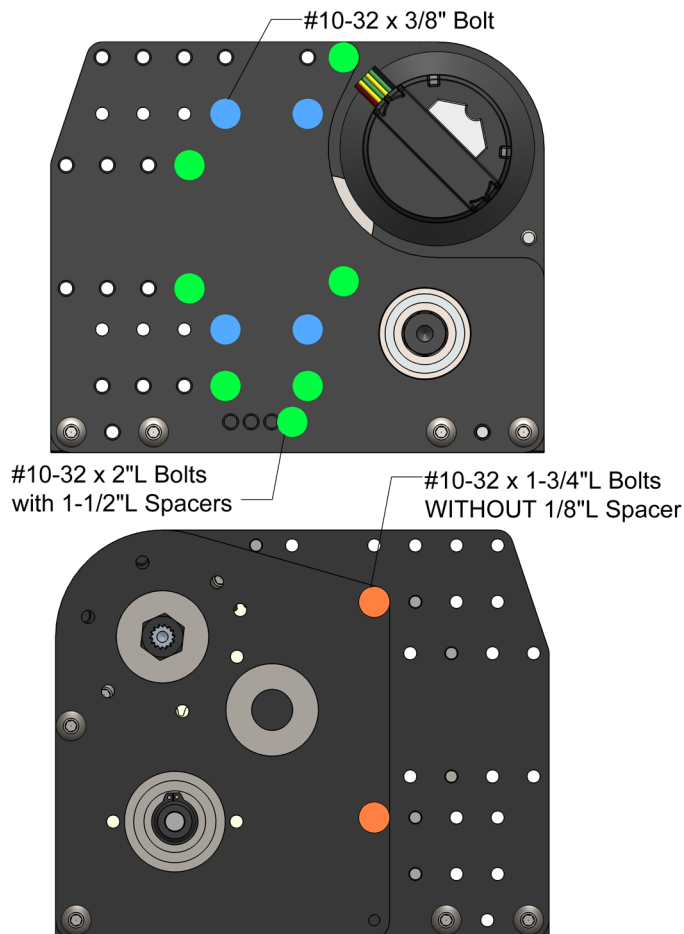


Gearbox - Step 9 (1-1/2" Base Gearbox)

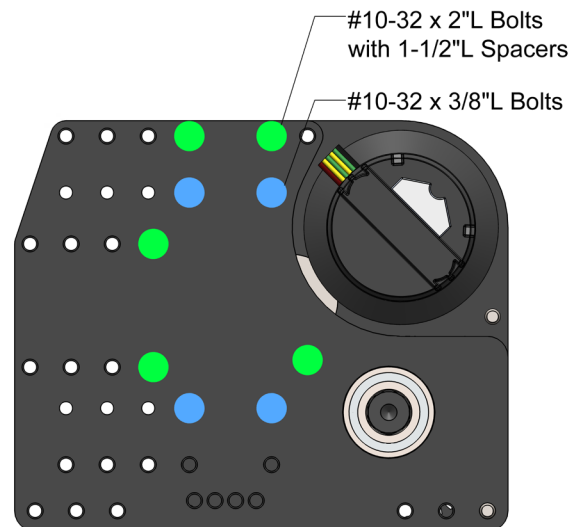
The images shown below mark out the bolt locations in green, blue, and orange. These configurations of the Gearbox both use #10-32 x 2"L bolts and 1-1/2"L spacers.

Note: The 1-1/2" Base Gearbox does not require the 1/8"L spacers installed in Step 7.

1-1/2" Base Non-Flipped Gearbox



1-1/2" Base Flipped Gearbox



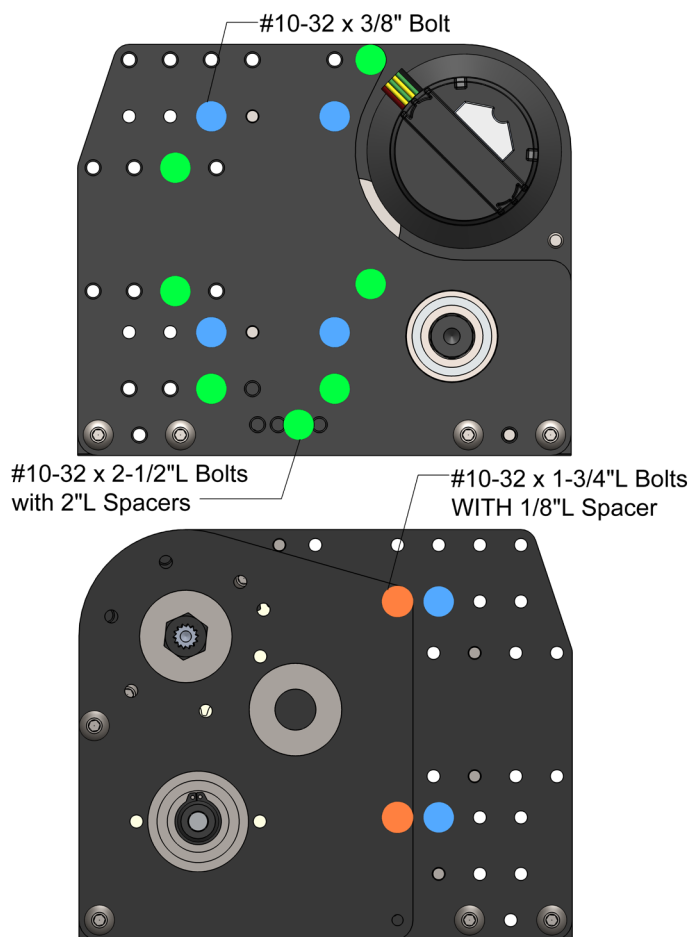


Gearbox - Step 9 (2" Base Gearbox)

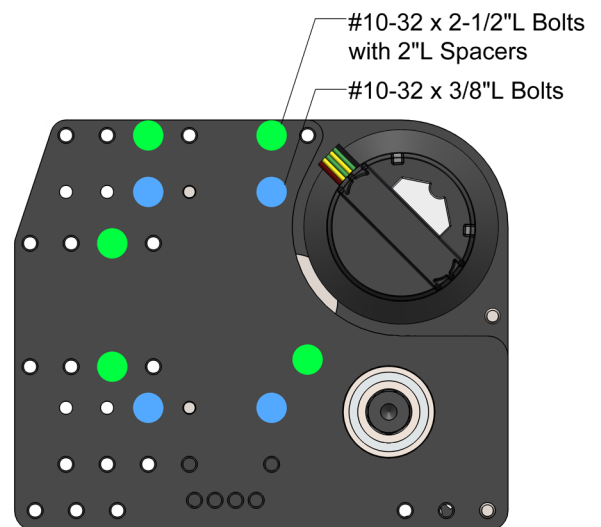
The images shown below mark out the bolt locations in green, blue, and orange. These configurations of the Gearbox both use #10-32 x 2-1/2" L bolts and 2" L spacers.

Note: The 2" Base Gearbox does require the 1/8" L spacers installed in Step 7.

2" Base Non-Flipped Gearbox



2" Base Flipped Gearbox



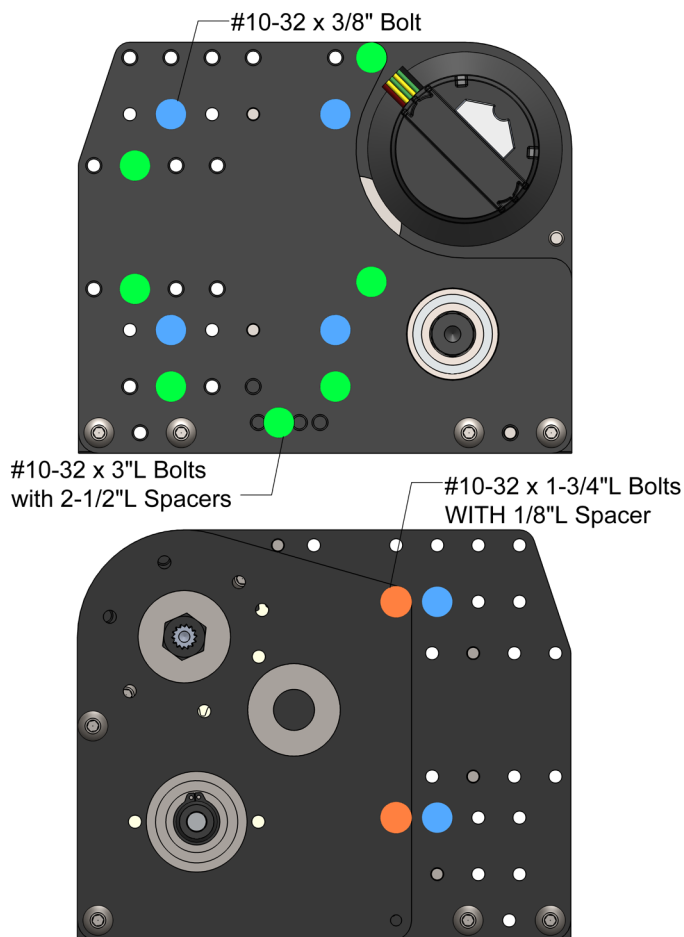


Gearbox - Step 9 (2-1/2" Base Gearbox)

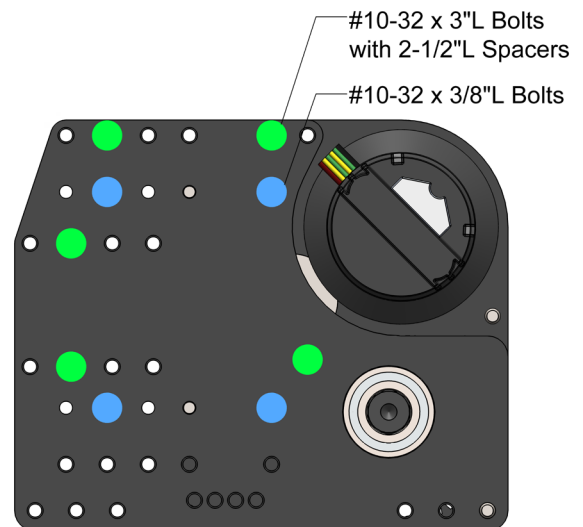
The images shown below mark out the bolt locations in green, blue, and orange. These configurations of the Gearbox both use #10-32 x 3"L bolts and 2-1/2"L spacers.

