PRO FLIGHT TRAINER

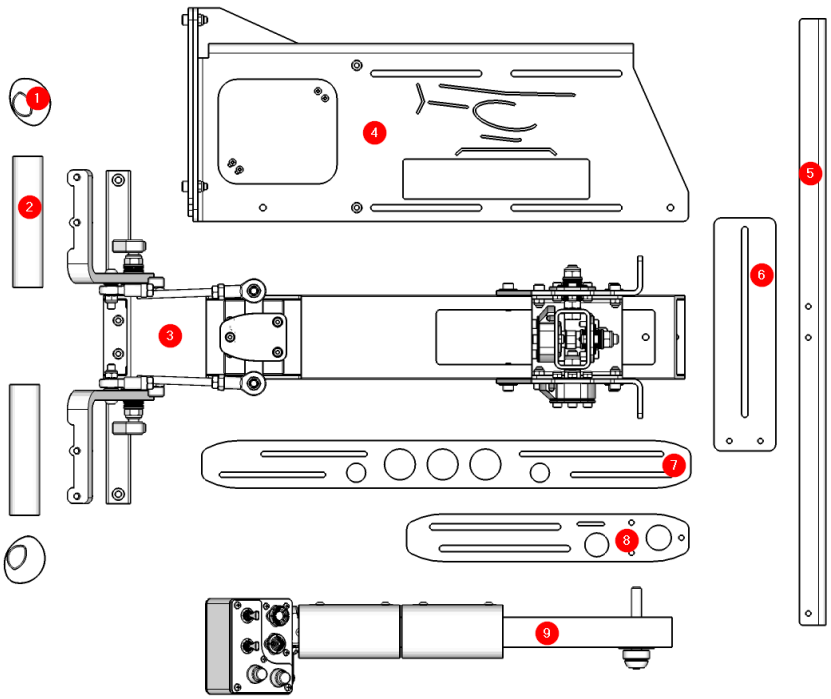
PUMA X assembling guide 1 V7.E2 updated 19/02/25

Start by removing the parts from their packaging, removing zip ties, and bubble wrap packaging.

In addition to the flight control parts, you will find bags of parts in a small cardboard box. The color and style of the bags can vary.

1 accessories box
2 cyclic grip screws (content varies)
3 frame fasteners
4 collective fasteners
5 accessory bag
6 spare parts (optional)
7 collective sensor and plates

Note: some flight control parts are packaged in the small cardboard box.



1 pedal end caps
2 pedal tubes
3 pedal and cyclic frame
4 main frame (main PCB and USB connection)
5 seat blocker bar
6 seat blocker plate
7 collective arm long
8 collective arm short
9 collective assembly (pictures showing twin-engine variant)

In the accessory bag:

Haribo bears

Fold Stopper V1 (left - red or black) or V2 (right)

Mini-Wrench Nr 13 for quick friction adjustment (red or black)

Calibration wire, used for maintenance and special tasks

Small tube of silicon-based grease, used for friction washers and maintenance

USB Cable

You will also find floor protection pieces, some strap bands and tools

In the cyclic Grip screw bag:

- fasteners for the Cyclic Grip:

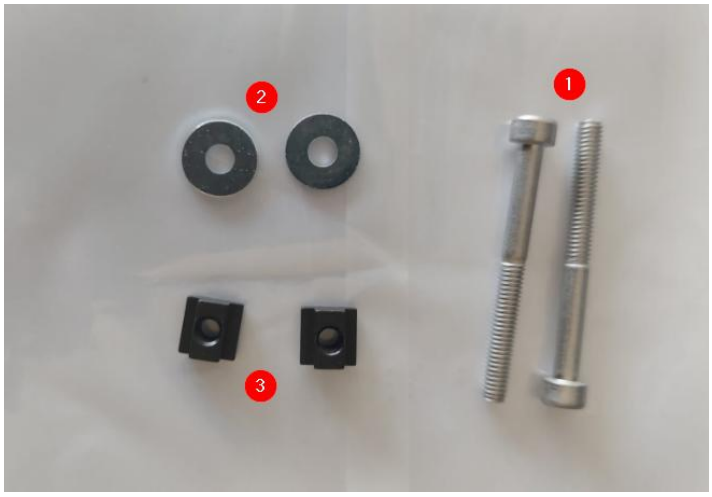
The content varies depending on your product.

For example, A-Style Grip:

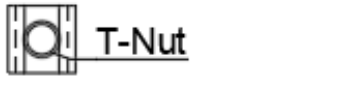
2x M4 x 40mm Socket Cap Screws (1)

2x M4 washers (2)

2x M4 T-Nuts (3)



A fastener cheat sheet can be printed:



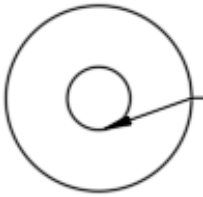
T-Nut

Standoff M4x30

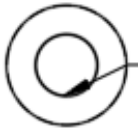
Lock Nut M8

Lock Nut M5

Lock Nut M4

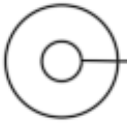


Washer Large M8

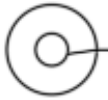


Washer Disc M8

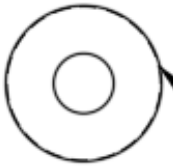
Washer M8



Washer Wide M5



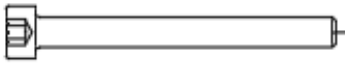
Washer Wide M4



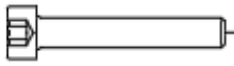
Needle Bearing M8
Bearing and Washer

Socket Screw M5x35

Socket Screw M5x18



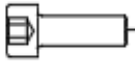
Socket Screw M4x40



Socket Screw M4x25

Socket Screw M4x20

Socket Screw M4x16



Socket Screw M4x12

Dept.	Technical reference	Created by	Approved by
		19/02/2025	
		Document type	Document status
		Title: Cheatsheet Fasteners PUMA X E1	DWG No.
			Rev. / Date of issue / Sheet: 1/1

Check if someone is around.

Carefully and quietly open the Haribo bears and count them (High level of noise might attract nearby predators!).

If you have less than 7 bears in the bag, **immediately call our quality control center to report a code red alert!**

Only eat bears when instructed. That is crucial!

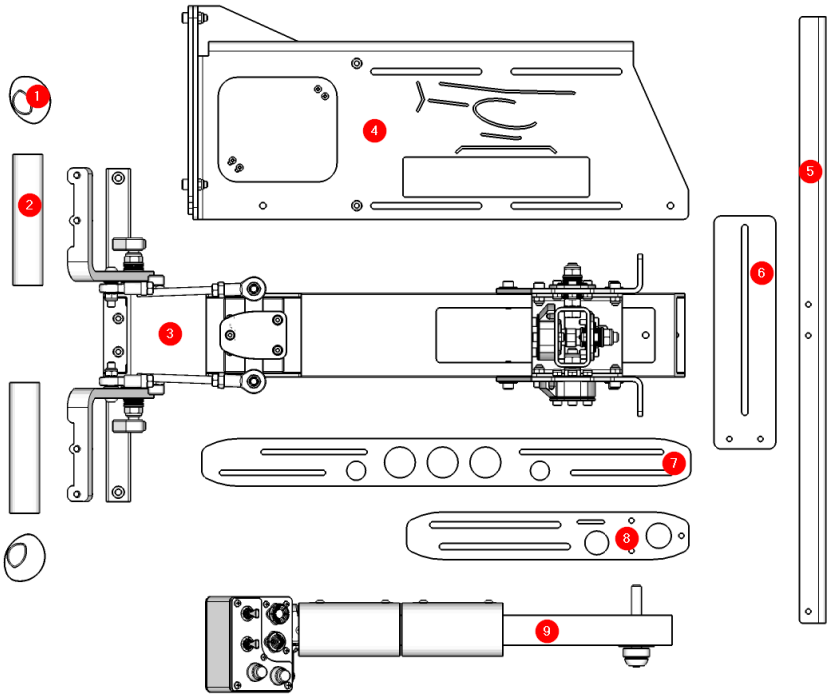
You may eat bears when you see this symbol:

The next pages show how to assemble the PUMA X flight controls.

Never use excessive forces.

Contact us if something is not working out, we are happy to assist you and get it sorted out.

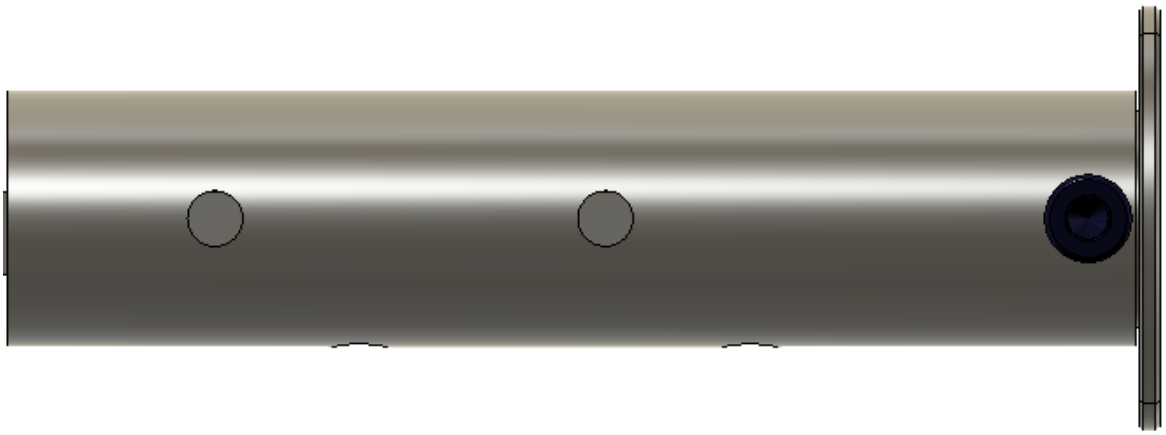
Note that most pictures are not showing the wiring/cables for easier assembling experience. The wires are shown in the “wiring guide”.

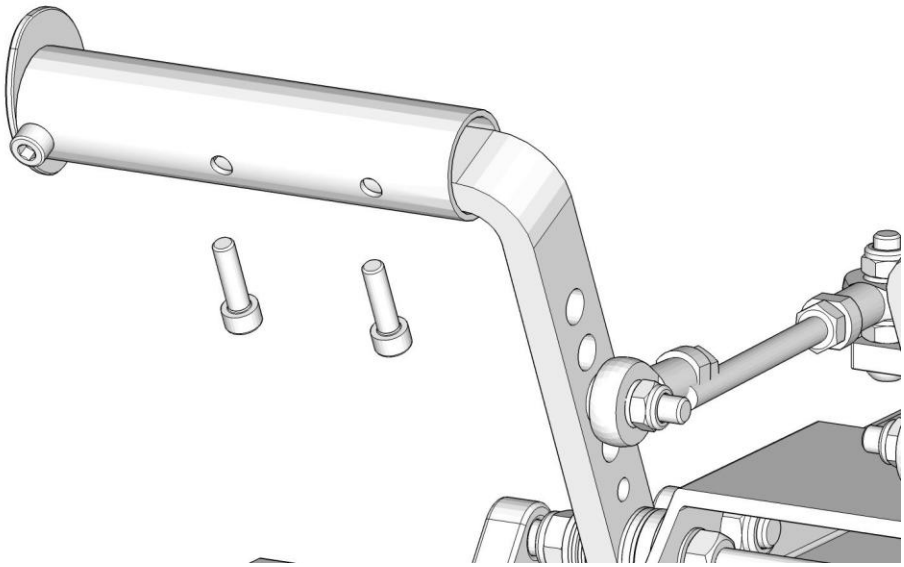


1 pedal end caps
2 pedal tubes
3 pedal and cyclic frame
4 main frame (main PCB and USB connection)
5 seat blocker bar
6 seat blocker plate
7 collective arm long
8 collective arm short
9 collective assembly (pictures showing twin-engine variant)

Assemble the pedal end cap with a M5x18mm screw

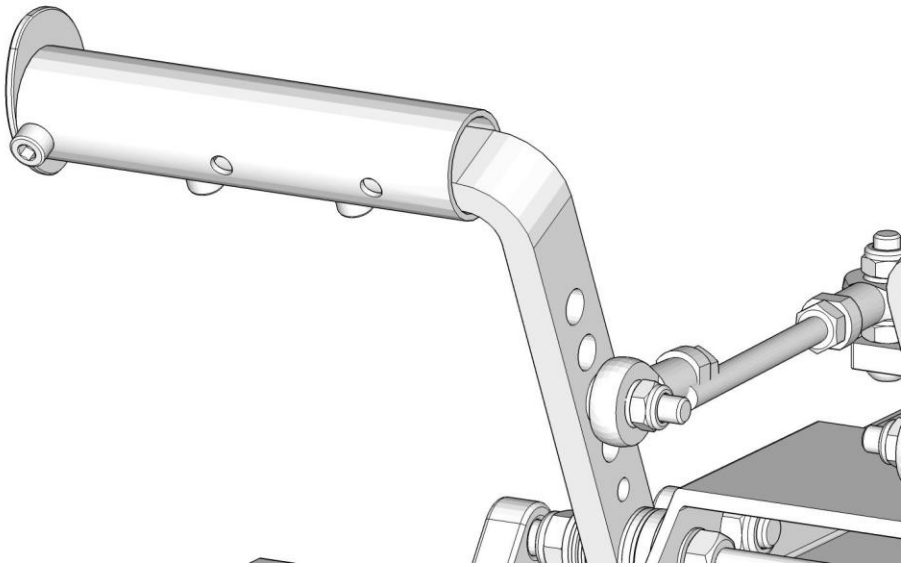
Repeat for each pedal tube side.





