B9Creator™ v1.2 Visual Assembly Guide

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Inventory v1.2

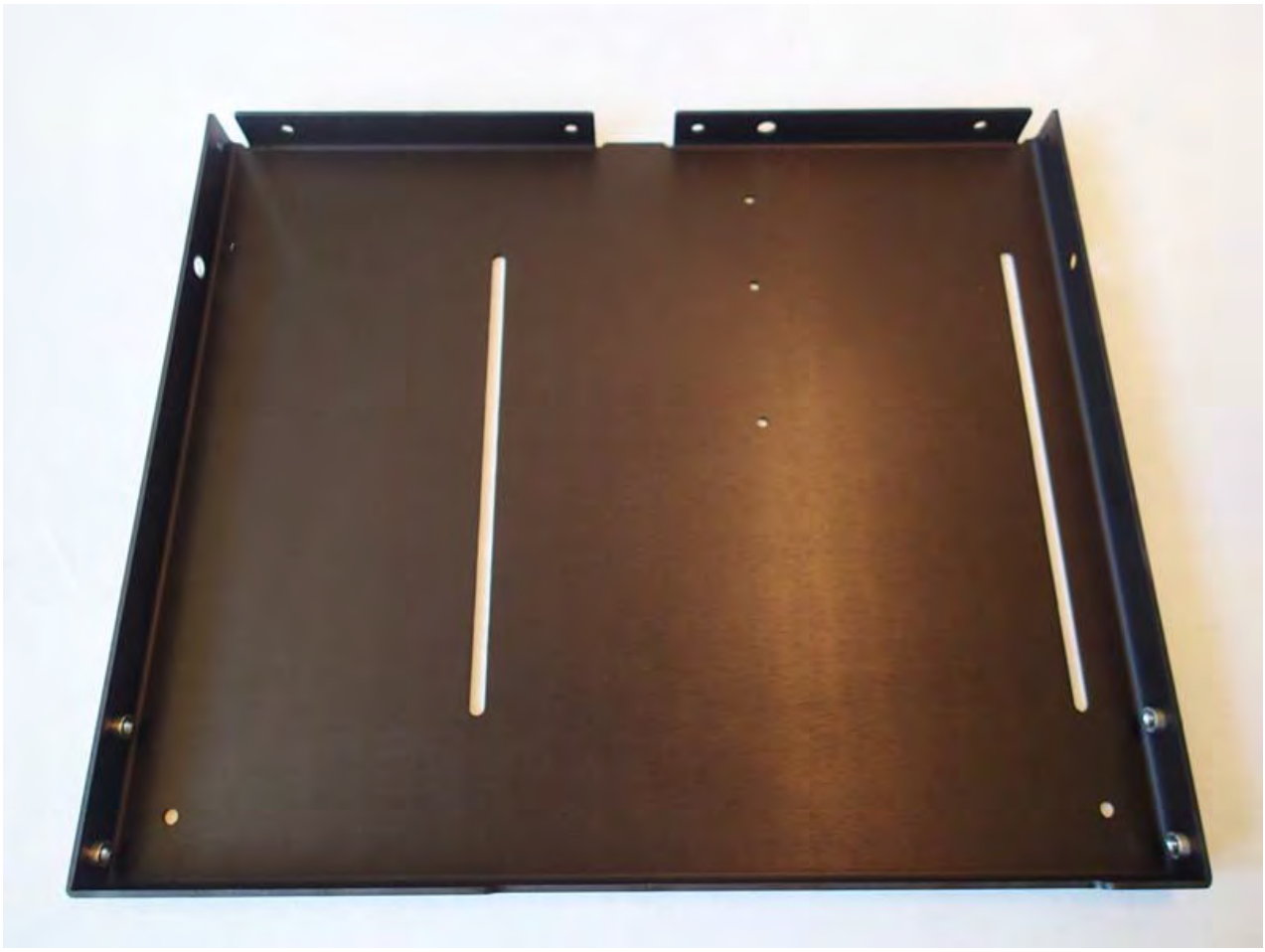
The B9Creator Kit - Double boxed for extra protection during shipping

Open the inner box to inventory the various individual parts and sub-kits

Individual Parts

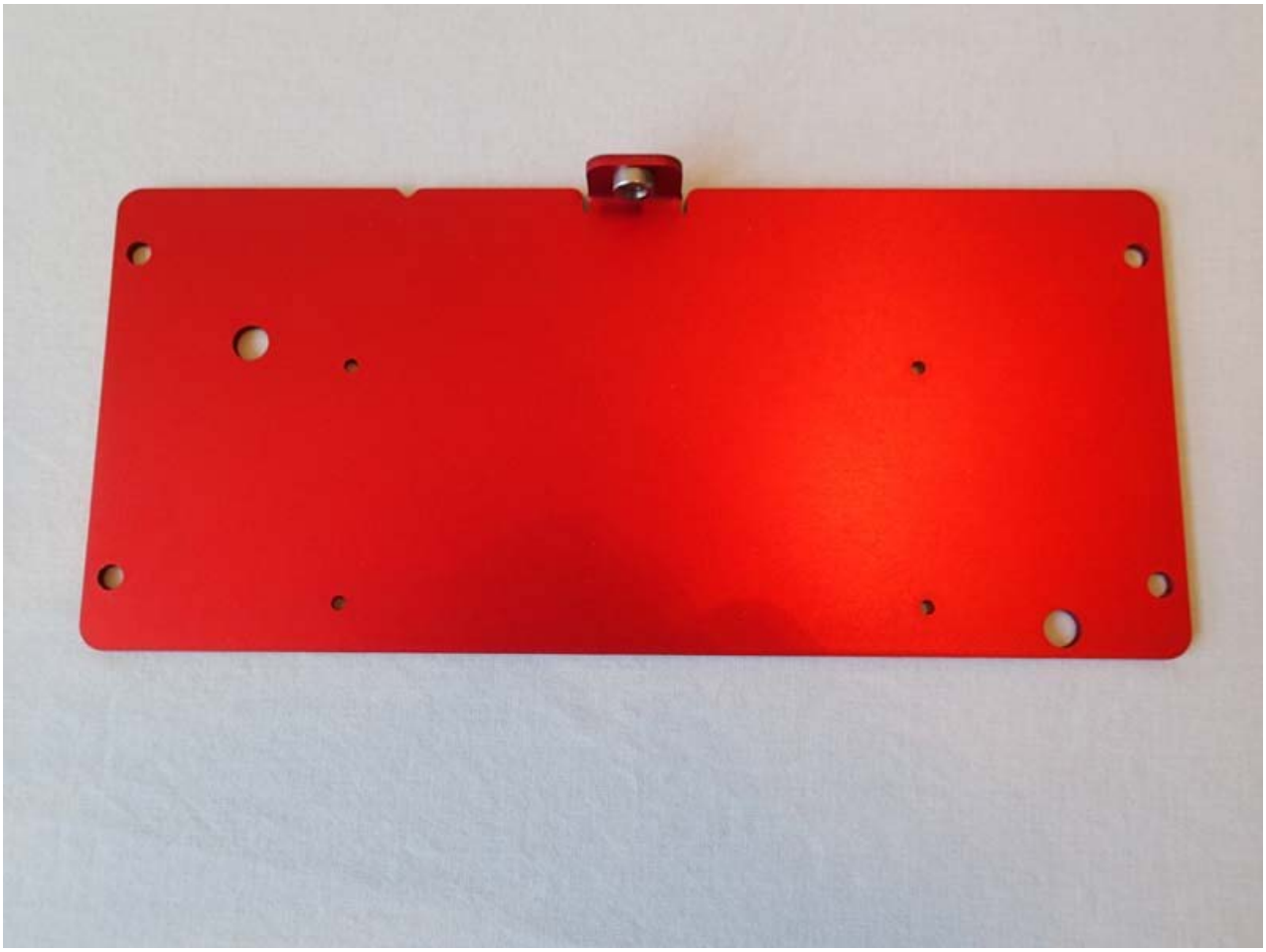
PS-01Av3 Projector Support

Black Aluminum



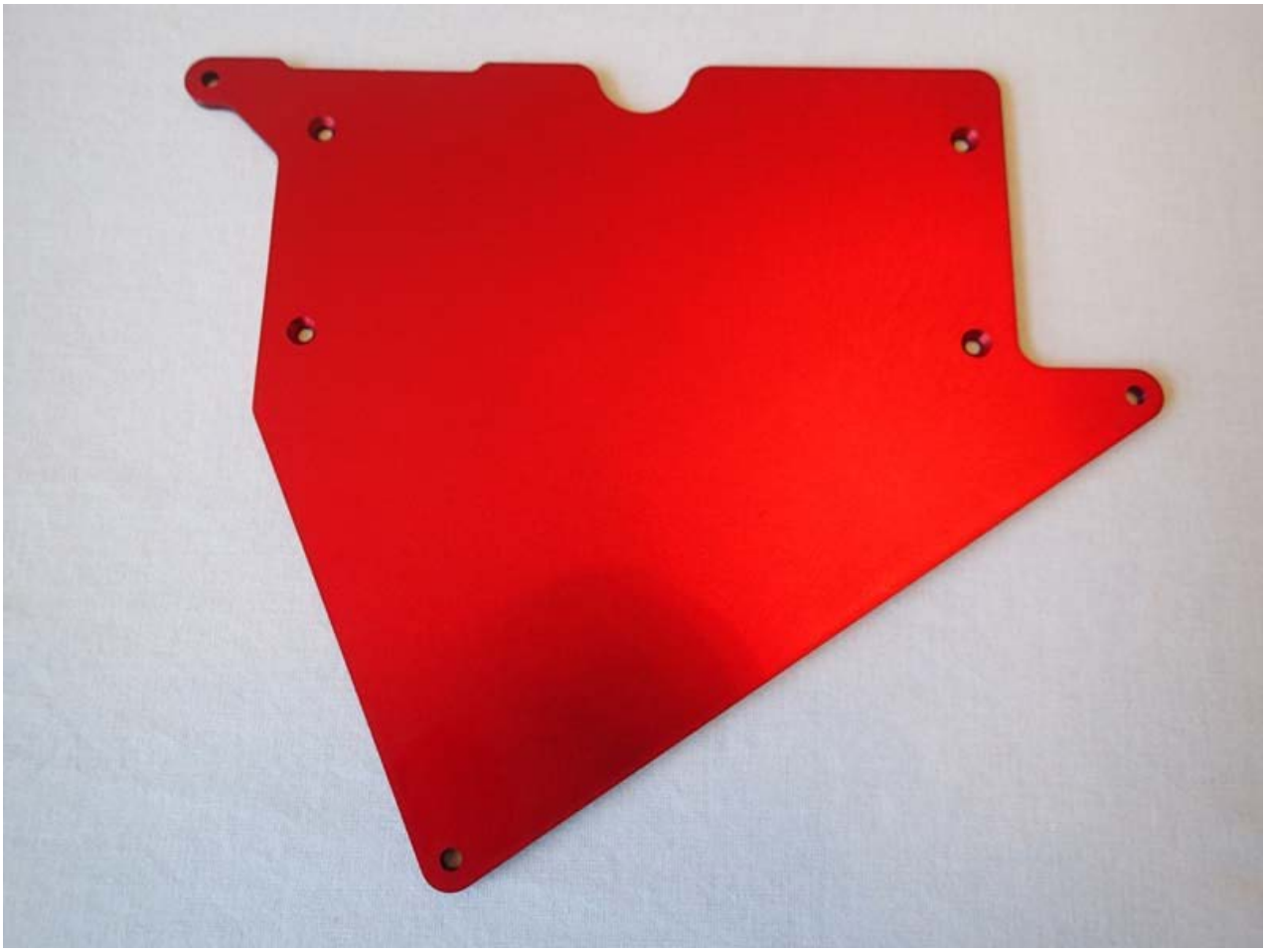
PS-02Av3 Projector Mount

Red Aluminum



PS-04 Projector Adapter

Red Aluminum

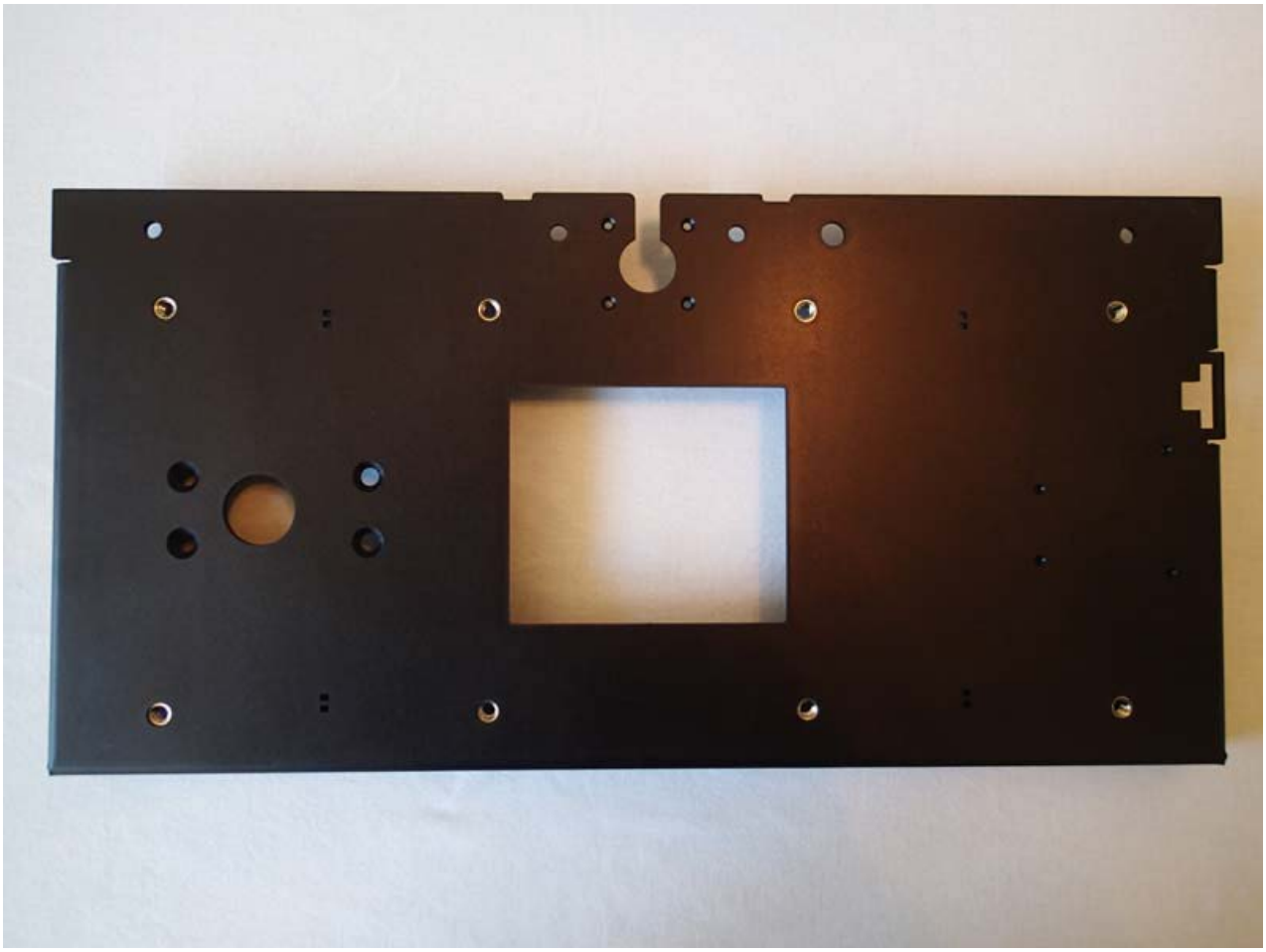


D912HD Projector

Modified D912HD Projector, Power Cord, VGA cord, case & accessories.
(Note, projector will work with all international power cords but only US style cord is provided in kit)

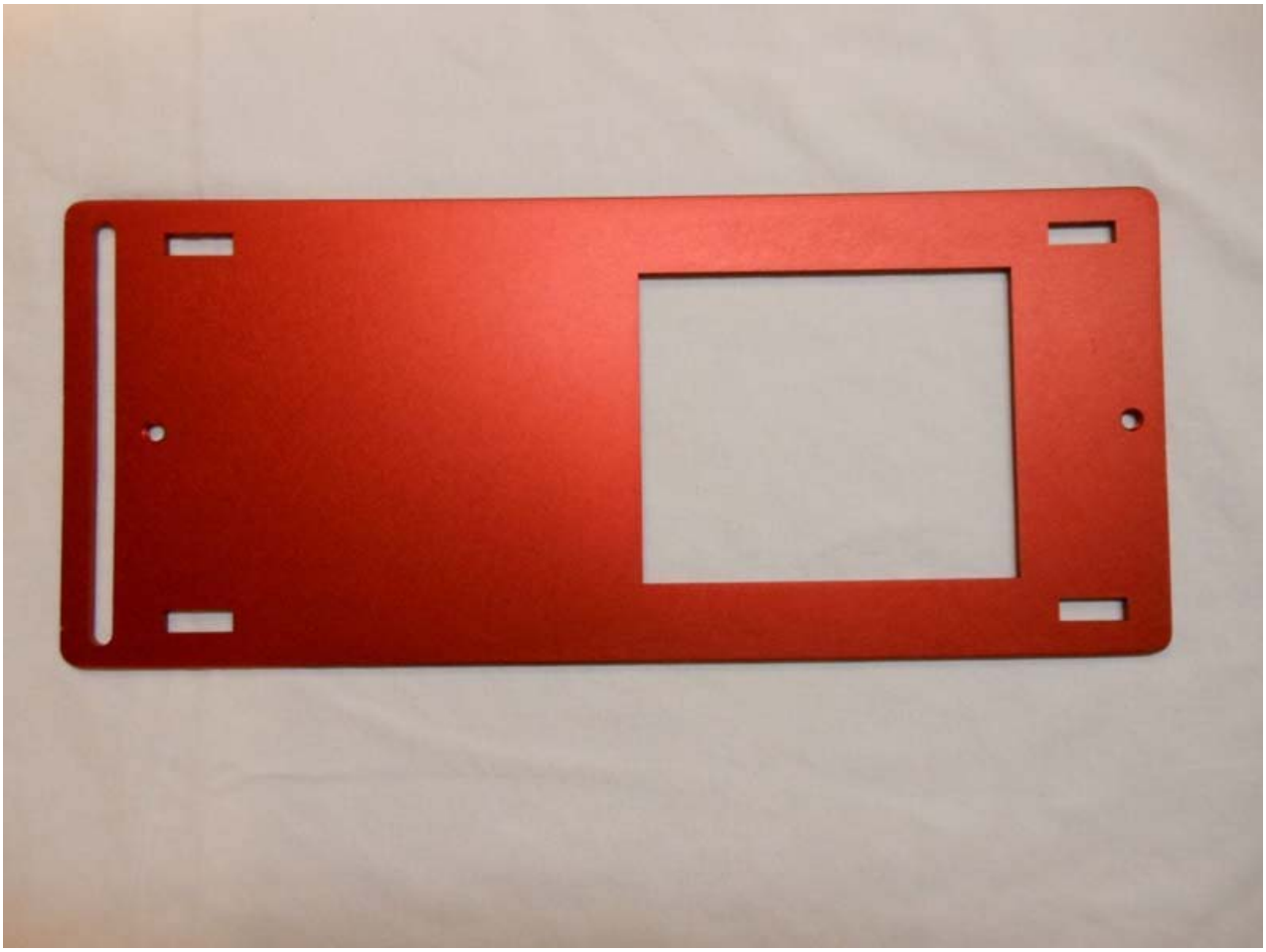
XA-01Av4 X Axis Base Plate

Black Aluminum



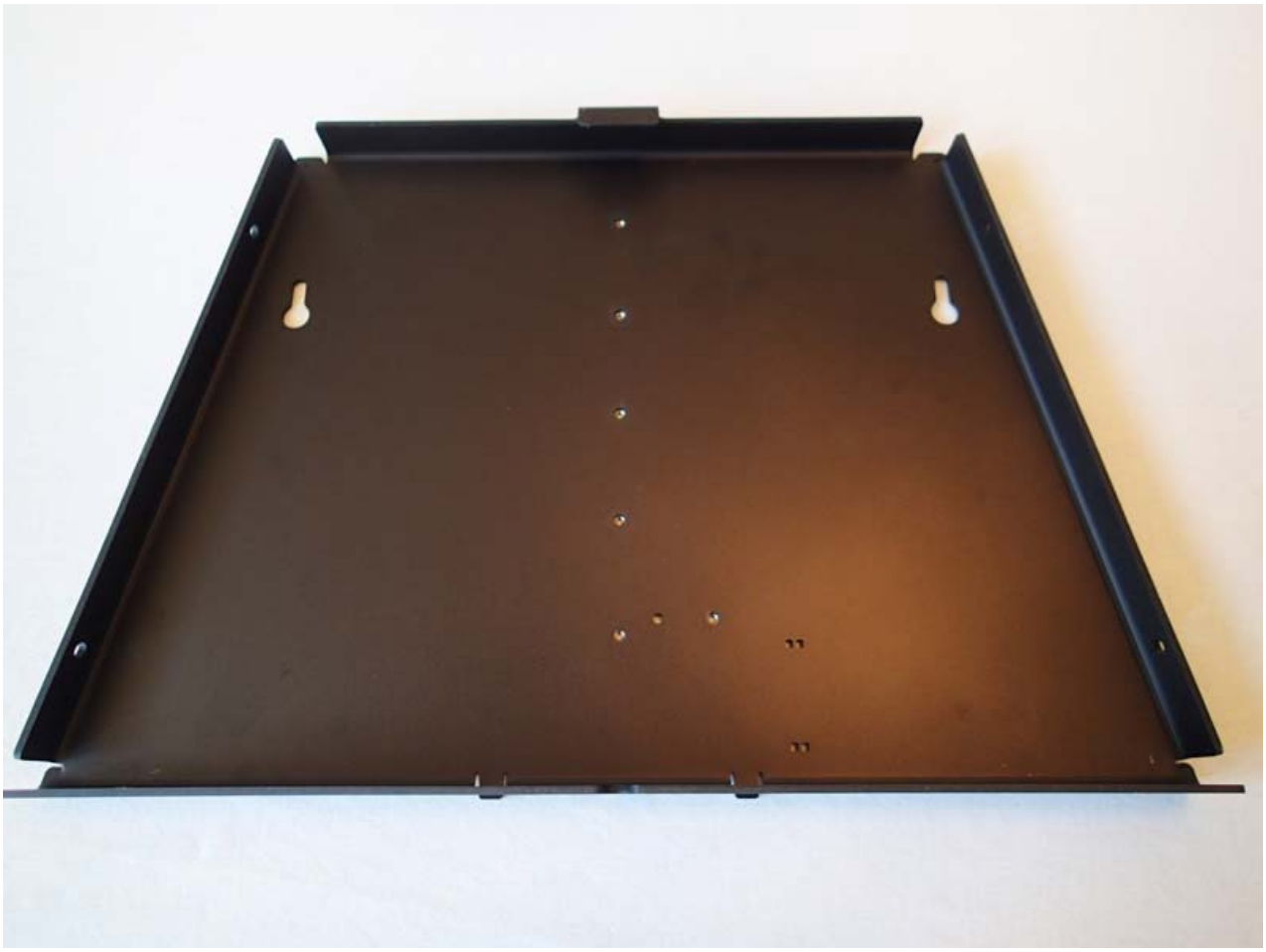
XA-08 X Axis Slide Table

Red Aluminum



ZA-01Av4 Z Axis Back Plate

Black Aluminum



SS-01 Lower Side Supports

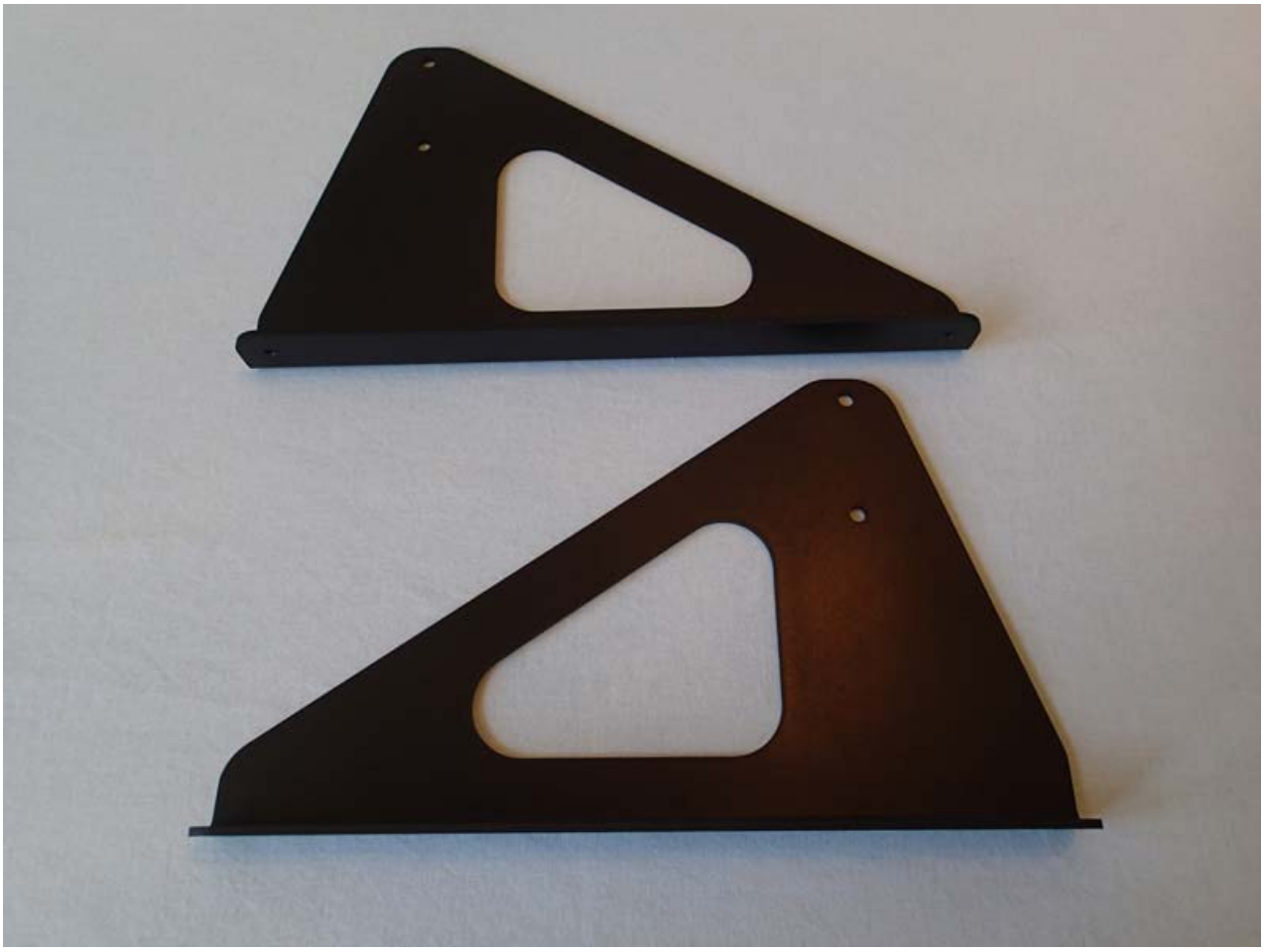
Black Aluminum, 2 each, identical

SS-02R & SS-02L Upper Side Supports

Right & Left Upper Side Supports
Black Aluminum, left side has two additional cutouts

SS-03R & SS-03L Foot Supports

SS-03Lv2(upper in image)
SS-03Rv2(lower in image)
Black Aluminum



HA-01v2 Hatch

Black Aluminum

WD-01 Front Window

Amber Acrylic - Remove protective paper prior to assembly

WD-02 Side Windows

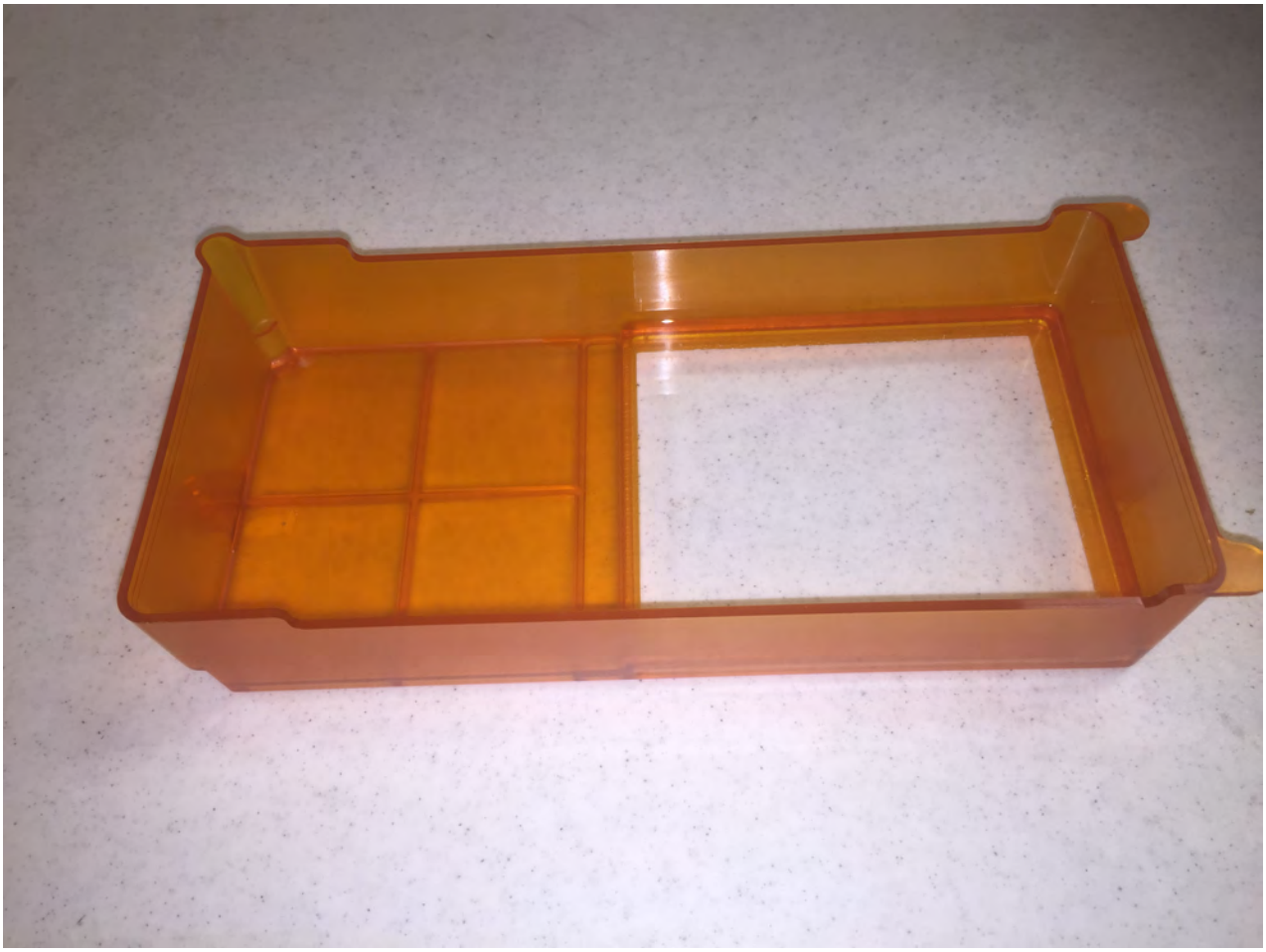
2 each, Amber Acrylic, Identical
Remove protective paper prior to assembly

WD-03 Top Window

Amber Acrylic - Remove protective paper before assembly.