Note: The 2-1/2" Base Gearbox does require the 1/8"L spacers installed in Step 7.

2-1/2" Base Gearbox



2-1/2" Base Flipped Gearbox

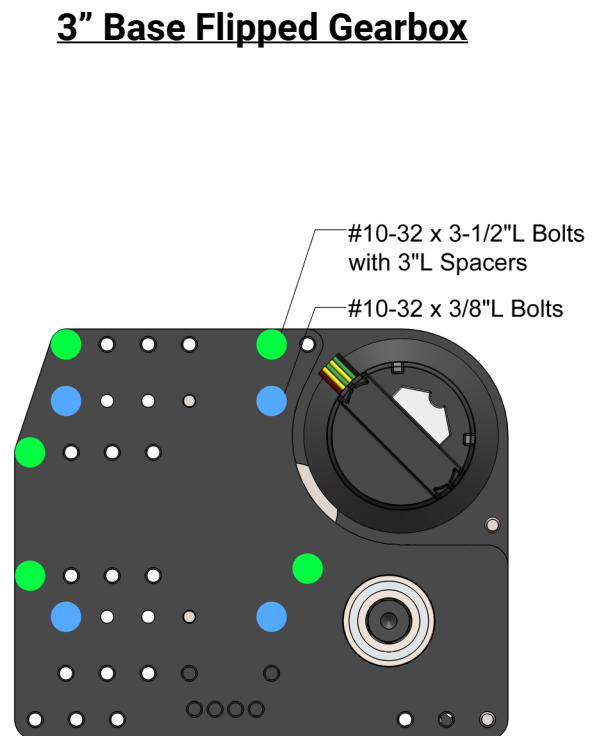
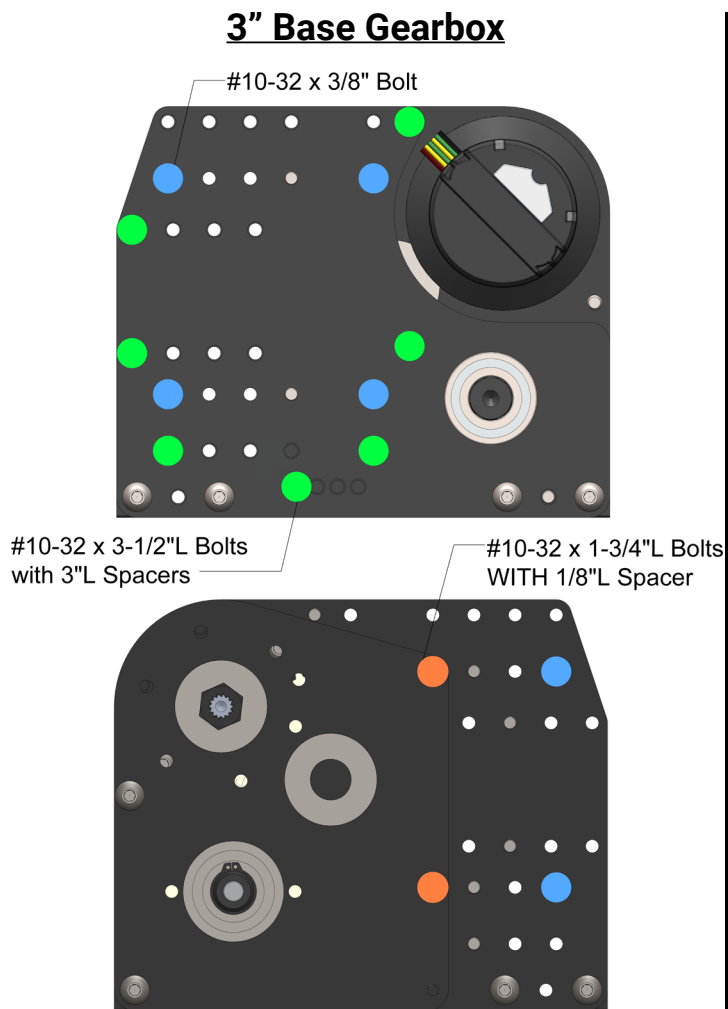




Gearbox - Step 9 (3" Base Gearbox)

The images shown below mark out the bolt locations in green, blue, and orange. These configurations of the Gearbox both use #10-32 x 3-1/2" L bolts and 3" L spacers.

Note: The 3" Base Gearbox does require the 1/8" L spacers installed in Step 7.

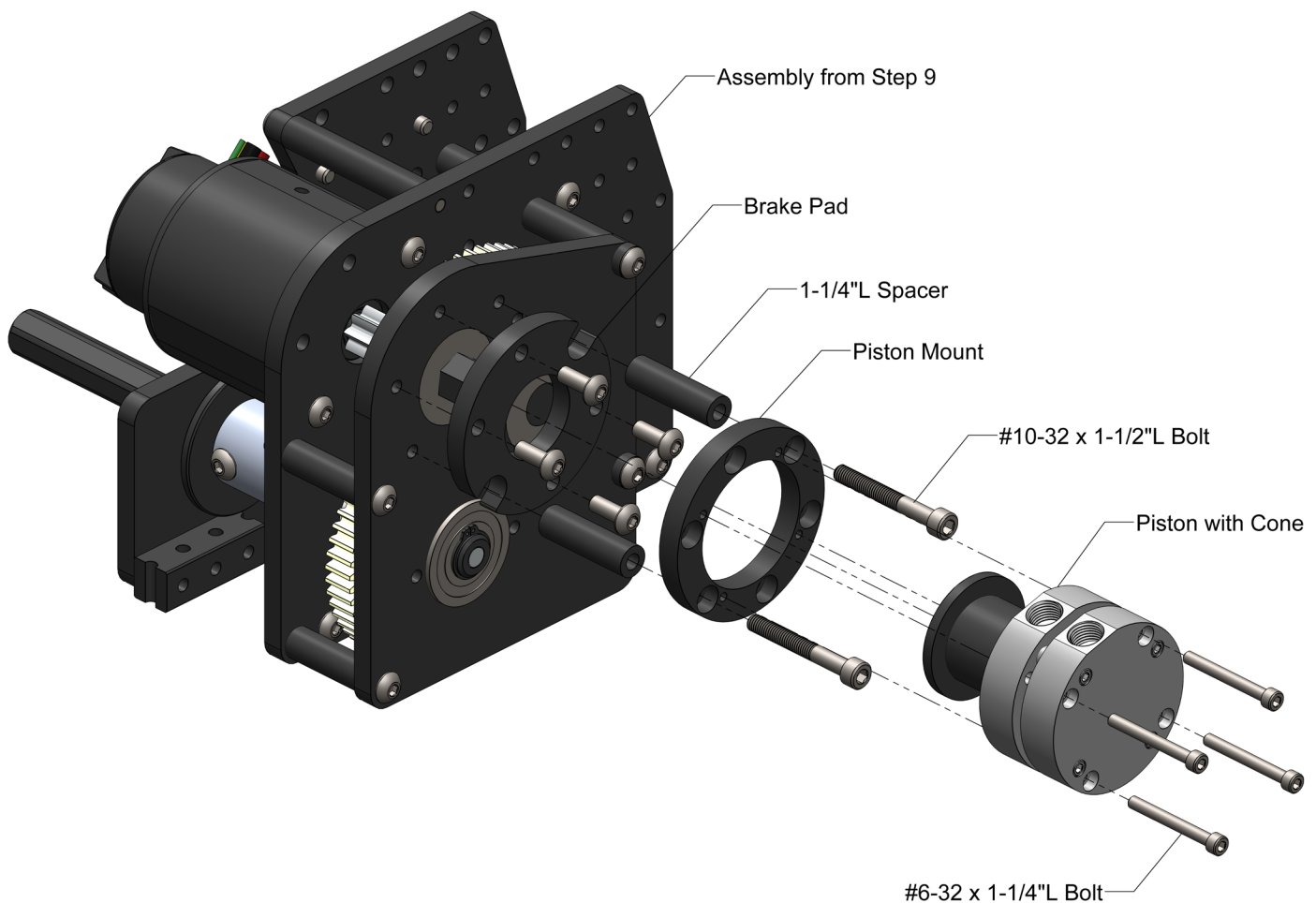




Gearbox - Step 10

To mount the Friction Brake, first bolt the Break Pad to the Outside Gearbox Plate, then mount the Piston Mount, and finally install the Piston with Cone.

Note: This step can be skipped if you plan on using the Telescope without the Ratchet & Pawl or WCP Friction Brake.