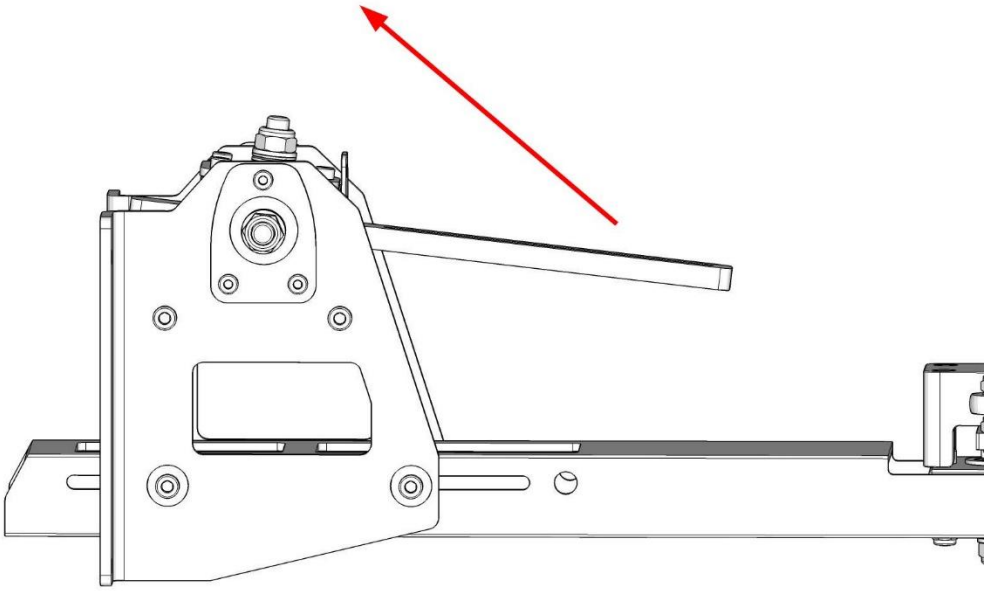
Insert pedal tube, and attach with 2 Socket Screw M5x18

The extra line of holes is only used for the toe brakes kit

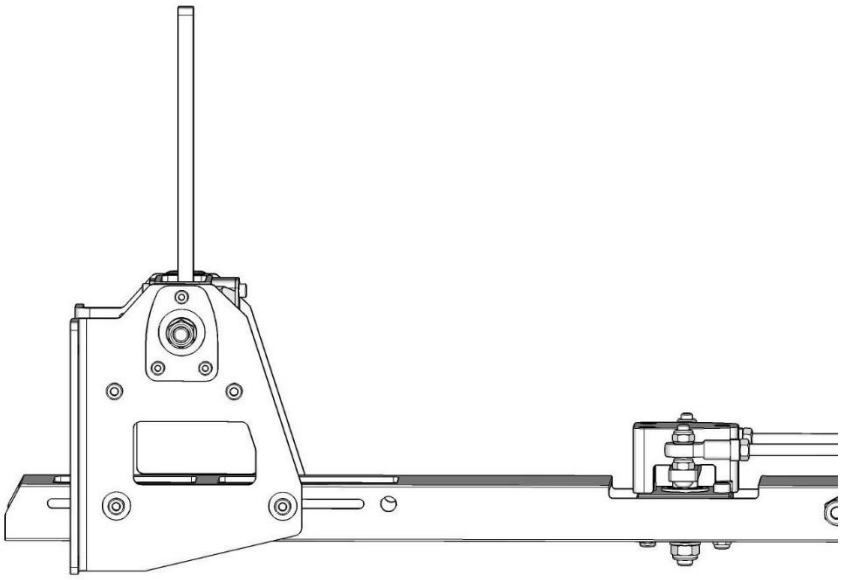


Tighten both screws, repeat on both sides

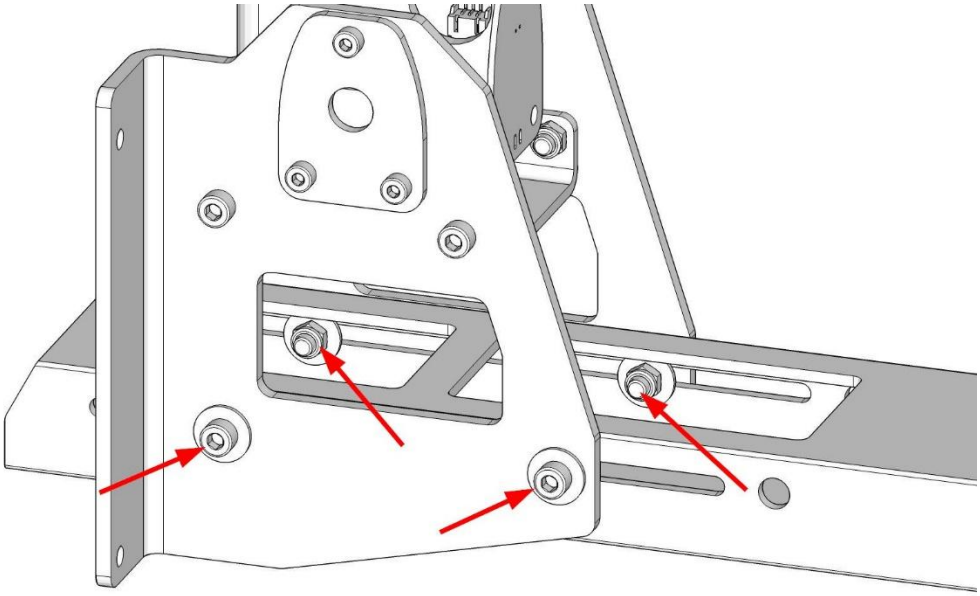
Gently rotate and lift the cyclic bar



Watch that no wires get pinched

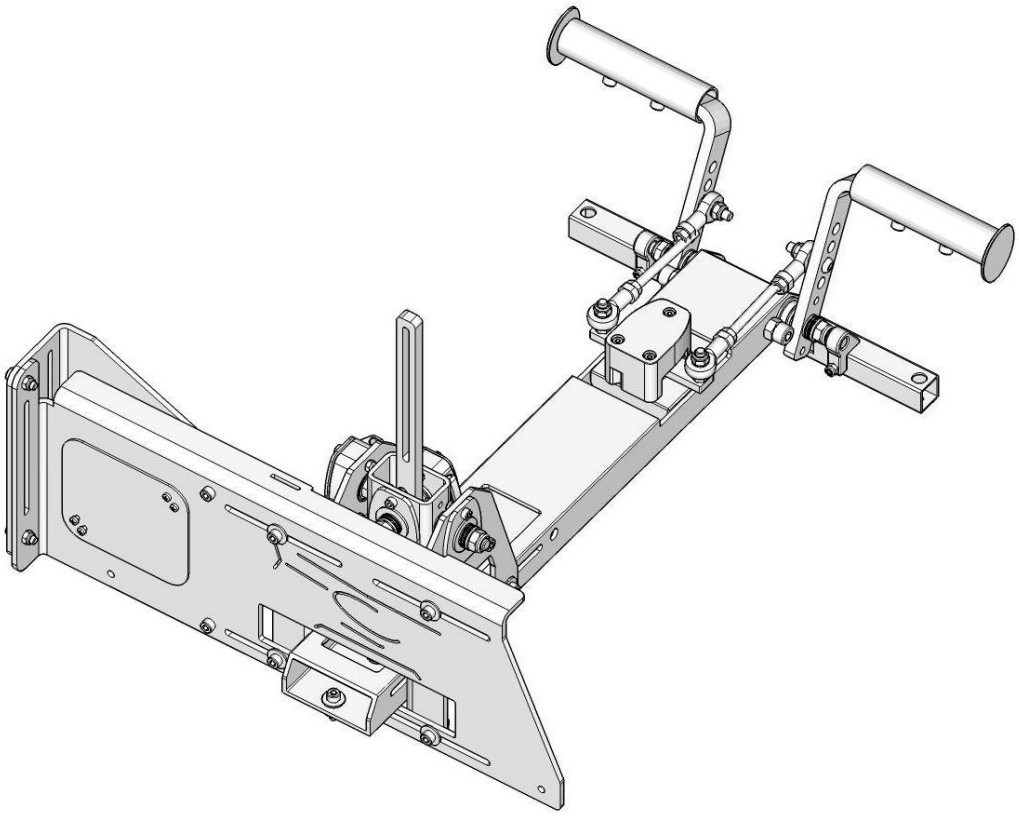


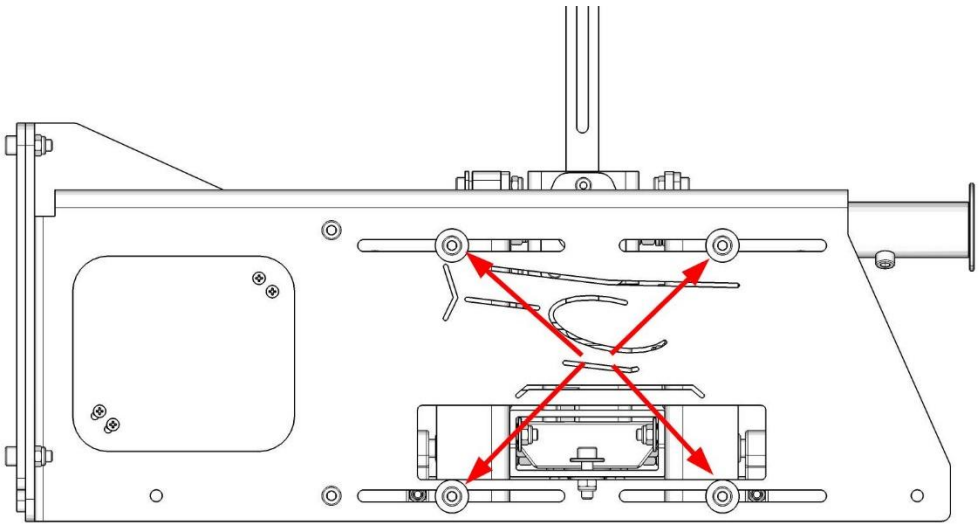
The cyclic bar should be roughly vertical



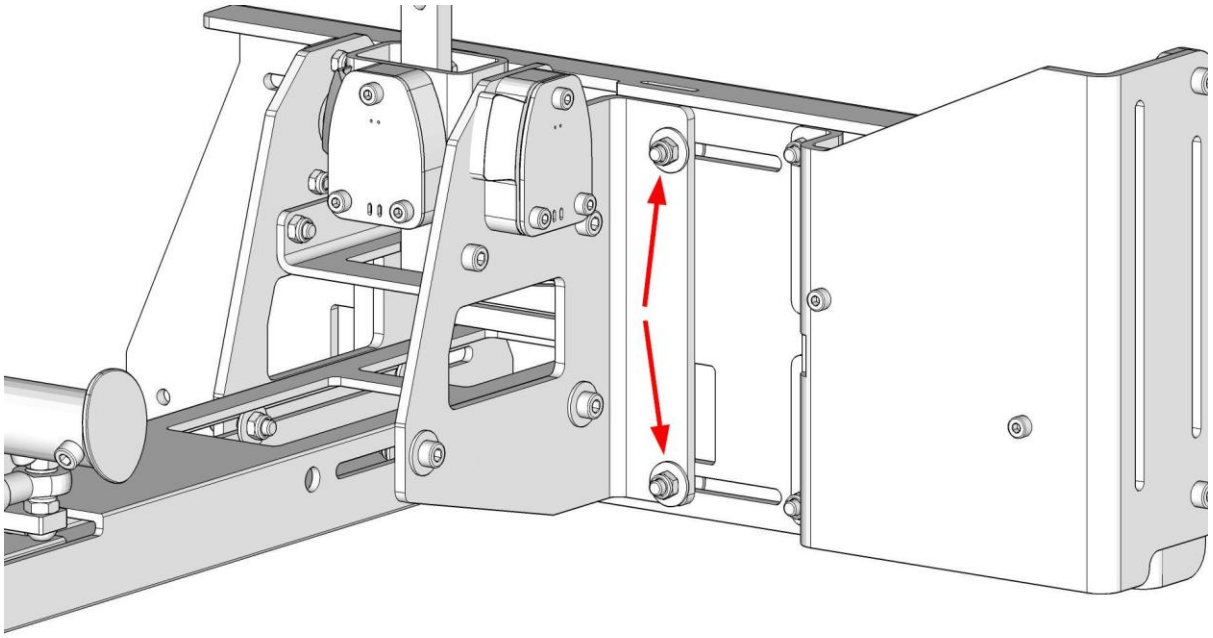
Loosen 4 bottom screws, don’t remove! Just loosen slightly!

Slide the main frame into position.

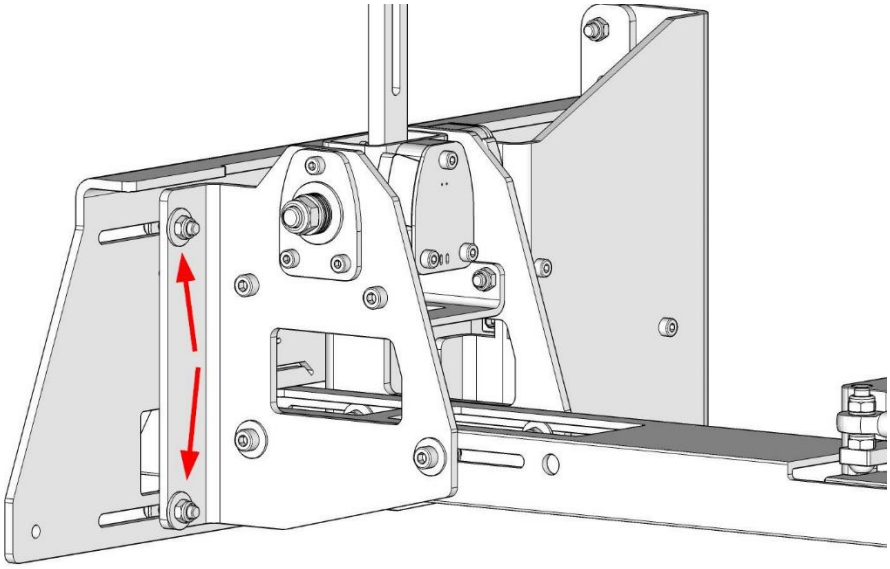




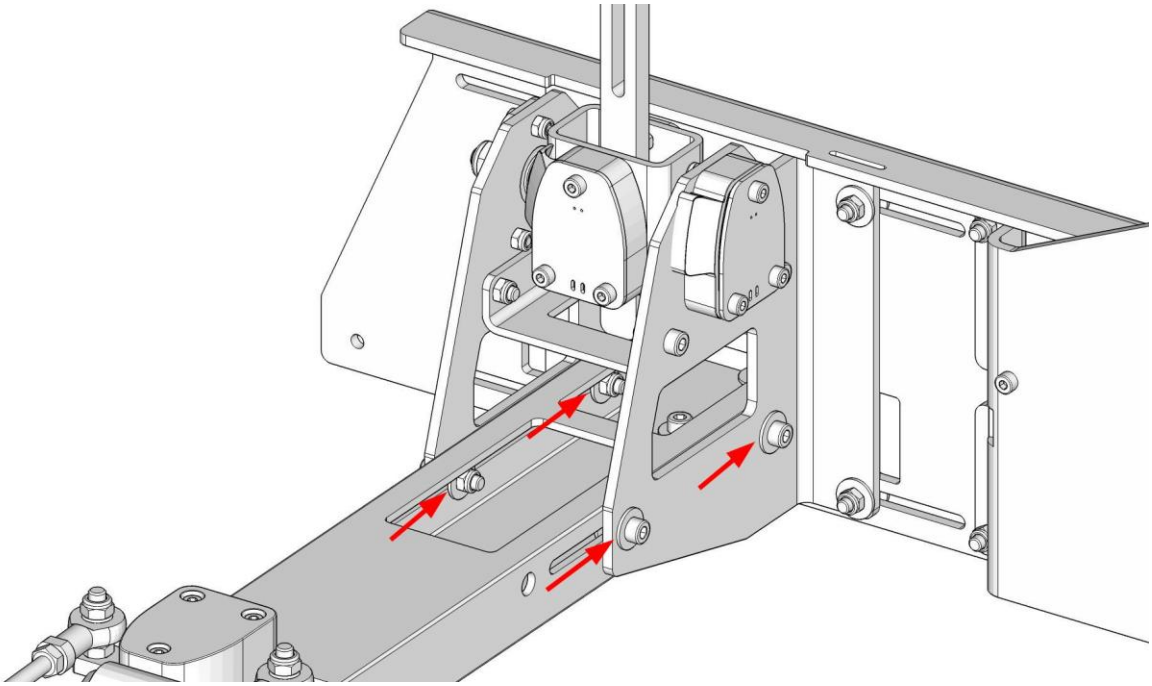
Insert 4 M5x18 screws, M5 standard washer on both sides, and secure with M5 lock nuts



Tighten the left frame screws



Tighten the right frame screws



Tighten the 4 bottom screws

Congratulations! 1/4 through!

Eat 2 bears because you deserve it 😊

The next steps cover assembling the collective assembly.