Vat

B9 Resin Vat with PDMS Coating

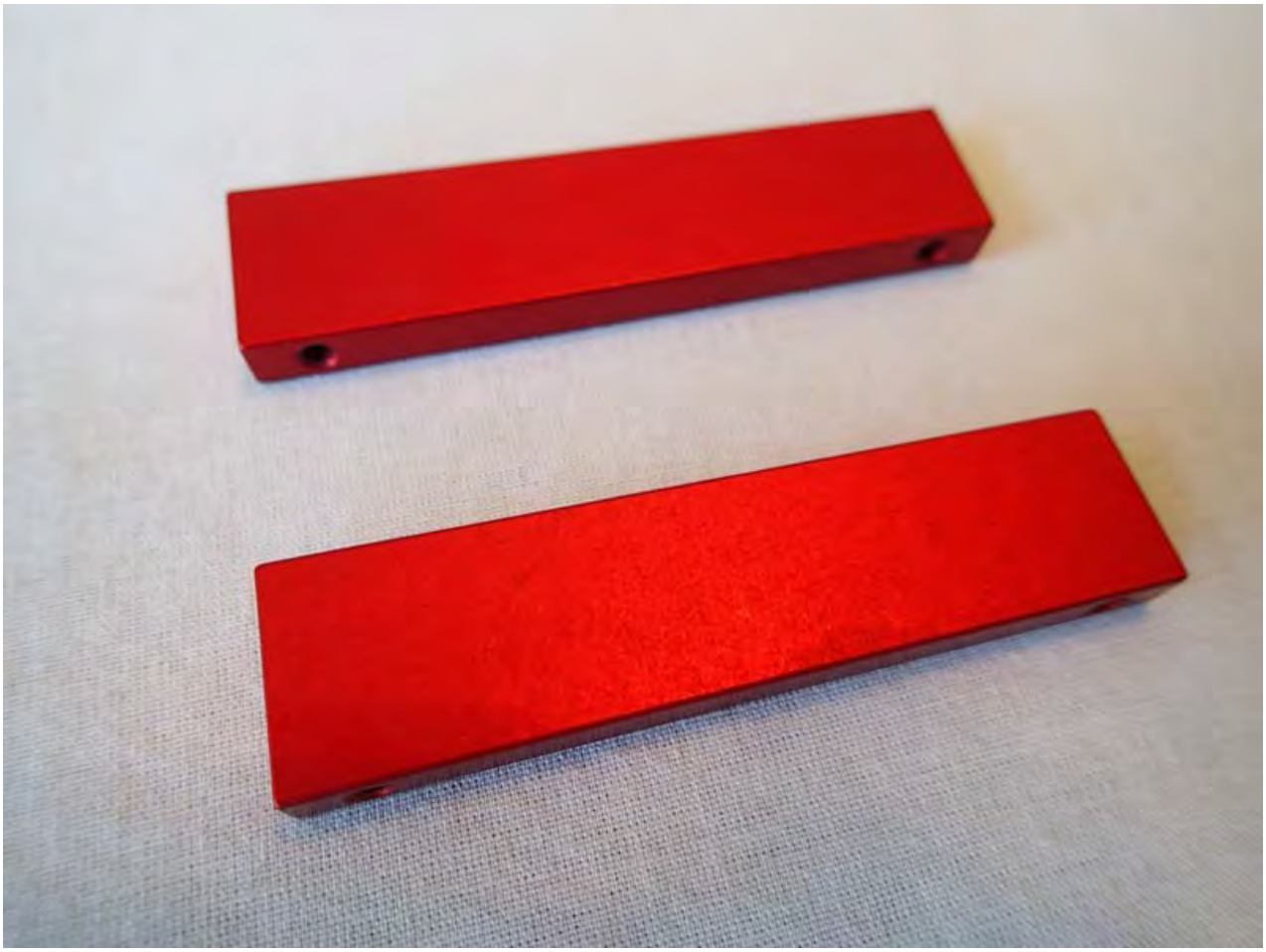


Miscellaneous Small Parts Bag

The miscellaneous small parts bag

PS-03 Projector Standoffs

2 each, Red Aluminum



PS-05 Projector Hanger

Gold Aluminum

XA-02 Motor Mount

Red Aluminum

XA-06 Sensor Mount

Black ABS

XA-07 Motor Arm

Gold Aluminum

XA-09 Motor Shield

Red Aluminum

ZA-02v3 Z Arm

Gold Aluminum

ZA-06v3 Sensor Strip

Red Aluminum

ZA-04Av2 Build Table Mount

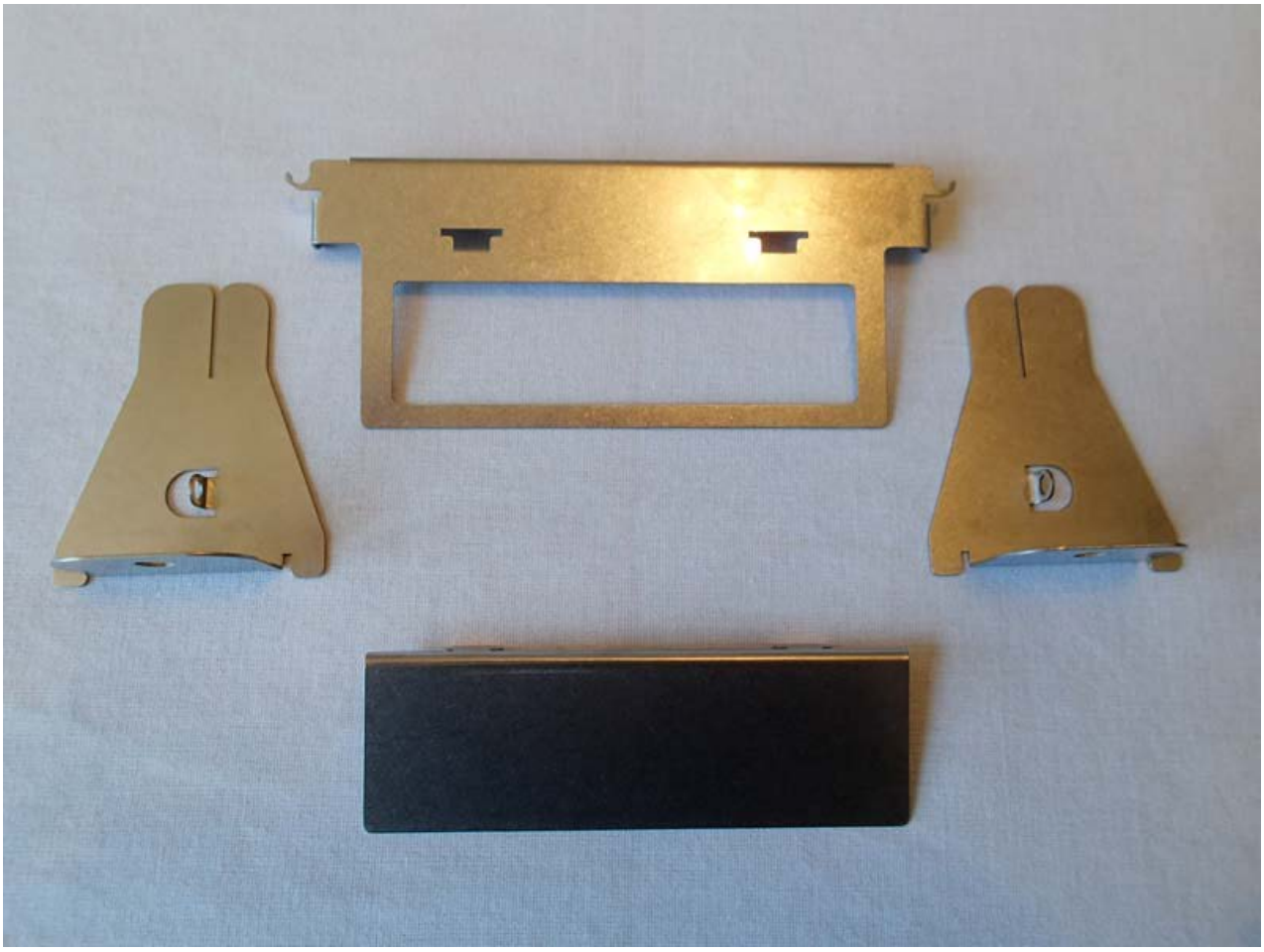
Black Aluminum

ZA-05A Build Table

Red Aluminum

Sweeper Parts

Stainless steel
Supports: Back SW-01Bv2 (left image) & Front SW-01Fv2(right image)
SW-02v3 Sweeper, SW-03v2 Sweeper Flap



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Long Parts Bag

NOTE: Any Errata (screw changes, missing items, etc.) to the Hardware kit will be included in this "Long Parts Bag". Errata items, if included, should be substituted into the appropriate hardware bag.

XA-10v2 Slide Rails

Black Delrin

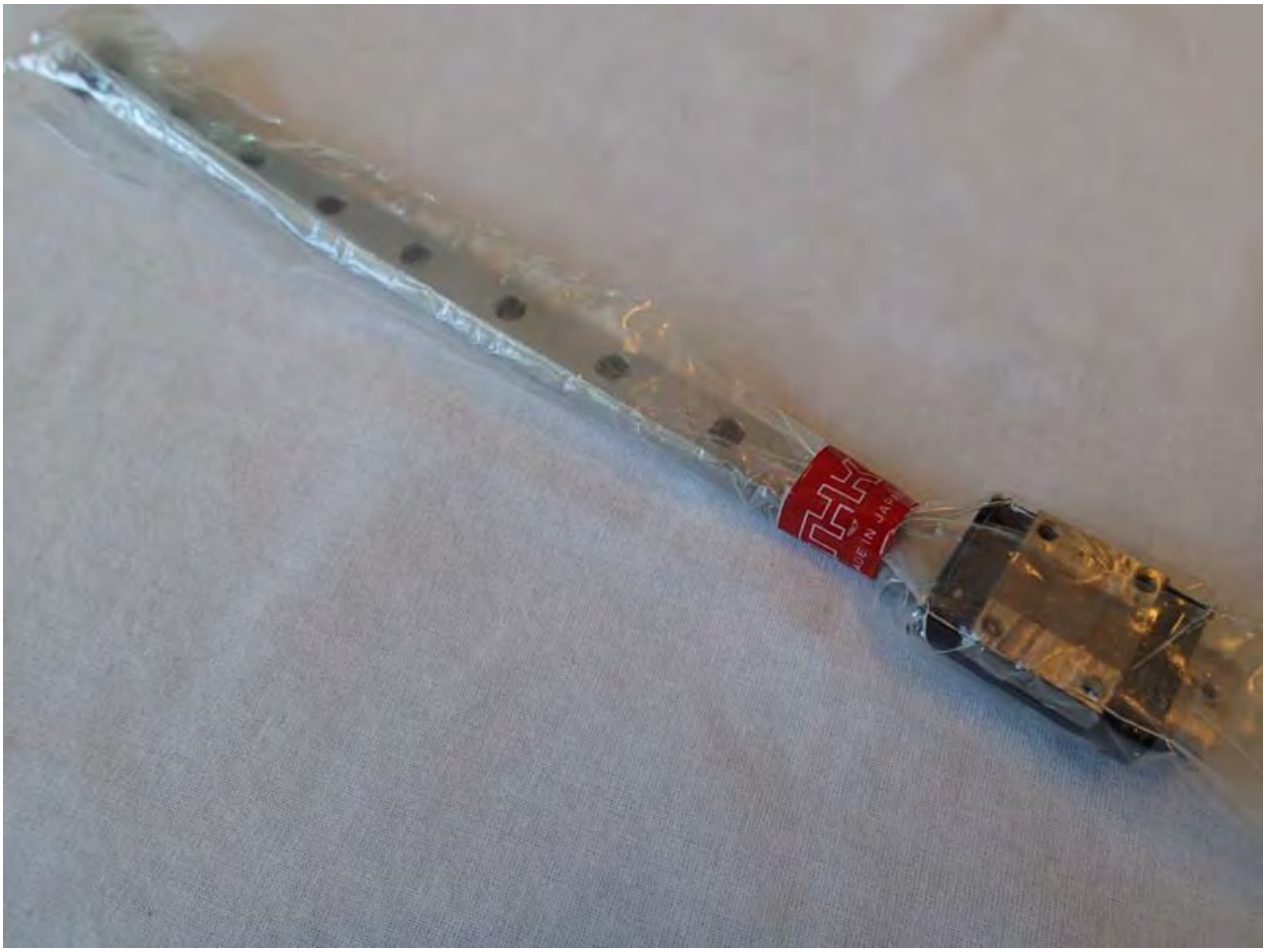
Note: The Bottom Side has 3 circular clearance recesses

Z Stepper Motor Assembly

Z Axis Stepper Motor with attached lead screw and anti-backlash nut

Z Axis Linear Slide

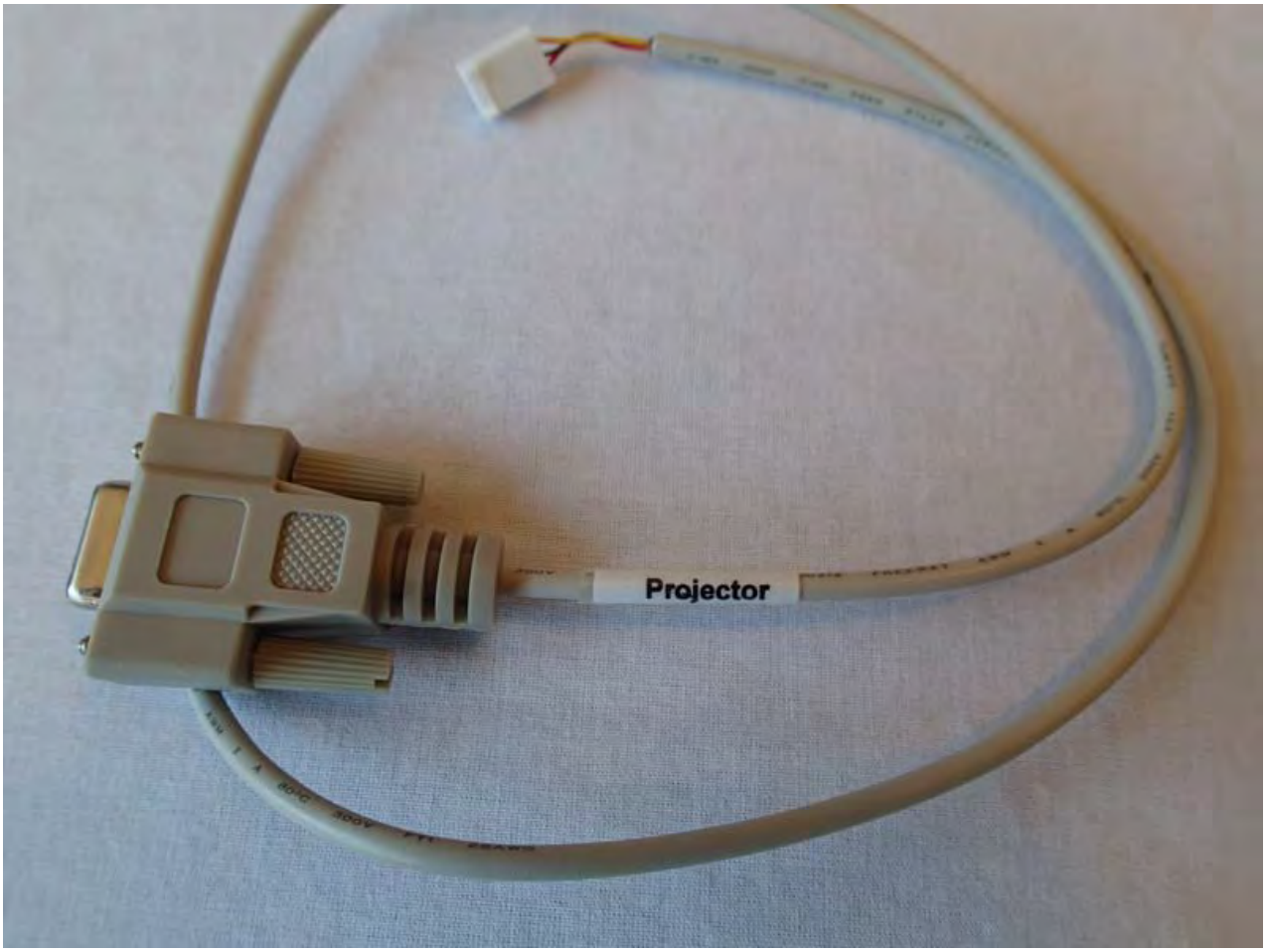
Tip: Leave wrapped until ready to install



Electrical Kit Box

Projector Cable

RS-232



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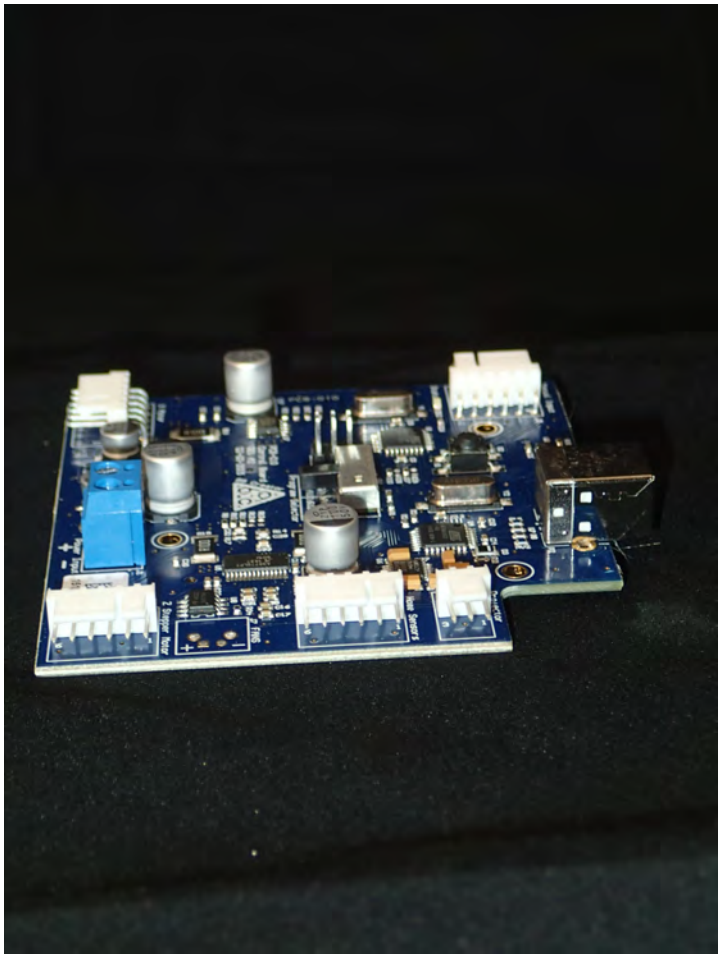
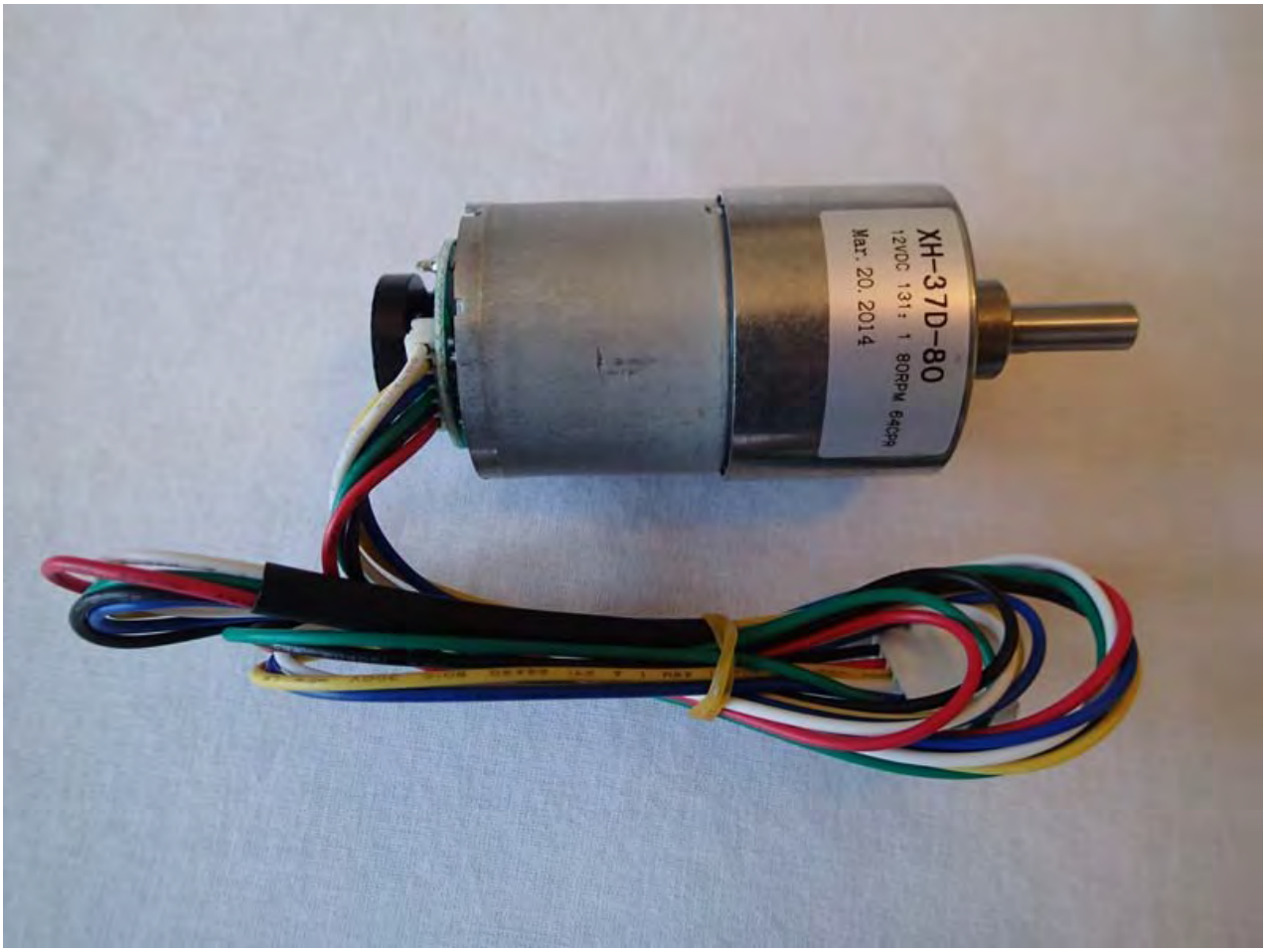
Printed Circuit Board (PCB)

v1.0



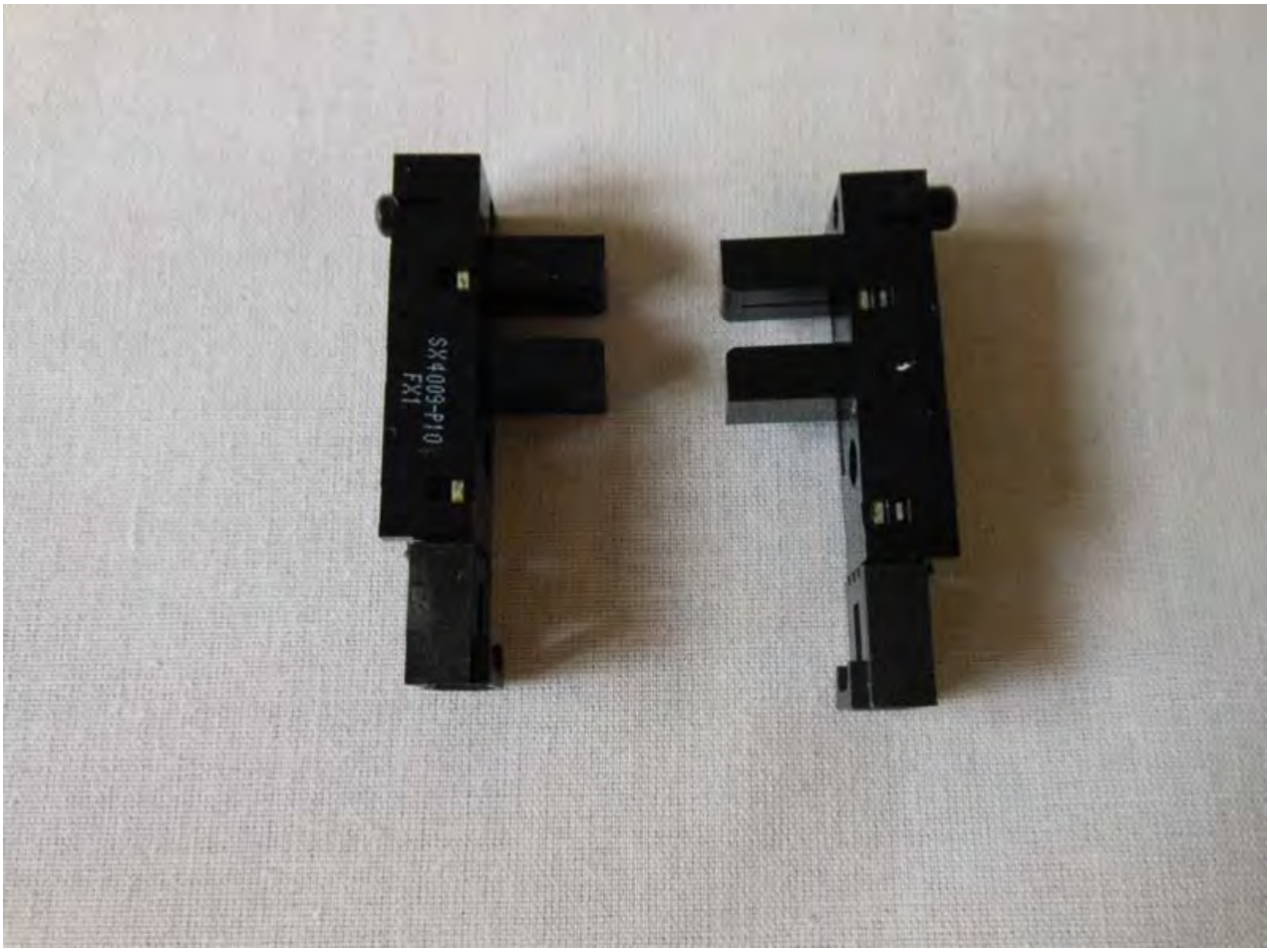
X Axis DC Gear Motor

X Axis DC Gear Motor with Encoder, 131:1 ratio

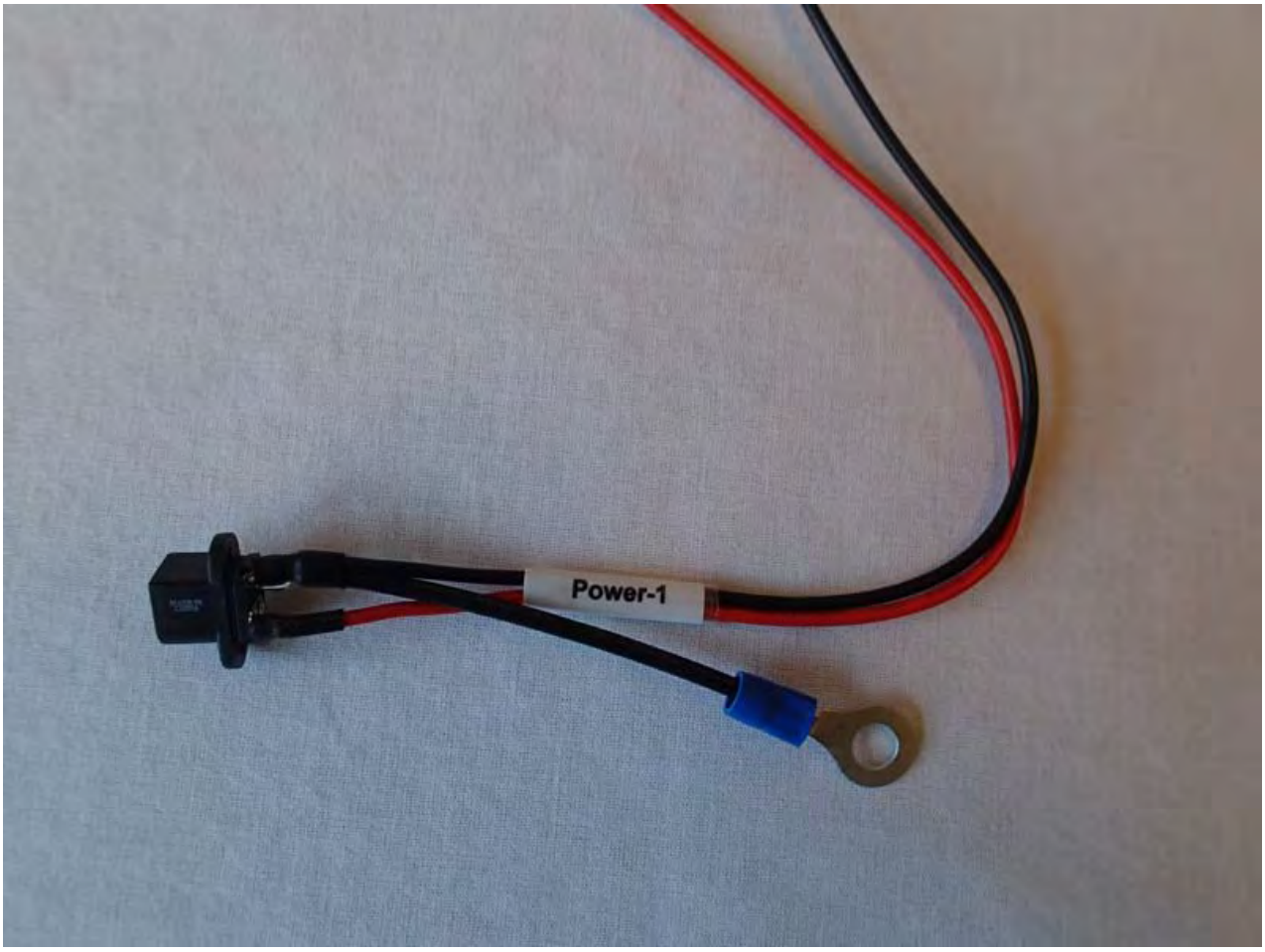


Home Sensors

Optical "Home" Sensors (2 each)