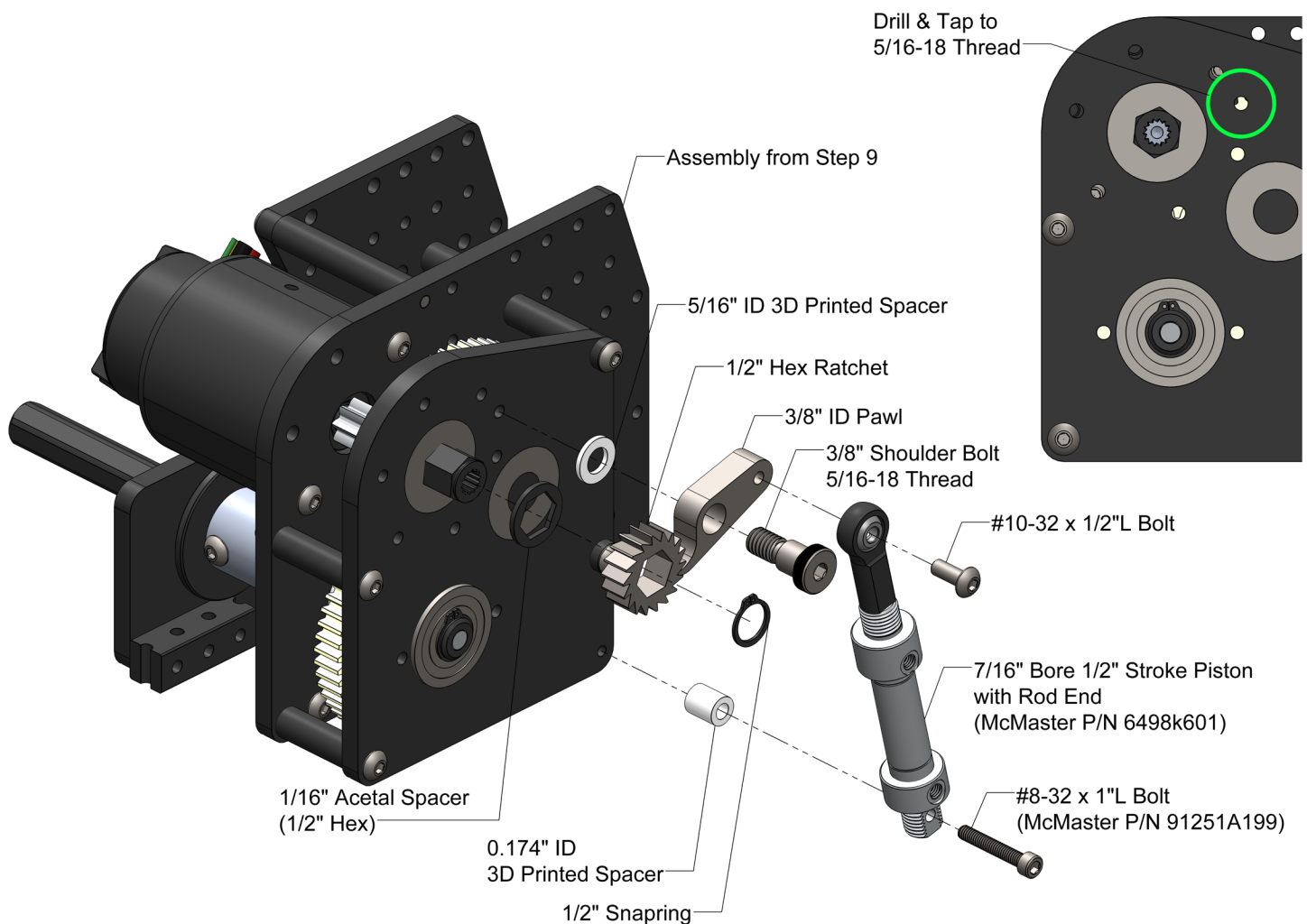


Gearbox - Step 10 (Continued)

To mount the Ratchet & Pawl, first drill and tap to 5/16-18 the hole the Pawl mounts to. Then mount the Ratchet & Pawl using the parts shown in the image down below. Finally, drill out the mounting hole at the end of the piston with a #18 drill bit and mount the piston once everything else is in place.

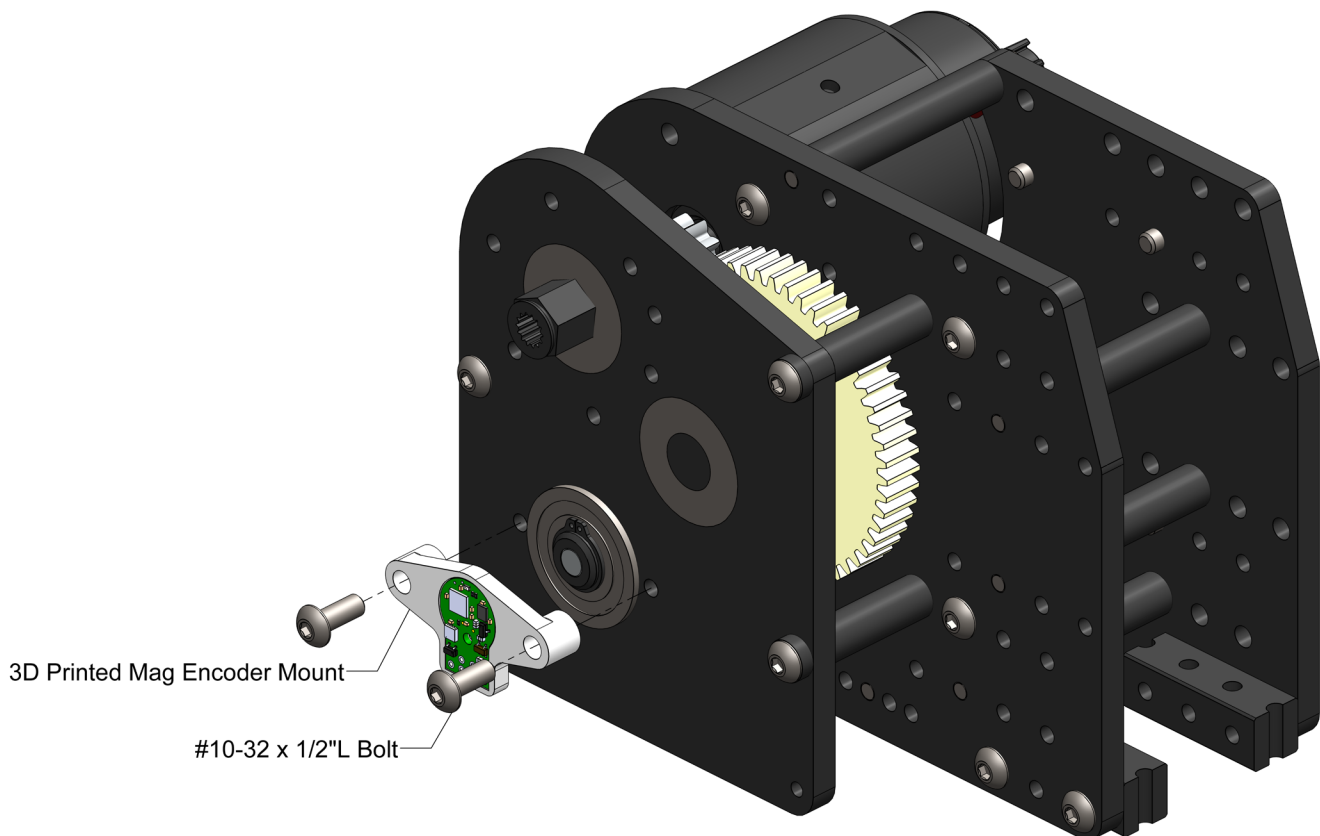
Note: This step can be skipped if you plan on using the Telescope without the Ratchet & Pawl or WCP Friction Brake.

Note: Piston and #8-32 x 1"L Bolt are not sold by WCP.



Gearbox - Step 11

Install the 3D Printed Mag Encoder Mount using two #10-32 x 1/2" L bolts. To install the Mag Encoder, remove the board from the case and fit it into the cutout on the 3D Printed Mag Encoder Mount. Use the mounting bolts from the Mag Encoder to attach the sensor. The CANcoder can be used as a drop in replacement.

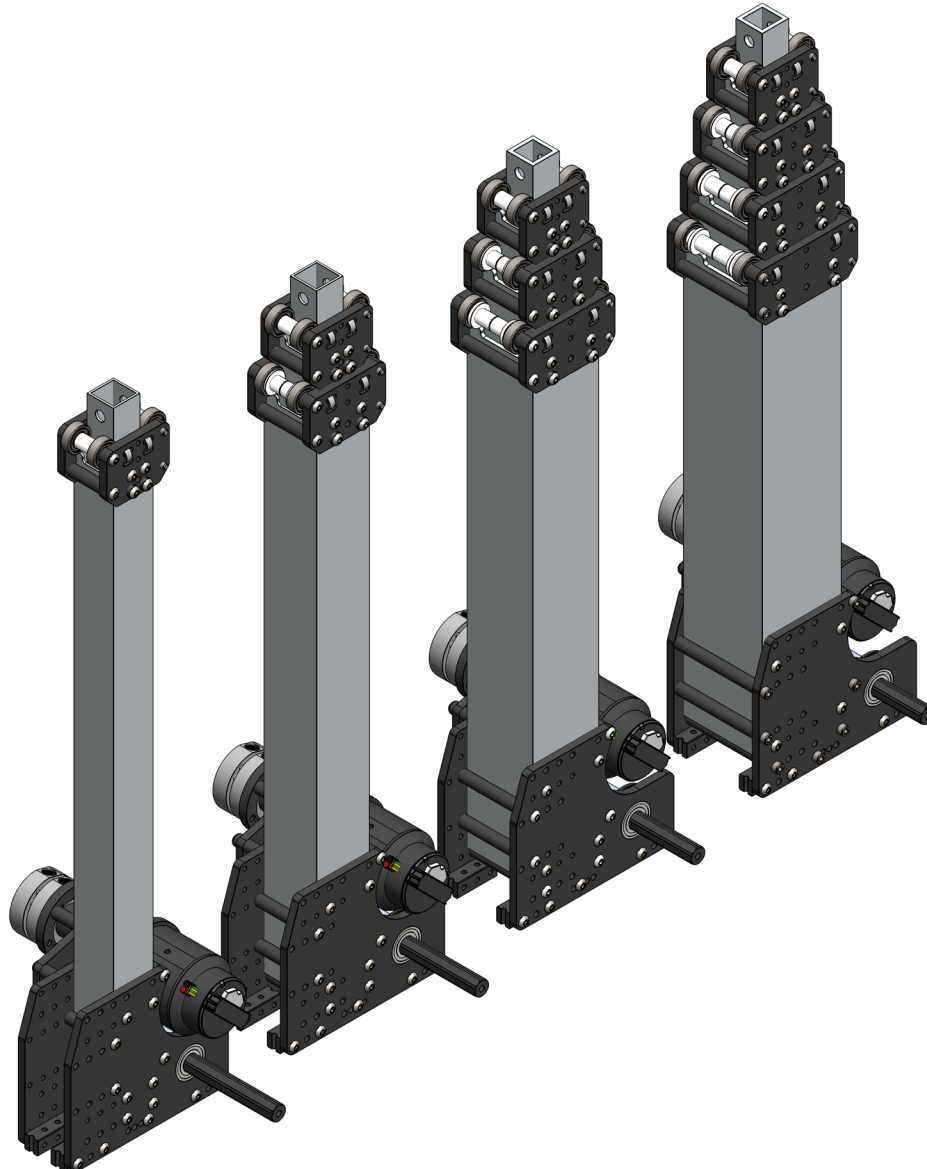




Telescope Assembly Instructions

These instructions show the assembly for one stage. For any extra stages, repeat steps 2-5 before running the string.

Note: Blue Loctite (McMaster P/N 1004A12) is recommended on all bolts that thread into a tapped hole.