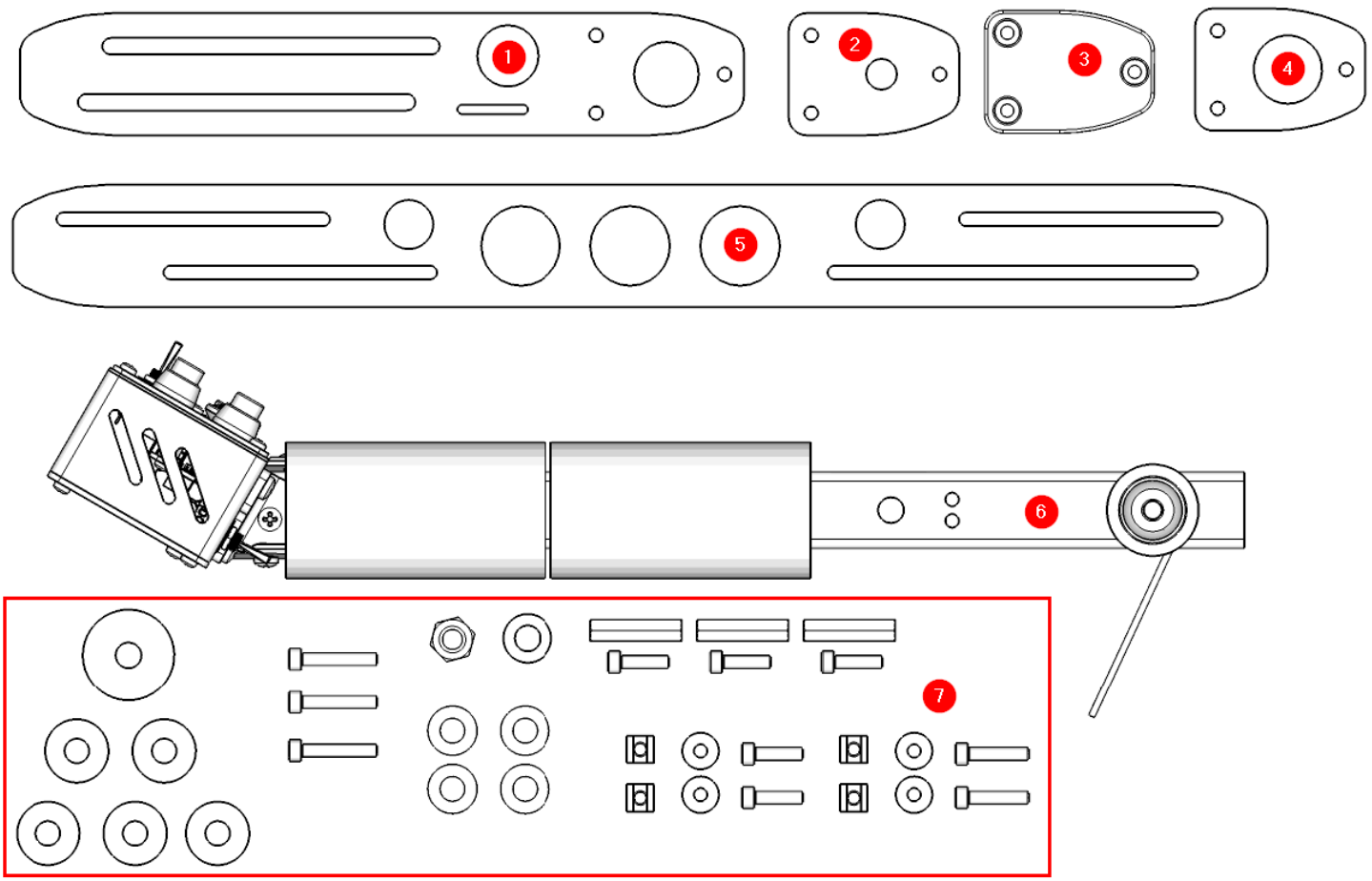
Take your time, this is the most “challenging” part 😉.

Note: the protective piece on the toggle switches is just for transport and can be thrown away.

The toggle cover can be used on any of the 3 collective toggles.

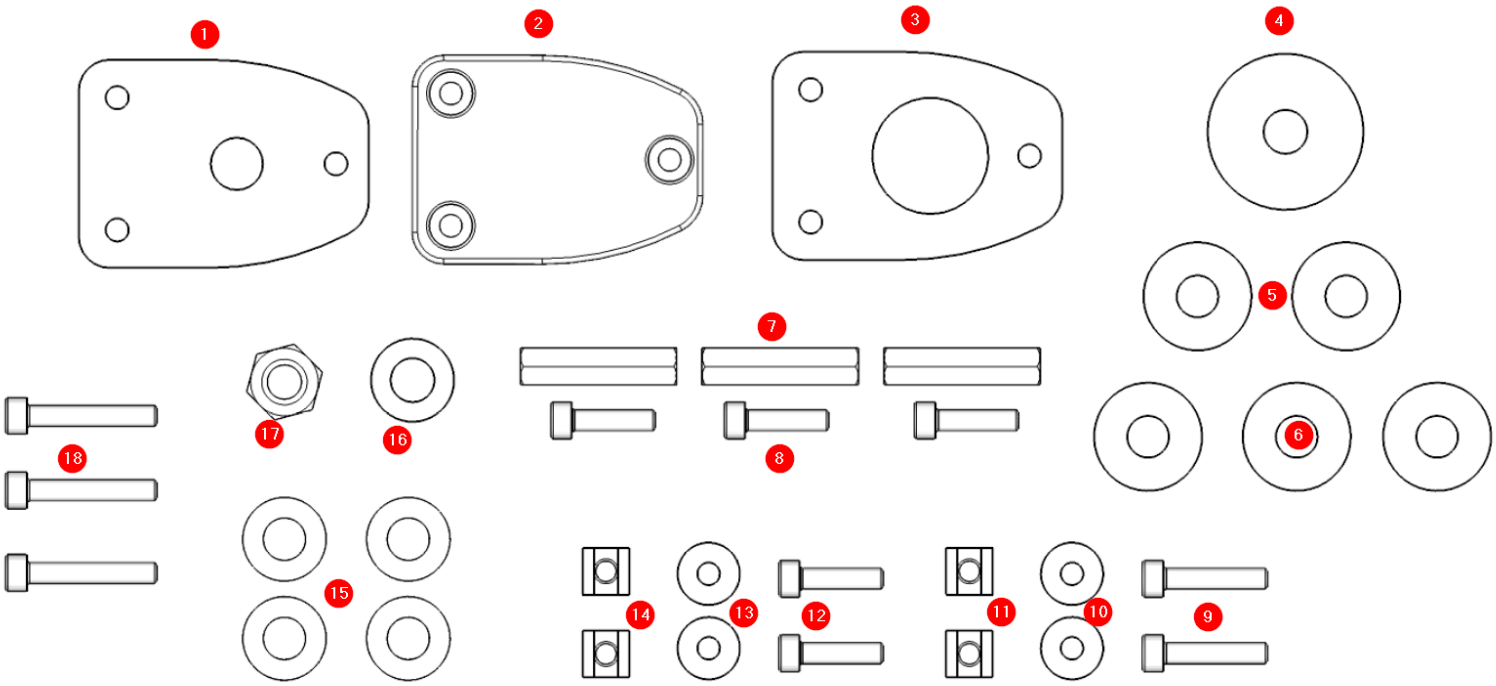
Take all components from the bag.

Revision C (or higher) collective component overview



1- Upper arm
2- Right side plate
3- Sensor cover
4- Left side plate
5- Lower arm
6- Collective assembly (showing twin variant)
7- fasteners

Revision C (or higher) small parts overview for collective



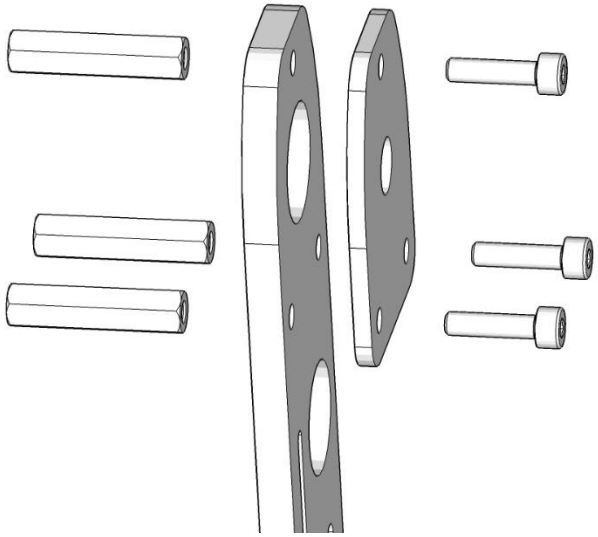
1- Right side plate
2- Sensor cover
3- Left side plate
4- M8 Large washer
5- M8 Needle bearings (2)
6- M8 Needle washers (3)
7- M4 x 30mm standoffs
8- M4 x 16 socket screws
9- M4 x 20 socket screws
10- M4 standard washers
11- M4 t-nuts
12- M4 x 16 socket screws
13- M4 standard washers
14- M4 t-nuts
15- M8 disc washers
16- M8 standard washer
17- M8 lock nut
18- M4 x 20 socket screws

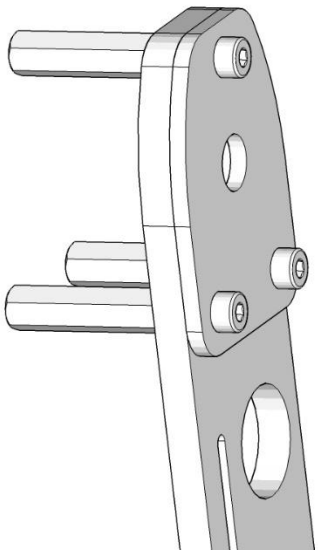
Start by assembling the upper arm

Use:

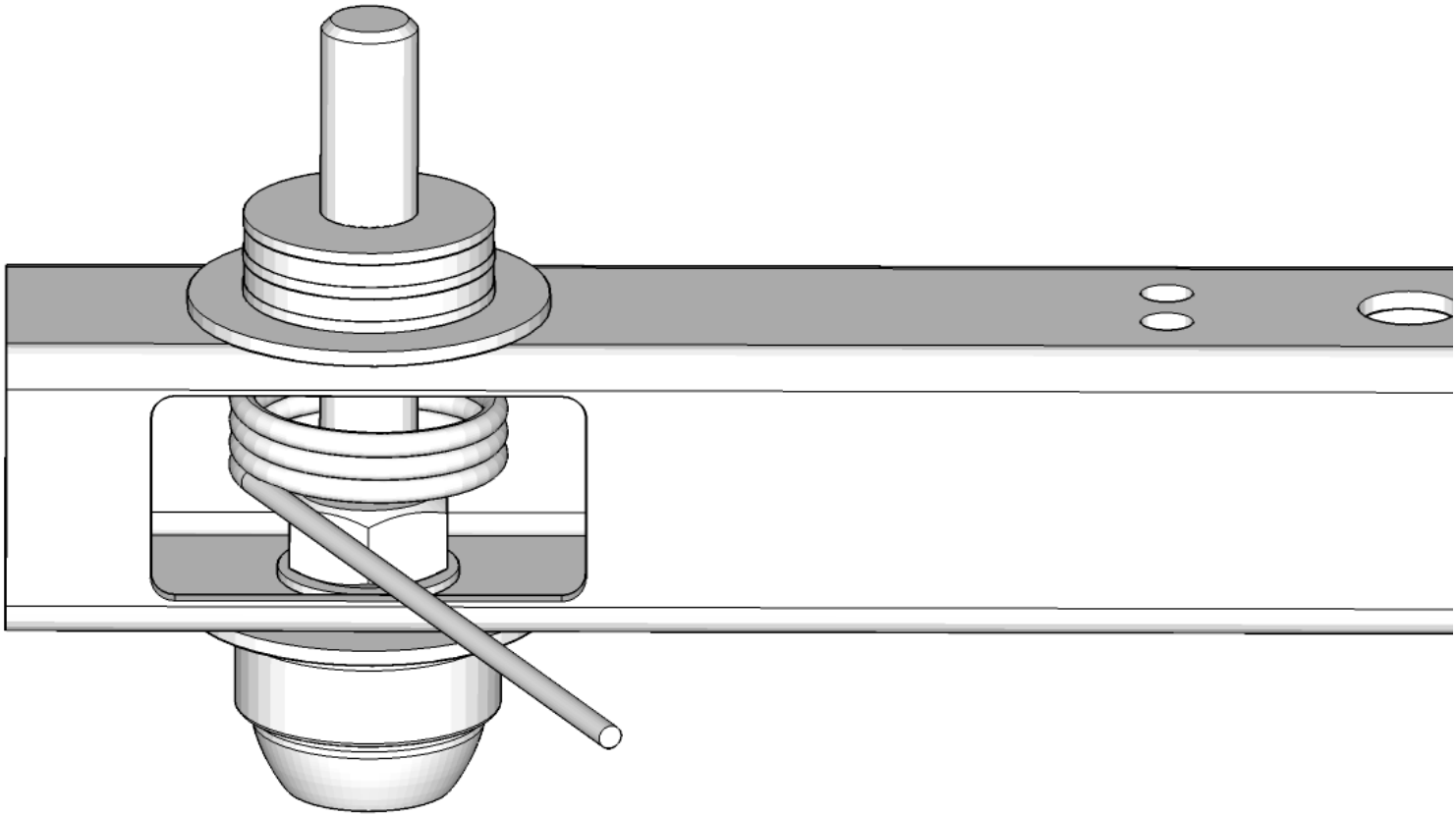
M4 x 16 socket caps (3), Right side plate

Upper arm, M4 x 30mm standoffs (3)





Place the collective assembly flat on its left side.