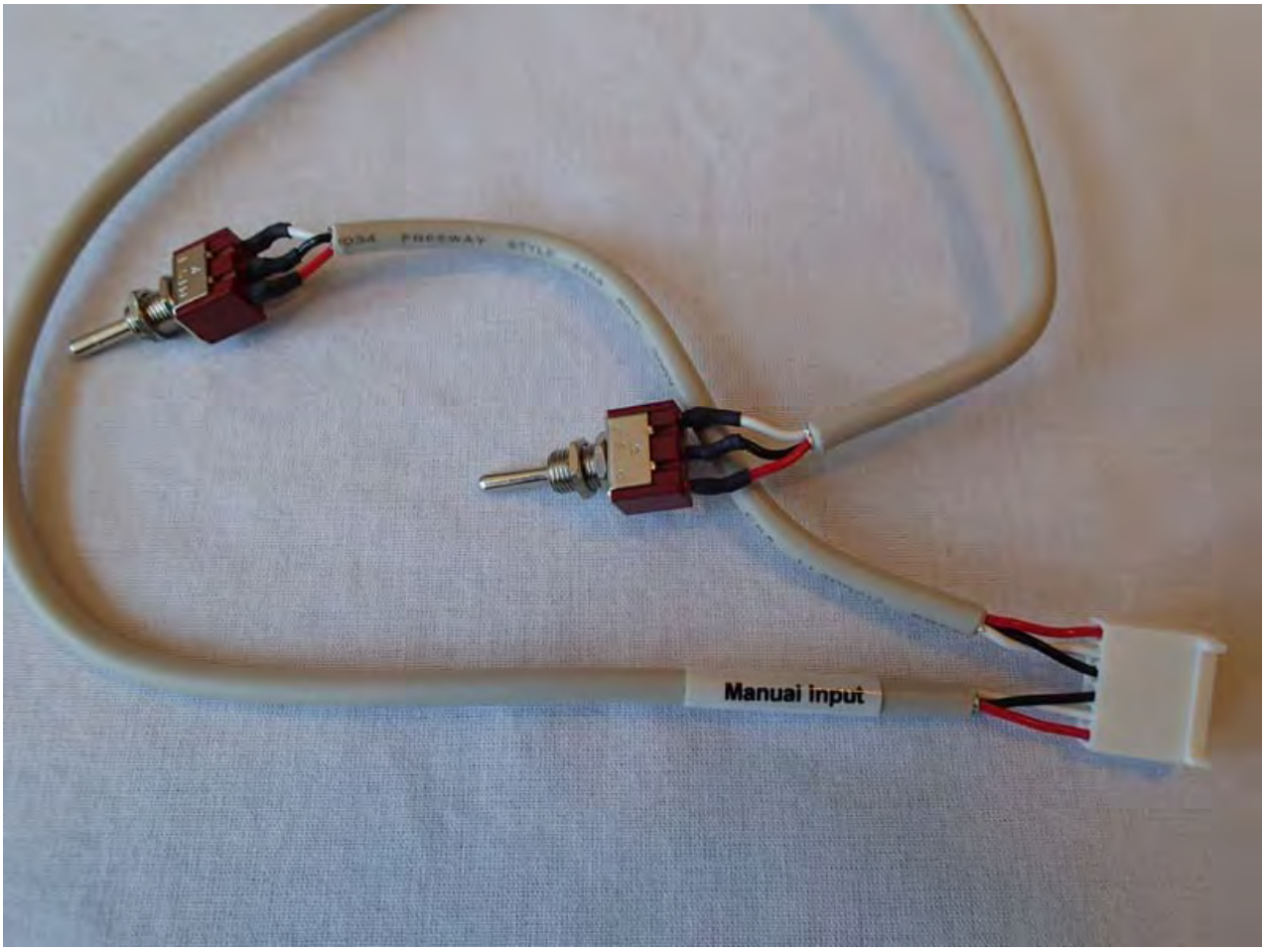


Power Input Cable

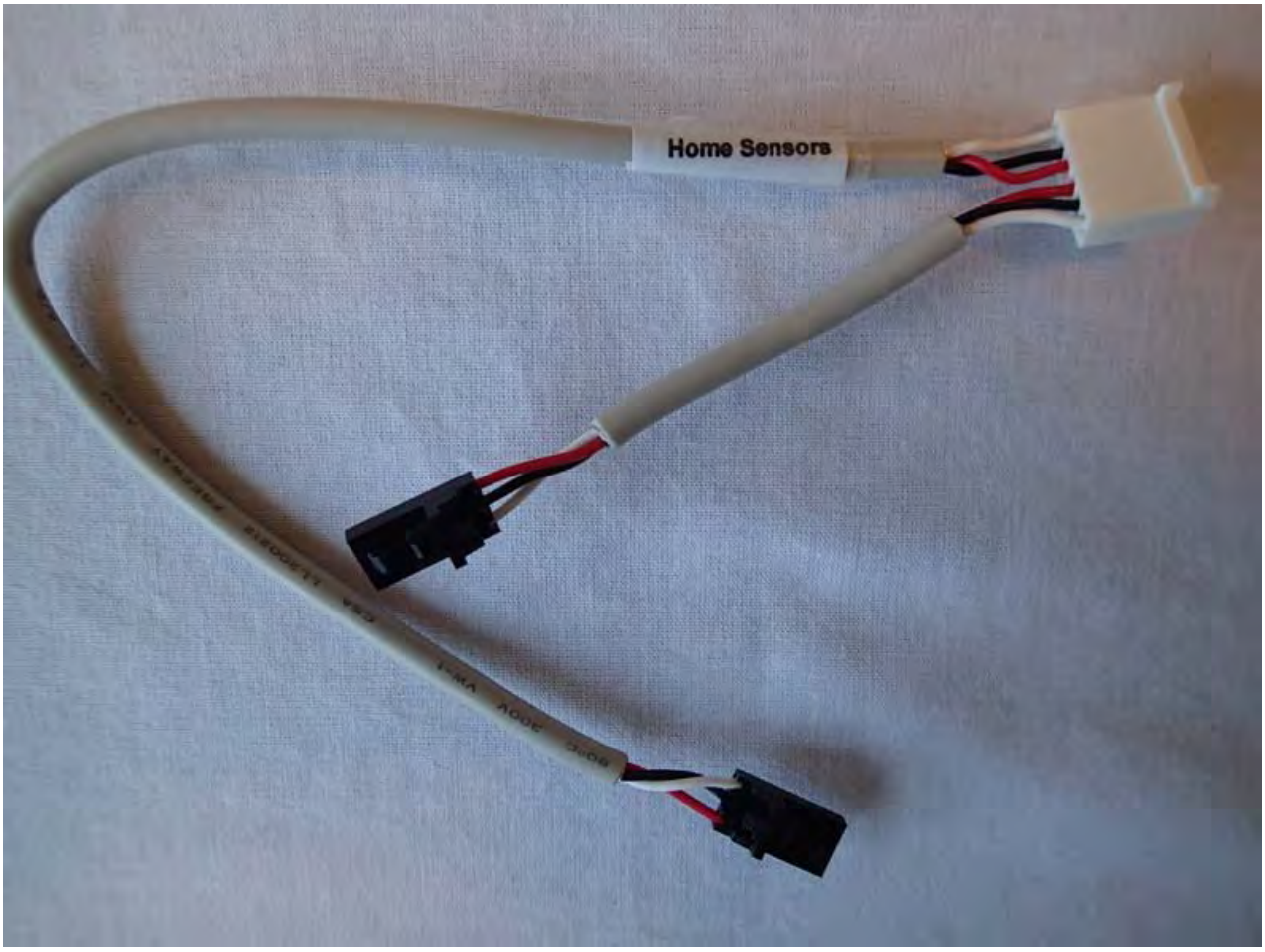


Z Motor Cable

Manual Input Cable



Home Sensors Cable



USB Cord

Wall Transformer

Power Supply with International adapter plugs

Hardware

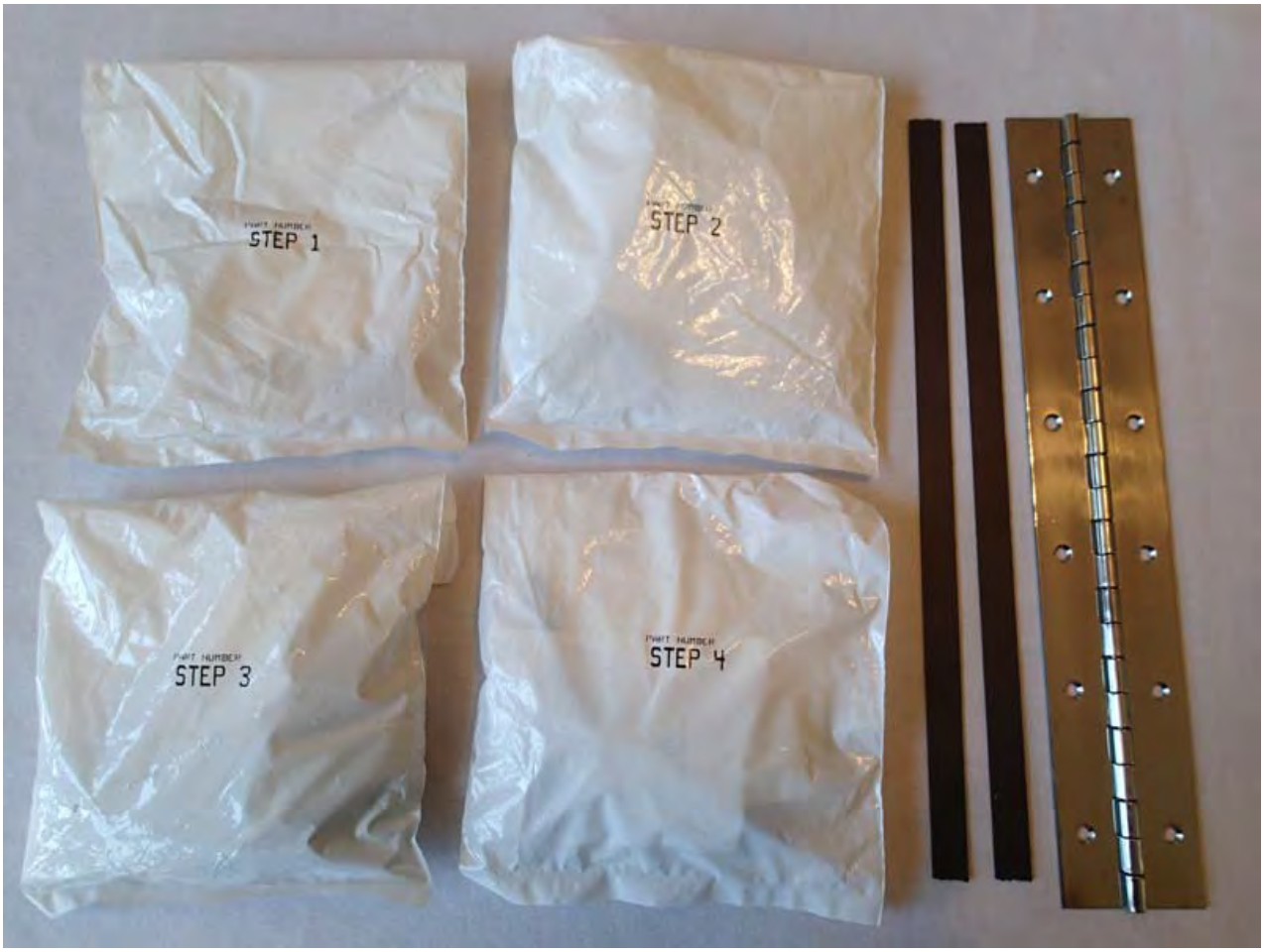
For ease of assembly, the hardware is divided into four
"Steps" which correspond with the major construction steps.
Step 1 Projector Support Assembly: Use this to build the base section of the B9Creator
Step 2 - X Axis Assembly: Use this to build the Vat slide base section
Step 3 - Z Axis Assembly: Use this to build the Z axis riser section
Step 4 - Final Assembly: Use this to complete the assembly of the B9Creator

Note that hardware sub-kit bags are labeled 1A, 1B, etc. in the assembly order required and typically contains the parts needed for that particular step. McMaster Carr Part Numbers are given for reference, when available.

NOTE: Any Errata (screw changes, missing items, etc.) to the Hardware kit will be included in the Long Parts Bag. Errata items, if included, should be substituted into the appropriate hardware bag. This guide is current and will reflect the correct items and part numbers.

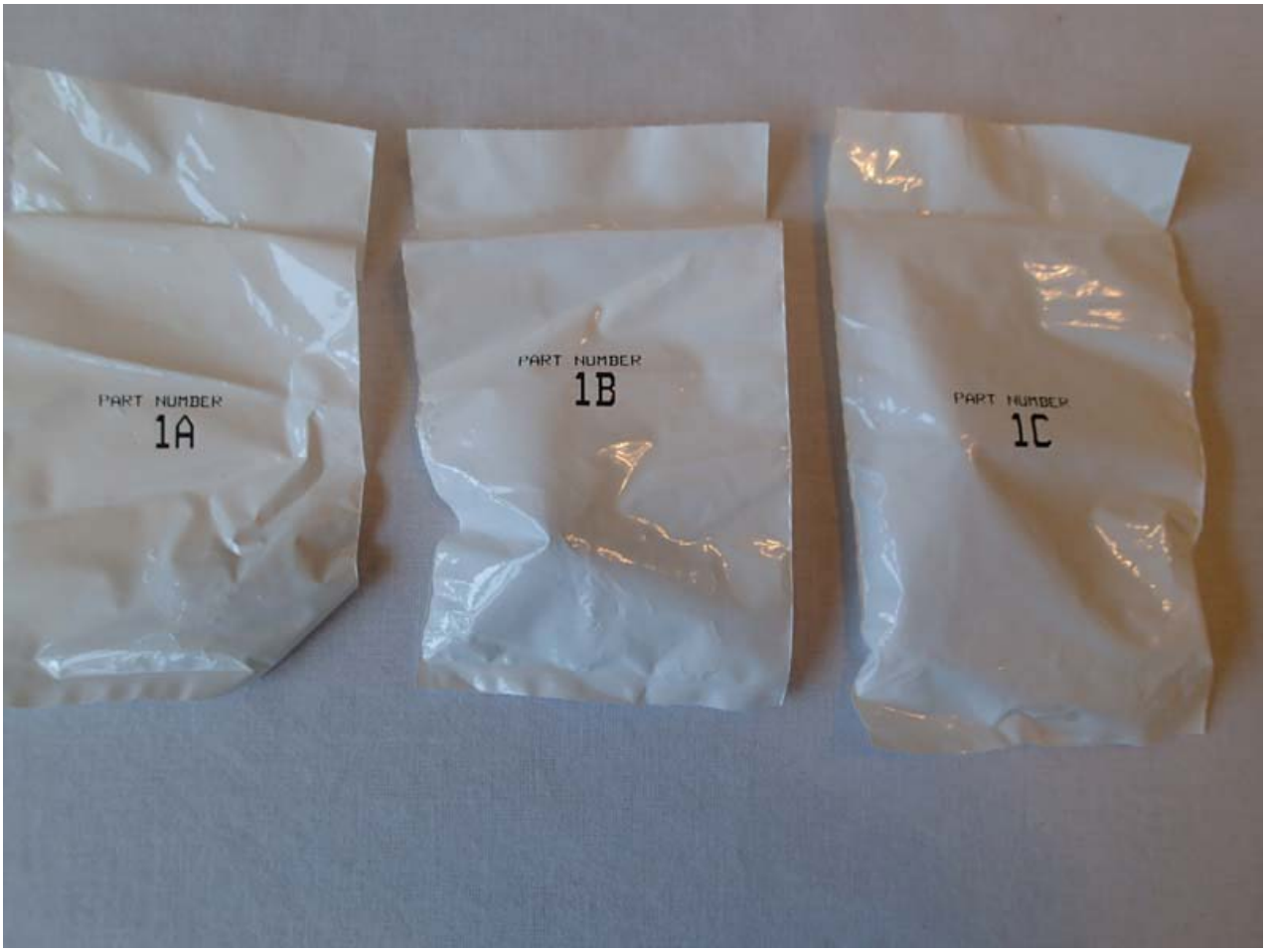
Hardware Kit Bag Contents

STEP 1-4 Bags
2 each - 5759K26, Flexible Magnetic Strip Adhesive Back, Cut to Length 11.5"
Type 304 SS Piano Hinge with Holes Polished Exposed Side, .060" Thk, 2" W Open, 1'L



Step 1

Contains bags 1A, 1B & 1C



Bag 1A

3 each 92000A220 18-8 SS Metric Pan Head Phil Machine Screw M4 Size, 10mm Length, .7mm Pitch
8 each 91771A146 18-8 Stainless Steel Flat Head Phillips Machine Screw, 6-32 Thread, 3/8" Length

Bag 1B

1 each 98704A625 Plastic-Head Thumb Screw with Socket Drive 1/4"-20 Thread, 7/8" Length
1 each 98325A002 Zinc-Plated Steel Shoulder-Style Quick-Release Pin,T-Handle

Bag 1C

4 each 1092741A160, Brass Round Knurled Thumb Nut, 1/4"-20 Thread Size, 5/8" Head Diameter
4 each 92141A029, 18-8 SS General Purpose Flat Washer 1/4" Screw Size, 5/8" OD, .04"-.06" Thick
4 each 91772A539, 18-8 SS Pan Head Phillips Machine Screw 1/4"-20 Thread, 5/8" Length

Step 2

Contains bags 2A - 2G

Bag 2A

12 each 7130K12, Standard Nylon Cable Tie 4" L, 7/8" Bundle Dia, 18# Tensile Strength, White

Bag 2B

1 each 93996A118, Self-Locking Precision Shoulder Screw Slotted, 4-40 Thread
1 each 94639A301, Nylon Unthreaded Spacer 1/4" OD, 1/4" Length, #6 Screw Size
2 each 94105A192, Alloy Steel Flat Point Socket Set Screw 8-32 Thread, 3/8" Length
1 each 7122A41, Inch Hex L-key, Long-arm, 5/64" Hex, 3-1/4" Length

Bag 2C

6 each 93925A240, Metric 18-8 SS Internal-Tooth Lock Washer M3 Screw Size, 6mm OD, .4mm min Thick
6 each 92000A118, 18-8 SS Metric Pan Head Phil Machine Screw M3 Size, 8mm Length, .5mm Pitch

Bag 2D

4 each 96278A511, 18-8 SS Machine Screw Hex Nut W/Tooth Washer 1/4"-20 Thrd Sz
4 each 91099A453, 18-8 SS Flat Undercut Head Phil Machine Screw 1/4"-20 Thread, 3/4" Length

Bag 2E

4 each 90730A003, 18-8 SS Undersized Machine Screw Hex Nut 2-56 Thread Size
4 each 94639A703, Nylon Unthreaded Spacer 3/16" OD, 3/16" Length, #2 Screw Size
4 each 91771A081, 18-8 SS Flat Head Phillips Machine Screw 2-56 Thread, 1/2" Length

Bag 2F

4 each 92010A116, Metric 18-8 Stainless Steel Flat Head Phillips, M3 Size, 6mm Length, .5mm Pitch

Bag 2G

1 each 7122A47, Hex L-key, Long-arm, 3/16" Hex, 4-5/8" Length
8 each 96659A106, 18-8 Stainless Steel Type A SAE Flat Washer 1/4" Screw Size, 5/8" OD, .05"-.08" Thick
8 each 92196A543, 18-8 Stainless Steel Socket Head Cap Screw 1/4"-20 Thread, 1-1/8" Length

Step 3

Contains 3A - 3E

Bag 3A

1 each 7122A43, Inch Hex L-key, Long-arm, 7/64" Hex, 3-11/16" Length
1 each 91772A148, 18-8 Stainless Steel Pan Head Phillips Machine Screw, 6-32 Thread, 1/2" Length
5 each 92196A145, 18-8 Stainless Steel Socket Head Cap Screw 6-32 Thread, 5/16" Length

Bag 3B

27 each 91770A146, 18-8 SS Truss Head Phillips Machine Screw 6-32 Thread, 3/8" Length
27 each 94900A007, Black Nylon 6/6 Hex Nut 6-32 Thread Size, 5/16" Width, 1/8" Height

Bag 3C

1 each 1325A2, Extruded Pull Handle w/ Threaded Hole Round, Steel, Nickel Finish, 3" Ctr-to-Ctr
2 each 91099A260, 18-8 Stainless Steel Flat Undercut Phillips Machine Screw 8-32 Thread, 3/8" Length

Bag 3D

8 each 96278A511, 18-8 SS Machine Screw Hex Nut W/Tooth Washer 1/4"-20 Thrd Sz
8 each 91772A539, 18-8 SS Pan Head Phillips Machine Screw 1/4"-20 Thread, 5/8" Length

Bag 3E

6 each 96278A511, 18-8 SS Machine Screw Hex Nut W/Tooth Washer 1/4"-20 Thrd Sz
6 each 91772A537, 18-8 SS Pan Head Phillips Machine Screw 1/4"-20 Thread, 1/2" Length

Step 4

Contains bags 4A - 4G

Bag 4A

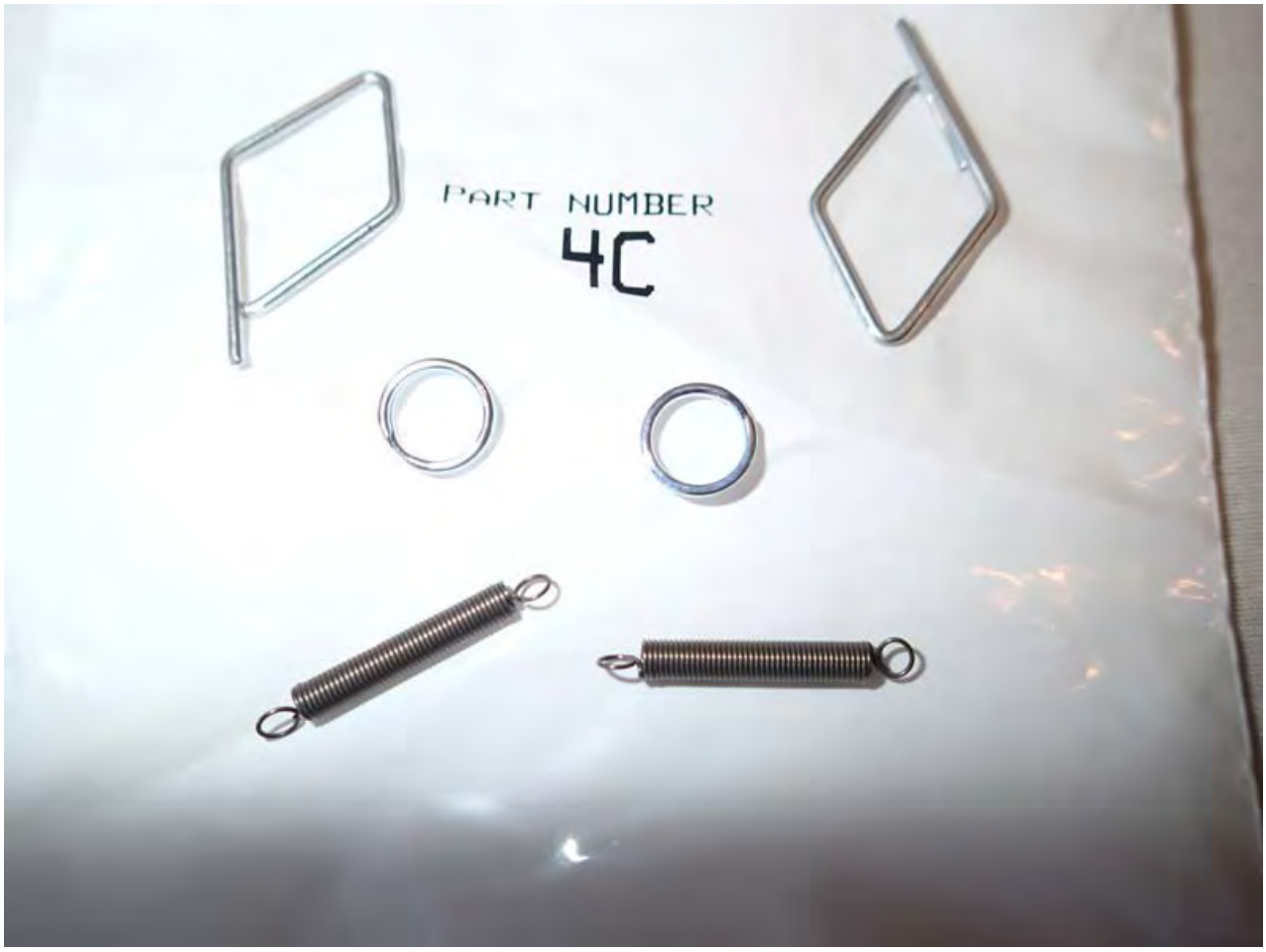
12 each 96278A007, 18-8 SS Machine Screw Hex Nut W/Tooth Washer 6-32 Thread Sz
12 each 91772A146, 18-8 SS Pan Head Phillips Machine Screw 6-32 Thread, 3/8" Length

Bag 4B

4 each 91772A537, 18-8 SS Pan Head Phillips Machine Screw 1/4"-20 Thread, 1/2" Length
4 each 9541K1, Rubber Bumper w/ Out Metal Core Recessed, 1/2" Diameter, 6-32 Threaded Stud
4 each 96278A007, 18-8 SS Machine Screw Hex Nut W/Tooth Washer 6-32 Thread Sz

Bag 4C

2 each 1600T62, Diamond Ring with Blunt End, 15/16" X 9/16" Inside Diameter
2 each 90177A210, Zinc-Plated Steel Split Ring 3/8" OD, 5/16" ID
2 each 9654K966, Steel Extension Spring 1.0" Length, .125" OD, .016" Wire



Bag 4D

4 each 91772A108, 18-8 Stainless Steel Pan Head Phillips Machine Screw, 4-40 Thread, 3/8" Length
2 each 91772A105, 18-8 Stainless Steel Pan Head Phillips Machine Screw, 4-40 Thread, 3/16" Length
4 each 91290A111, Metric Black-Oxide Socket Head Cap Screw, M3 Thread, 6mm
Length, 0.50mm Pitch 1 each 7289A13, Metric Hex L-Key, 2.5 mm Hex, 2-3/16" Length

Bag 4E

4 each 92196A145, 18-8 Stainless Steel Socket Head Cap Screw 6-32 Thread, 5/16" Length
4 each 96659A102, 18-8 Stainless Steel Type A SAE Flat Washer NO. 6 Screw Size, 3/8" OD

Bag 4F

1 each 98704A625, Plastic-Head Thumb Screw with Socket Drive 1/4"-20 Thread, 7/8" Length
2 each 98704A605, Plastic-Head Thumb Screw with Socket Drive 1/4"-20 Thread, 3/8" Length
1 each 8510K11, Abrasion Resistant Rubber Edge Trim - cut to 4.0" length

Bag 4G

2 each 8213K7, Adhesive-Backed Foam Bumpers Square Top, 1/2" Square, 1/16" Height, Black
6 each 95495K221, Adhesive-Backed Polyurethane Bumper Flat Top, 1/2" Dia, 1/4" H, Black