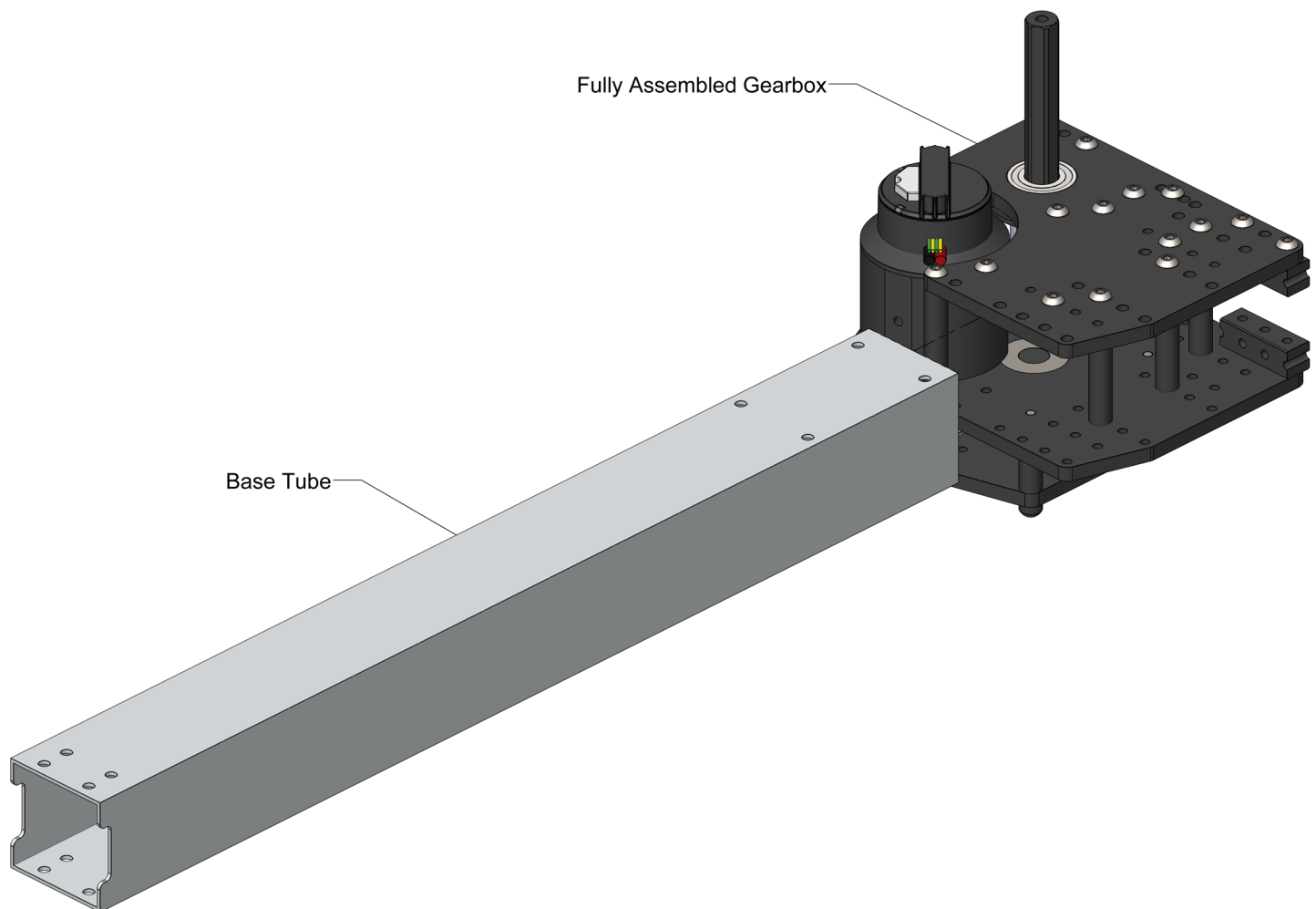




Telescope - Step 1

Slide the Base Tube for your Telescope into the gearbox. In order to do this, loosen all bolts and remove all #10-32 x 3/8"L bolts. The 4 holes in the Base Tube will align with the holes for the #10-32 x 3/8"L bolts. Once the Base Tube is in Place, thread the #10-32 x 3/8"L bolts back in. These bolts should sit in the holes in the Base Tube and act as pins to prevent the tube from moving. Re-tighten all other bolts.

Note: For the Flipped Gearbox configuration, the Base Tube will be slid in from the opposite side.



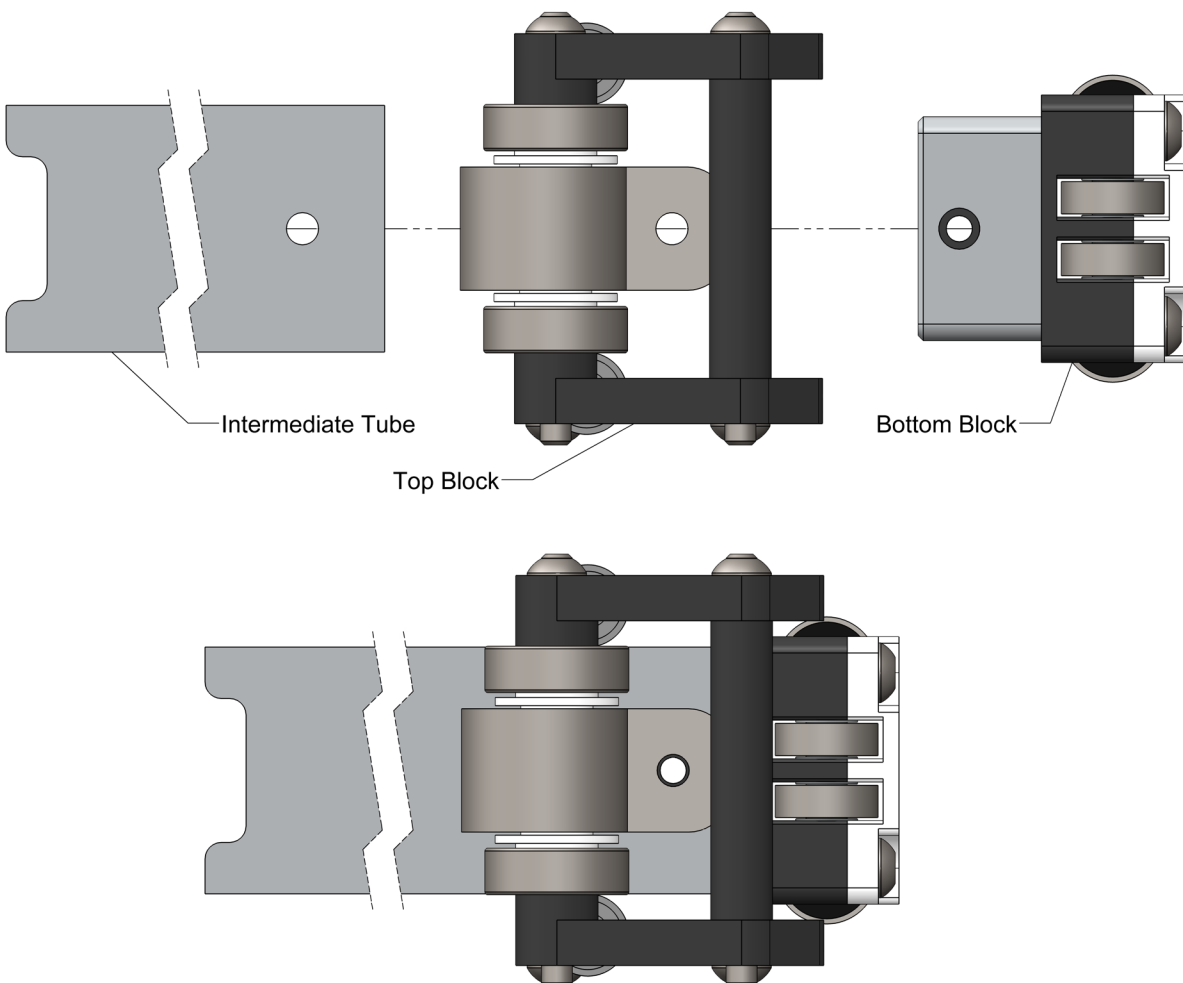


Telescope - Step 2

Slide the correct Top Block and Bottom Block onto the Tube for the next stage being assembled. For example, the images below show the 1-1/2" Tube with the 2" Top Block and the 1-1/2" Bottom Block.

Warning: Handle the CF Springs carefully, the edges can be sharp.