Stack the washer and needle bearings as shown in the picture

(top to bottom)

Needle washer

Needle bearing

Needle washer

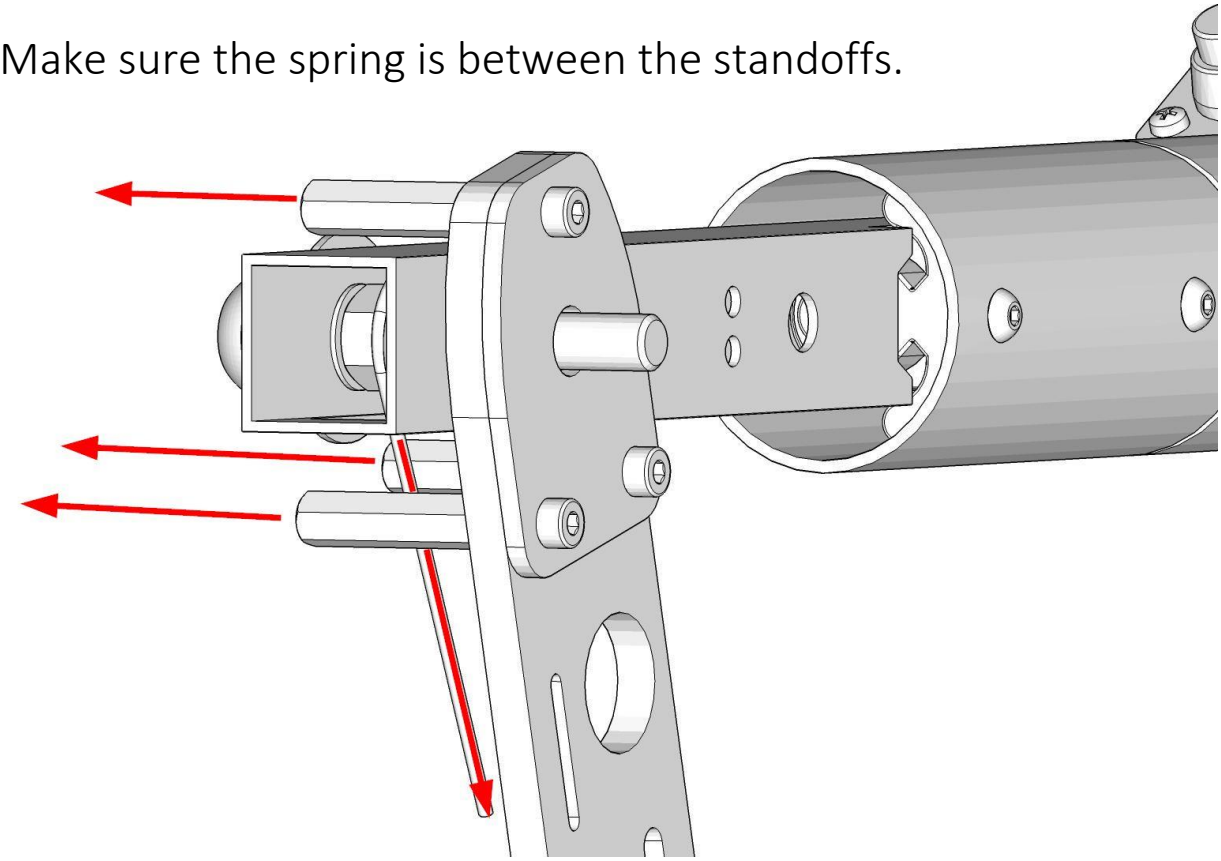
Needle bearing

Needle washer

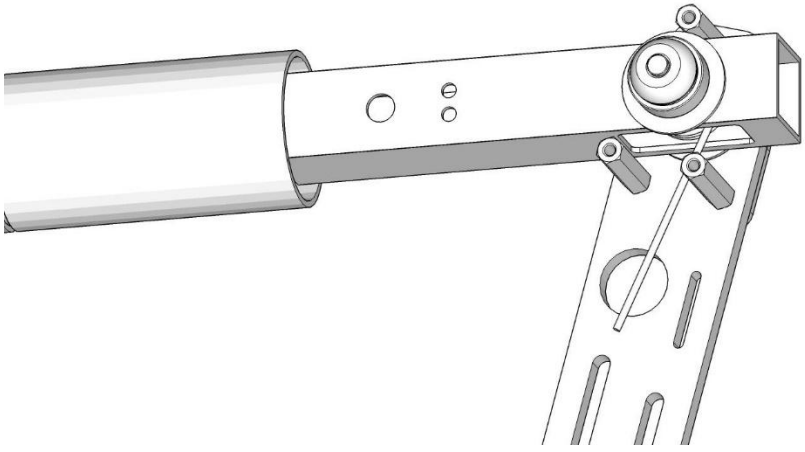
M8 Large washer

Place the upper arm assembly on top of the collective axis shaft. Make sure the cables are not pinched.

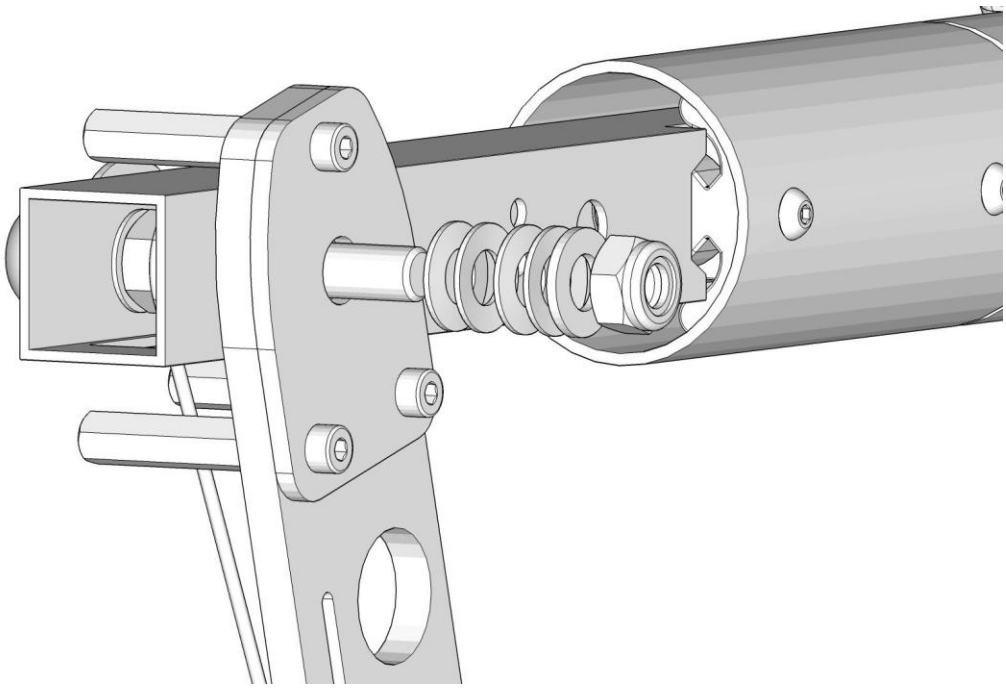
Make sure the spring is between the standoffs.



Lead the spring and cables between the standoffs.



Stack the disc washers (4), standard washer, and lock nut as shown in the picture

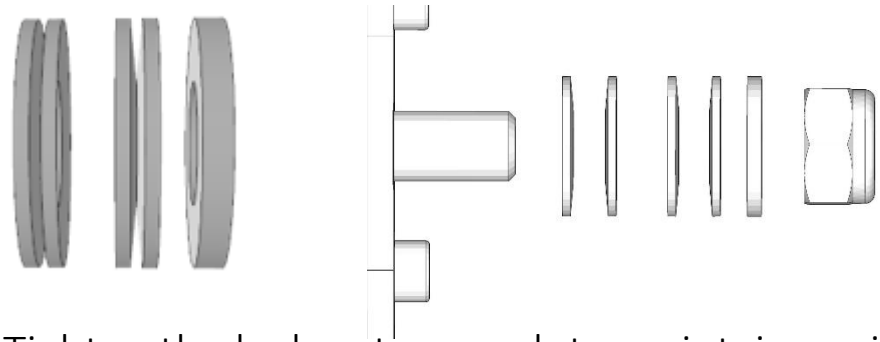


It is important to have all washers in the correct orientation to achieve the best friction experience.

2 pairs of disc washers.

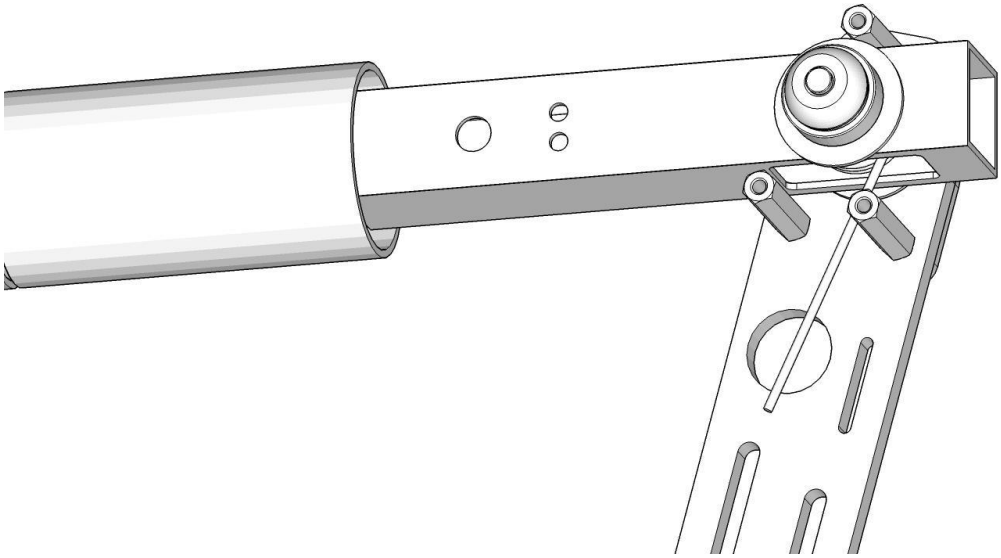
the standard washer on top, and the lock nut at the end.

Each disc pair is made of 1 disc facing up and 1 disc facing down. This detailed view shows how to add the washer stack.

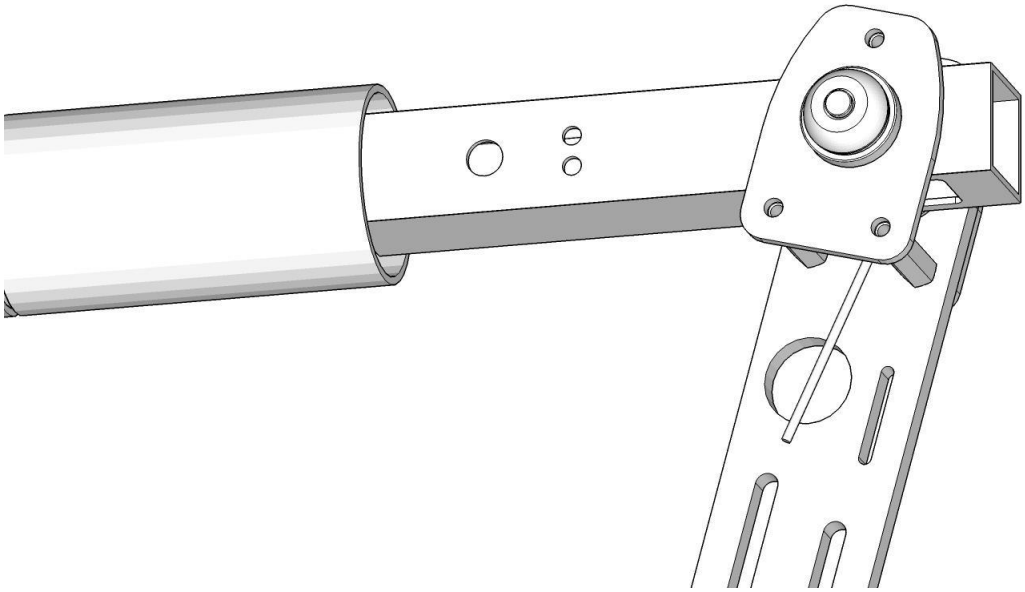


Tighten the lock nut, enough to maintain position. Use the lock nut to increase or decrease friction.

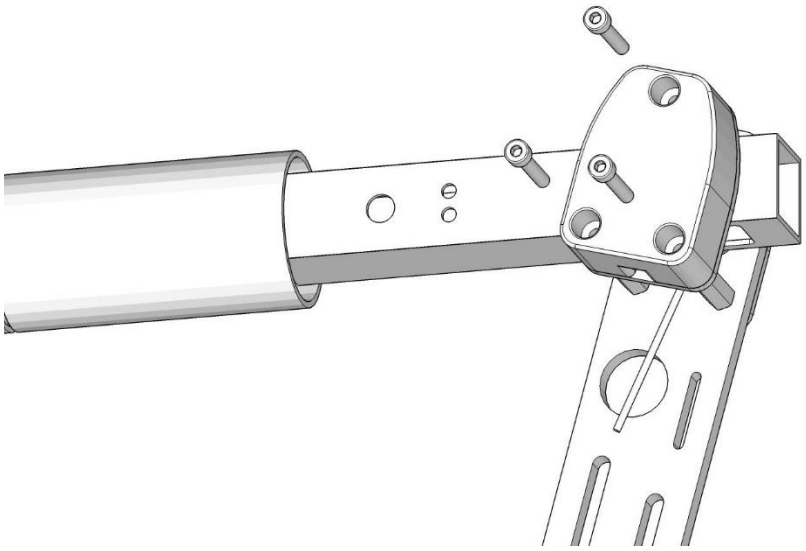
Flip the collective assembly and place it on its right side.

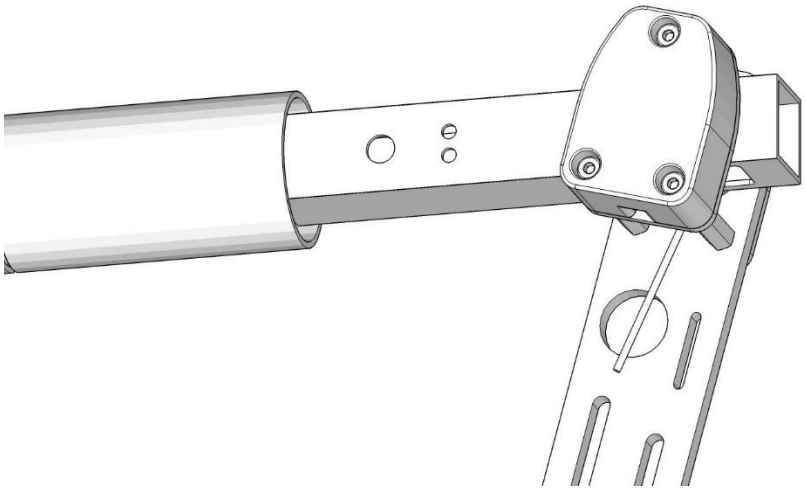


Insert the left side plate.



Install the sensor cover using M4 x 25 screws (3)



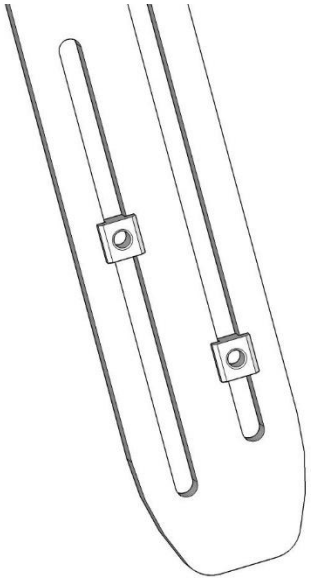


If you struggle to insert the screws, you might need to slightly untighten the screw on the opposite side to properly align the standoffs.

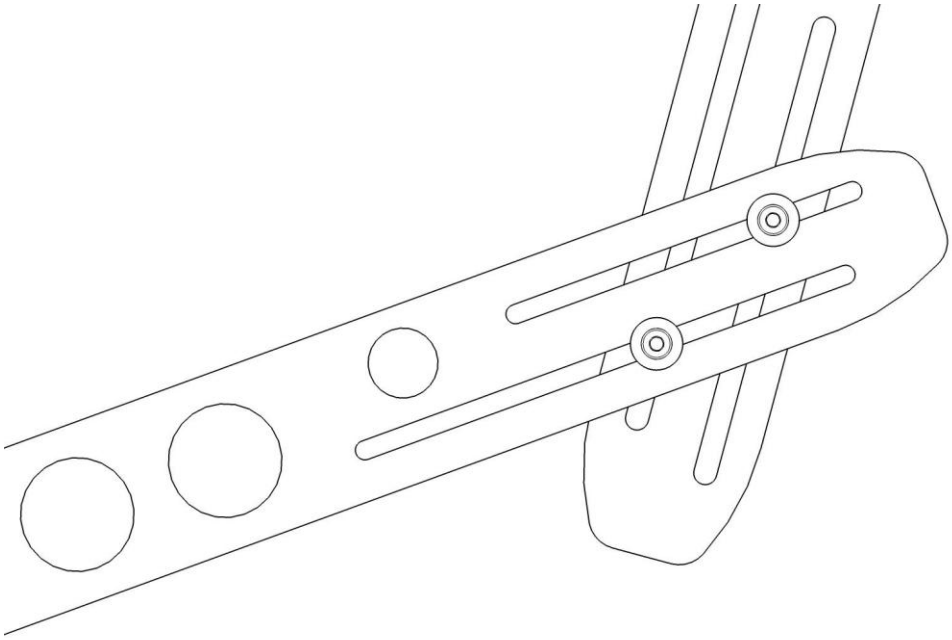
Make sure everything is tight after installation.