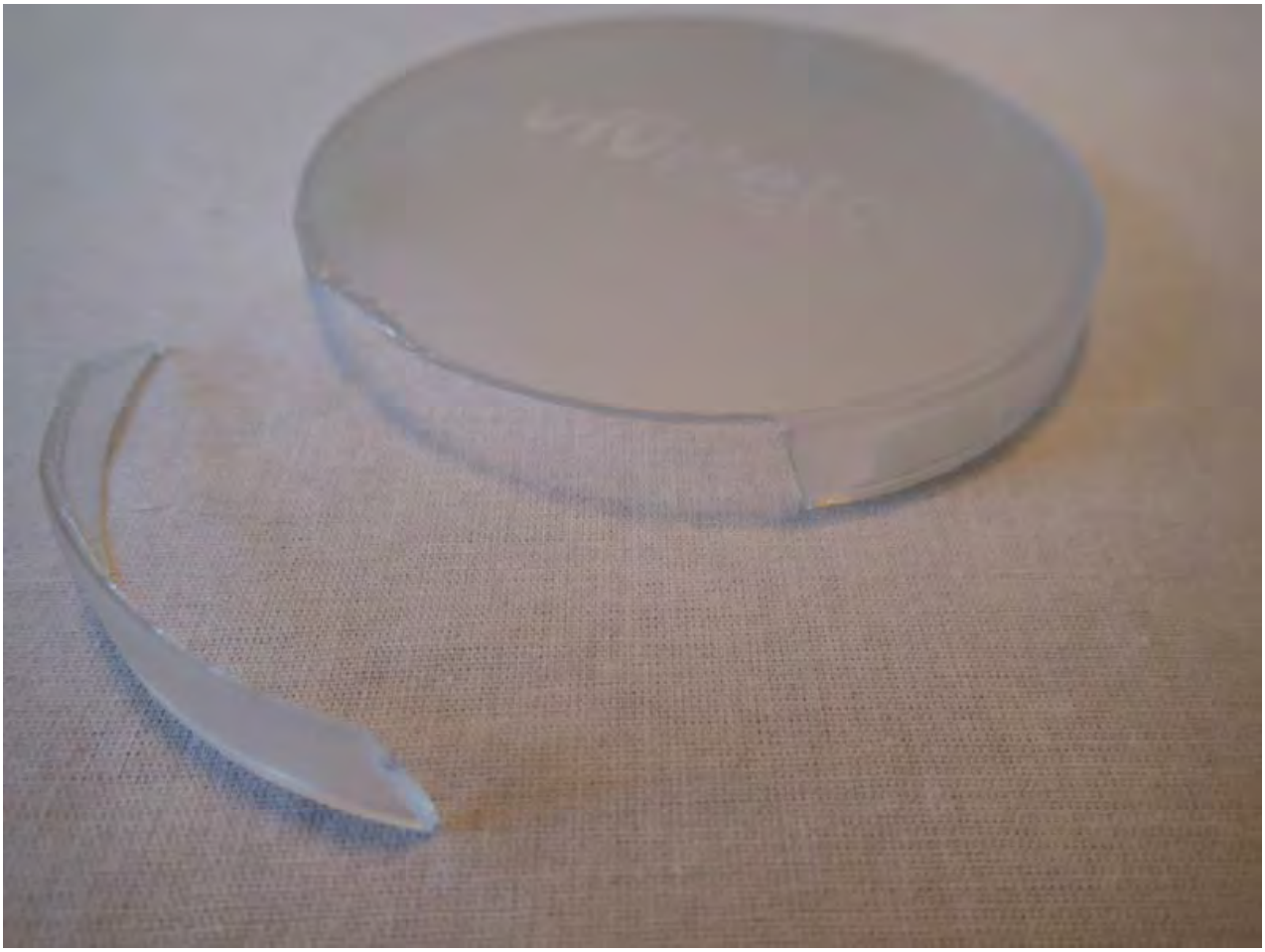
Step 1 - Projector Support Assembly

Completed Projector Support Assembly shown for reference

Modify the lens cap

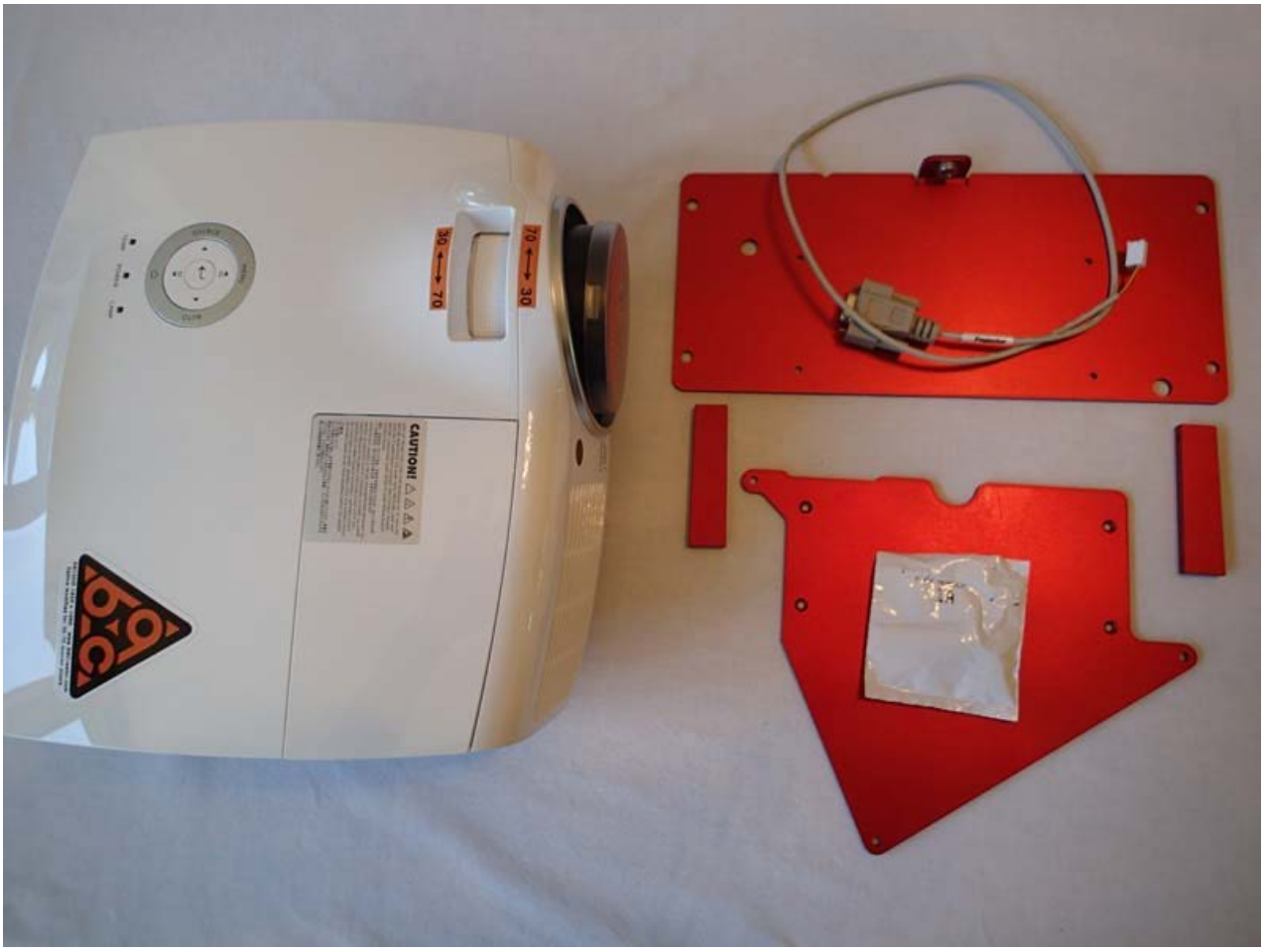
A small section of the lens cap must be removed.
This allows clearance when removing or replacing the cap with
the projector positioned at the upper most index (30 micron XY).
Use snips or similar to remove a small section of the lip as shown.
Always use the lens cover to protect from dust and dirt when the machine is not in use.

Remove and discard the section shown

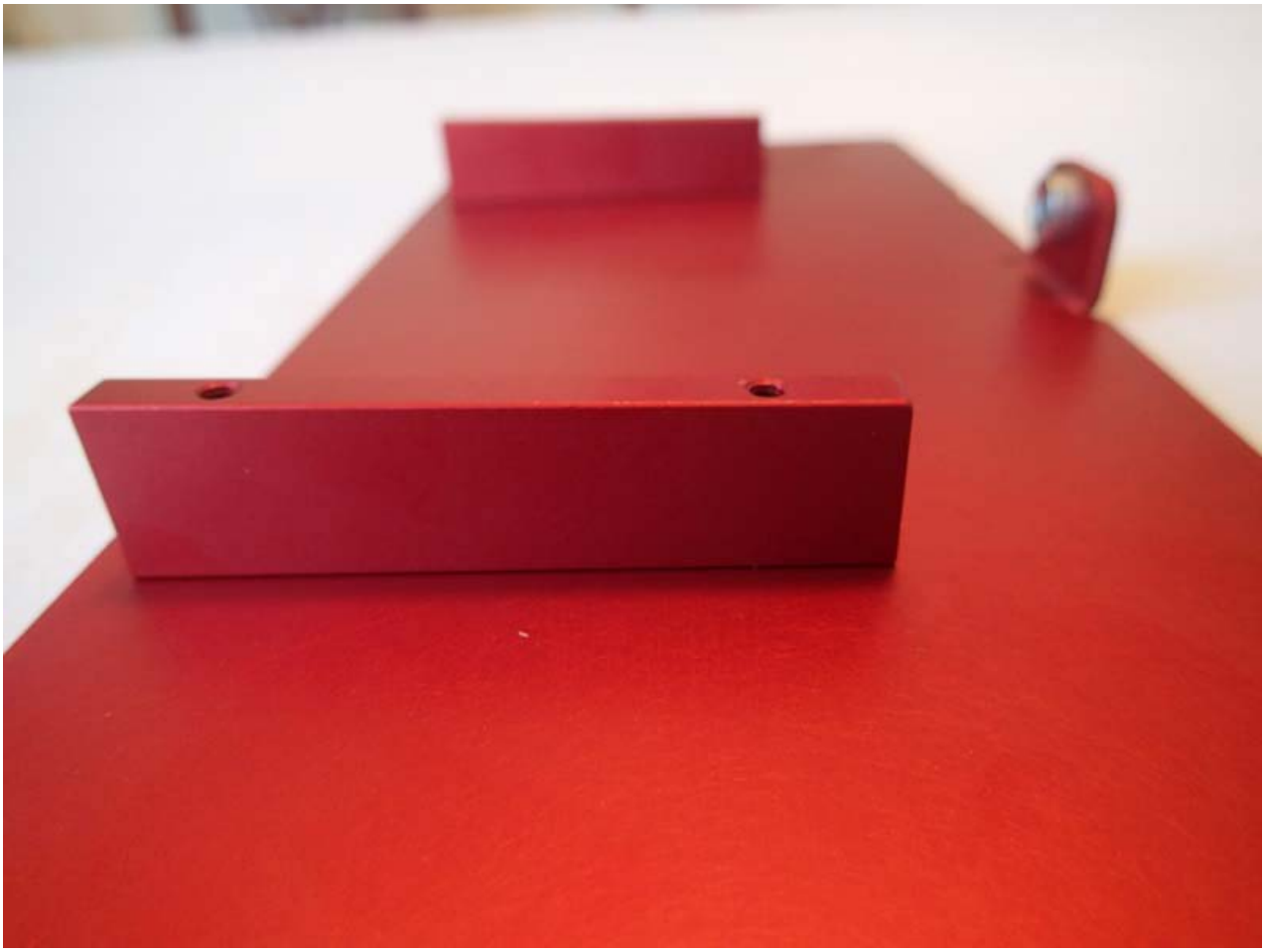


Assemble the projector mount

Assemble mount and projector - parts required
D912HD Projector, Projector Cable, PS-02Av3, PS-03, PS-04, Bag 1A

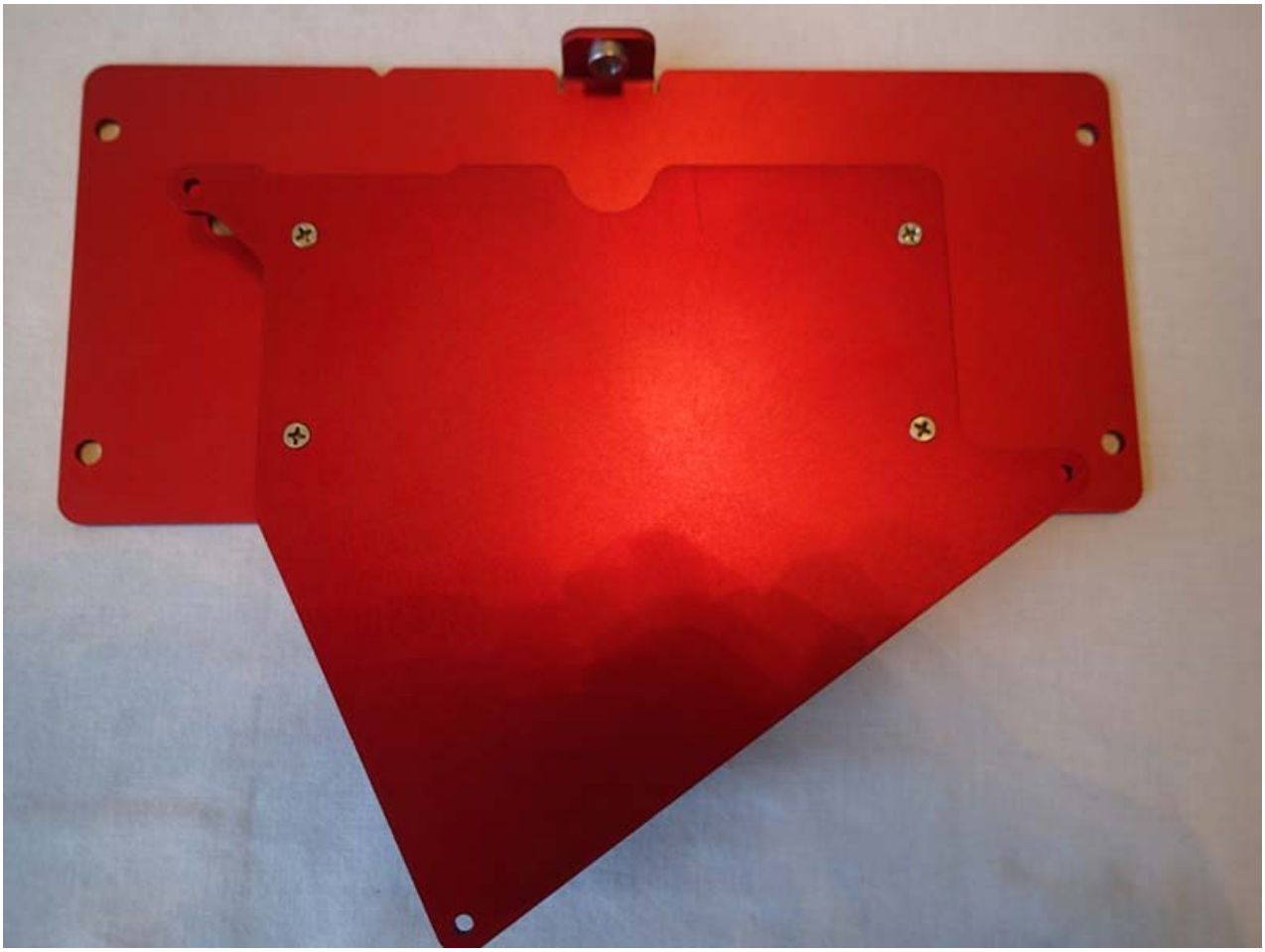


Note that the two standoffs have a slight slope, higher on the left and lower on the right in this photo. Be SURE to install them as shown! The bottom holes are spaced to only align with the bottom plate.



Attach the projector adapter plate

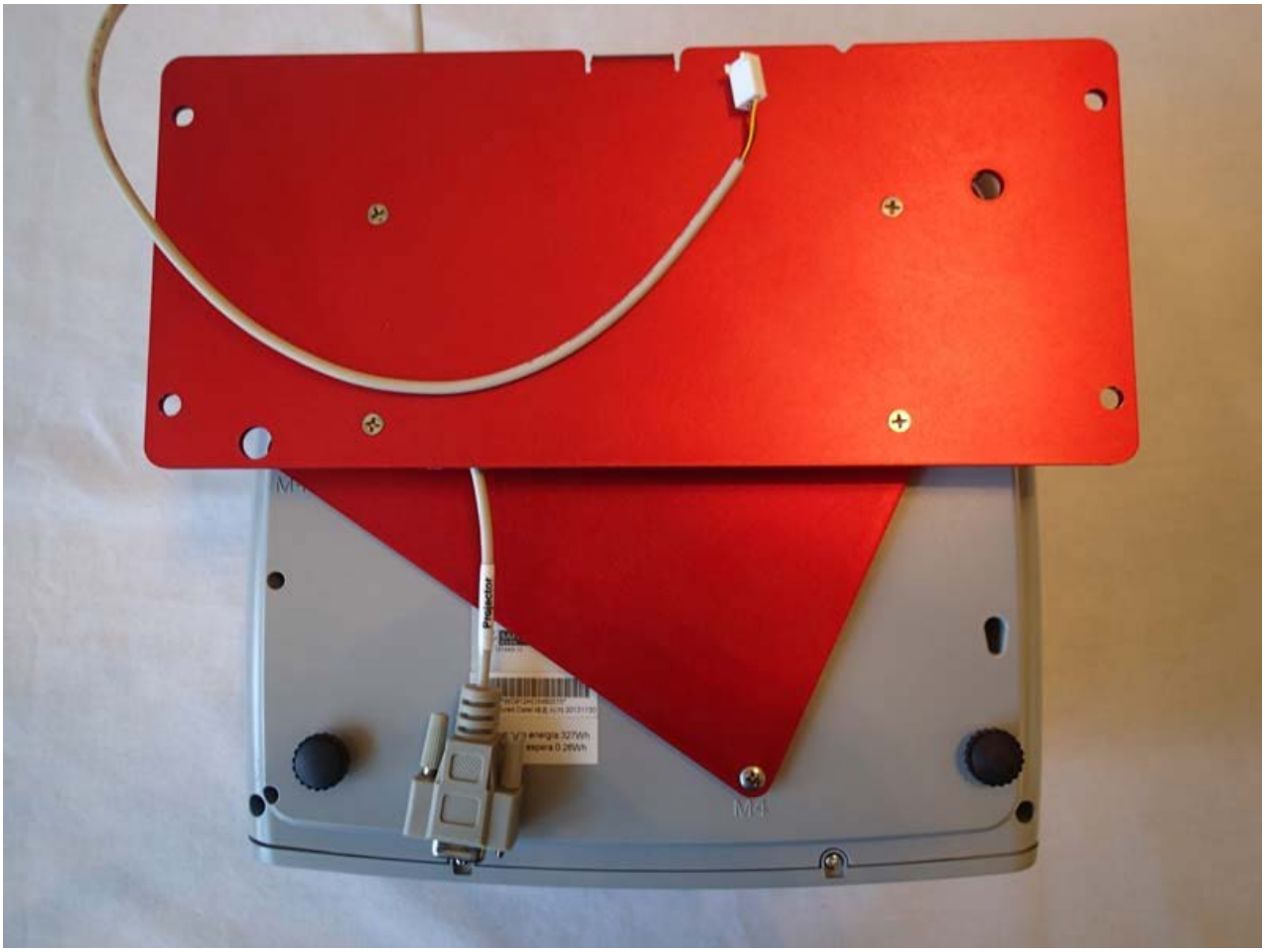
Finished Mount Assembly



Attach the projector to the mount

Next, attach the assembled projector mount to the projector.
Once attached, the projector should point slightly "down" when sitting on a flat surface.

Feed the Projector cable between the mount plates

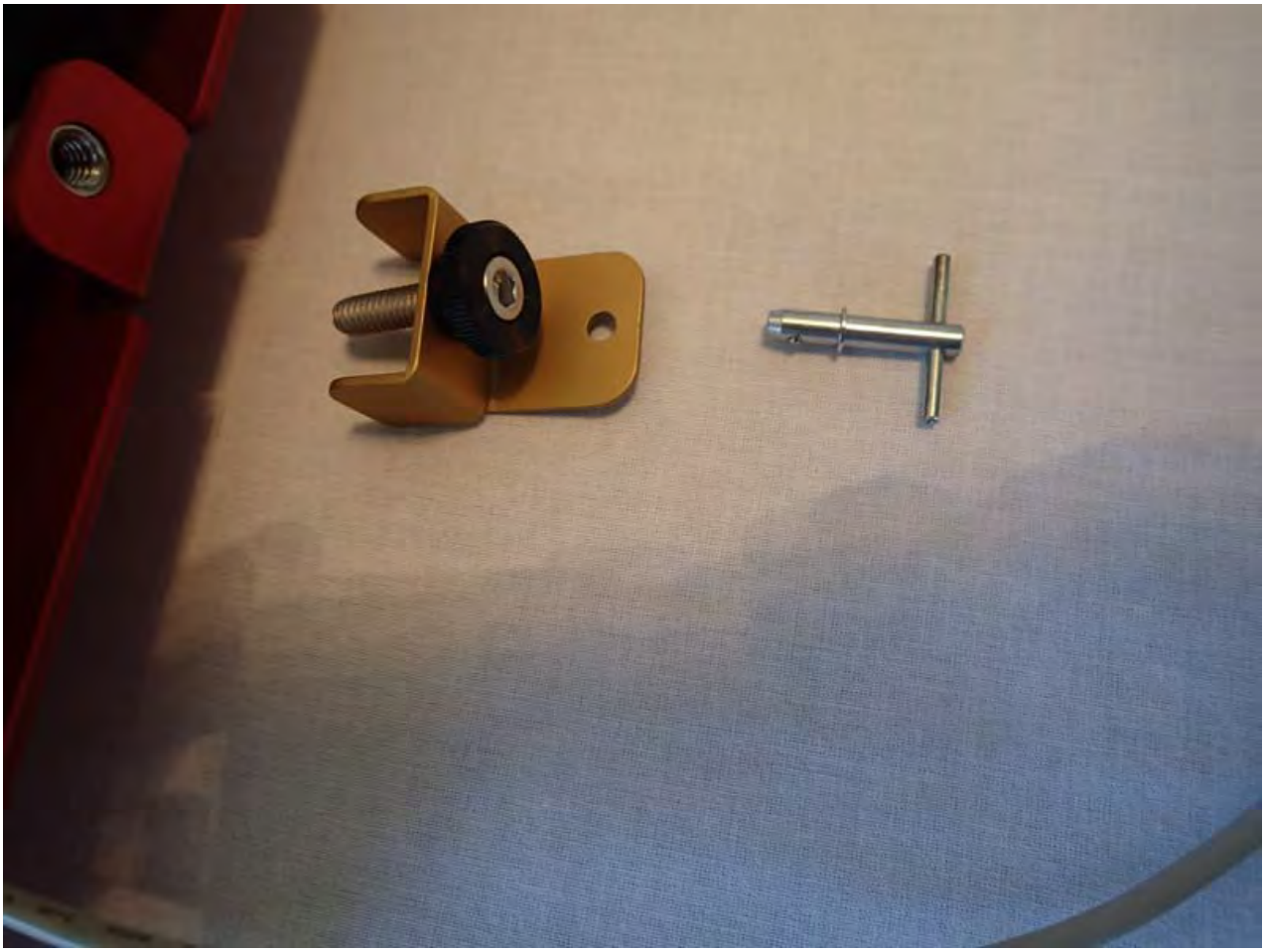


Secure the Projector Cable to the Projector's RS-232 port


VGA IN
VGA IN
VGA OUT
HDMI
Projector

Attach the mount assembly

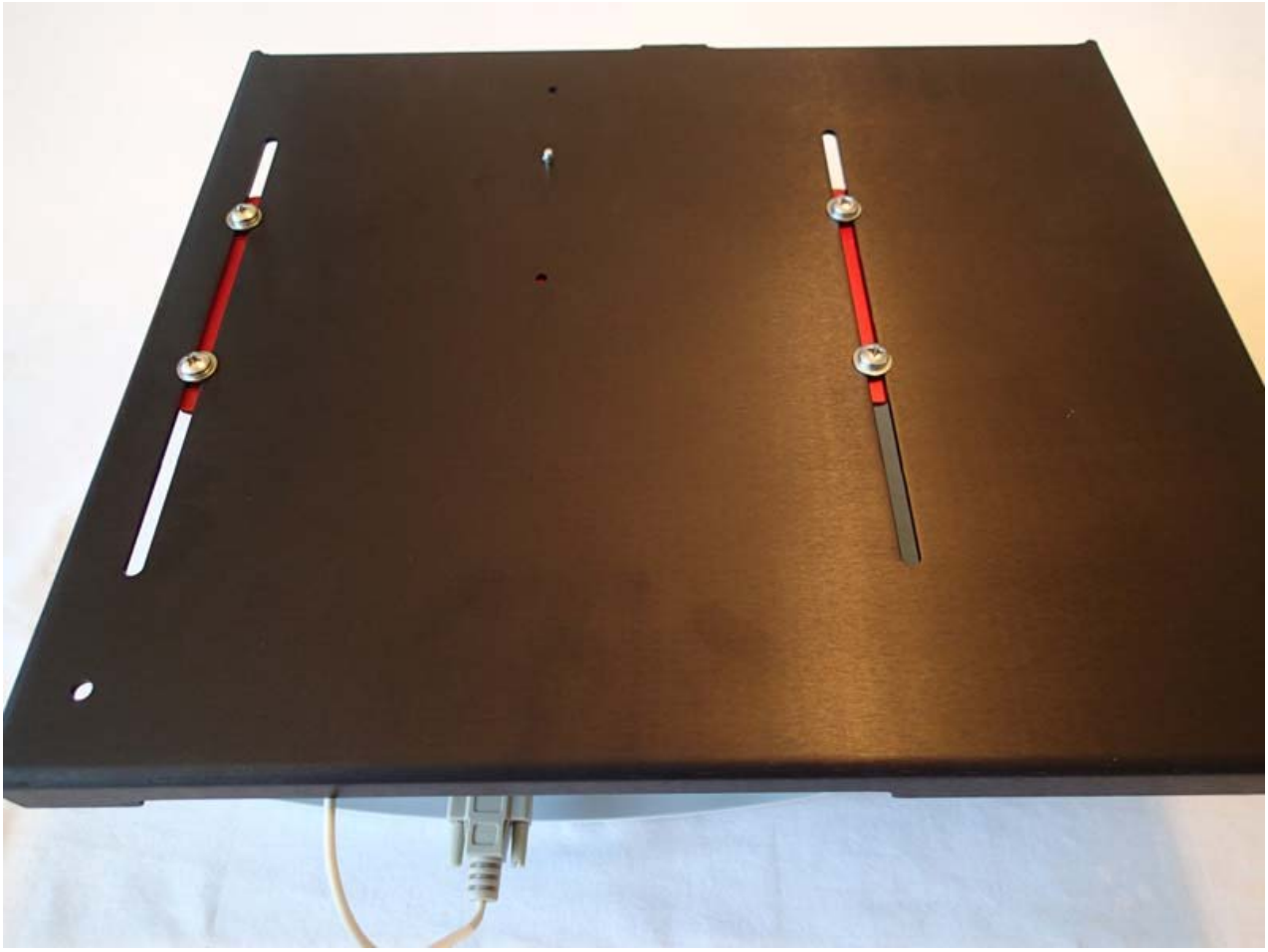
Using parts from Bag 1B, attach the projector hanger.
The screw allows small vertical adjustment of the projector.
The T-Pin allows for hanging the projector at the 30, 50, or 70 micron index holes.



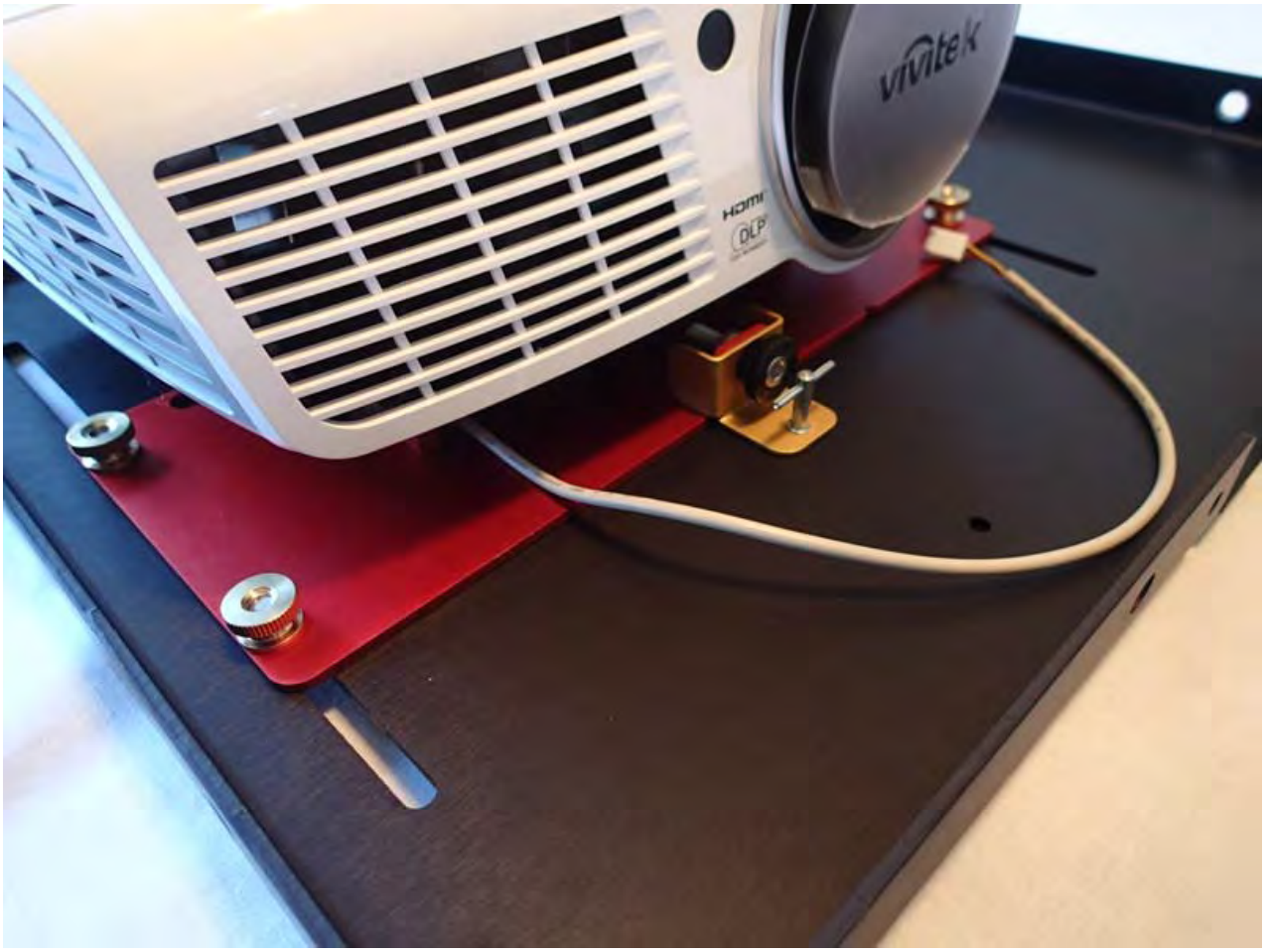
The normal position for the black thumb screw is backed out about 1/4 inch (~6 mm)

Use Bag 1C hardware to attach the projector to the backplate


PART NUMBER
1C



Align the hanger T-Pin to the middle (50 micron) index for assemble. Insert the screws with washers in place.