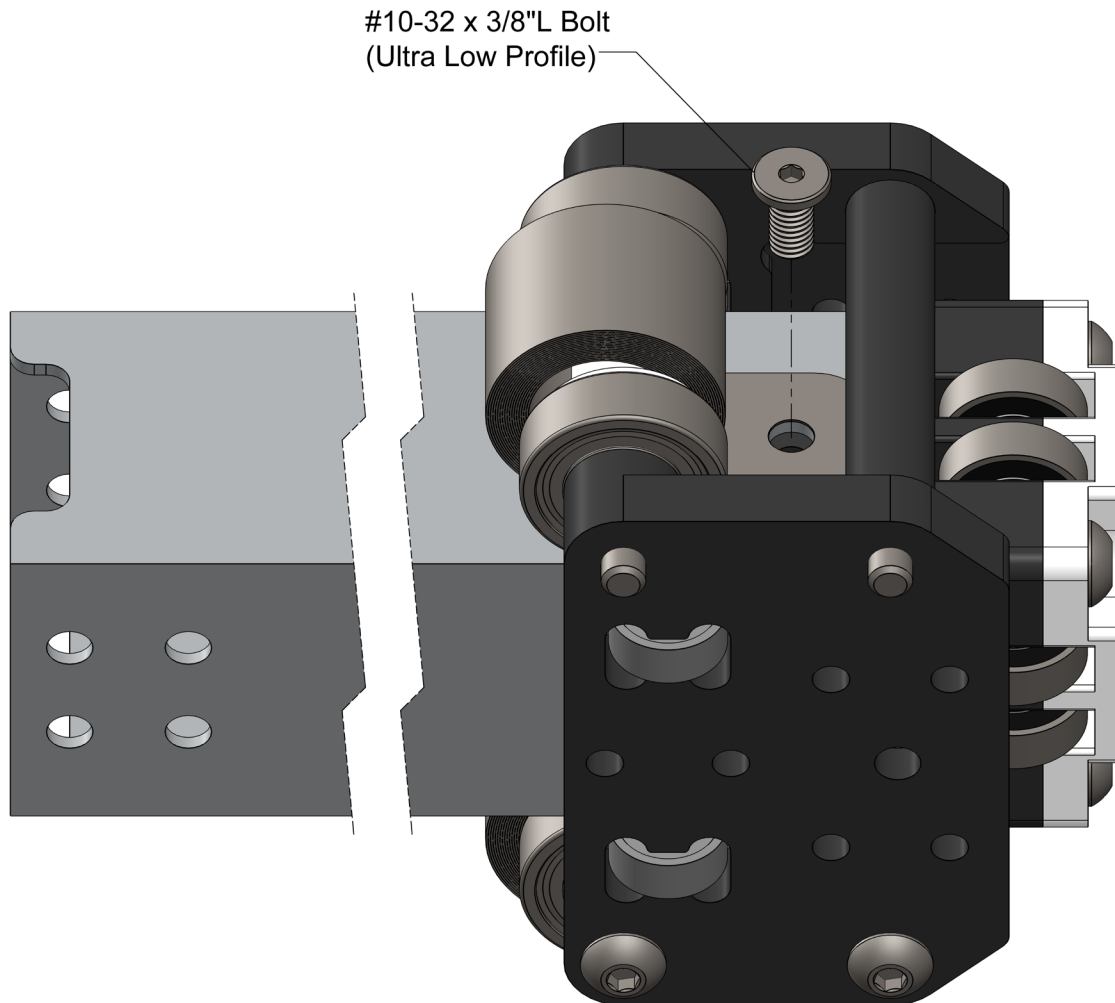
Note: If you are using 1/16" wall tubing, the bottom block must be installed using an appropriate sleeve.





Telescope - Step 3

Bolt the flat tab of the CF Spring through the Tube into the Bottom Block using an Ultra Low Profile #10-32 x 3/8" L Bolt. Repeat this step for both CF Springs in the Top Block.



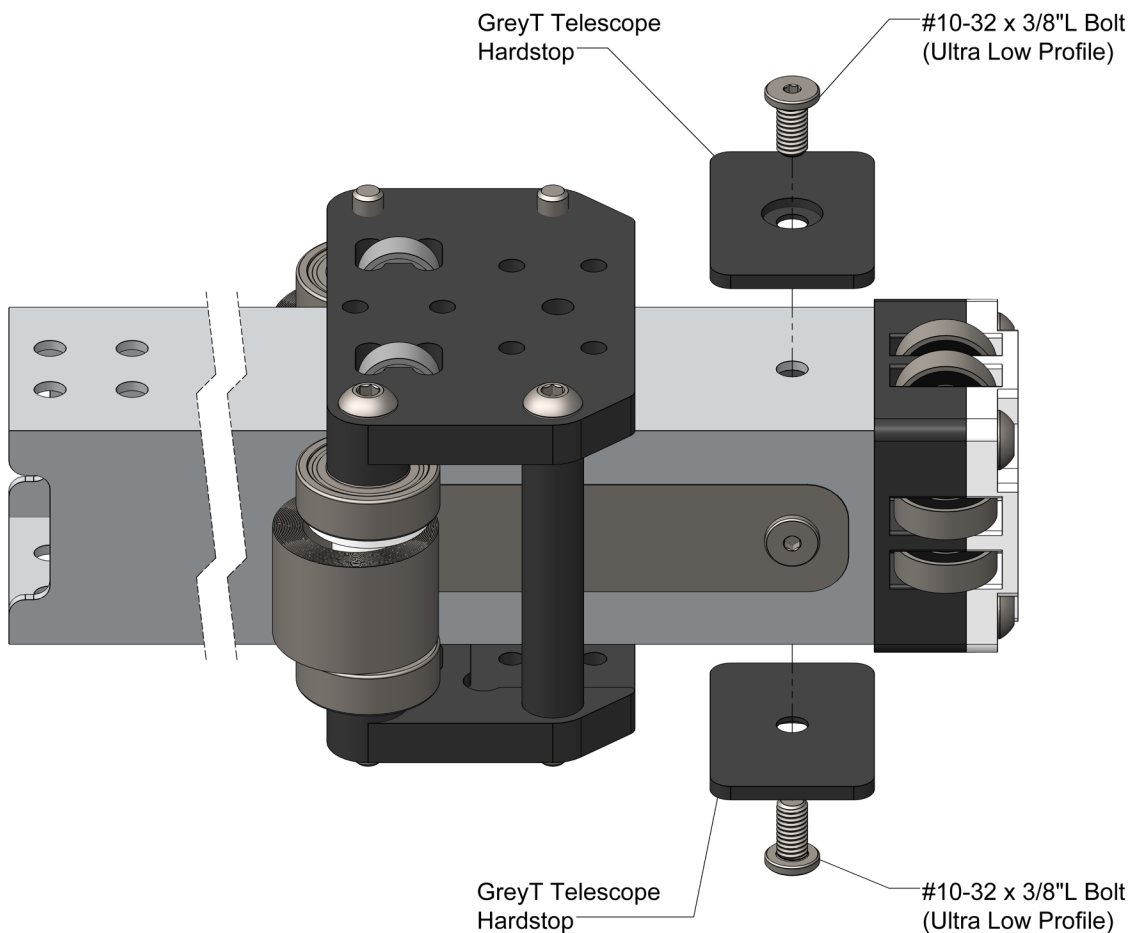


Telescope - Step 4

Pull the Top Block down the tube. Bolt the correct GreyT Telescope Hardstops to the tube using Ultra Low Profile #10-32 x 3/8" L Bolts. These bolts should thread through the Hardstop and into the Bottom Block. The hardstop used must be cut to the same width as the tube it is being bolted to.

Note: It is recommended to have another person or a QuickGrip hold the Top Block in place while installing the Hardstops.

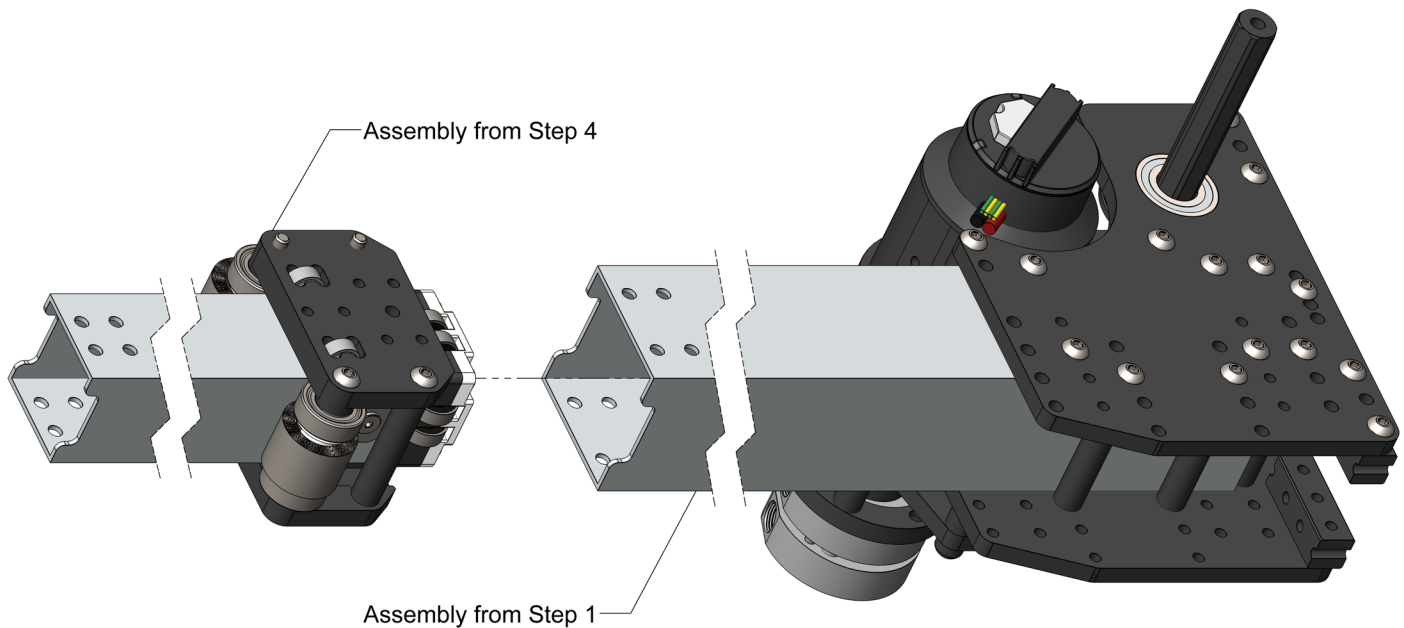
Note: The GreyT Telescope Hardstop (WCP-0502) is not included or required. However, it is recommended to purchase as it will help with the stability of the telescope when fully extended.





Telescope - Step 5

Slide the assembly from Step 4 into the correct tube. For example, the image below shows the 1-1/2" Tube being slid into the 2" Base Tube. Loosen the 4 bolts on the Top Block and slide the Top Block over the end of the larger tube. The 4 unused tapped holes in the Top Block will align with the 4 holes in the larger tube. Once the Top Block is in place, tighten the 4 bolts on the Top Block.