Prepare the lower arm and remaining fasteners.

Insert 2 t-nuts in the upper arm’s slots.

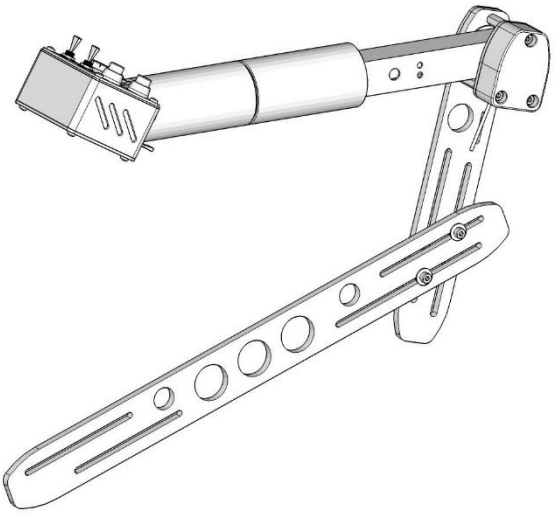


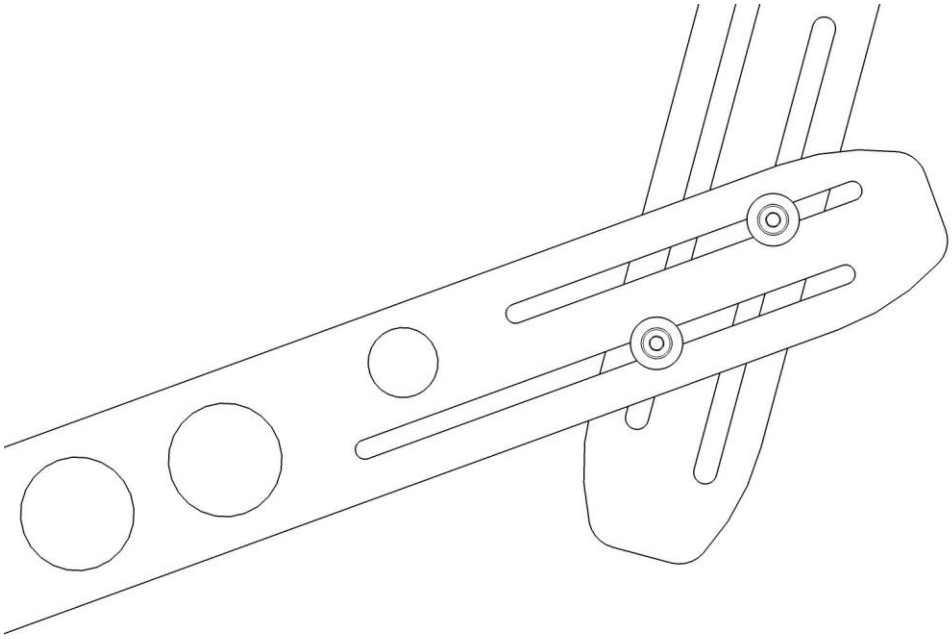
Use M4 x 16mm screws (2) and M4 standard washers (2) to attach the lower arm.



You have completed the collective assembly process.

Adjust the angle to match the picture approximately.



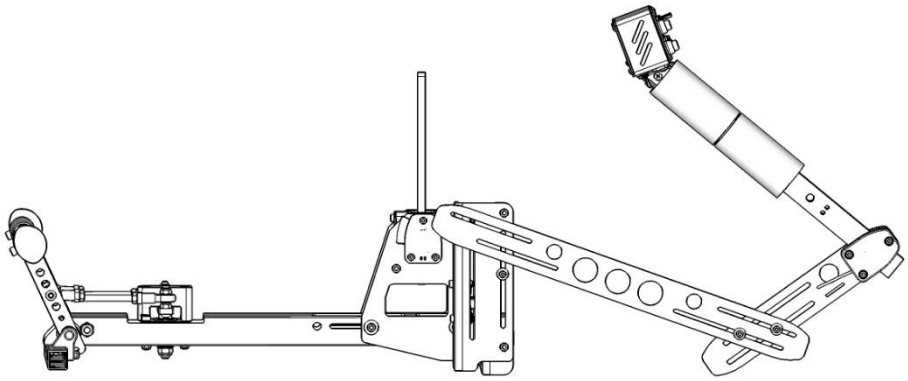


Congratulations! Halfway through! 😊

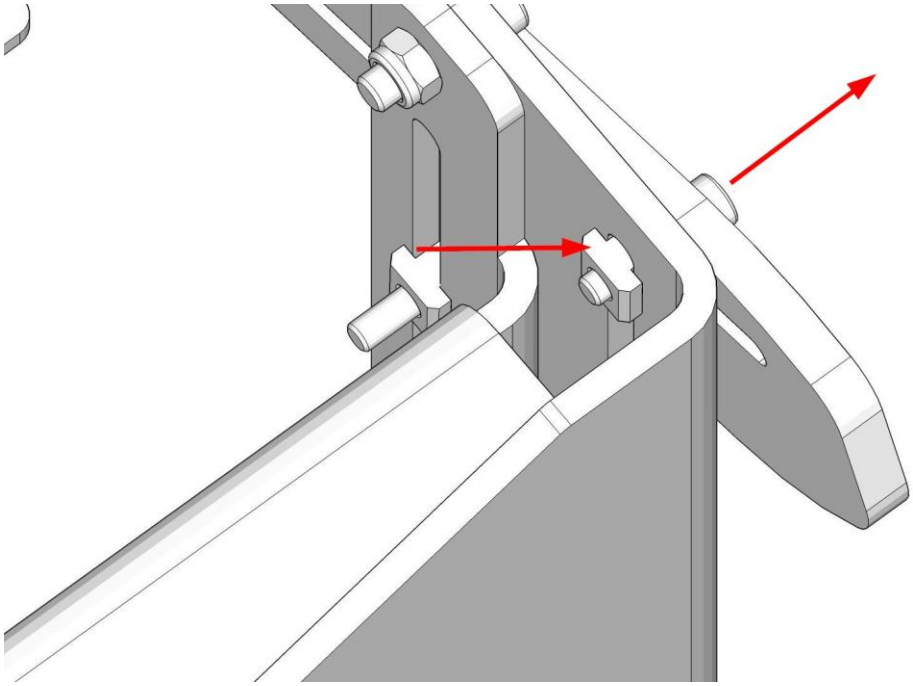
That’s certainly worth a couple of bears!

We are now goanna attach the collective to the frame

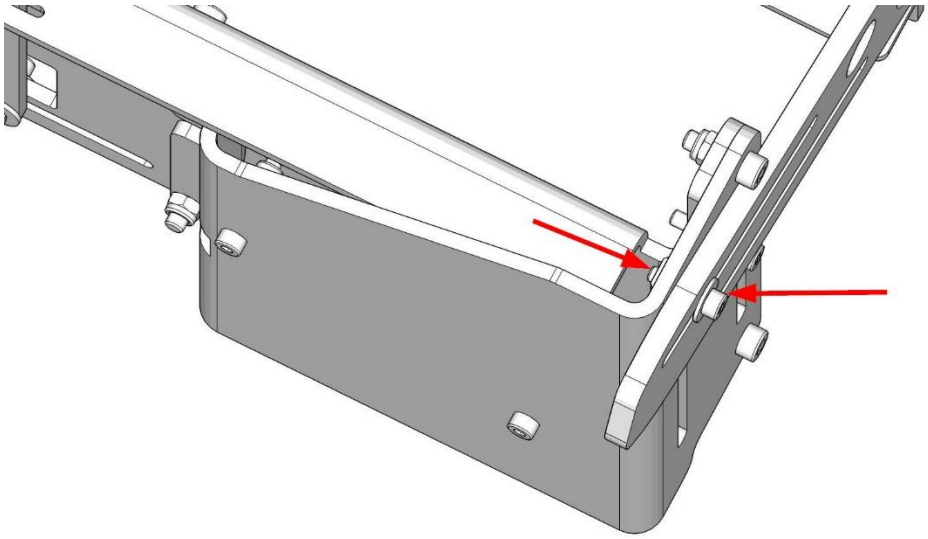
Place the collective arm (touches the ground on the right side) to fit the upper t-nut position



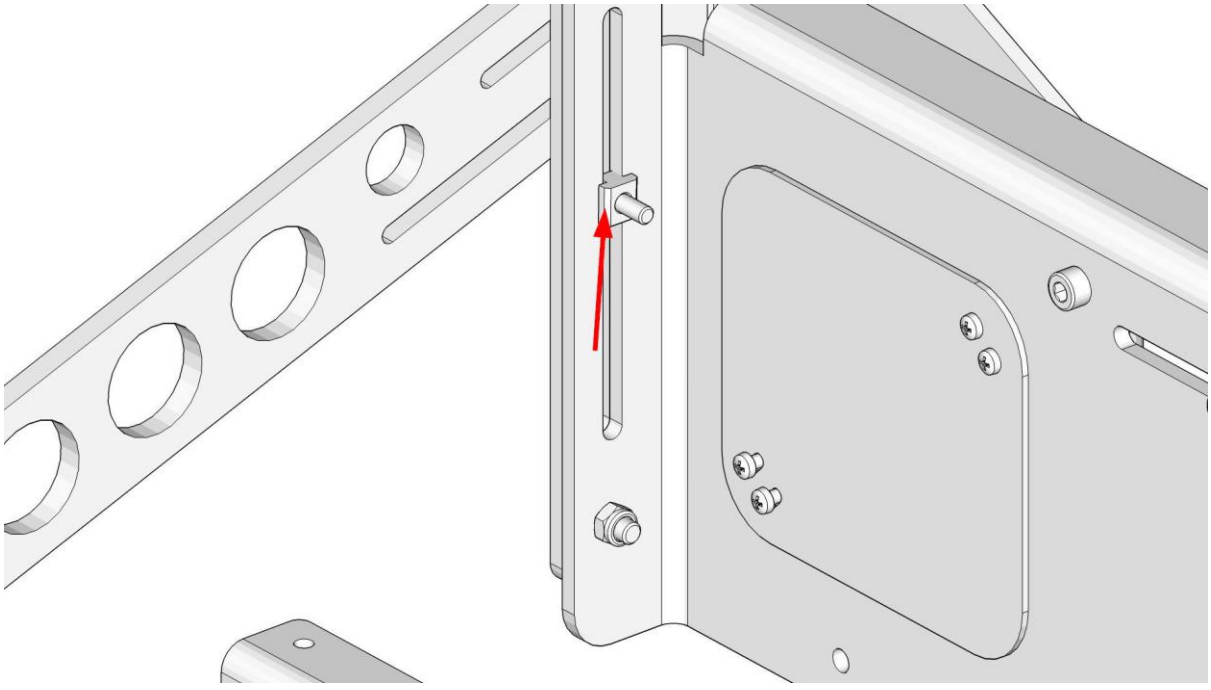
Hold the left t-nut, release the screw (if the nut falls during the process, just put it back in place at the top)

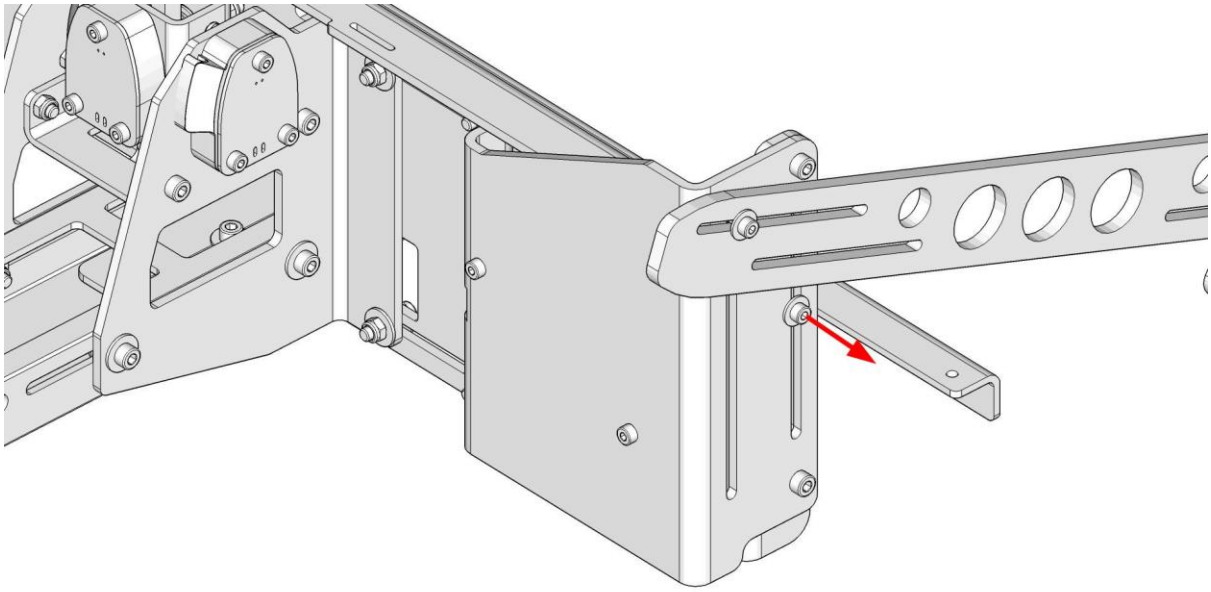


Slide the t-nut in position and insert the M4 x 20mm screw with the washer. Don’t tighten strongly, just slightly.



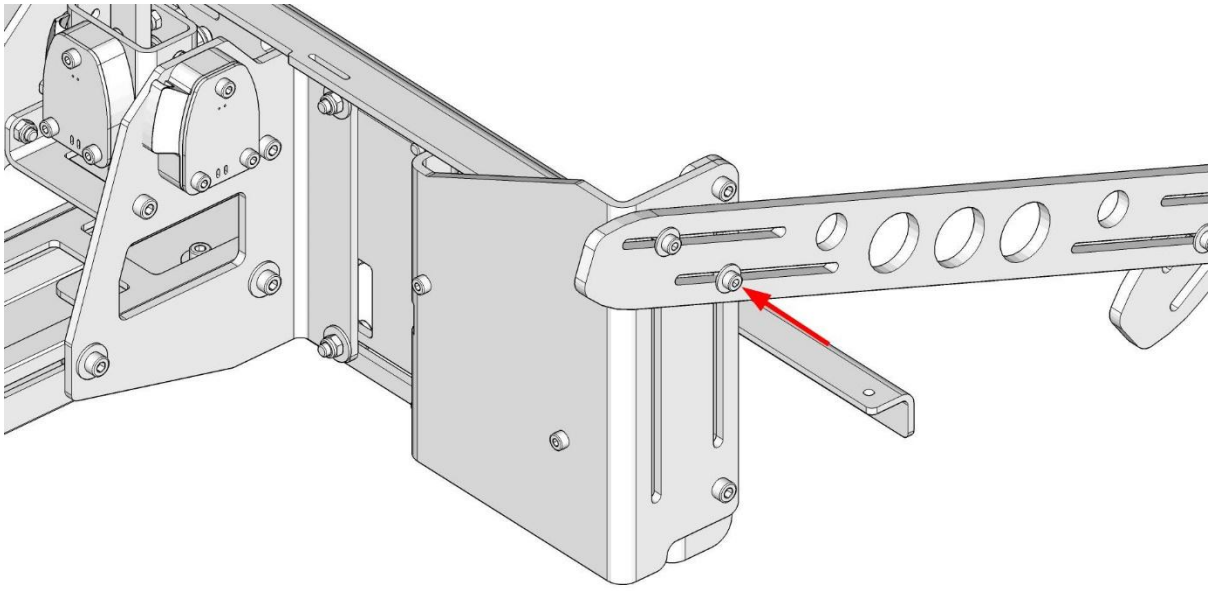
Hold the right t-nut, release the screw.