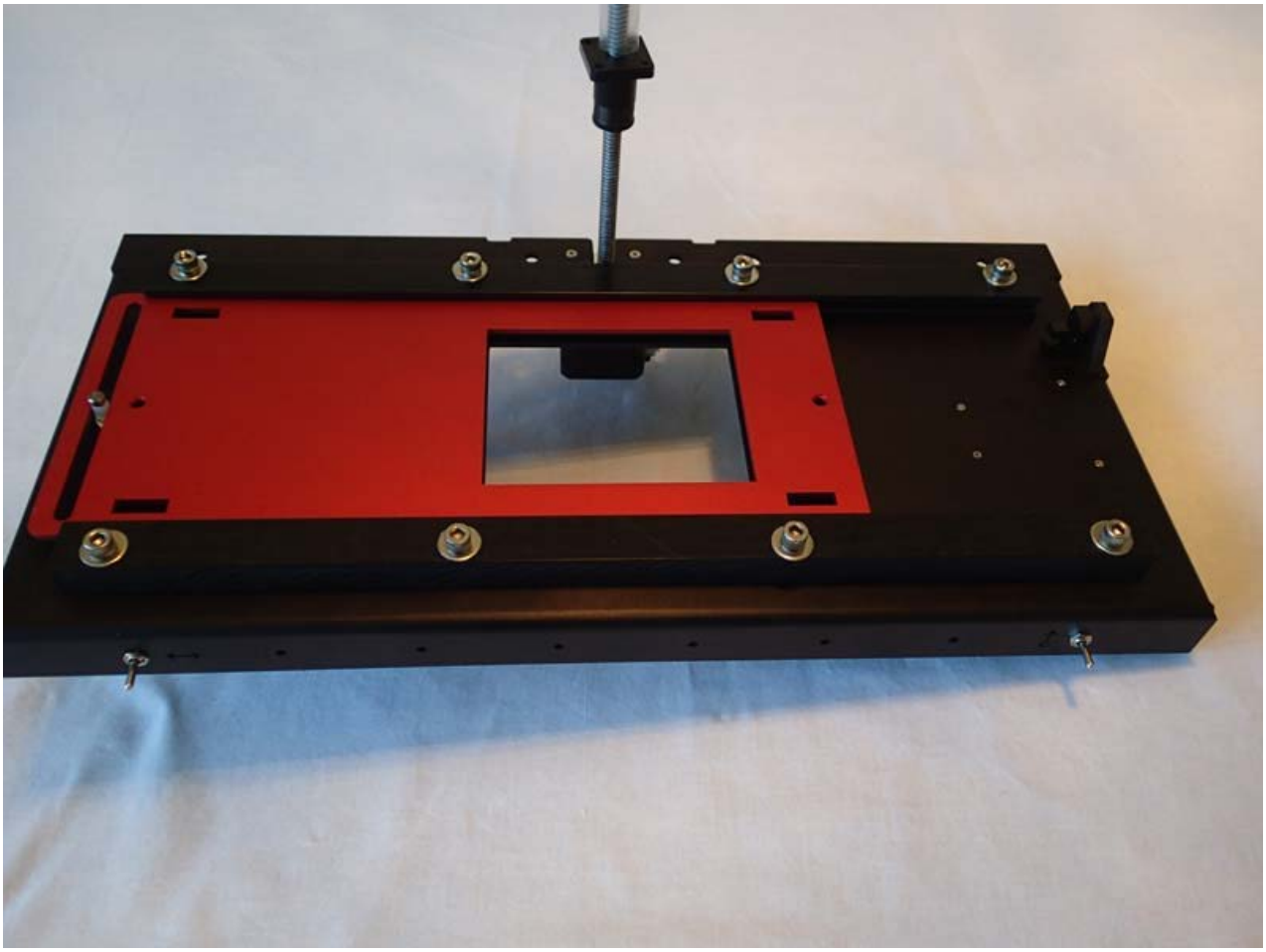


The four brass thumbnuts hold the projector in the 50 micron position.

This completes STEP 1 of the assembly process!

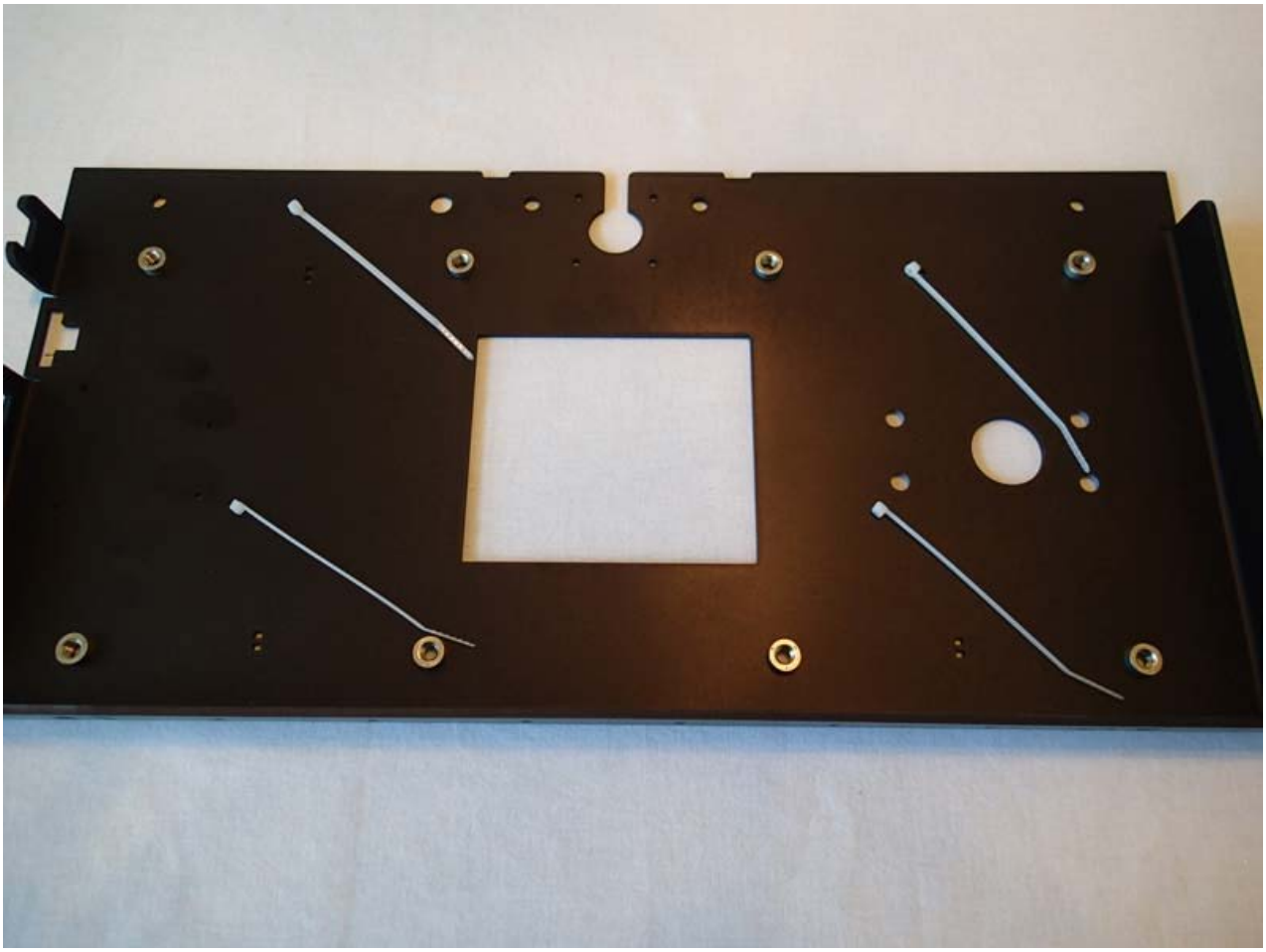
Step 2 - X Axis Support Assembly

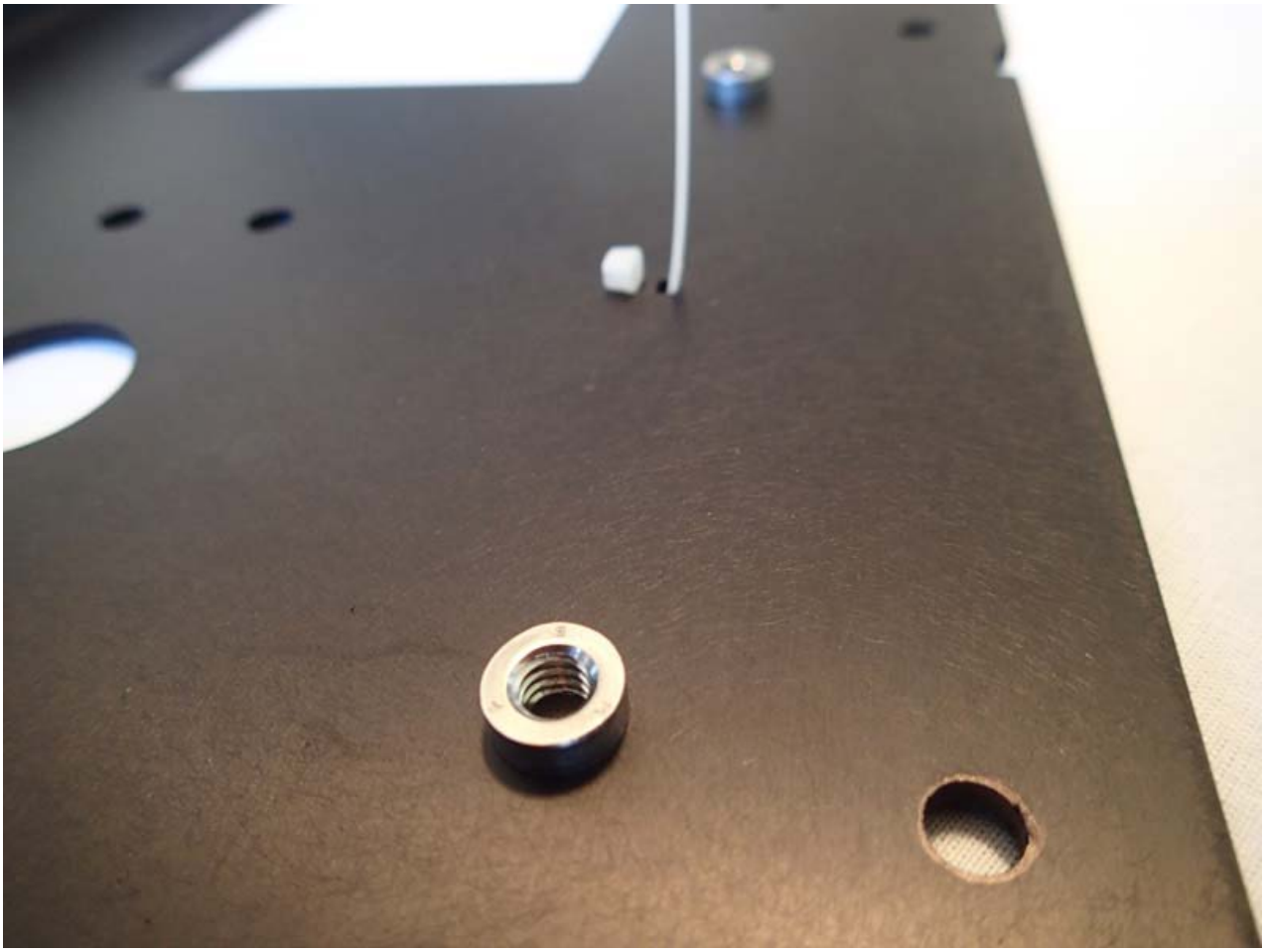
Completed X Axis assembly, shown for reference



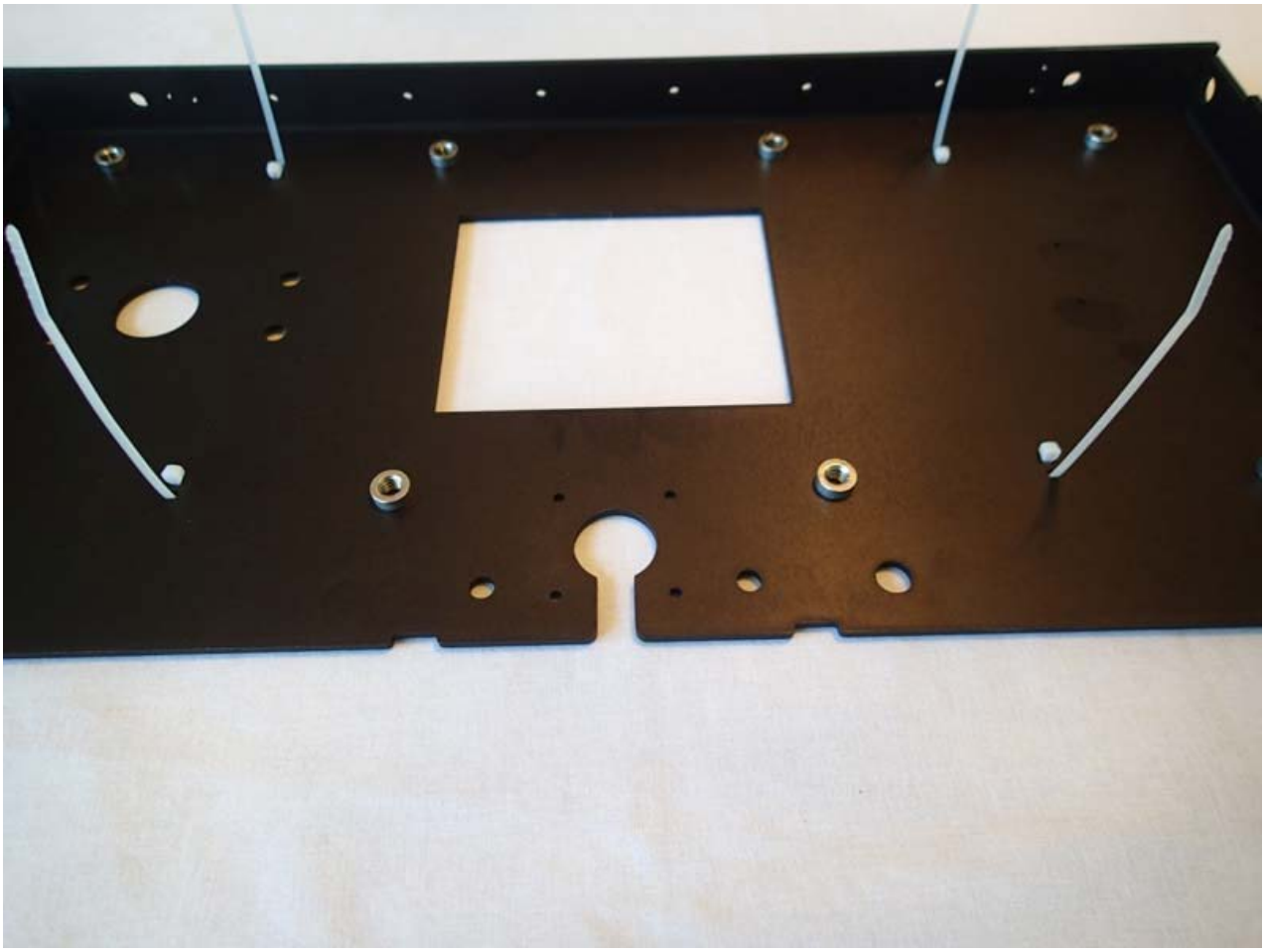
Insert Zip Ties

From Bag 2A, insert 4 zip ties as shown into the X-Axis base plate.
These will be used later to secure the wire cables.



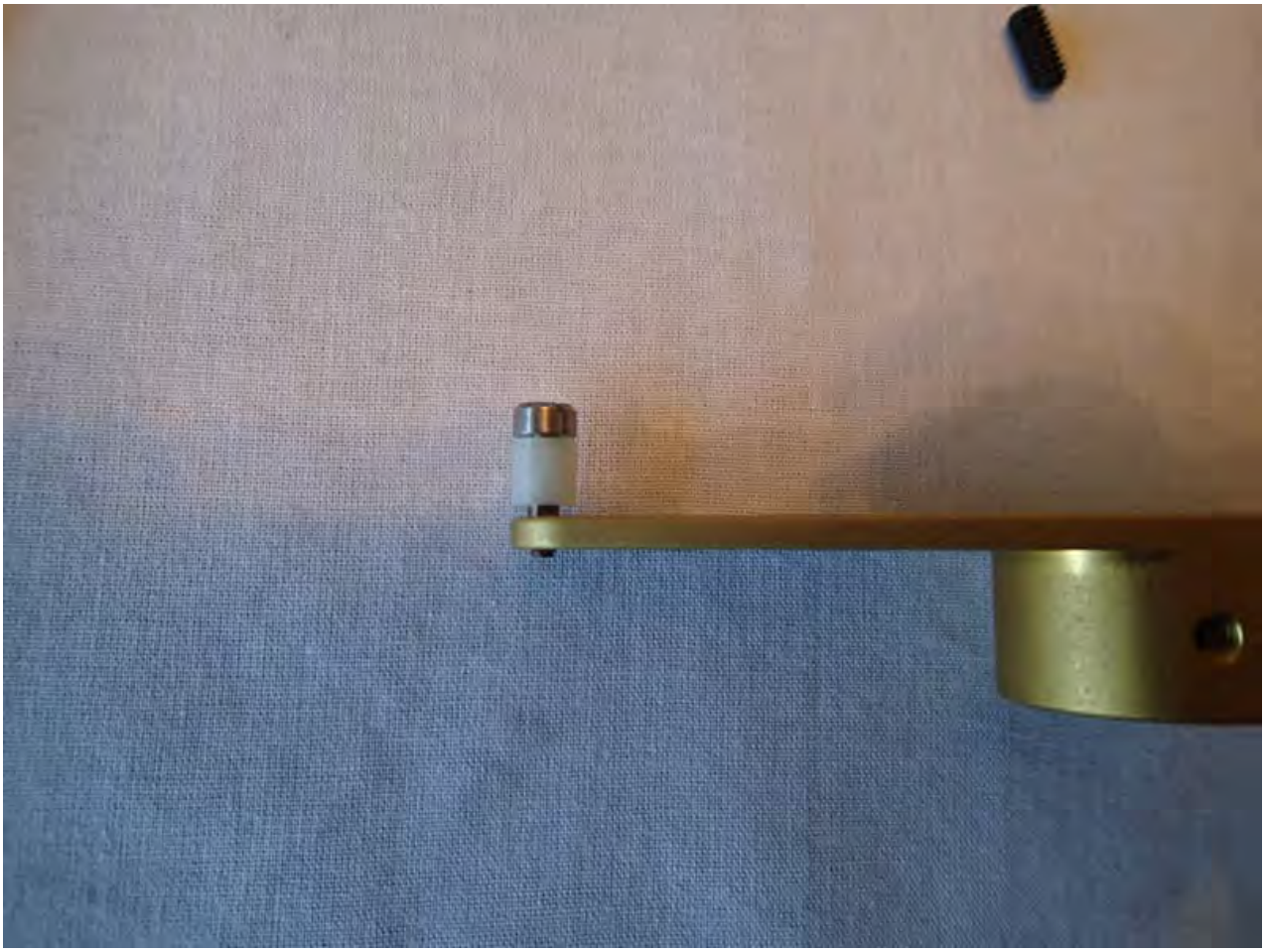


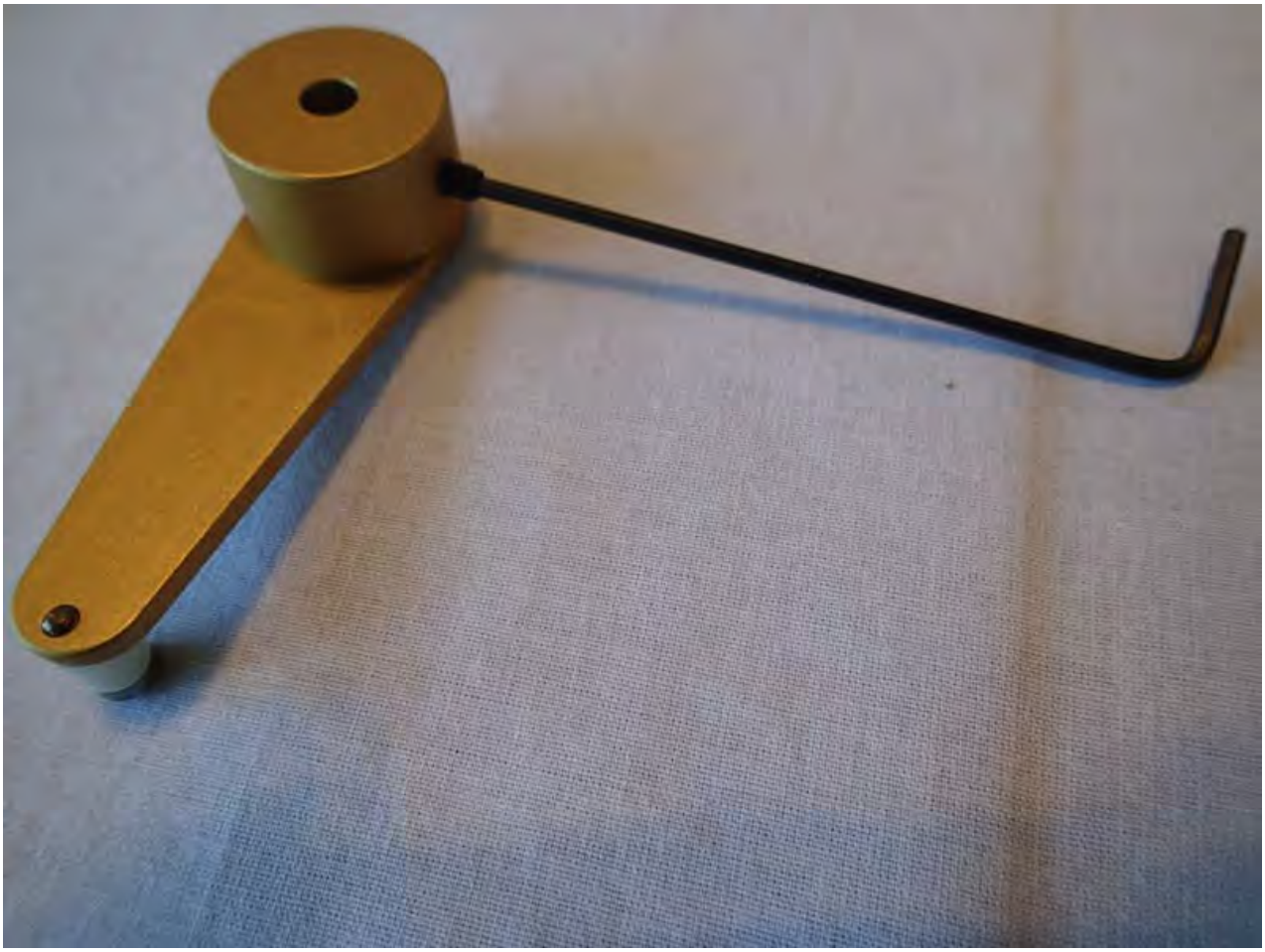
Note the orientation of the ties!



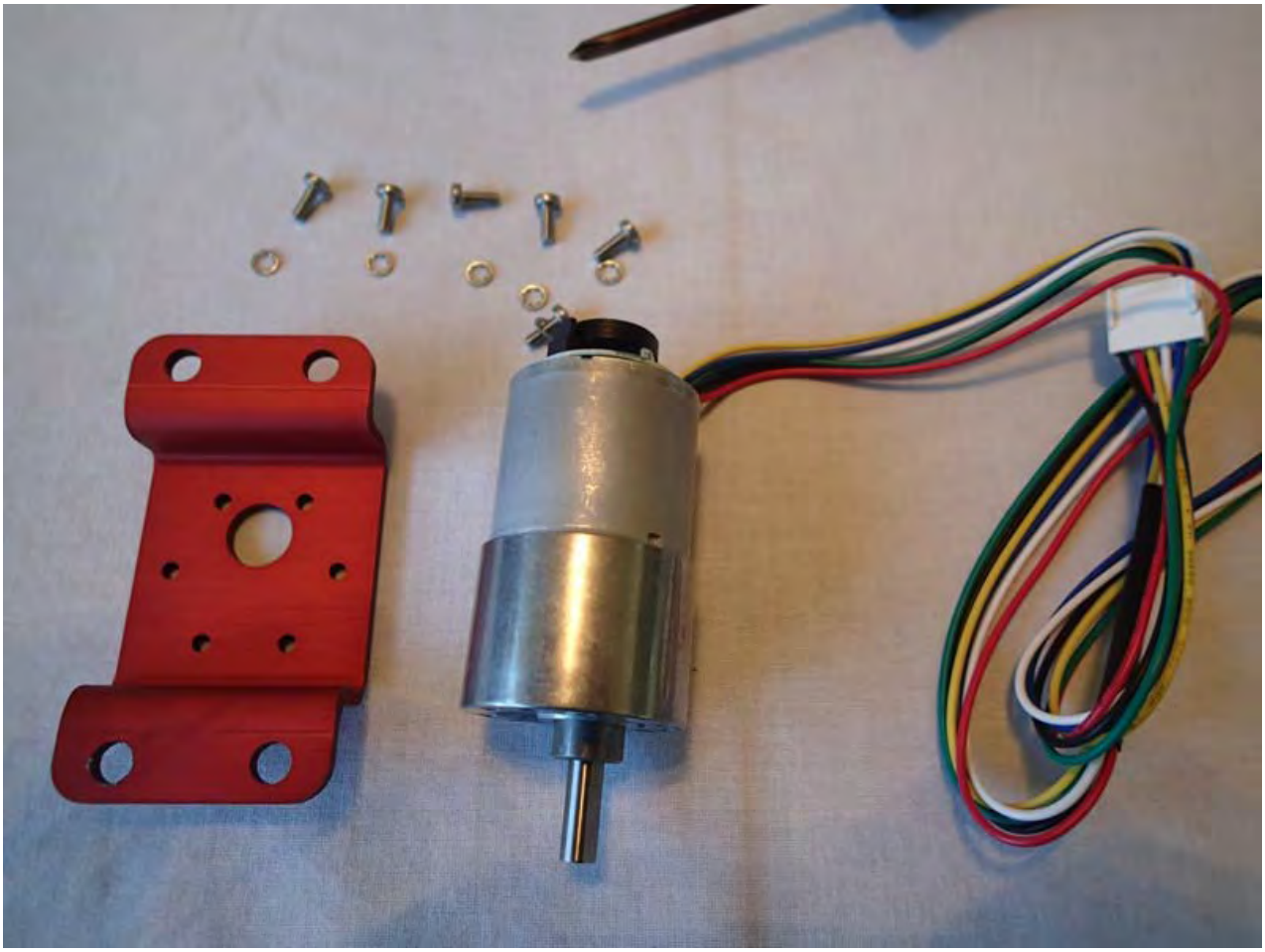
X-Motor Assembly

Use Bag 2B to build up the X Motor Arm

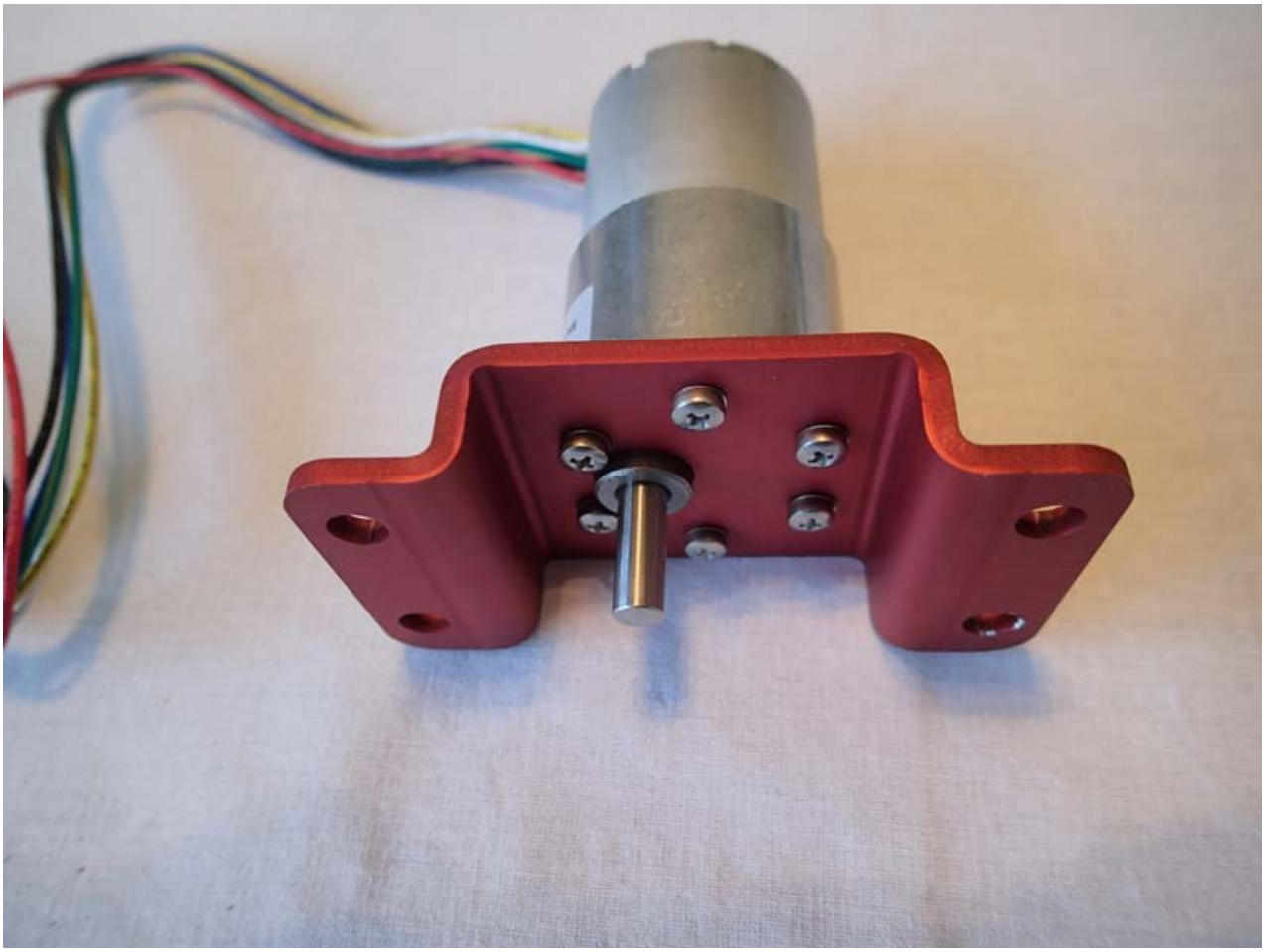




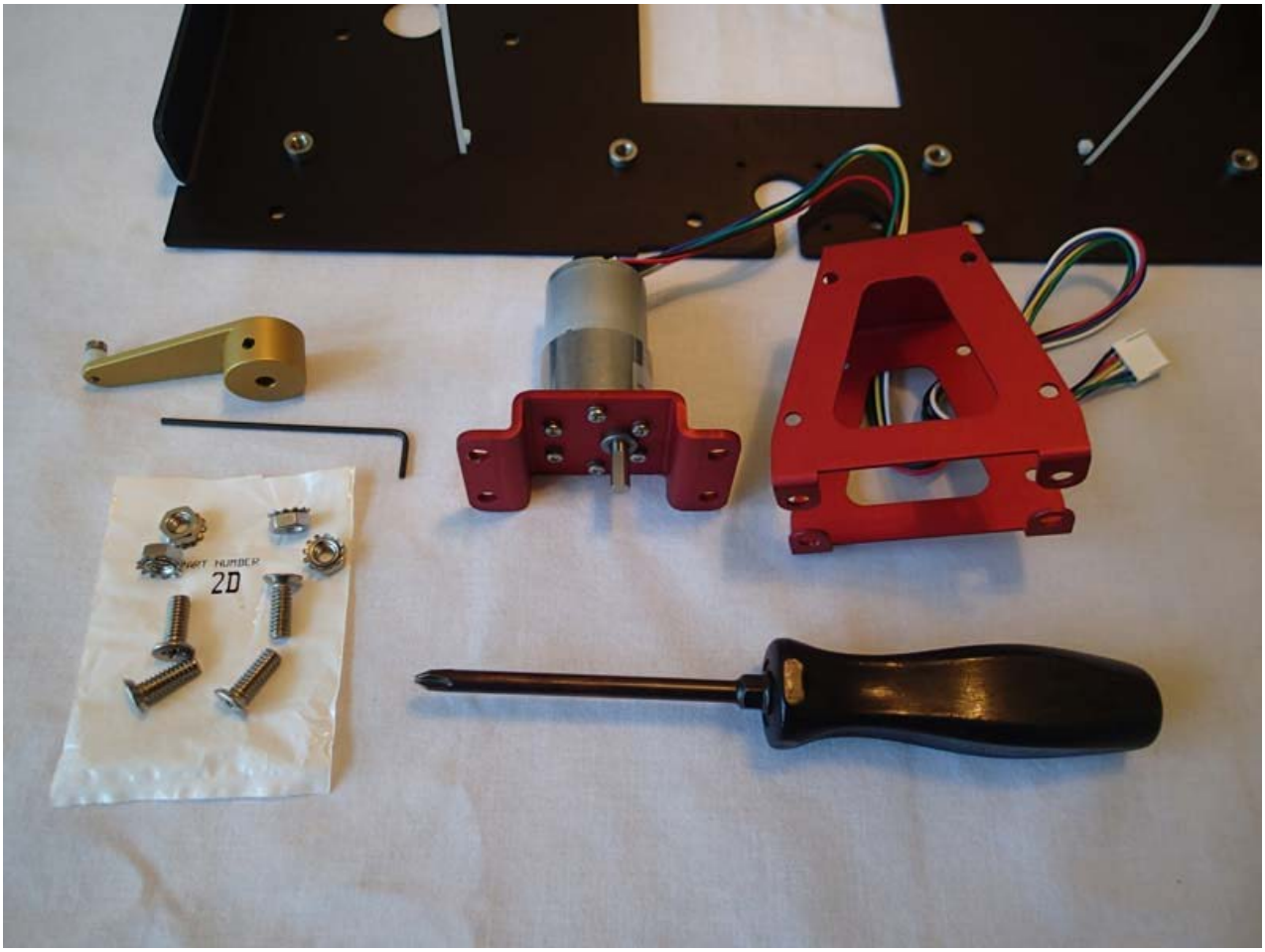
Insert the two set screws, one on each side, until they are flush with the arm surface.