Telescope - Step 6

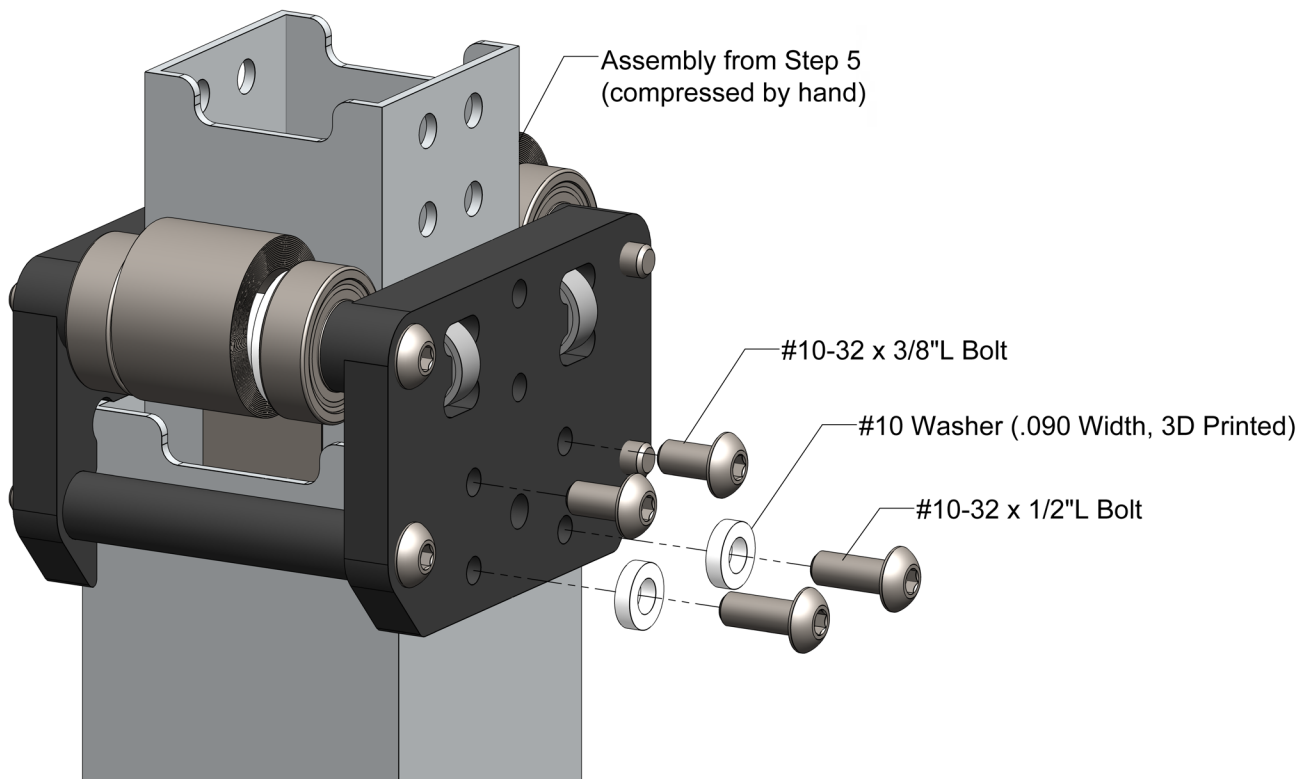
Compress the assembled stages from the previous step by hand. Thread two #10-32 x 3/8"L bolts into the top two holes of the Top Block. These bolts will act as pins to keep the Top Block in place.

The #10-32 x 1/2"L bolts will be threaded into the bottom two holes in the Top Block, and will act as the hardstops for this stage. They will have to be installed with one 0.090" thick #10 Washers.

Repeat this step for both sides of the Top Block.

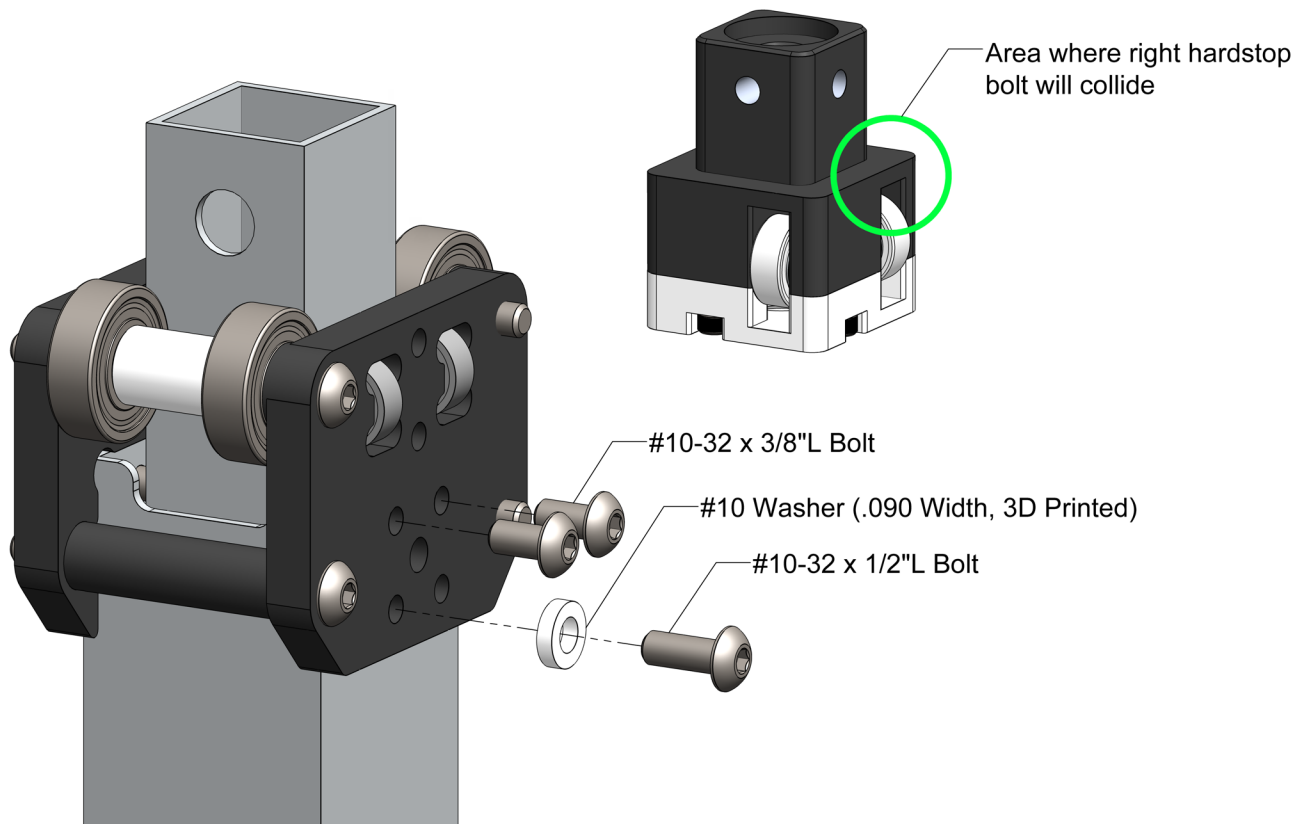
Note: Do not overtighten the #10-32 x 1/2"L bolts. This may crush the 3D printed spacers and cause the bolts to rub.

Note: If any of the bolts used in this step rub against the smaller tube while it is moving, add 0.010" thick #10 Washers (WCP-0038) underneath them until they no longer rub.



Telescope - Step 6 (Continued)

If you are assembling the 1 to 1-1/2" Stage without the GreyT Telescope Hardstop, make sure to only thread in the left hardstop bolt in the top block. If both bolts (or just the right bolt) are used, the hardstop bolt may dent the slot for the Bearing Stack-Up in the 1" Tube Bottom Block. This could cause the 1" Bottom Block to rub against the 1/4" ID Bearing, creating unnecessary friction in the assembly.



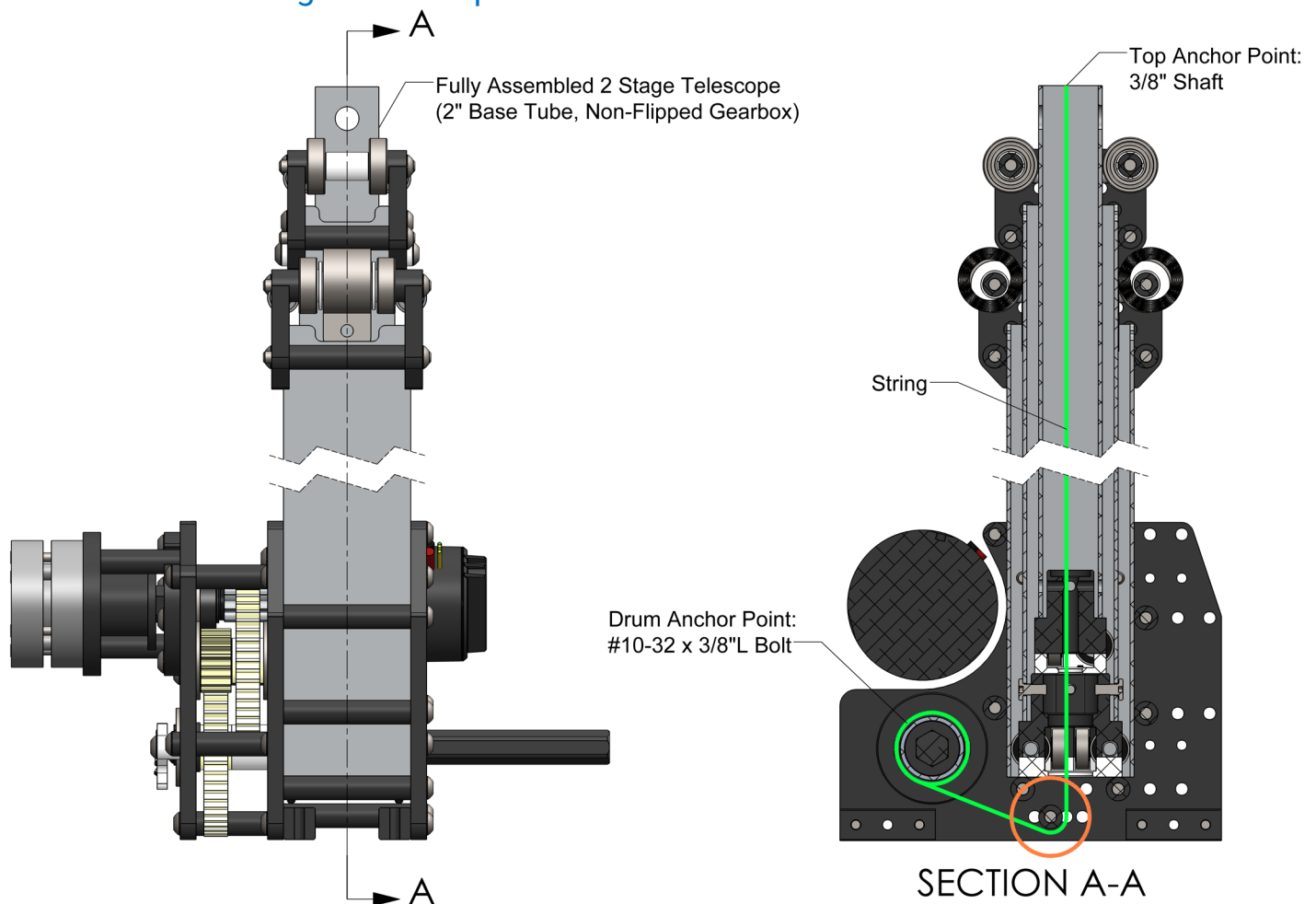


Telescope - Step 7 (Non-Flipped)

The string will be attached to the Drum using the #10-32 x 3/8" L bolt installed in Gearbox - Step 1. From there, drop the other end of the string through the bottom of the assembled Telescope and fish it through all the stages. The string will then be tied to the final stage using a 3/8" Shaft.