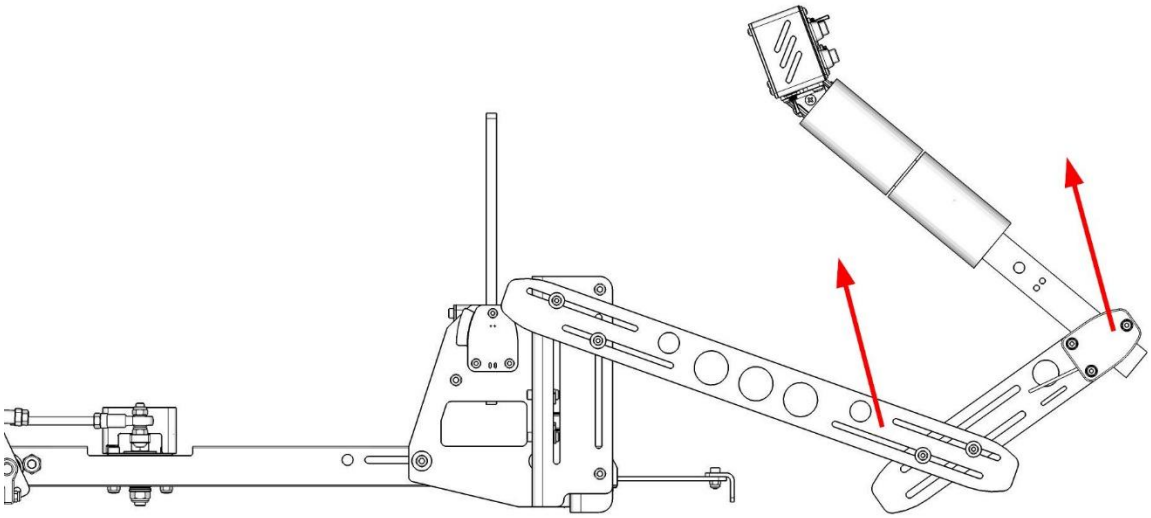


Insert the lower M4 x 20mm collective screw and slightly tighten it

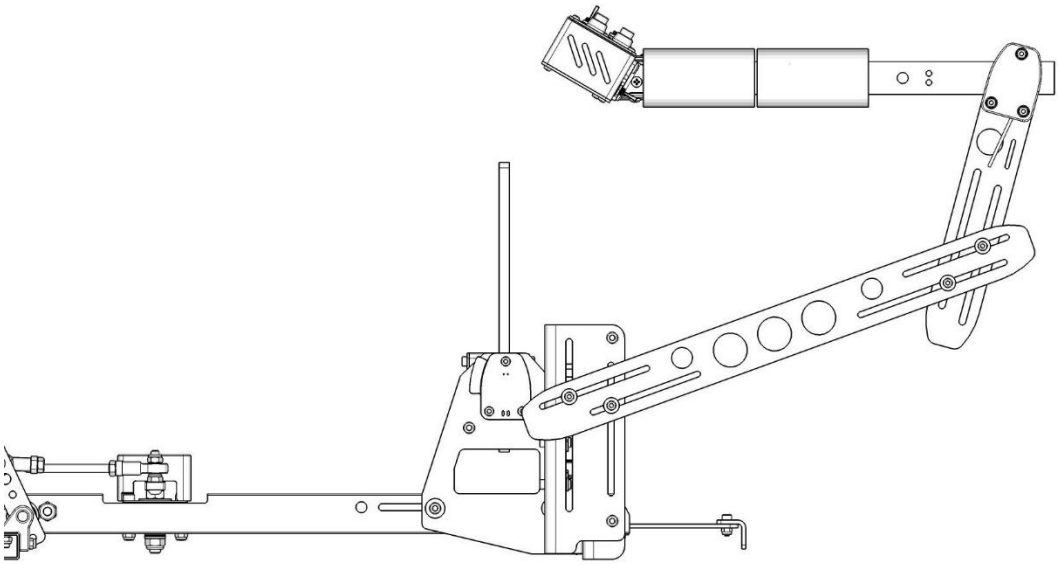
Do not tighten strongly!



Rise the collective assembly; loosen both collective screws if you tightened too much



Once you are happy with the placement, you can tighten both collective screws, don’t use too much force or you will damage the screw heads!



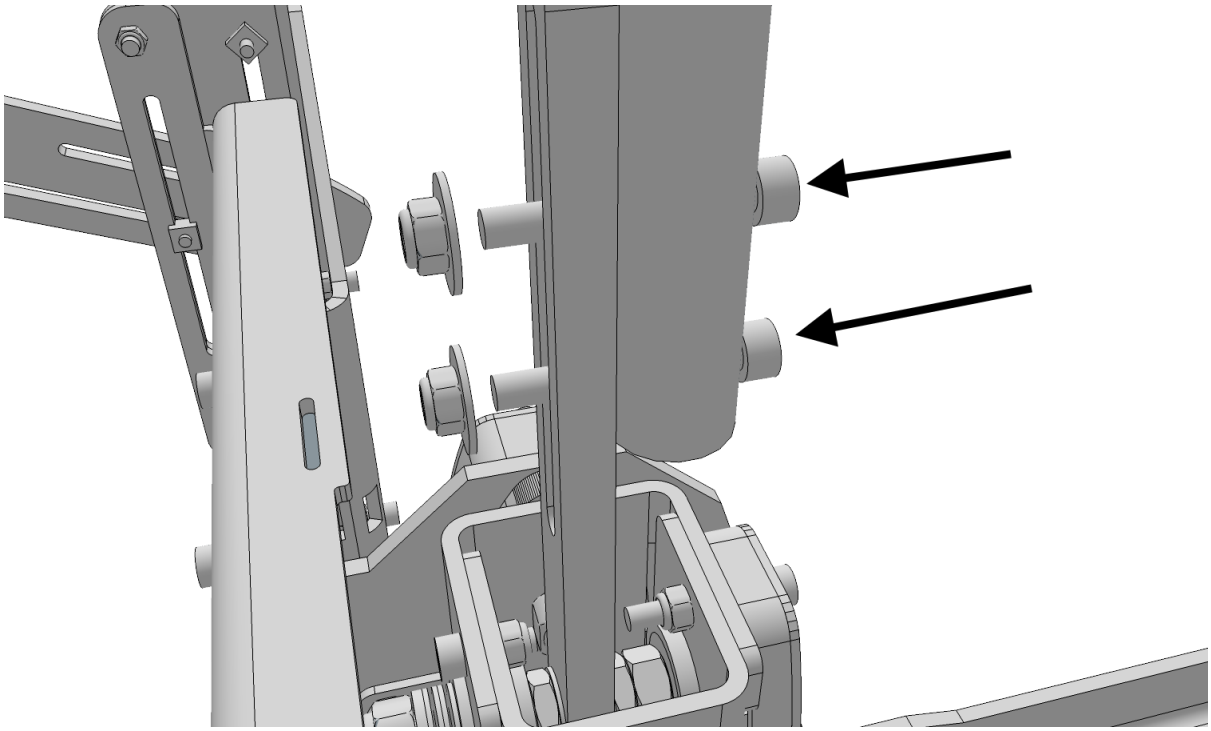
Eat 2 bears only. 

Resist the temptation to eat all remaining bears!

We know it’s hard.

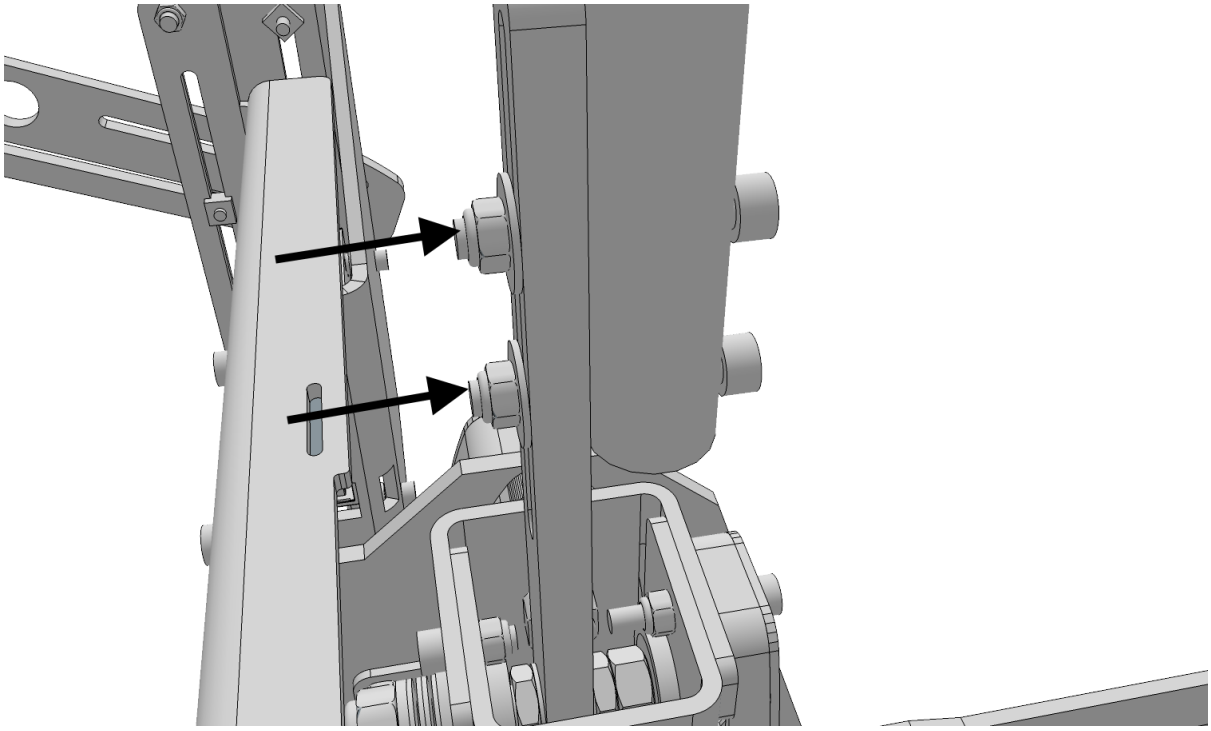
But you can do it!

A-Style Grip owners -> jump to the next page!



Loosen the nuts on the cyclic assembly and insert the screws on the cyclic bar. Don’t remove the screws from the cyclic curved tube!

If the screws are not installed on the tube, use the M5 x 35 screws and M5 standard washers on each side.



Mount the nuts and tighten them.

A-Style Cyclic Grip

If you own an **A-Style (inspired by Airbus) Cyclic Grip**, the M5 Lock nuts are replaced with M4 T-Nuts 👍 . You should have a little bag with all the fasteners for the A-Style Cyclic grip!

Check our website for the A-Style Grip assembly!

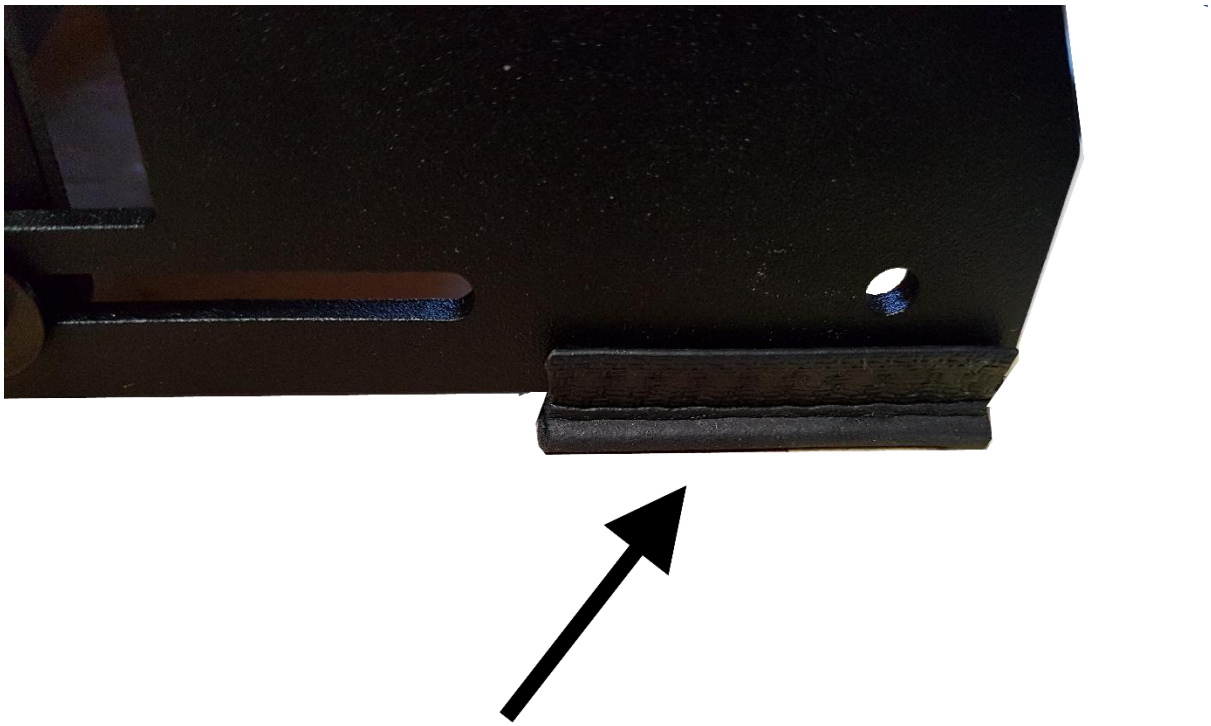
https://pro-flight-trainer.com/puma-x-a-style-cyclic-grip/

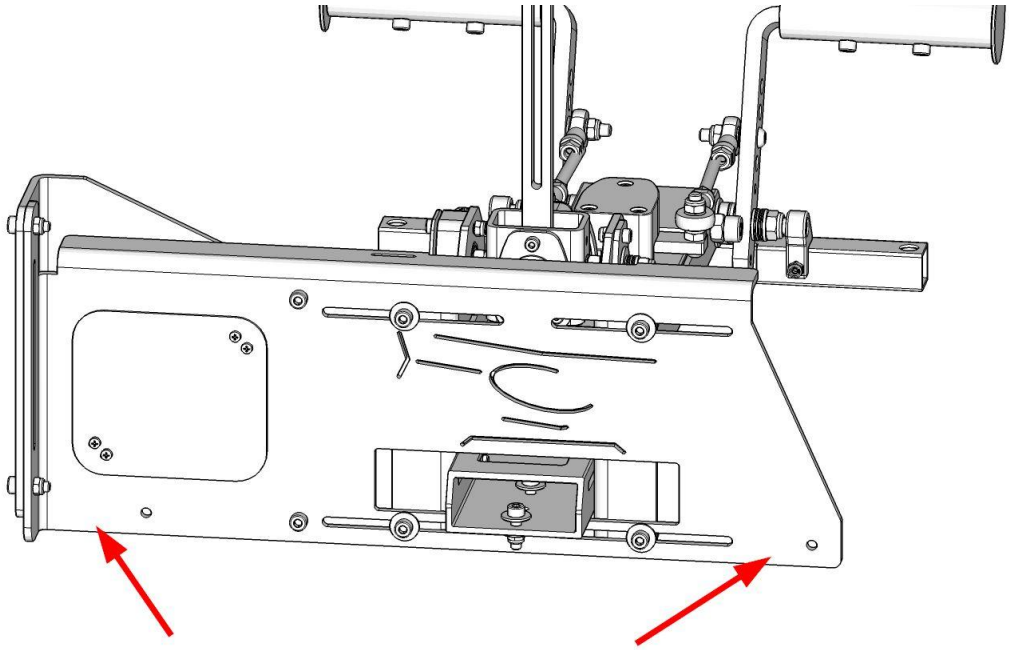
You did it! The flight controls are assembled.