Attach the X Motor to the mount with the 6 screws and washers from Bag 2C.

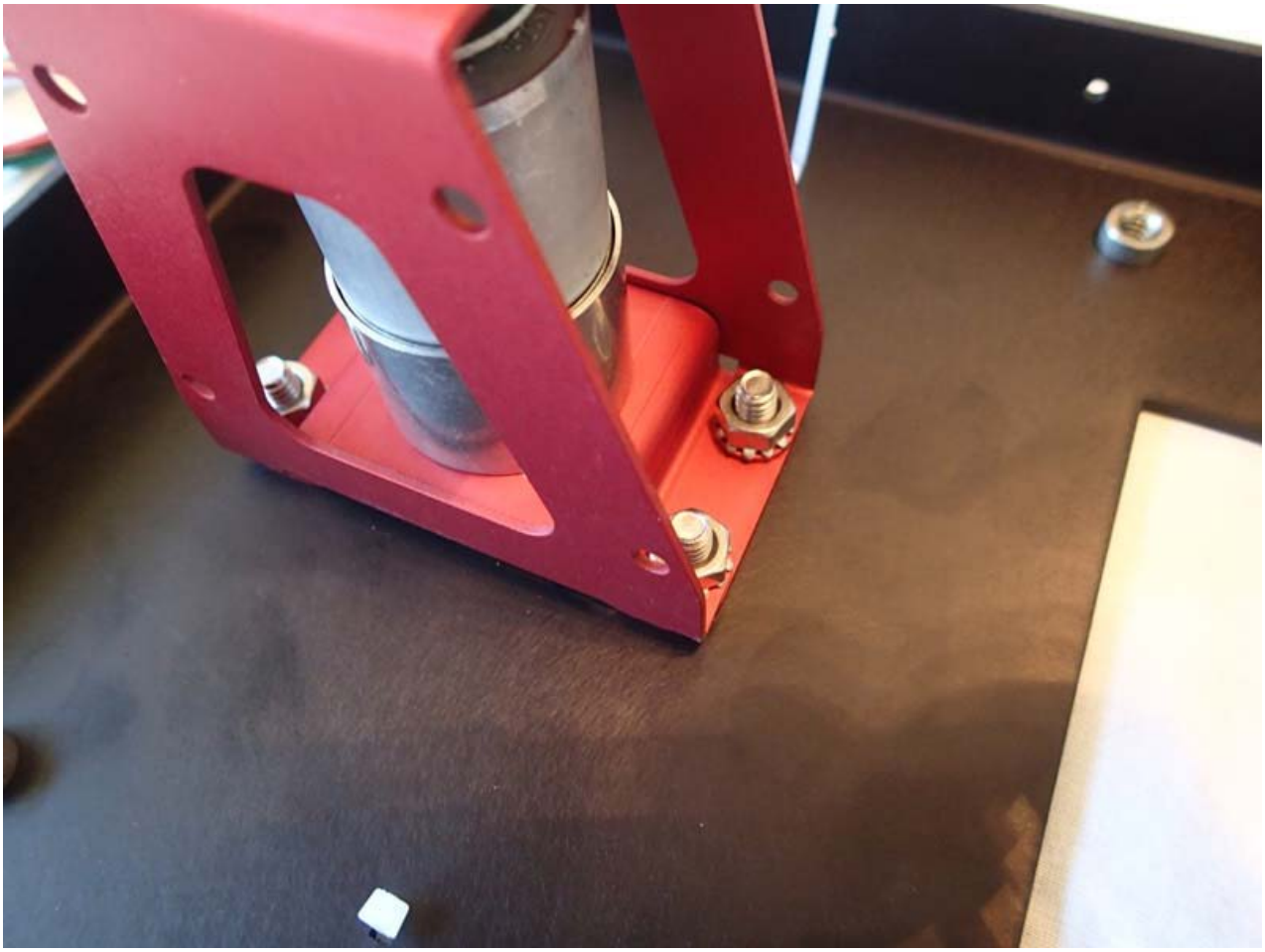


Motor attached.

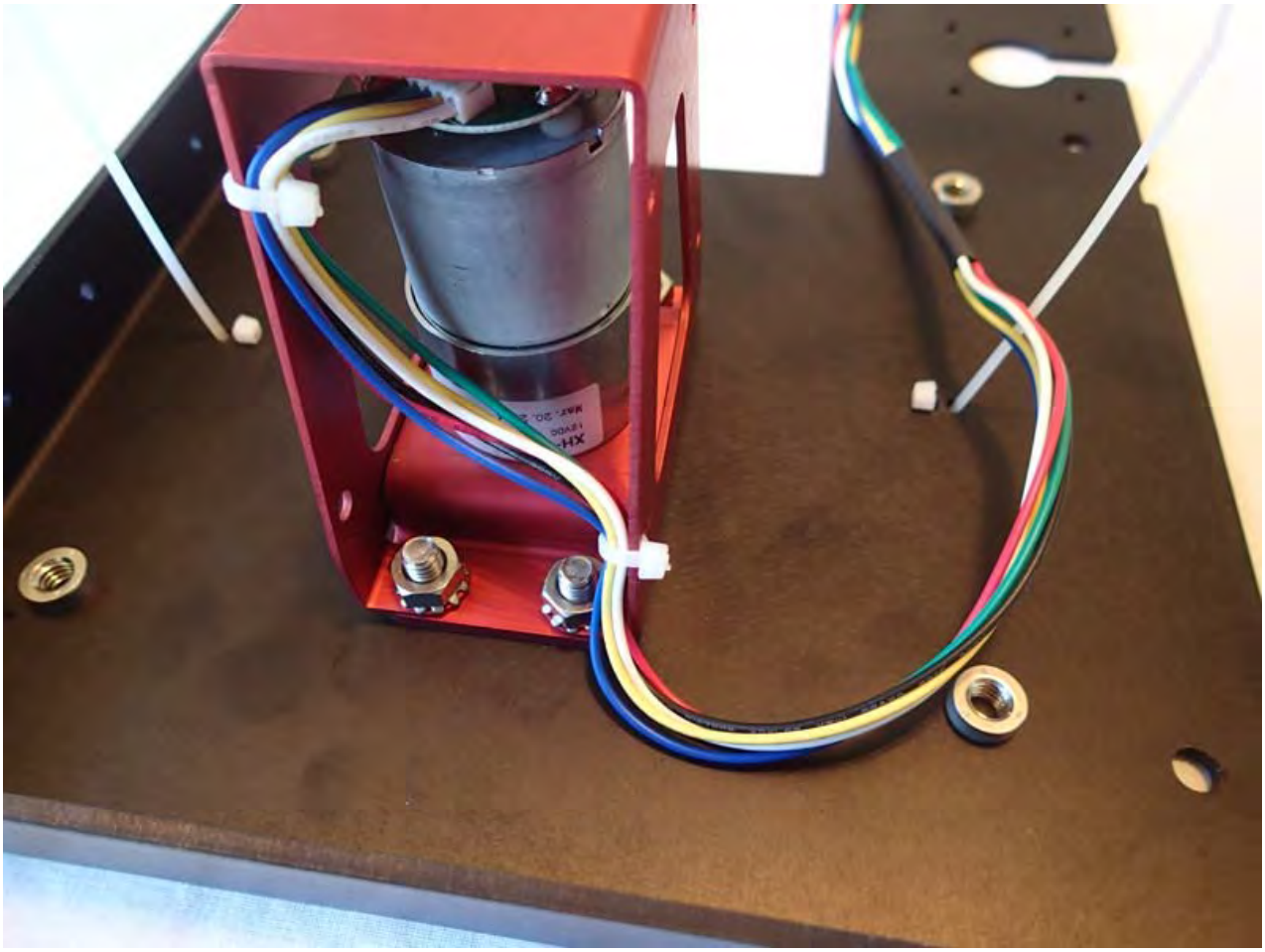


Ready to attach the X Motor assembly and Arm assembly using Bag 2D and motor shield

Motor in place with 4 screws, make sure shaft is centered on X Axis base plate hole.

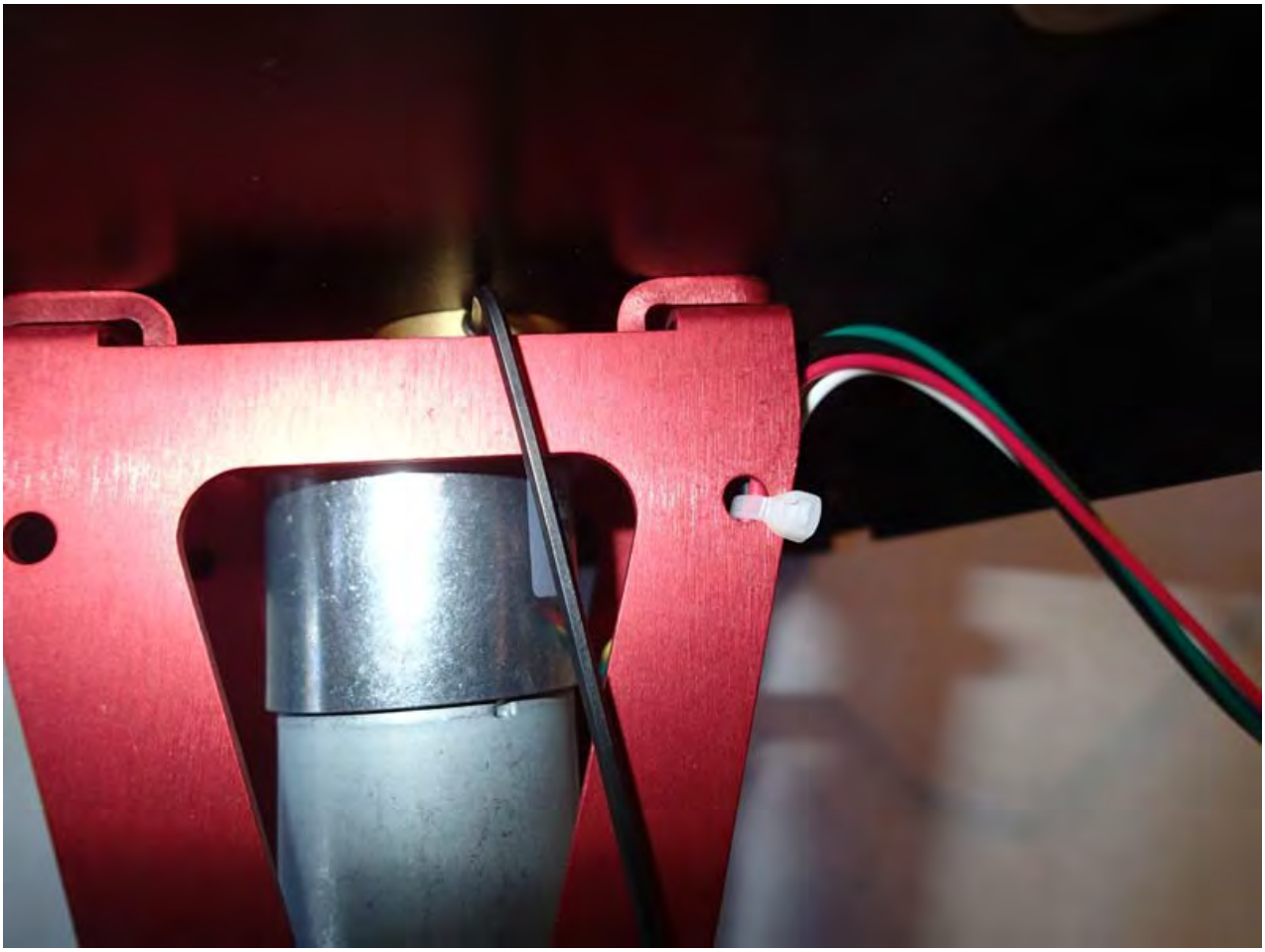


Put the motor shield in place and secure with nuts



Secure motor cable to the shield with 2 zip ties as shown

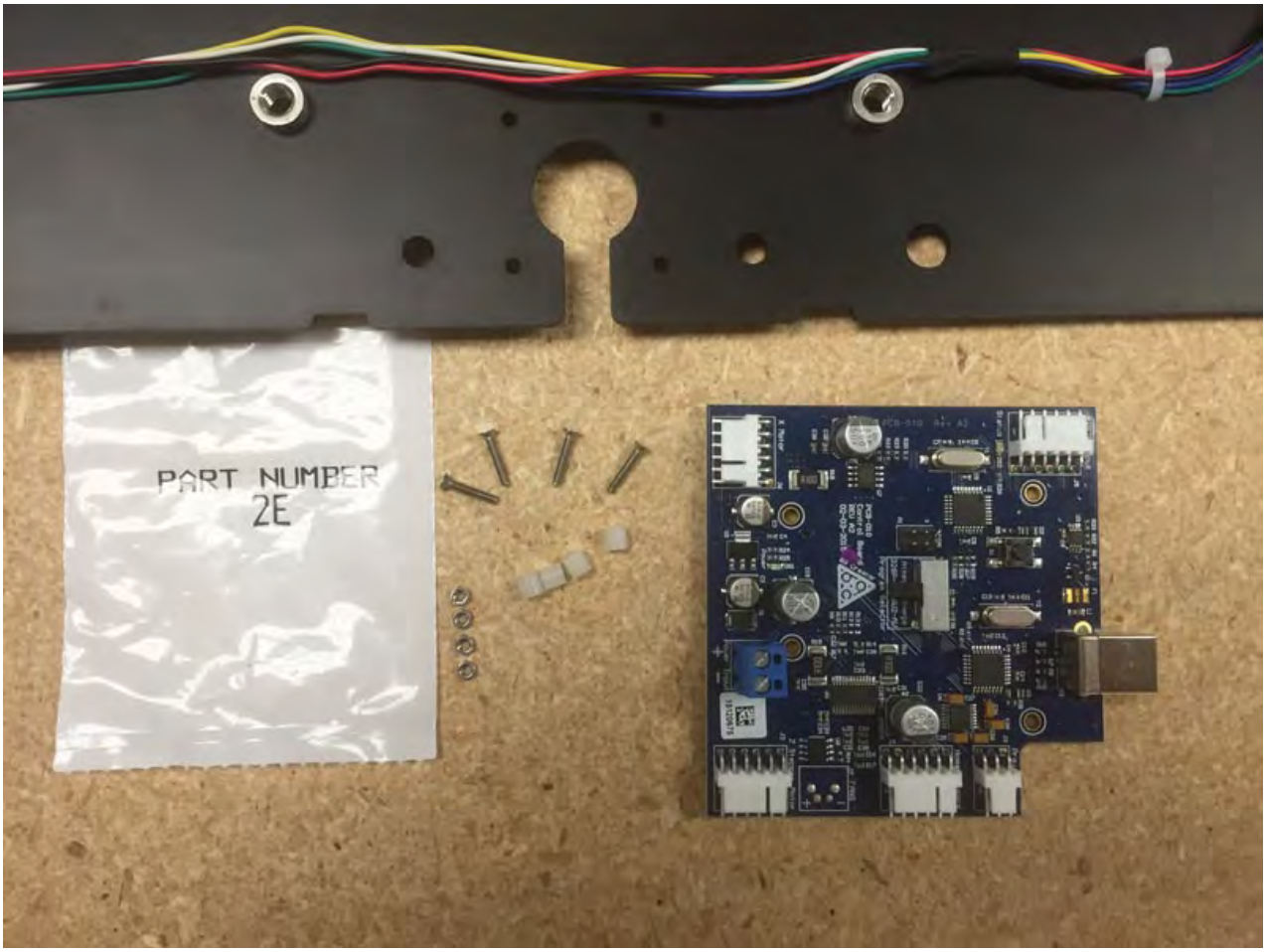
Place the arm assembly on the X motor shaft, **one set screw should align with the flat on the motor shaft.**
Photo below shows the **required clearance between arm and X Axis base plate**

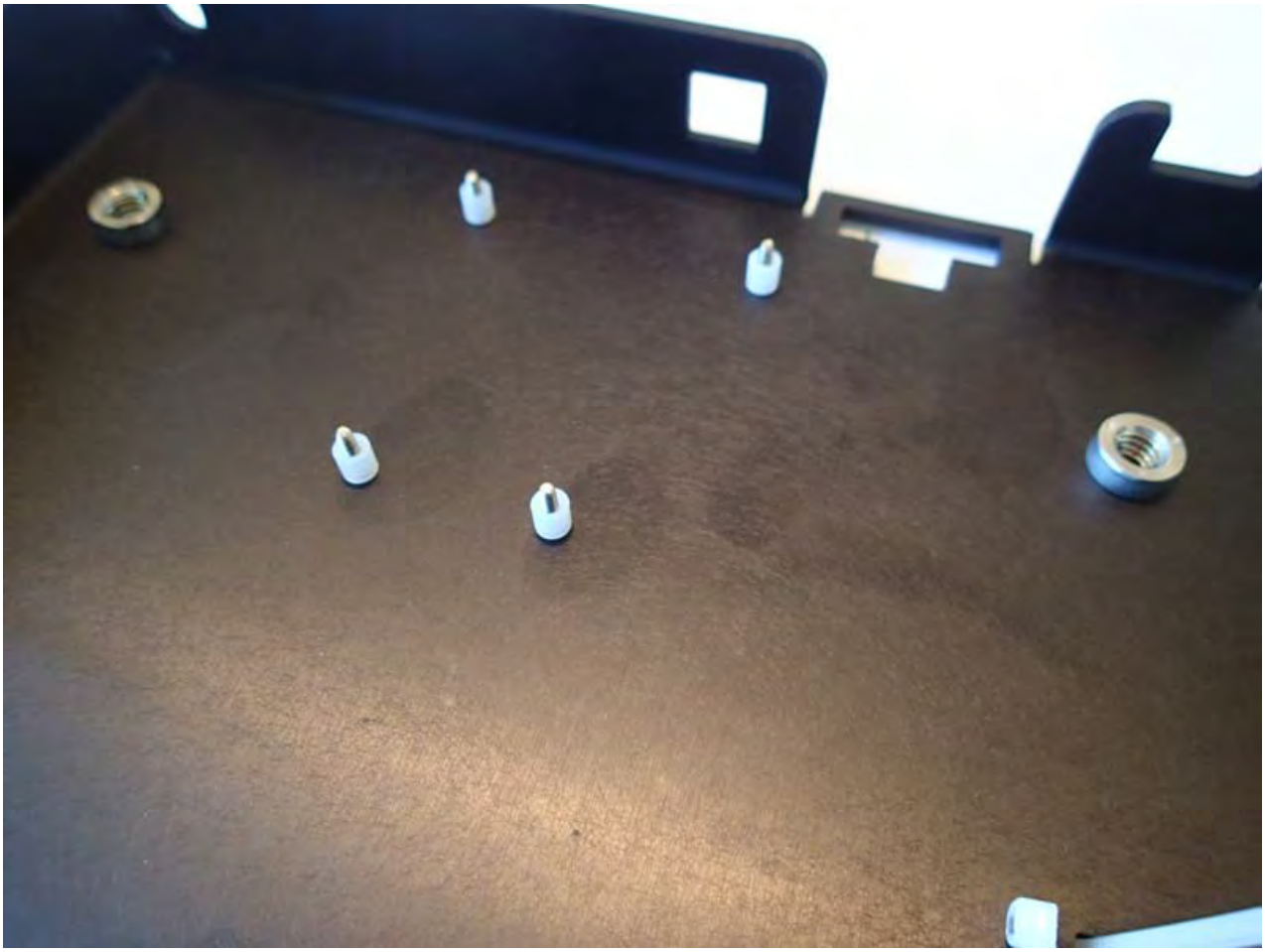


Secure arm with hex wrench on **both sides** to complete the X motor assembly.

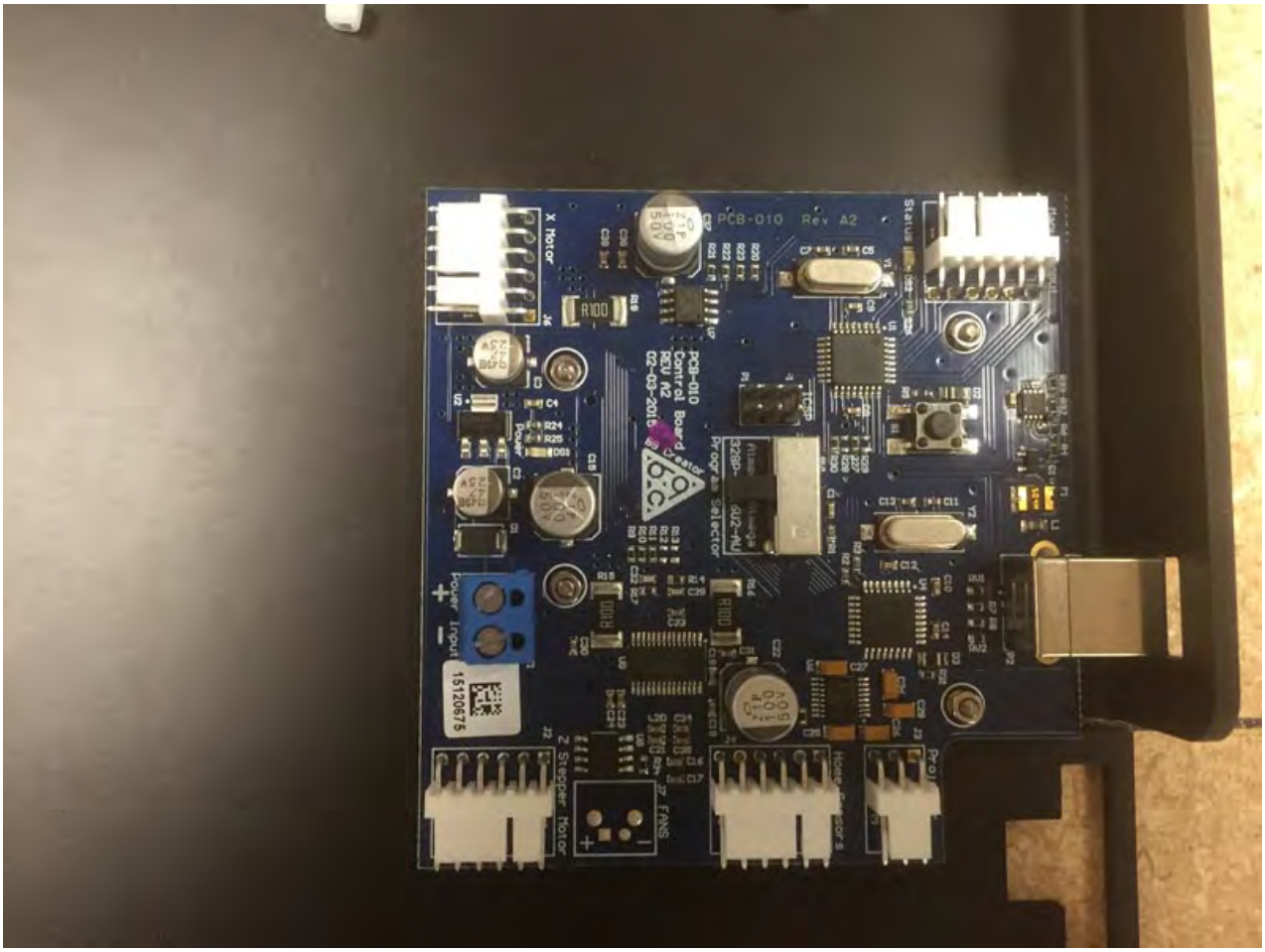
Attach PCB

Hardware needed: Bag 2E & Printed Circuit Board (PCB)