Note: It is recommended that the drum should have a minimum of 2 to 3 full string wraps when the telescope is fully extended.

Note: It is also recommended that the spacer used to redirect the string is shortened using a belt sander or lathe until it spins freely when assembled. This will reduce any unnecessary friction on the string run. This spacer is marked in orange in the image below. Do not overtighten this spacer.

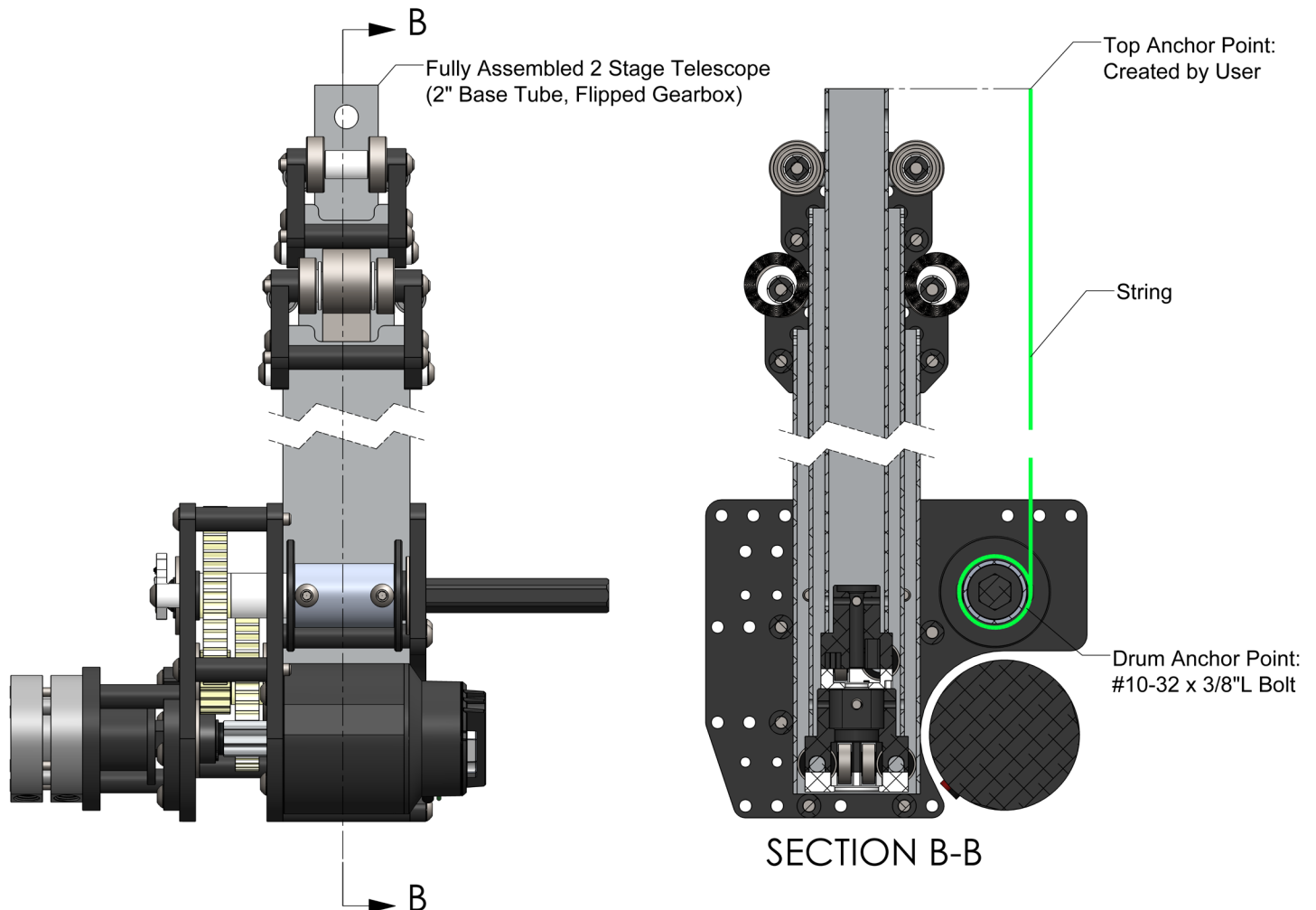




Telescope - Step 7 (Flipped)

The string will be attached to the drum using the #10-32 x 3/8" L Bolt installed in Gearbox - Step 1. The other end of the string will attach to a custom plate or shaft created by the user.

Note: The string does not have to be run exactly as shown in the images down below. However, the string must be run in a way to ensure that it does not collide with the CF Springs in any of the installed Top Blocks.





Available Kits

Kit Number	Name
KIT-0018	GreyT 1 Stage Telescope (All .060" Wall)
KIT-0019	GreyT 1 Stage Telescope (All .125" Wall)
KIT-0020	GreyT 2 Stage Telescope (All .060" Wall)
KIT-0021	GreyT 2 Stage Telescope (All .125" Wall)
KIT-0022	GreyT 3 Stage Telescope (Mixed .060 & .125" Wall)
KIT-0023	GreyT 3 Stage Telescope (All .125" Wall)
KIT-0024	GreyT 4 Stage Telescope (Mixed .060 & .125" Wall)
KIT-0025	GreyT 4 Stage Telescope (All .125" Wall)
KIT-0026	GreyT Telescope Gearbox (Falcon, 10.61:1)
KIT-0027	GreyT Telescope Gearbox (Falcon, 15.34:1)
KIT-0028	GreyT Telescope Gearbox (Falcon, 20.25:1)
KIT-0029	GreyT Telescope Gearbox (Cim, 10.62:1)
KIT-0030	GreyT Telescope Gearbox (Cim, 15.60:1)
KIT-0031	GreyT Telescope Gearbox (Cim, 18.00:1)



KIT-0018: GreyT 1 Stage Telescope (All .060" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0041	0.250" ID x 0.625" OD x 0.196" WD (Radial Bearing)	4
WCP-0079	1" x 1" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0283	1.5" x 1.5" x 0.0625" Aluminum Tube Stock (59")	1

KIT-0019: GreyT 1 Stage Telescope (All .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	4
WCP-0080	1" x 1" x 0.125" Aluminum Tube Stock (59")	1
WCP-0284	1.5" x 1.5" x 0.125" Aluminum Tube Stock (59")	1



KIT-0020: GreyT 2 Stage Telescope (All .060" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
WCP-0041	0.250" ID x 0.625" OD x 0.196" WD (Radial Bearing)	12
WCP-0079	1" x 1" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0283	1.5" x 1.5" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0083	2" x 2" x 0.0625" Aluminum Tube Stock (59")	1

KIT-0021: GreyT 2 Stage Telescope (All .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	12
WCP-0080	1" x 1" x 0.125" Aluminum Tube Stock (59")	1
WCP-0284	1.5" x 1.5" x 0.125" Aluminum Tube Stock (59")	1
WCP-0296	2" x 2" x 0.125" Aluminum Tube Stock (59")	1



KIT-0022: GreyT 3 Stage Telescope (Mixed .060 & .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
WCP-0420	GreyT Telescope (Stage #3, 2.5" to 2")	1
WCP-0041	0.250" ID x 0.625" OD x 0.196" WD (Radial Bearing)	12
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	8
WCP-0079	1" x 1" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0283	1.5" x 1.5" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0083	2" x 2" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0471	2.5" x 2.5" x 0.125" Aluminum Tube Stock (59")	1

KIT-0023: GreyT 3 Stage Telescope (All .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
WCP-0420	GreyT Telescope (Stage #3, 2.5" to 2")	1
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	20
WCP-0080	1" x 1" x 0.125" Aluminum Tube Stock (59")	1
WCP-0284	1.5" x 1.5" x 0.125" Aluminum Tube Stock (59")	1
WCP-0296	2" x 2" x 0.125" Aluminum Tube Stock (59")	1
WCP-0471	2.5" x 2.5" x 0.125" Aluminum Tube Stock (59")	1



KIT-0024: GreyT 4 Stage Telescope (Mixed .060 & .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
WCP-0420	GreyT Telescope (Stage #3, 2.5" to 2")	1
WCP-0421	GreyT Telescope (Stage #4, 3" to 2.5")	1
WCP-0041	0.250" ID x 0.625" OD x 0.196" WD (Radial Bearing)	12
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	16
WCP-0079	1" x 1" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0283	1.5" x 1.5" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0083	2" x 2" x 0.0625" Aluminum Tube Stock (59")	1
WCP-0471	2.5" x 2.5" x 0.125" Aluminum Tube Stock (59")	1
WCP-0472	3" x 3" x 0.125" Aluminum Tube Stock (59")	1

KIT-0025: GreyT 4 Stage Telescope (All .125" Wall)

Part Number	Name	QTY
WCP-0418	GreyT Telescope (Stage #1, 1.5" to 1")	1
WCP-0419	GreyT Telescope (Stage #2, 2" to 1.5")	1
WCP-0420	GreyT Telescope (Stage #3, 2.5" to 2")	1
WCP-0421	GreyT Telescope (Stage #4, 3" to 2.5")	1
217-3489	0.250" ID x 0.500" OD x 0.188" WD (Radial Bearing)	28
WCP-0080	1" x 1" x 0.125" Aluminum Tube Stock (59")	1
WCP-0284	1.5" x 1.5" x 0.125" Aluminum Tube Stock (59")	1
WCP-0296	2" x 2" x 0.125" Aluminum Tube Stock (59")	1
WCP-0471	2.5" x 2.5" x 0.125" Aluminum Tube Stock (59")	1
WCP-0472	3" x 3" x 0.125" Aluminum Tube Stock (59")	1