Follow the wiring guide to wire up the sensors.

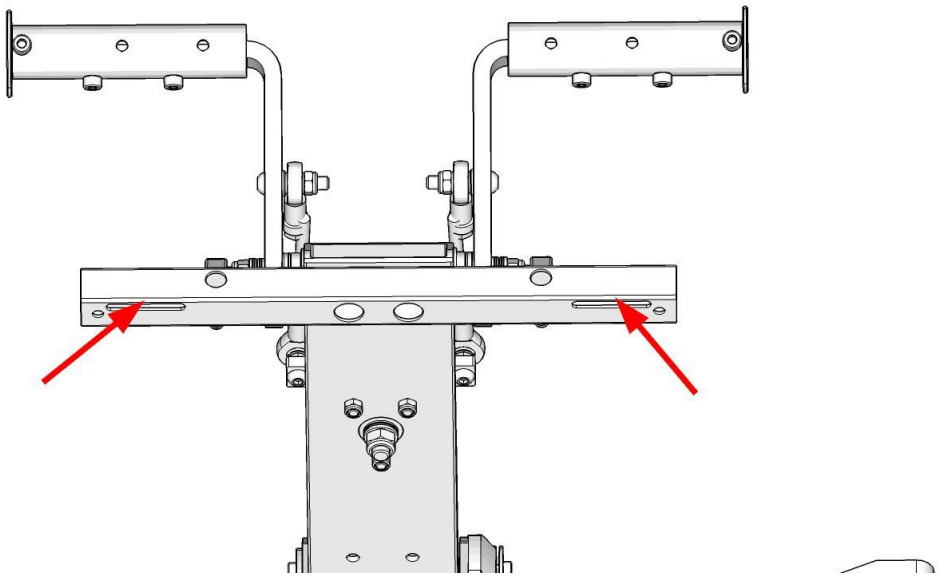
You might want to keep the remaining bears for later, or not, that’s up to you!

The PUMA X flight controls come with anti-slip foots that can be installed on all 4 corners of the frame as shown in the picture below.

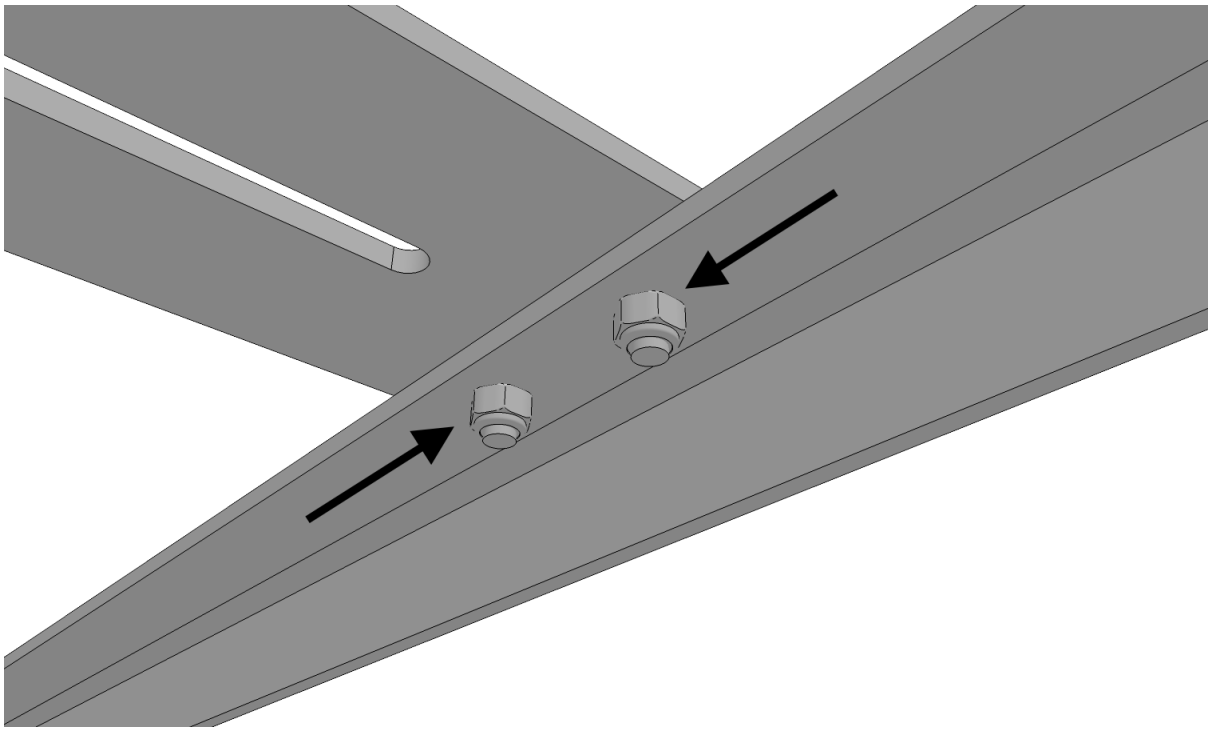




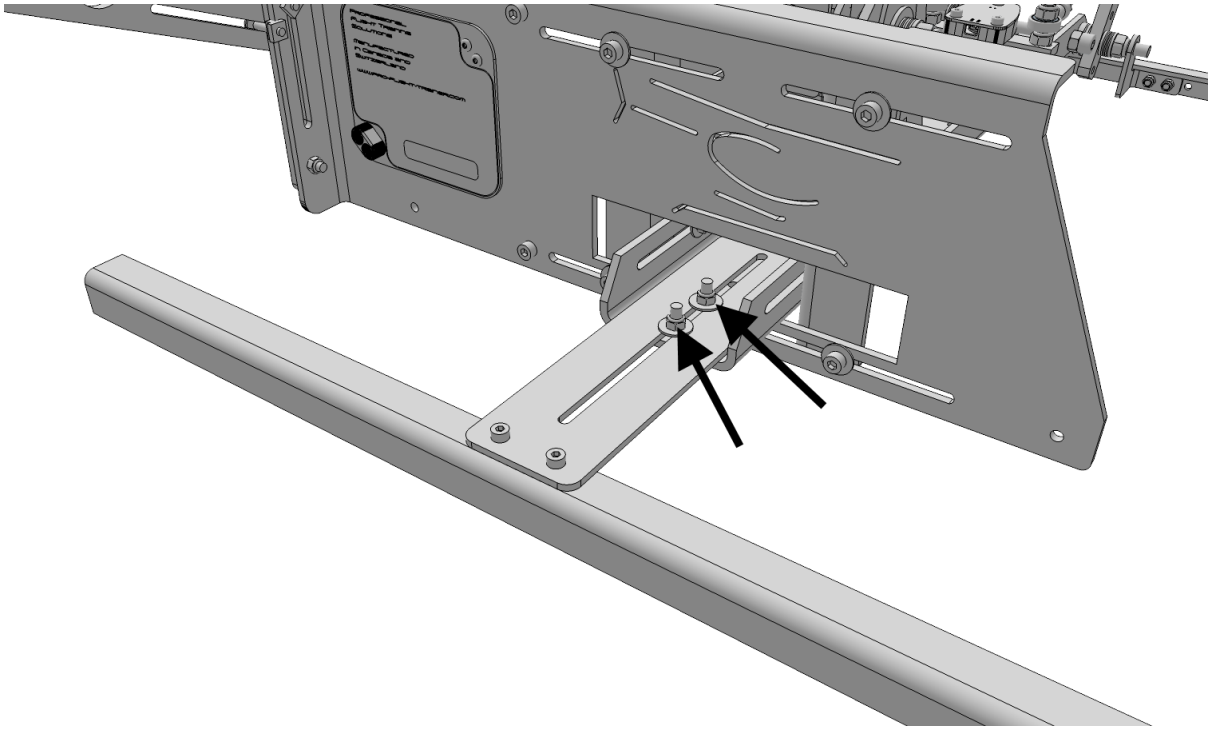
And at the front 2 shorter piece



In case the unit is used on a very slippery floor, or if you experience that the unit tends to move during usage of the pedals and brakes, you can add the seat blocker assembly to the frame.



Attach the seat blocker bar to the blocker plate using 2 screws



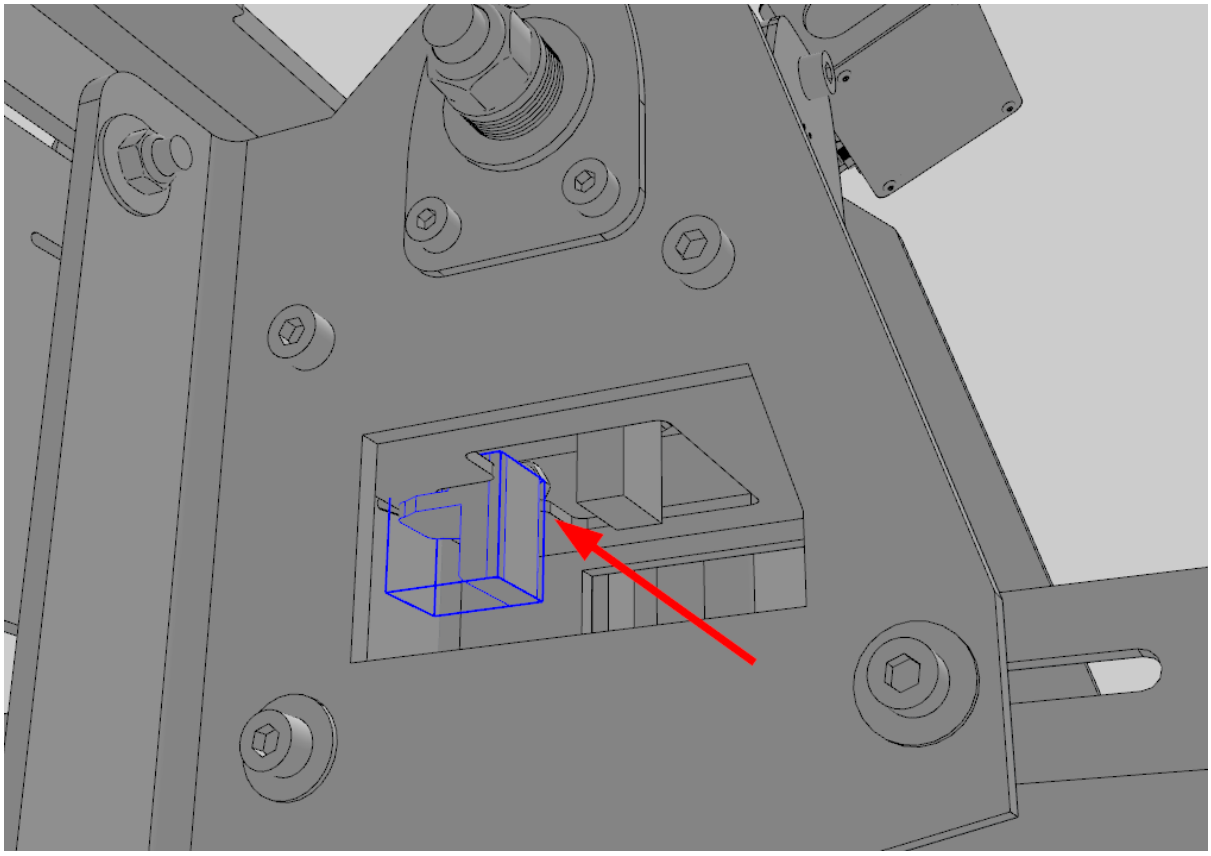
Attach the seat blocker assembly to the frame using 2 screws

The Fold Stopper for the Cyclic assembly can be used to prevent the cyclic from going through the fold slot.

V1 is red or black

Start by bringing the cyclic into its upright position.

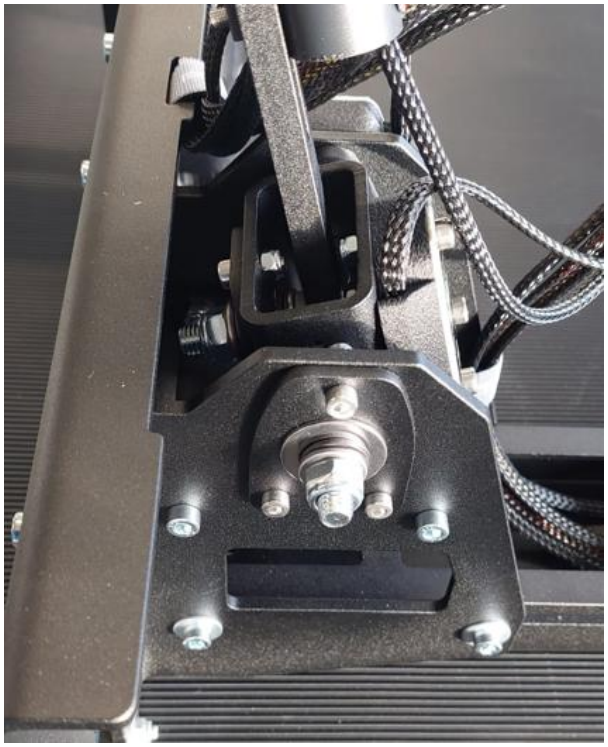
Insert the fold stop piece into the slot.