Screws and spacers in place



UNO secured with 4 nuts, make sure USB connector is aligned with square hole

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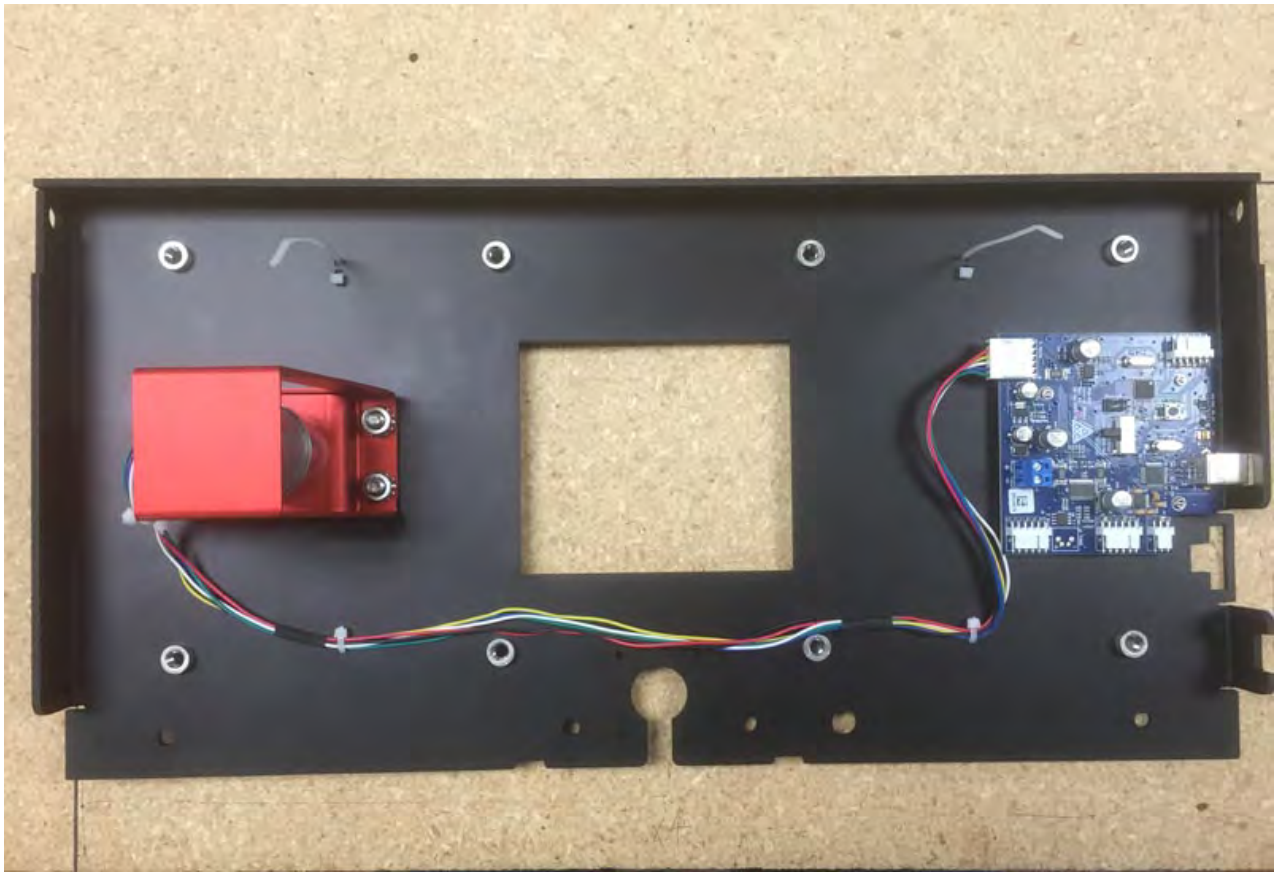
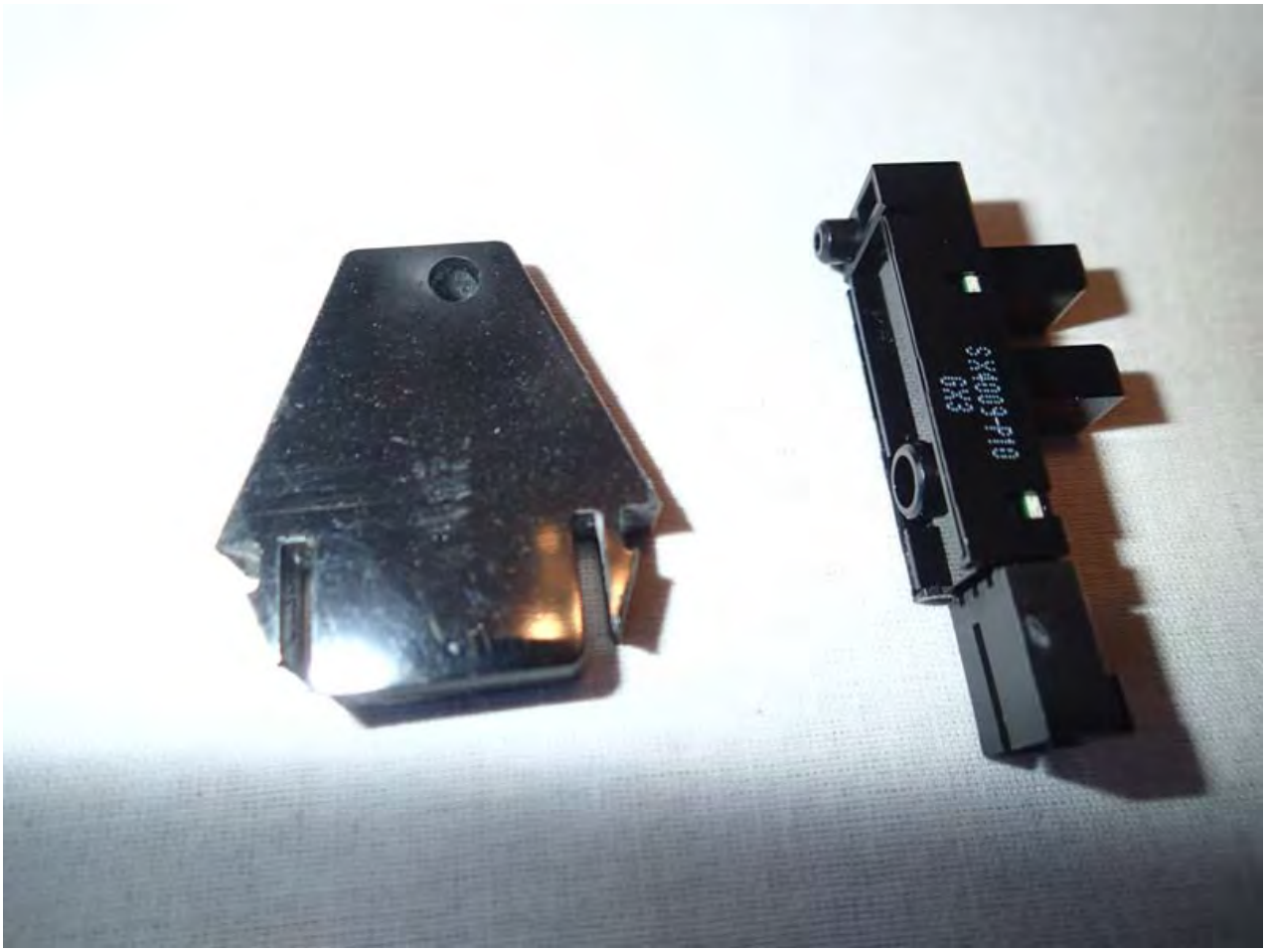
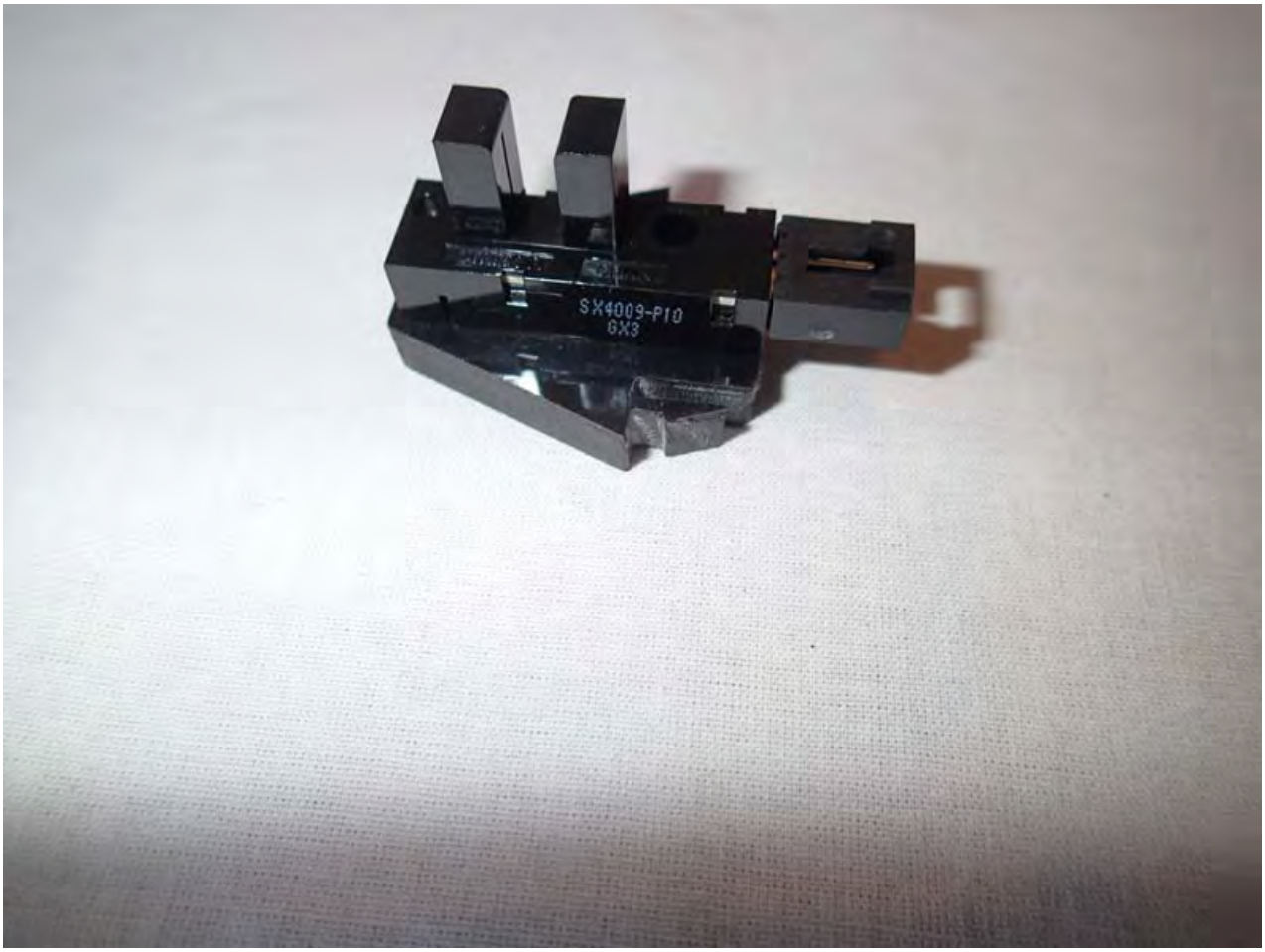


Home Sensor & Cables

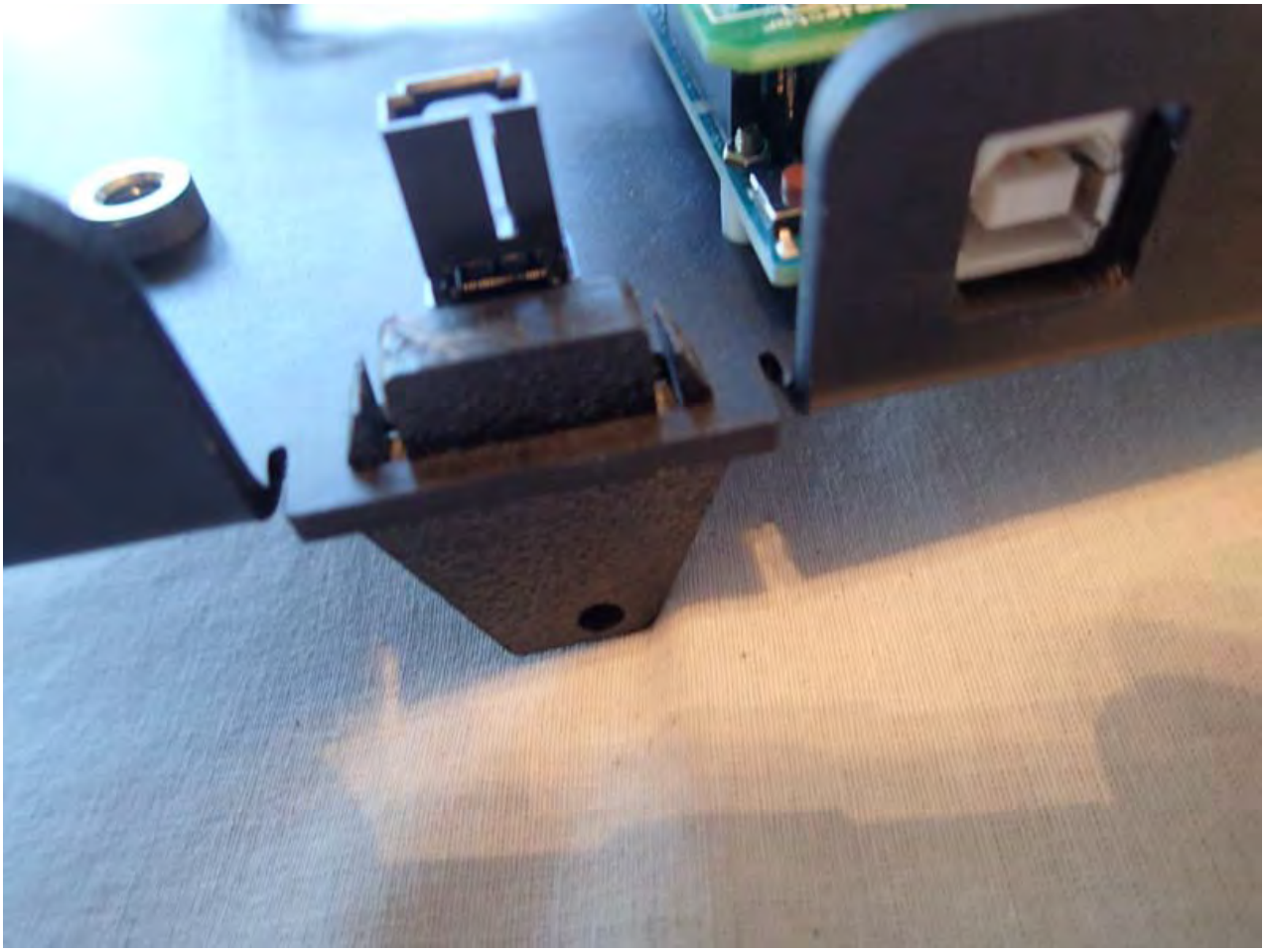
Attach X Axis Home Sensor & Mount



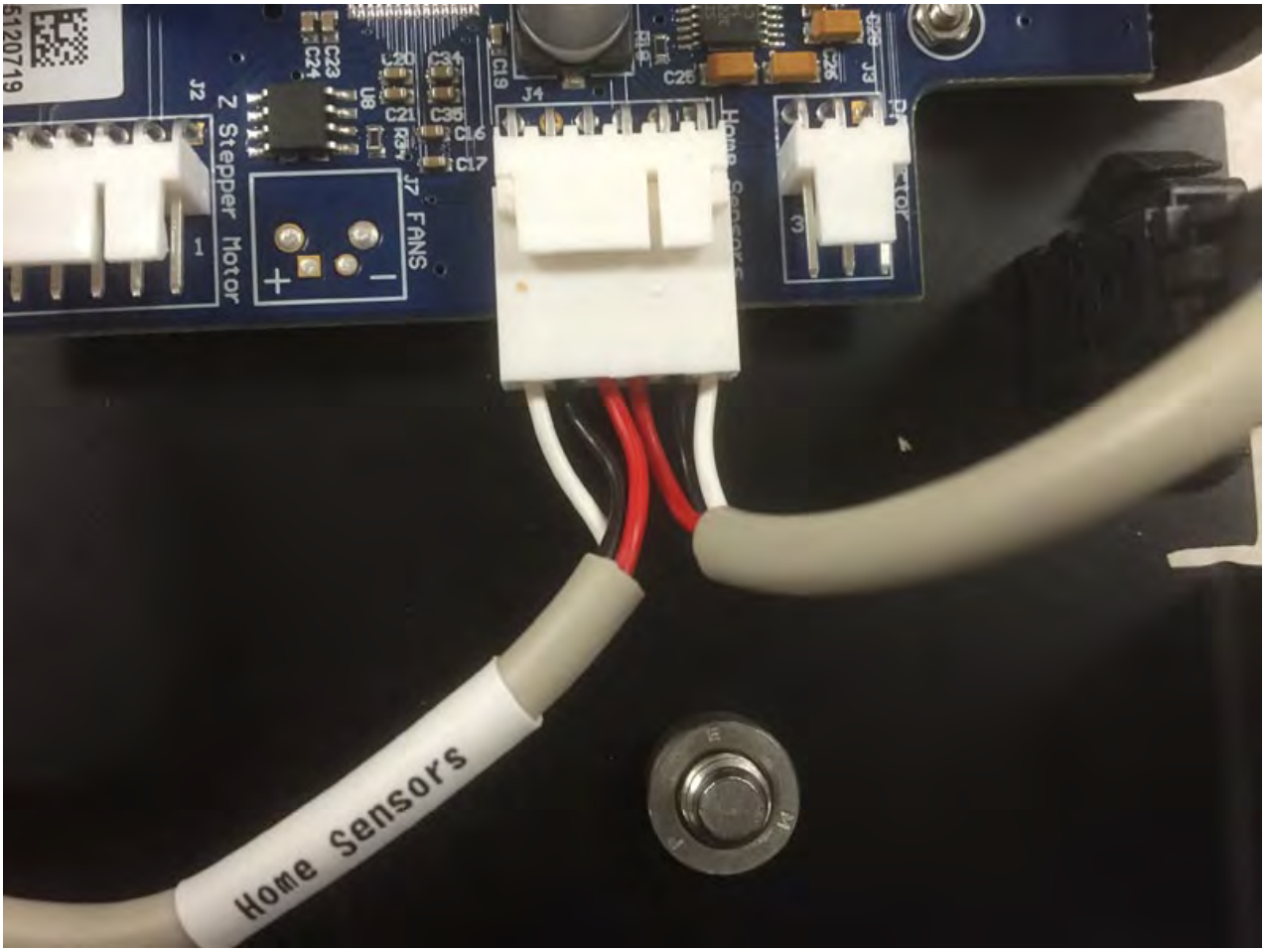
Home sensor engaged in mounting bracket



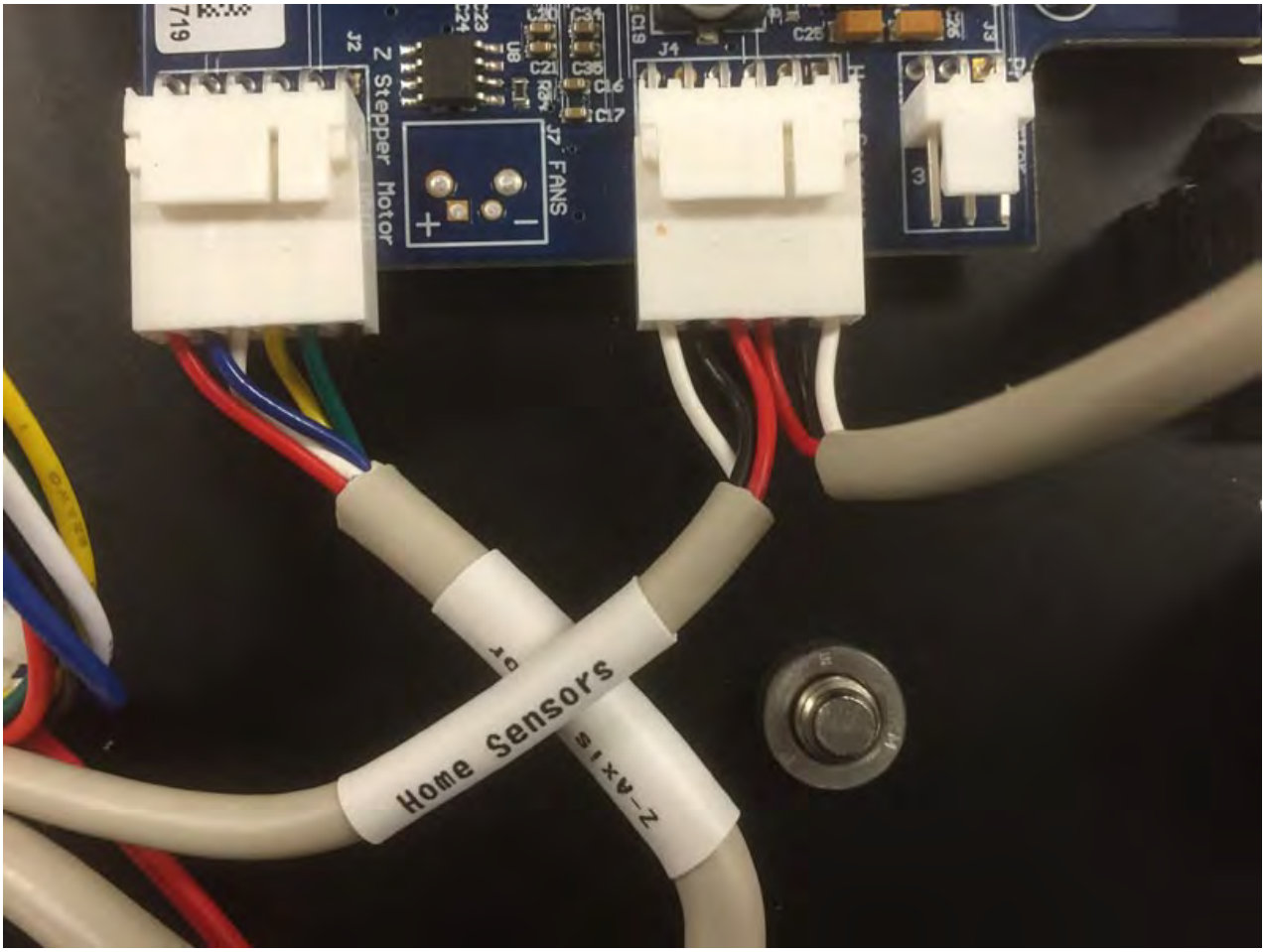
Slide into slot carefully



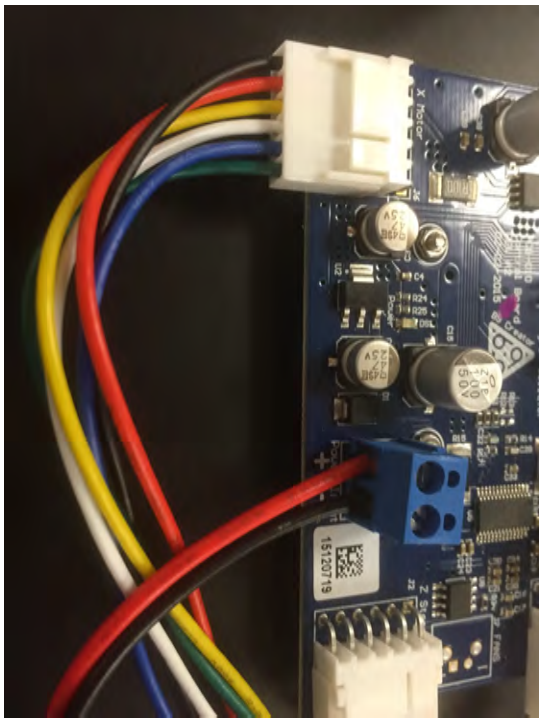
Mount tabs fully engaged and locked in place



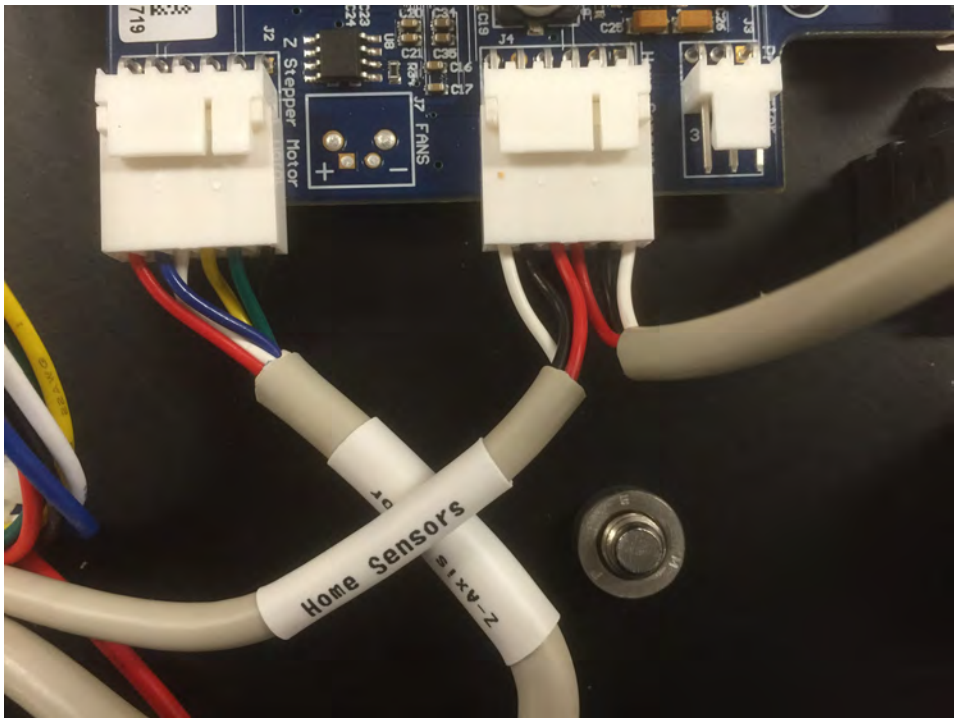
Home Sensors Cable attached to PCB and X Axis Home Sensor