KIT-0026: GreyT Telescope Gearbox (Falcon, 10.61:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6915	8T Steel Spur Gear (20 DP, 10T Center Distance, Falcon Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-5467	28t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-2710	44t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



KIT-0027: GreyT Telescope Gearbox (Falcon, 15.34:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6915	8T Steel Spur Gear (20 DP, 10T Center Distance, Falcon Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-5462	22t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-3572	50t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



KIT-0028: GreyT Telescope Gearbox (Falcon, 20.25:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6915	8T Steel Spur Gear (20 DP, 10T Center Distance, Falcon Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	2
217-3209	18t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



KIT-0029: GreyT Telescope Gearbox (Cim, 10.62:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6335	9T Steel Spur Gear (20 DP, 10T Center Distance, CIM Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-5465	26t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-5472	46t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



KIT-0030: GreyT Telescope Gearbox (Cim, 15.60:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6335	9T Steel Spur Gear (20 DP, 10T Center Distance, CIM Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-5462	22t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1
217-3572	50t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



KIT-0031: GreyT Telescope Gearbox (Cim, 18.00:1)

Part Number	Name	QTY
WCP-0416	GreyT Telescope Gearbox (Stages #1-4)	1
217-2731	0.500" ID x 1.125" OD x 0.313" WD (Flanged Bearing)	3
217-4006	1/2" ThunderHex ID x 1.125" OD x 0.313" WD (Flanged Bearing)	1
217-3283	WCP SS - Output Shaft	1
WCP-0443	1.75" Roller Flange (1" ID Roller) (2-Pack)	1
WCP-0189	Roller Hub, 1/2" Hex Bore x 7/8" OD (Aluminum)	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD) (5-Pack)	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD) (5-Pack)	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD) (5-Pack)	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD) (5-Pack)	2
217-6335	9T Steel Spur Gear (20 DP, 10T Center Distance, CIM Motor)	1
217-3573	54t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	2
217-3209	18t Aluminum Spur Gear (20 DP, 1/2" Hex Bore)	1



WCP-0416: GreyT Telescope Gearbox (Stages #1-4)

Part Number	Name	QTY
WCP-0416-001	GreyT Telescope - Gearbox Plate	1
WCP-0416-002	GreyT Telescope - Gearbox Outside Plate	1
WCP-0416-003	GreyT Telescope - Gearbox Motor Plate	1
WCP-0226	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/8" WD)	4
WCP-0307	Aluminum Spacers (.196" ID x 3/8" OD x 1/8" WD)	2
WCP-0225-006	Rotation SS Gearbox - Second Stage Shaft	1
WCP-0416-007	GreyT Telescope - String Drum (2.563" Length)	1
217-3257	1/16" Acetal Spacer - 1/2" Hex	2
217-3259	1/4" Acetal Spacer - 1/2" Hex	1
WCP-0251	#10-32 x 1/4"L BHCS	4
WCP-0252	#10-32 x 3/8"L BHCS	6
WCP-0253	#10-32 x 1/2"L BHCS	13
WCP-0258	#10-32 x 1-3/4"L BHCS	4
WCP-0259	#10-32 x 2"L BHCS	7
WCP-0261	#10-32 x 2-1/2"L BHCS	7
WCP-0229	1/2" Snapring	3
WCP-0416-010	.938" Spacer - 1/2" Hex	1

GreyT Telescope - User Guide (Rev 1)



WCP-0418: GreyT Telescope (Stage #1, 1.5" to 1")

Part Number	Name	QTY
WCP-0418-003	GreyT Telescope - Stage #1 Top	2
WCP-0418-004	3/16" x 1.25"L Dowel Pin	2
WCP-0205	Aluminum Spacers (.196" ID x 3/8" OD x 1-1/2" WD)	4
217-3246	0.188" ID x 0.500" OD x 0.196" WD (Radial Bearing)	4
217-3239	0.375" ID x 0.875" OD x 0.281" WD (Radial Bearing)	4
WCP-0252	#10-32 x 3/8"L BHCS	4
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0259	#10-32 x 2"L BHCS	4
WCP-0418-010	#10 Washer (.090" Thick, 3D Print)	4
WCP-0418-006	GreyT Telescope - Stage #1 Bottom	1
WCP-0418-008	1/4" x 3/8"L Dowel Pin	4
WCP-0034	#10-32 x .375" L SHCS (Ultra Low Profile)	4
WCP-0039	1/4" Washer (.010" Thick, Steel)	8
WCP-0418-007	GreyT Telescope - Stage #1 Bottom Cap (3D Printed)	1
WCP-0418-005	3D Printed CF Spring Sleeve - Stage #1	4
WCP-0418-011	Plastic Tube Plug Sleeve (1"x1"x.06", 1/4" Clearance)	1
~	#4-40 x 1/2"L SHCS	4

Note: Because the wall thickness of the tubing affects the spacing of the GreyT Bottom Blocks, the Bottom Block bearings are not included in WCP-0418. Instead, they are included in KIT-0018 through KIT-0025.

GreyT Telescope - User Guide (Rev 1)



WCP-0419: GreyT Telescope (Stage #2, 2" to 1.5")

Part Number	Name	QTY
WCP-0419-004	GreyT Telescope - Stage #2 Top	2
WCP-0419-005	3/16" x 1.75"L Dowel Pin	2
WCP-0207	Aluminum Spacers (.196" ID x 3/8" OD x 2" WD)	4
217-3246	0.188" ID x 0.500" OD x 0.196" WD (Radial Bearing)	4
217-3239	0.375" ID x 0.875" OD x 0.281" WD (Radial Bearing)	4
WCP-0252	#10-32 x 3/8"L BHCS	4
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0261	#10-32 x 2-1/2"L BHCS	4
WCP-0418-010	#10 Washer (.090" Thick, 3D Print)	4
WCP-0419-007	GreyT Telescope - Stage #2 Bottom	1
WCP-0418-008	1/4" x 3/8"L Dowel Pin	8
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0034	#10-32 x .375" L SHCS (Ultra Low Profile)	4
WCP-0039	1/4" Washer (.010" Thick, Steel)	16
WCP-0419-006	3D Printed CF Spring Sleeve - Stage #2	4
WCP-0419-009	GreyT Telescope - Stage #2 Bottom Cap (3D Printed)	1
WCP-0419-011	Plastic Tube Plug Sleeve (1.25"x1.25"x.06", 1/4" Clearance)	1

Note: Because the wall thickness of the tubing affects the spacing of the GreyT Bottom Blocks, the Bottom Block bearings are not included in WCP-0419. Instead, they are included in KIT-0018 through KIT-0025.

GreyT Telescope - User Guide (Rev 1)



WCP-0420: GreyT Telescope (Stage #3, 2.5" to 2")

Part Number	Name	QTY
WCP-0420-005	GreyT Telescope - Stage #3 Top	2
WCP-0420-007	3/16" x 2.25"L Dowel Pin	2
WCP-0208	Aluminum Spacers (.196" ID x 3/8" OD x 2-1/2" WD)	4
217-3246	0.188" ID x 0.500" OD x 0.196" WD (Radial Bearing)	4
217-3239	0.375" ID x 0.875" OD x 0.281" WD (Radial Bearing)	4
WCP-0252	#10-32 x 3/8"L BHCS	4
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0263	#10-32 x 3"L BHCS	4
WCP-0418-010	#10 Washer (.090" Thick, 3D Print)	4
WCP-0420-008	GreyT Telescope - Stage #3 Bottom	1
WCP-0418-008	1/4" x 3/8"L Dowel Pin	8
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0034	#10-32 x .375" L SHCS (Ultra Low Profile)	4
WCP-0039	1/4" Washer (.010" Thick, Steel)	16
WCP-0420-006	3D Printed CF Spring Sleeve - Stage #3	4
WCP-0420-011	GreyT Telescope - Stage #3 Bottom Cap (3D Printed)	1
WCP-0420-012	Plastic Tube Plug Sleeve (2"x2"x.06", 1/4" Clearance)	1

Note: Because the wall thickness of the tubing affects the spacing of the GreyT Bottom Blocks, the Bottom Block bearings are not included in WCP-0420. Instead, they are included in KIT-0018 through KIT-0025.



WCP-0421: GreyT Telescope (Stage #4, 3" to 2.5")

Part Number	Name	QTY
WCP-0421-006	GreyT Telescope - Stage #4 Top	2
WCP-0421-007	3/16" x 2.75"L Dowel Pin	2
WCP-0209	Aluminum Spacers (.196" ID x 3/8" OD x 3" WD)	4
217-3246	0.188" ID x 0.500" OD x 0.196" WD (Radial Bearing)	4
217-3239	0.375" ID x 0.875" OD x 0.281" WD (Radial Bearing)	4
WCP-0252	#10-32 x 3/8"L BHCS	4
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0272	#10-32 x 3-1/2"L SHCS	4
WCP-0418-010	#10 Washer (.090" Thick, 3D Print)	4
WCP-0421-009	GreyT Telescope - Stage #4 Bottom	1
WCP-0418-008	1/4" x 3/8"L Dowel Pin	8
WCP-0253	#10-32 x 1/2"L BHCS	4
WCP-0034	#10-32 x .375" L SHCS (Ultra Low Profile)	4
WCP-0039	1/4" Washer (.010" Thick, Steel)	16
WCP-0420-008	3D Printed CF Spring Sleeve - Stage #3	4
WCP-0421-010	GreyT Telescope - Stage #4 Bottom Cap (3D Printed)	1

Note: Because the wall thickness of the tubing affects the spacing of the GreyT Bottom Blocks, the Bottom Block bearings are not included in WCP-0421. Instead, they are included in KIT-0018 through KIT-0025.



FAQ

Q: None of the bolts in any of my Top Blocks rub, but my Telescope still doesn't extend smoothly. What do I do?

A: This may be because the square tube used for the stages of your Telescope are too big. A way to fix this issue is to loosen the bolts holding the Top Blocks together until your Telescope extends smoothly.



Revision Table

Revision Date	Revision #	Description
11/22/2021	1.0	First revision created.