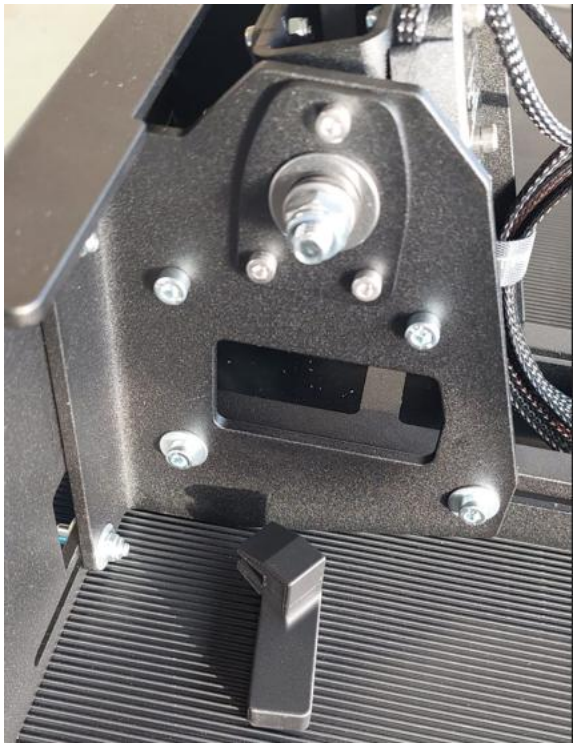


The fold stopper V2 is usually black

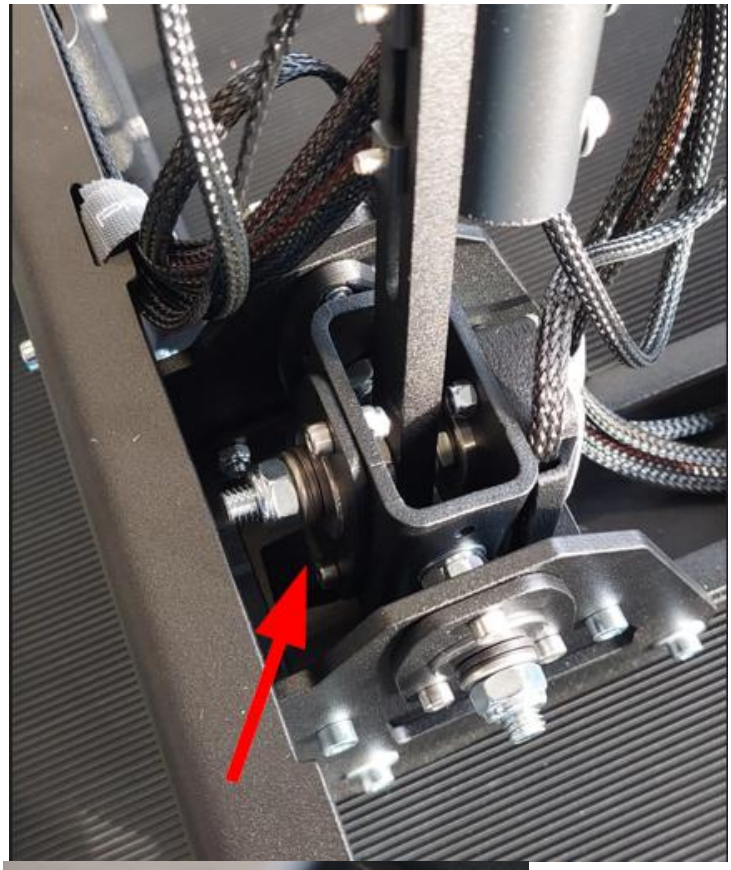
Installing the fold stopper V2.

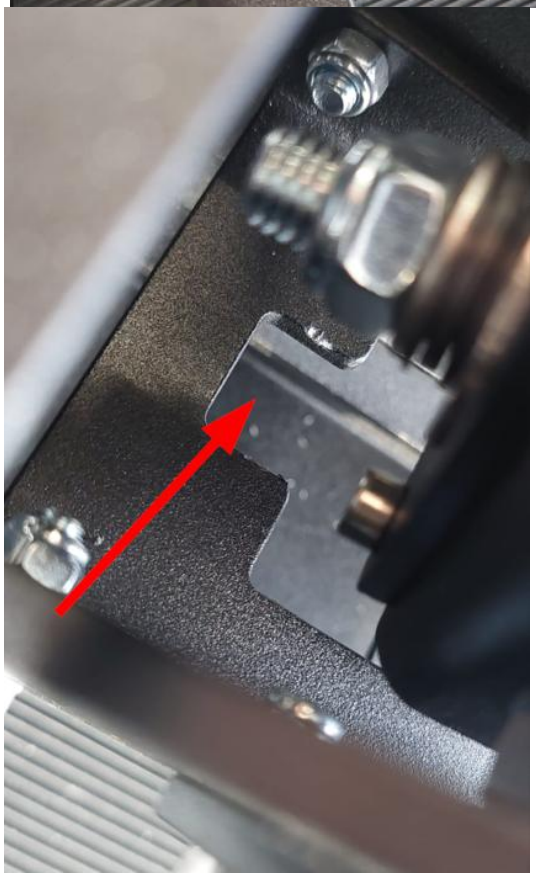
Place the cyclic in the backward left position (towards the pilot and left)
Orient the fold stopper as shown





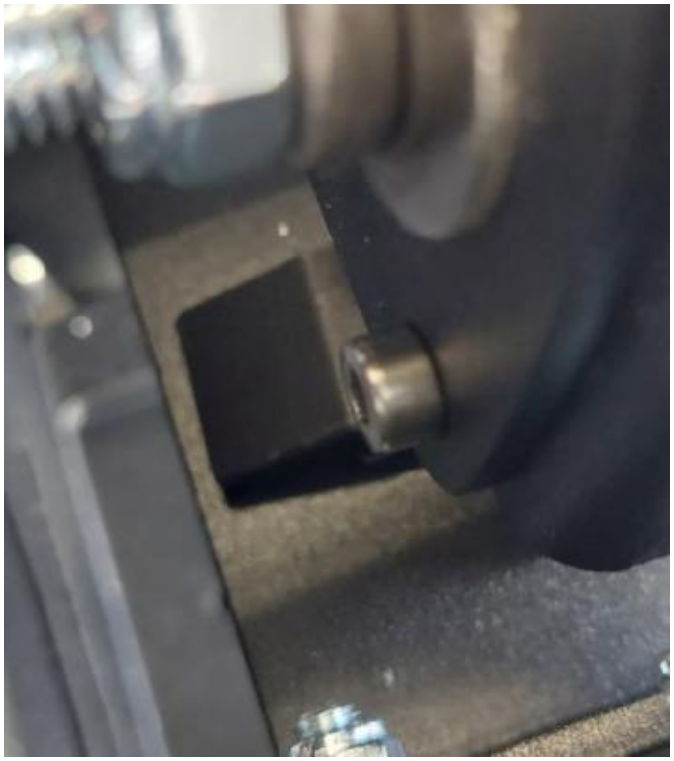
Locate the fold slot





Insert the fold stopper into the slot

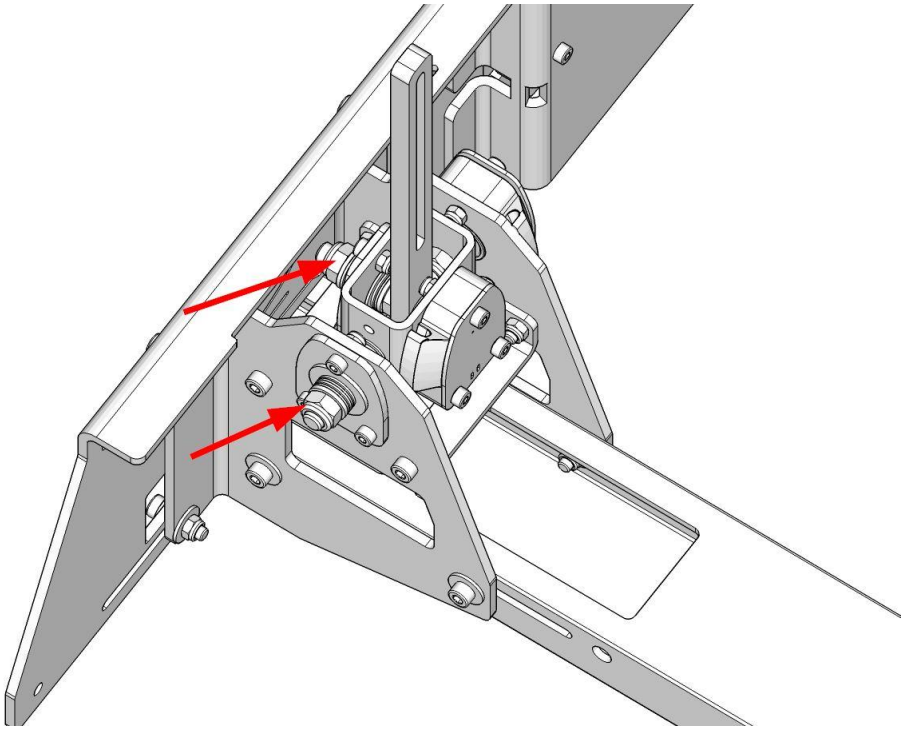
Once the fold stop is orientated and placed into the slot, move the cyclic forward and centre to push the fold stopper into position



Mini-Wrench Nr 13 for quick friction adjustment (red or black)

You can use this “mini wrench” to adjust friction on all 4 main axes “on the fly”.

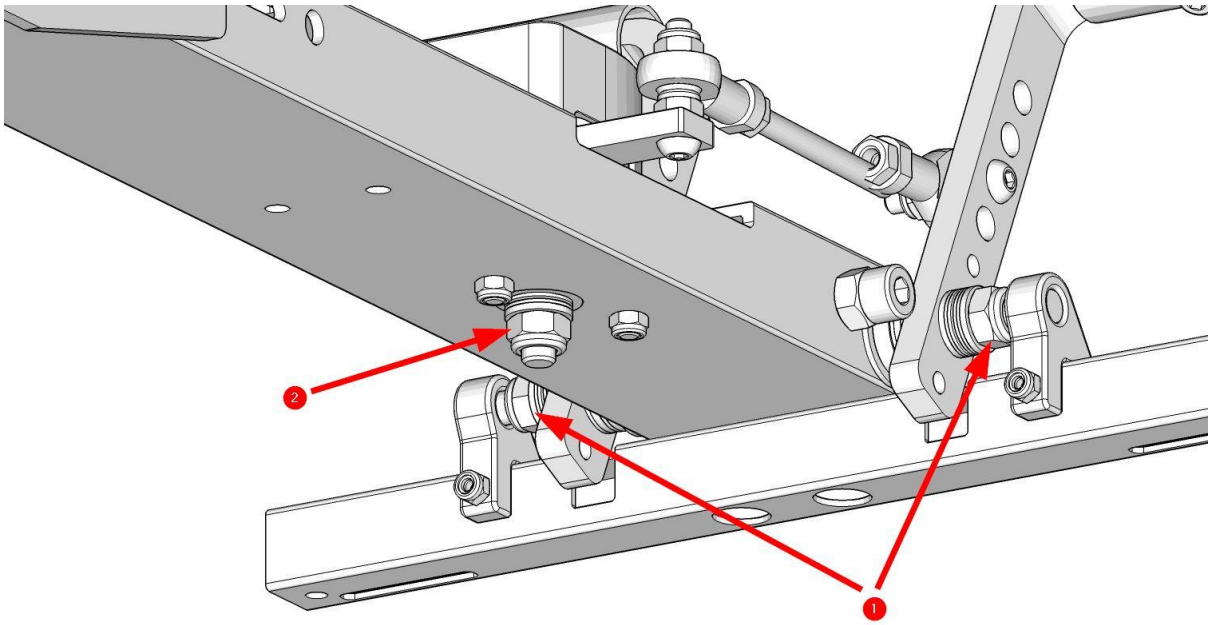
Each cyclic axis has its friction nut. Do not overtight them.



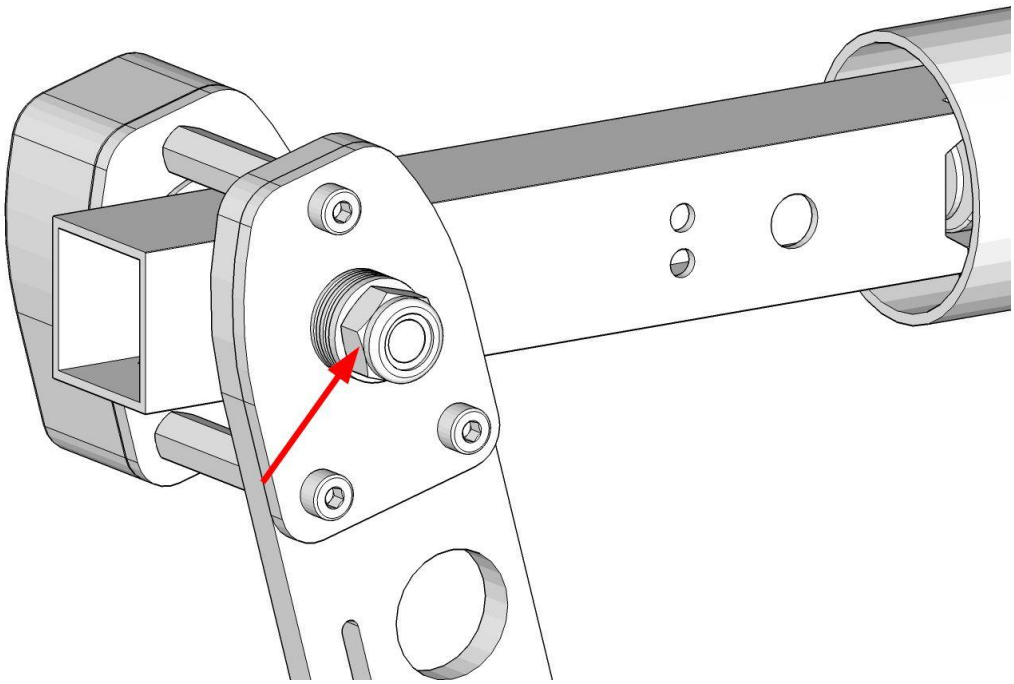
Do not use the pedal lock nut to adjust friction! (2)

This might induce axis play. Caution! Do not release the pedal lock nut such that the washers can freely move as this will create a play in the axis!

You may release or tighten the pedal front lock nuts (1) to decrease or increase pedal resistance.



The collective friction nut.



Calibration wire, used for maintenance and special tasks

This special wire and connector set is only used under instruction of our support team, keep it somewhere safe! ;-)

The red toggle cover can be used on any of the 3 toggles. When flying VR, it can be helpful to have one of the top toggles covered in order to recognized immediately which one you are touching while flying (tactile feedback).

Small tube of silicon-based grease, used for friction washers and maintenance

The grease can be used to lubricate the washers used on the main 4 axis after long usage, or if you want to achieve very high level of friction on the cyclic axis (not recommended but possible)

Getting the friction right:

This little guide can help to find the “friction sweet spot”

It was written by a very experienced military helicopter flight instructor.

I have experimented with different friction settings, and I approach my adjustments in two different but similar ways to help me somewhat quickly change between control feels. Each method helps me adjust the cyclic feel for two types of helicopters, Light hydraulically boosted helicopters like the B206/AS350/H125, and another method for Heavier hydraulically driven flight controls and helicopters without hydraulic flight control systems. It is also important to note that with these methods I am using the metal washers that you sent me as well as lubricating the metal washers with silicon oil. I started using the oil after finding that my cyclic

will squeak when used at higher friction settings, the added benefit was smoother cyclic movements at friction settings that closer resembled the aircraft I normally fly in real life. I mention this because this might not be necessary for most users. the Cyclic feel of an AH-64 is different from a R44, so most people will not need frictions set that high.

for light hydraulically boosted helicopters, I start with no friction, and then tighten it to where the flight controls hold their position when moved and do not flop all the way over to the stop. From there, I will add one half to one full turn of the nut. That is my base adjustment and I make smaller incremental adjustments from there until it feels right.

for heavier helicopters or non hydraulically driven/boosted models. I do the opposite. I tighten the until the controls do not move easily. I do not have a pull gauge, but i measure this by using two fingers and pressing on the cyclic in pitch and roll with my fingertips. my fingers should give and bend backwards before the cyclic moves. and it should be a smooth movement, the cyclic should feel like it has "broken free". from there I will make smaller adjustments to get it “just right”. I also use this method on my pedals. mostly because the AH-64 has force trim in the pedals, and large "feel springs" that offer a lot more resistance than that of a 300 or any of the Robbies.

I have found these give me the best results. Again, most of my adjustments are made to emulate what I fly on a regular basis, but it might be a useful technique for others.