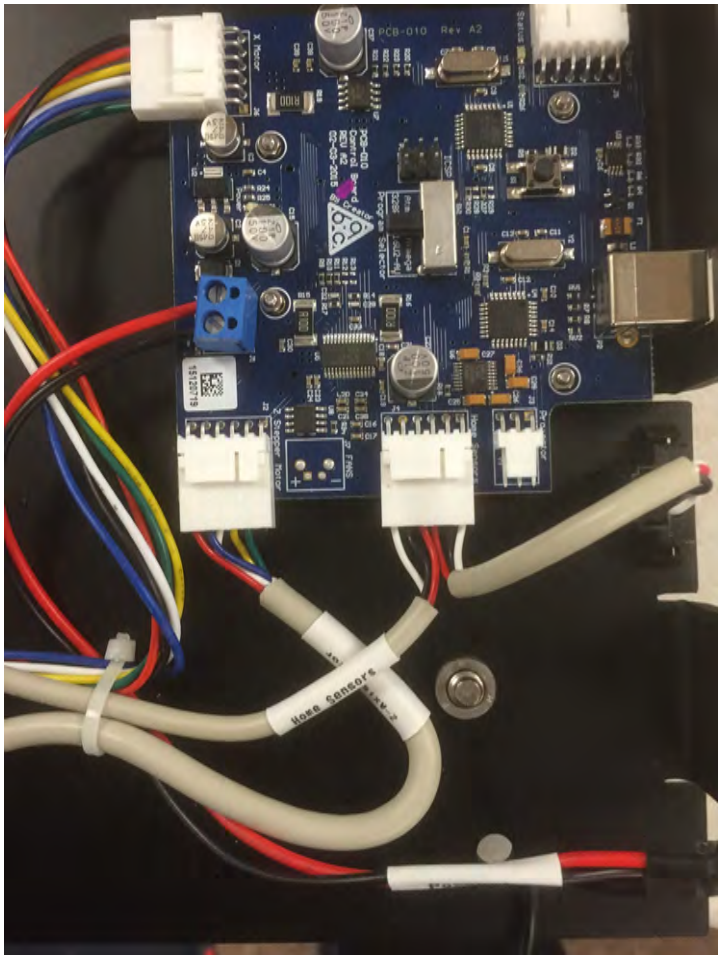
Z-Axis Motor Cable attached to PCB



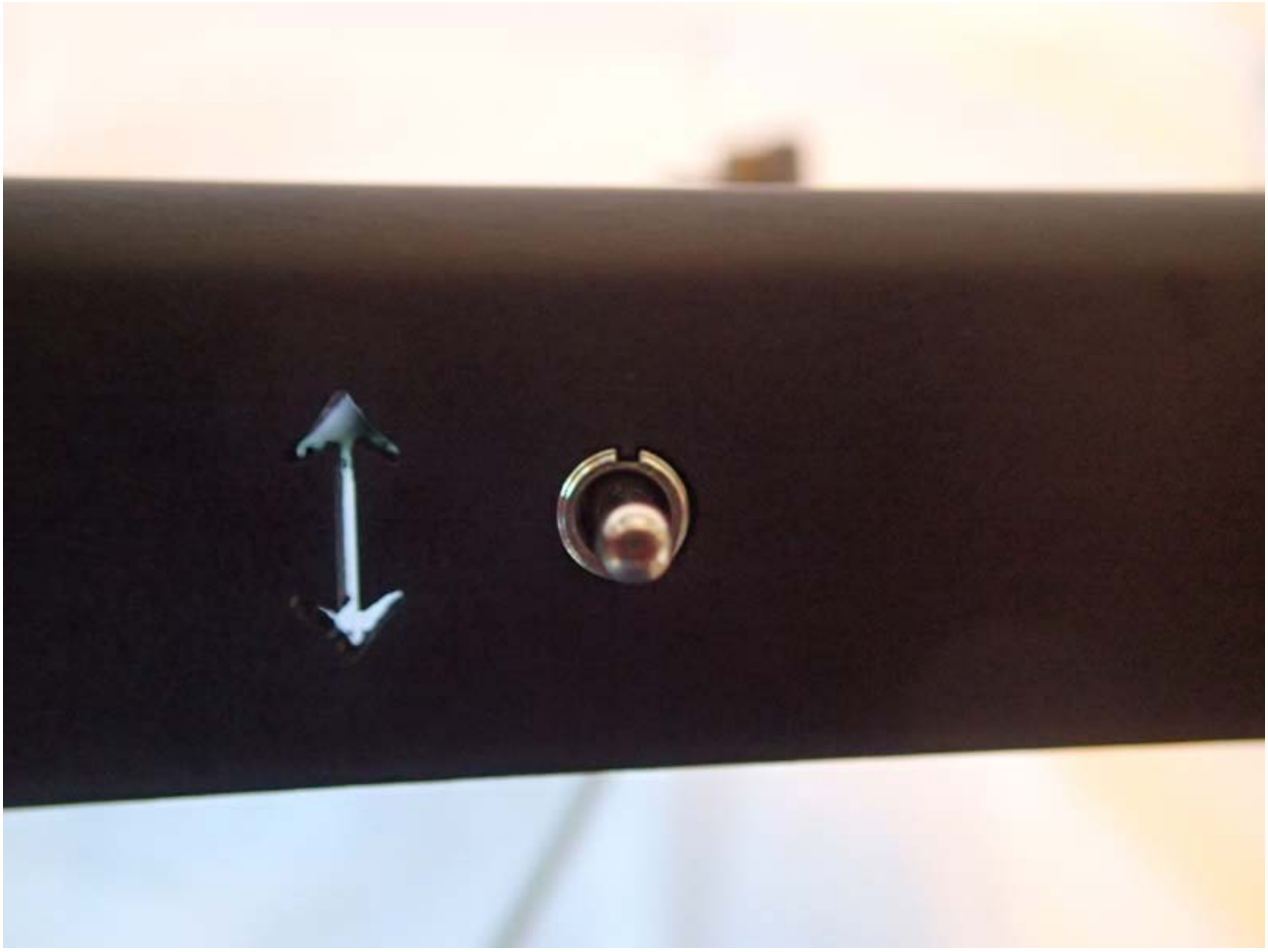
Power-1 Cable in place



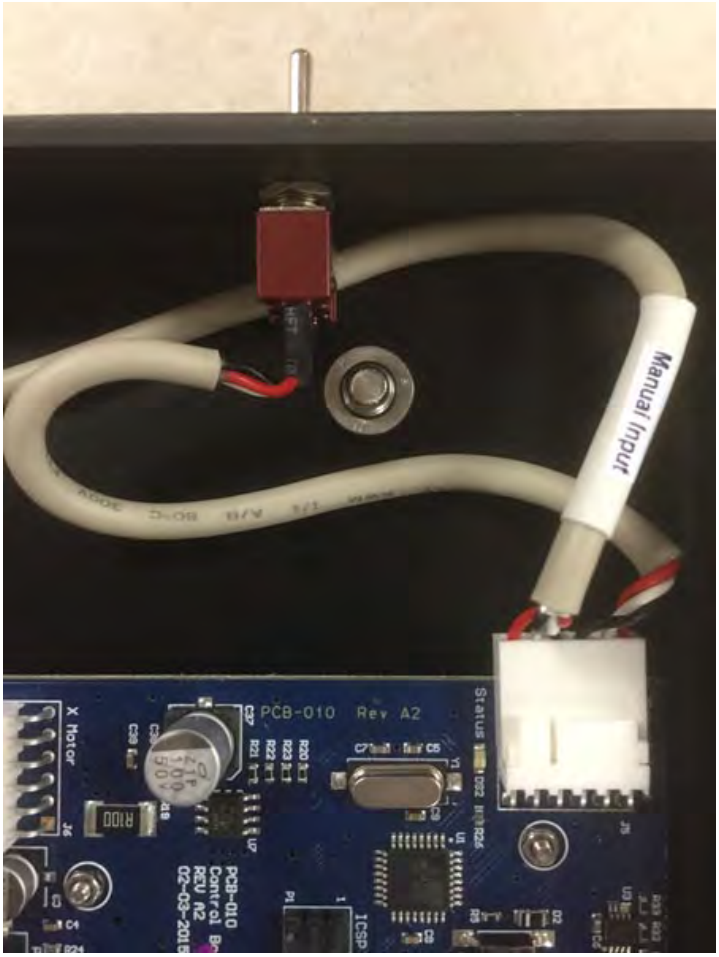
Power-1 Cable attached to PCB Terminal



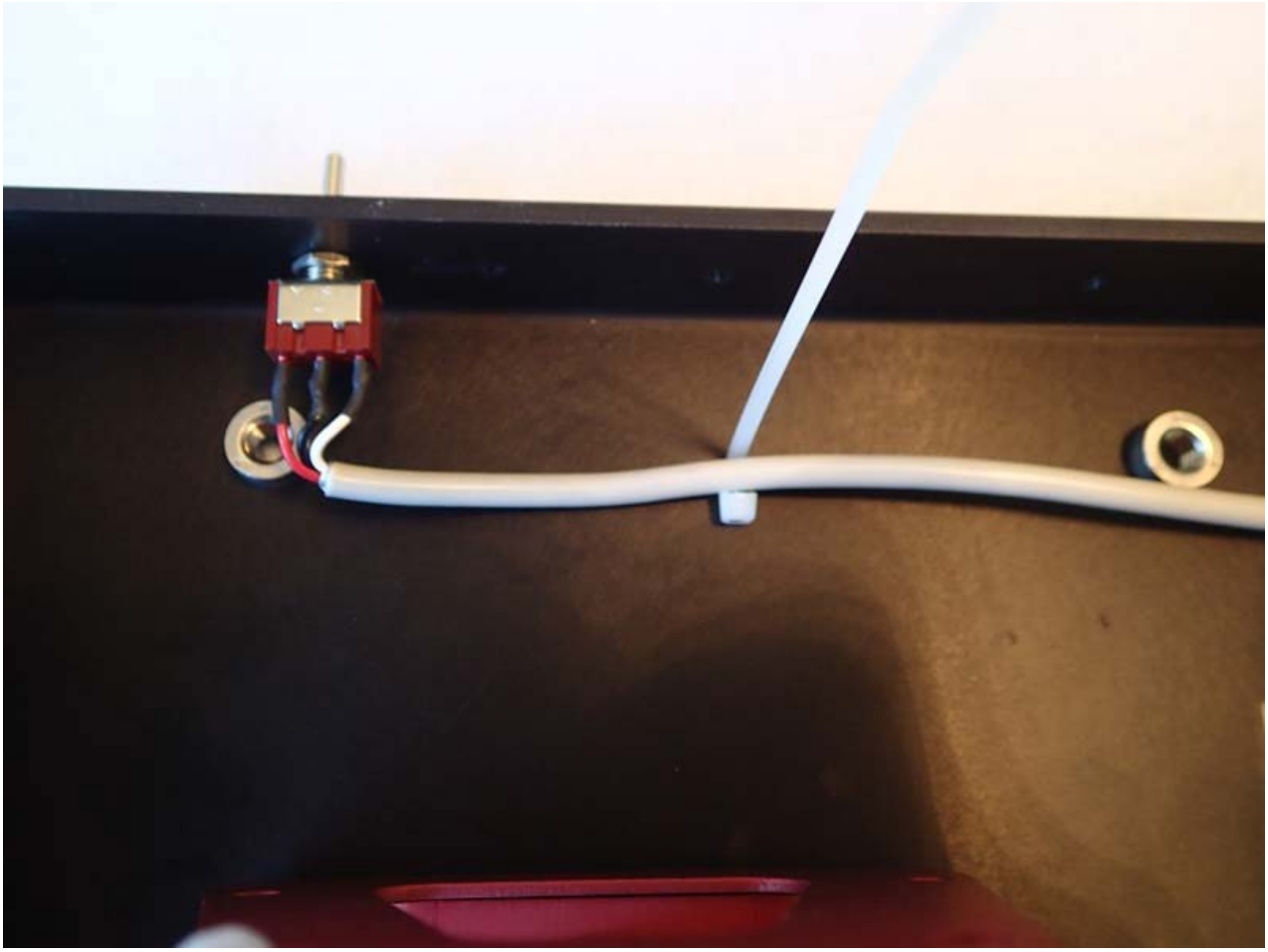
Cables secured with right side zip tie



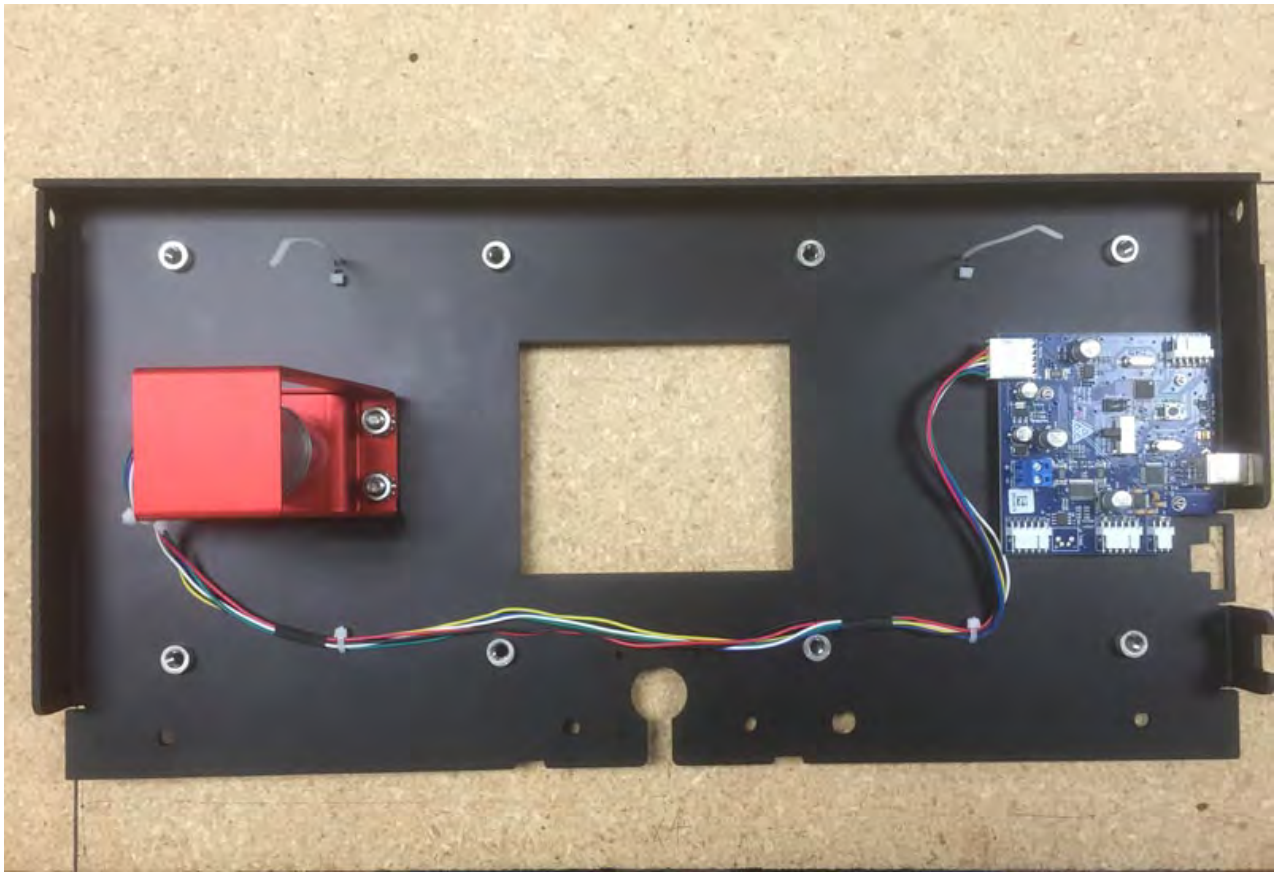
Attach Manual Inputs cable. Note how the notch in the switch aligns with the peg in the hole



Right side (up/down) switch attached and cable attached to PCB



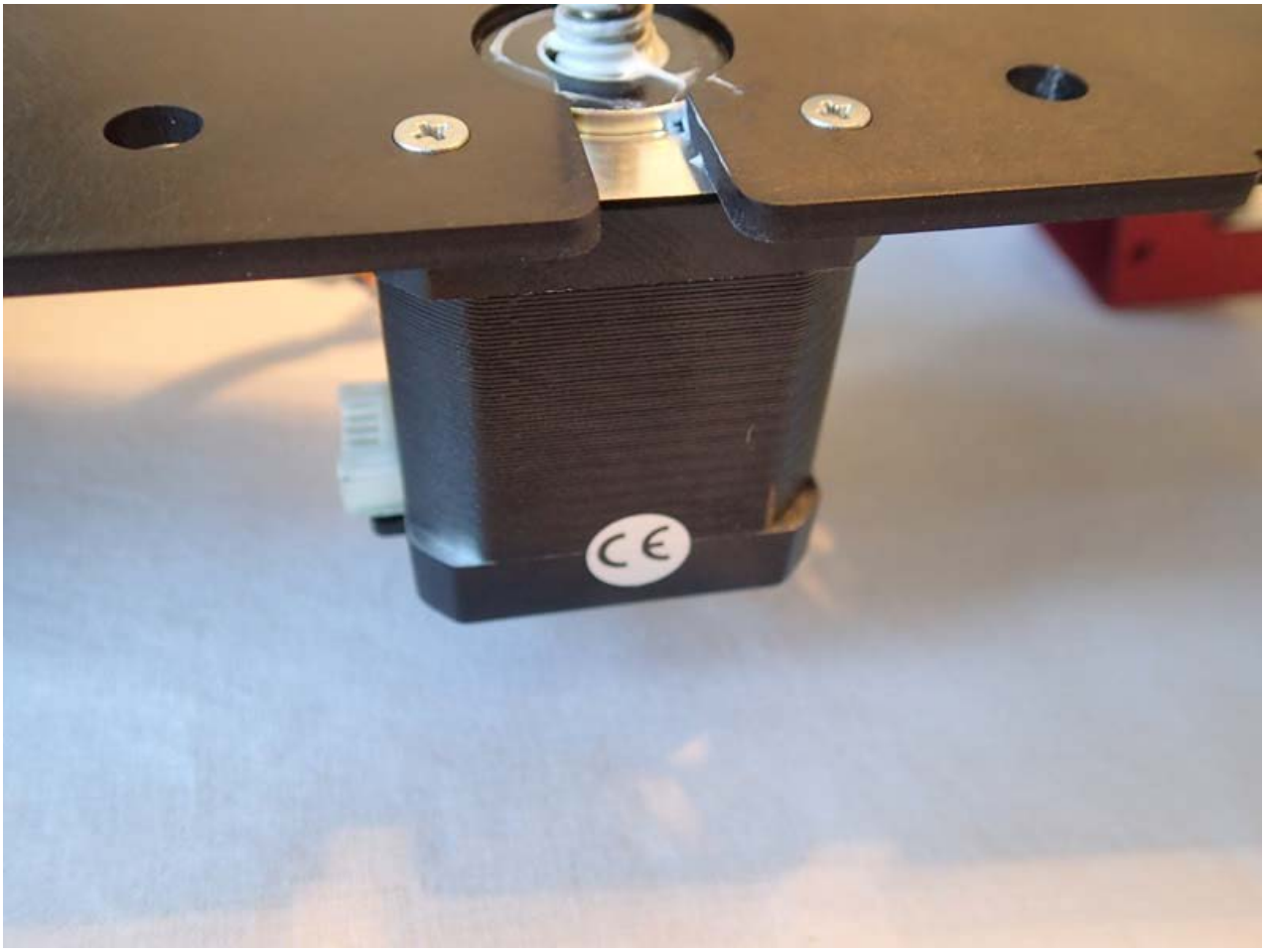
Left side (right/left) switch attached



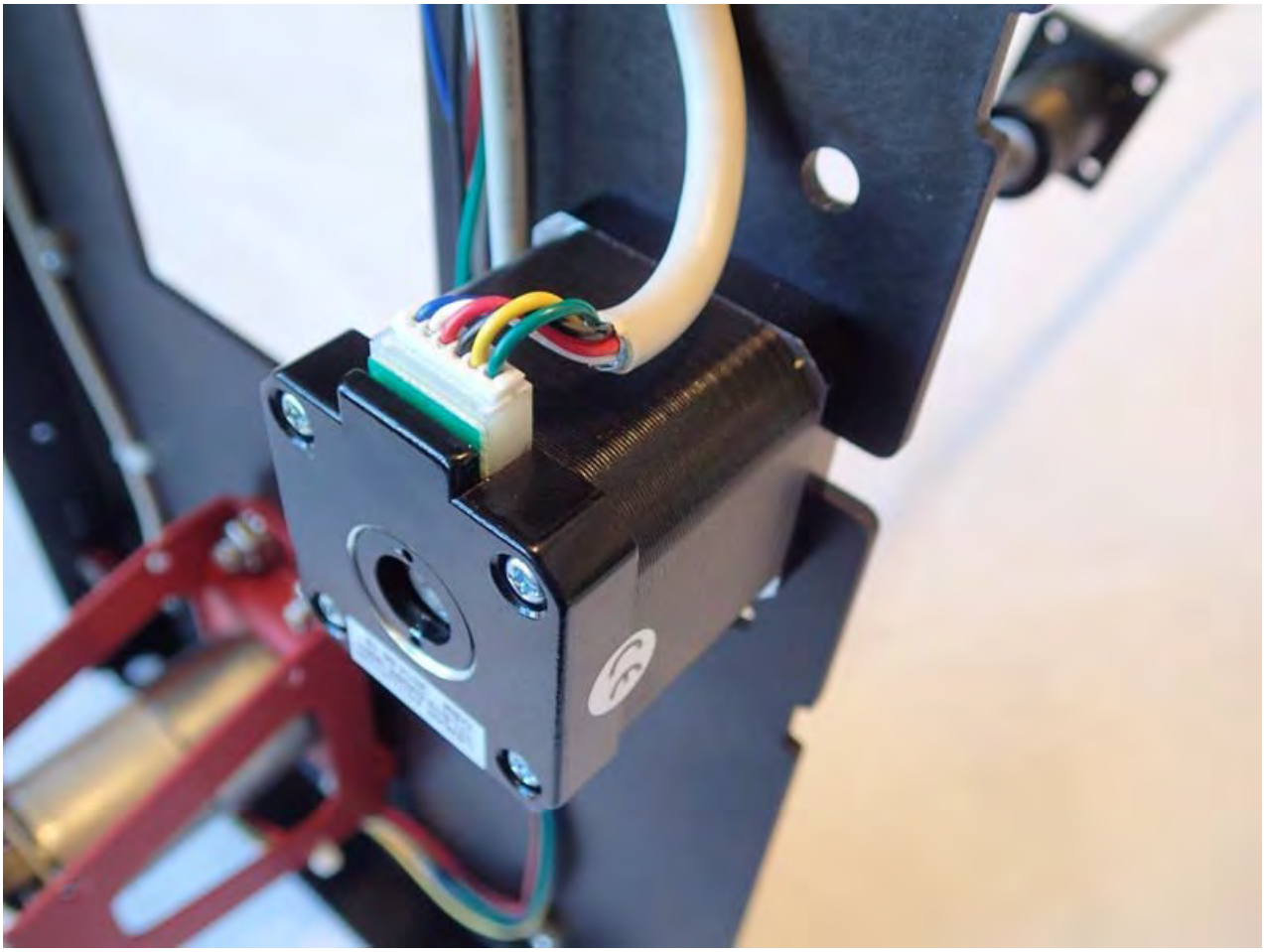
Manual Input cable attached and secured with top two zip ties

Z-Motor Assembly

Use Bag 2F to attach the Z Axis motor.
Position the Anti-backlash nut on the lead screw as shown by turning it.



Attach with 4 screws, be sure to position cable port towards the PCB as shown

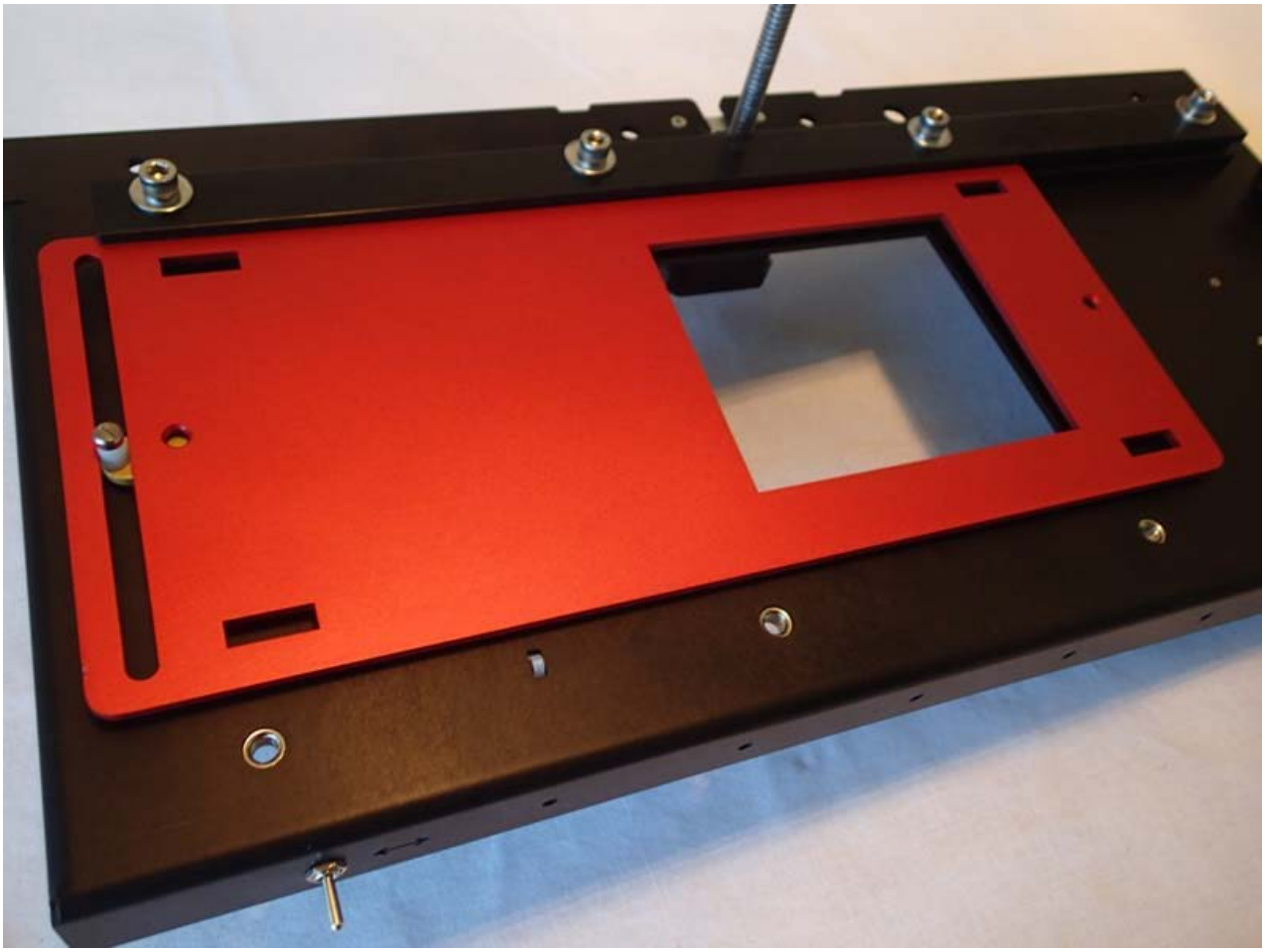


Attach the Z Motor cable to the motor

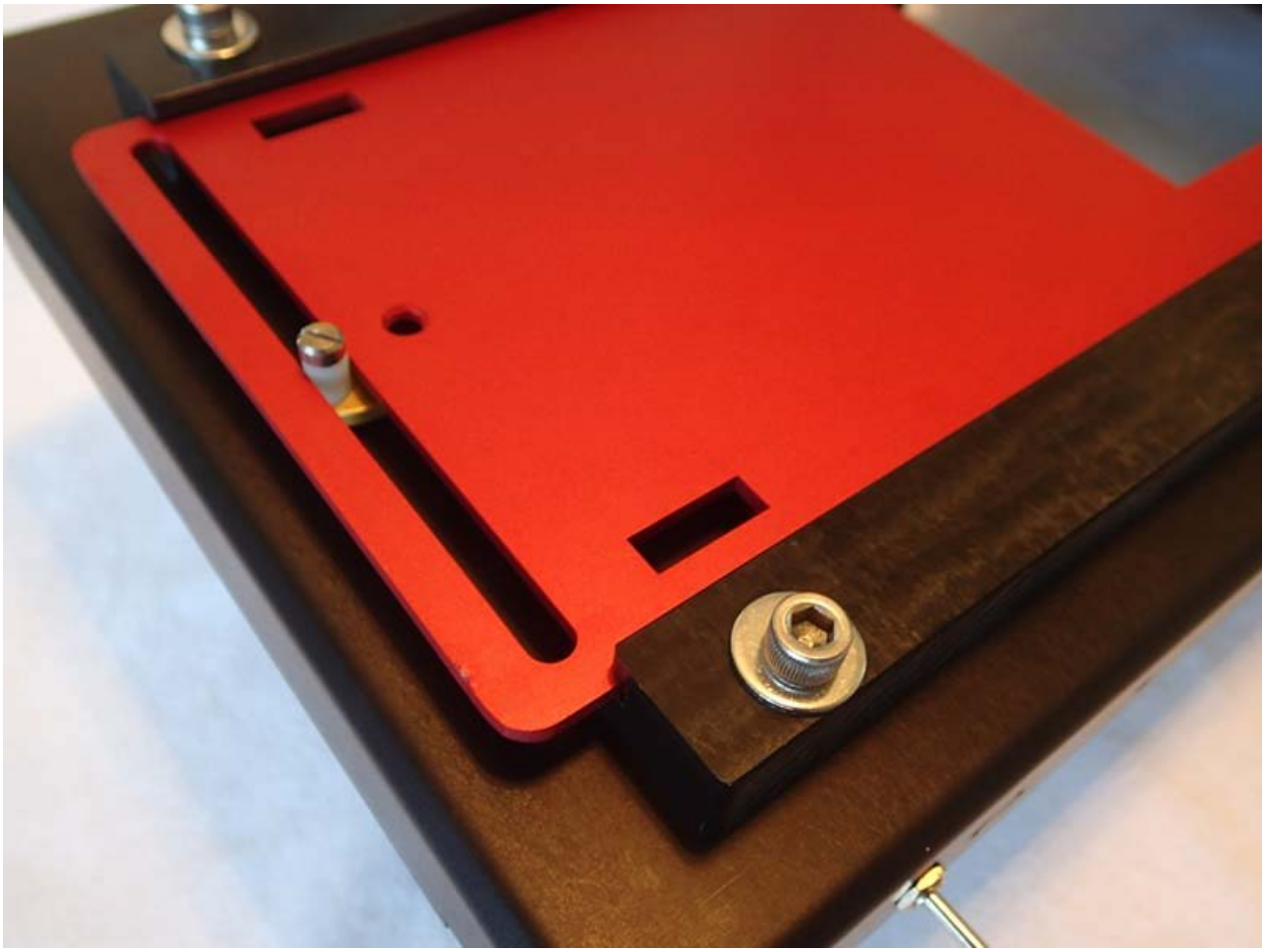
X Slide Assembly

Use Bag 2G to attach the Rails and Slide table to the X Axis base plate

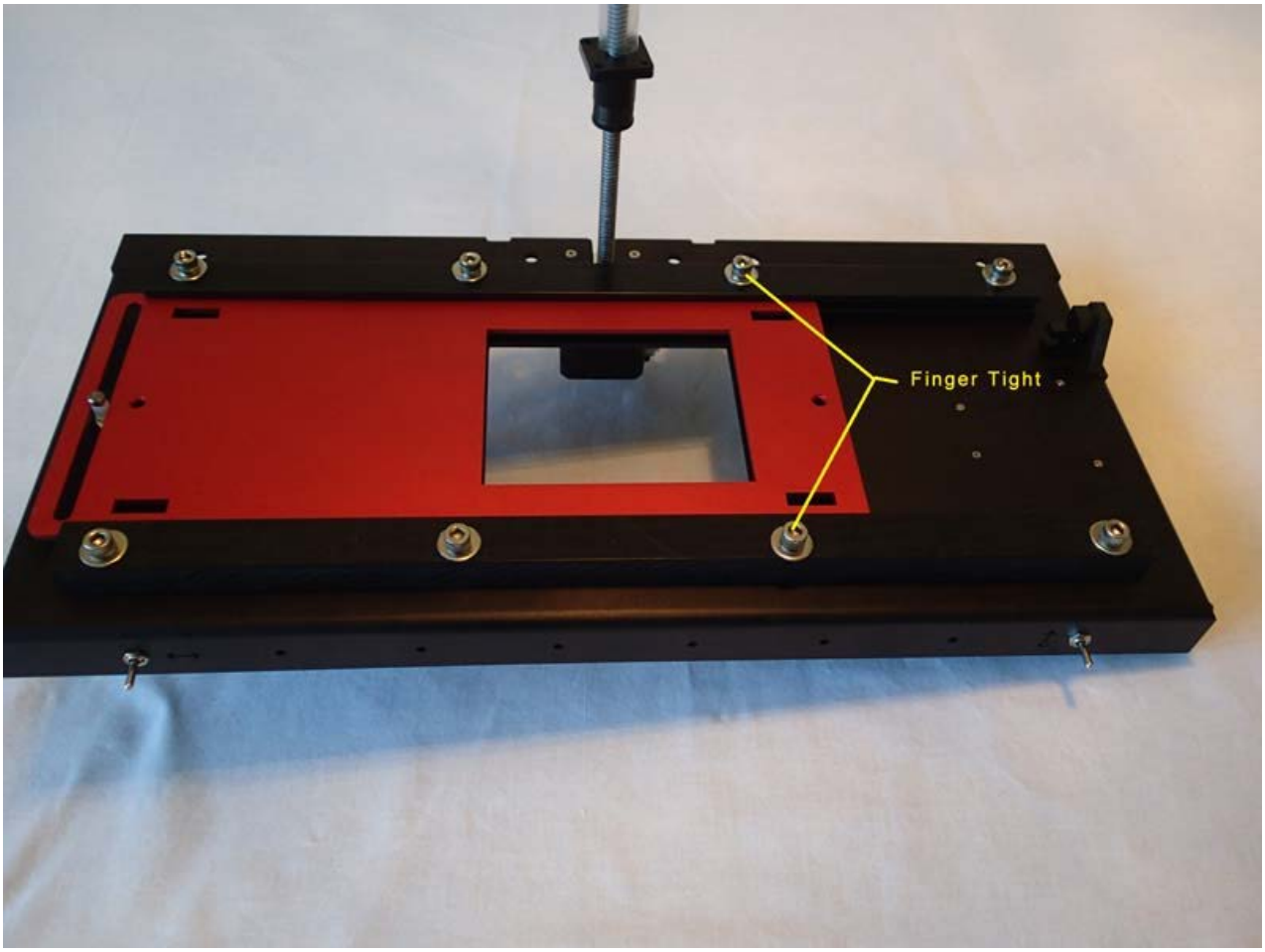
Note that each rail has three recessed clearance holes, **these holes face down**



Attach the back rail first, finger tight only.
Sit the slide table in place, note how notch engages the peg on the arm



Add the front rail, finger tight



Use the hex wrench to secure 6 of the 8 screws.
The other 2 screws (indicated in photo) are removed later, when we install the sweeper supports

Done!

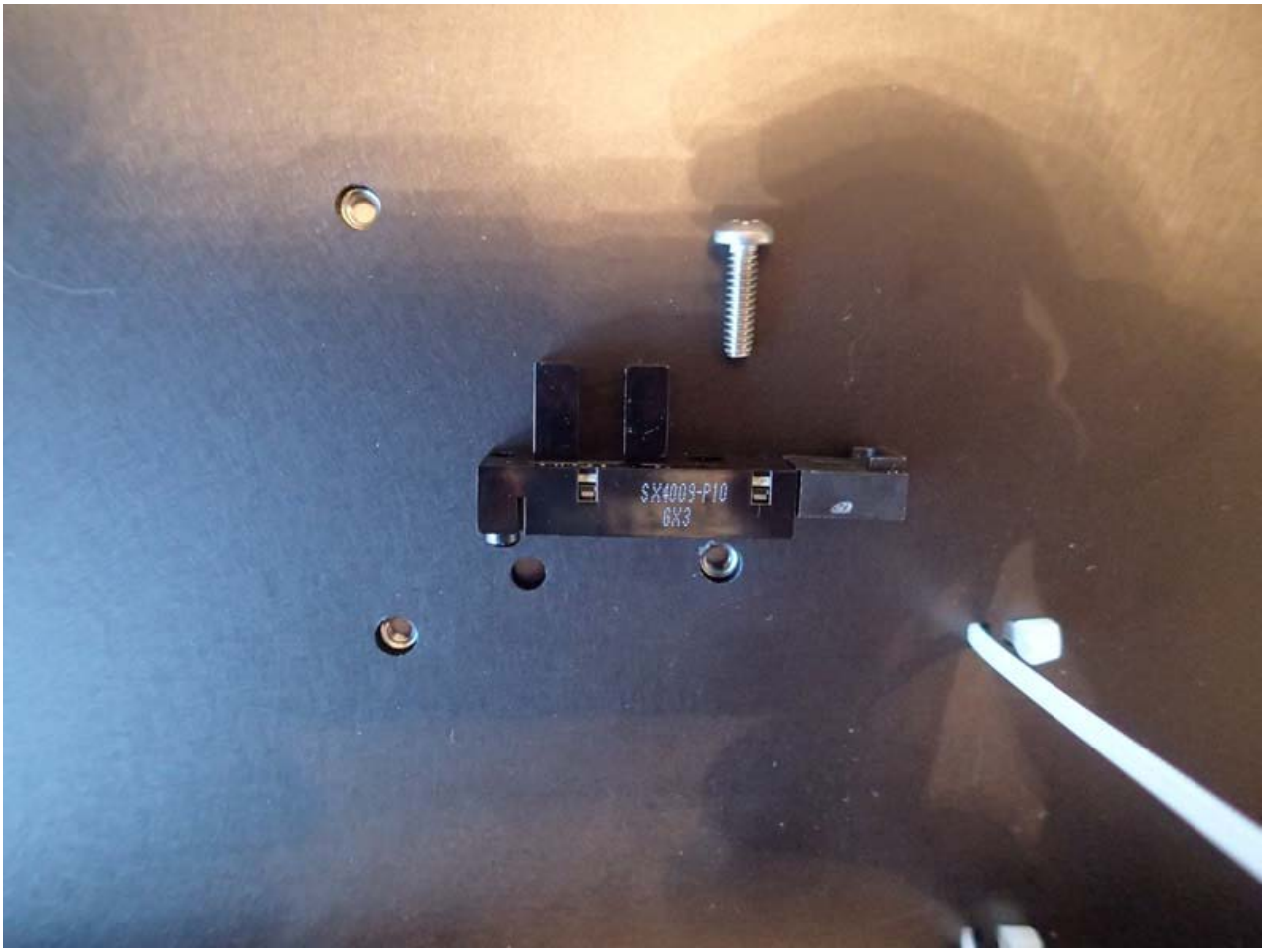
Step 3 - Z Axis & Major Sections Assembly

Completed Z Axis & Major Section Assembly Shown for Reference

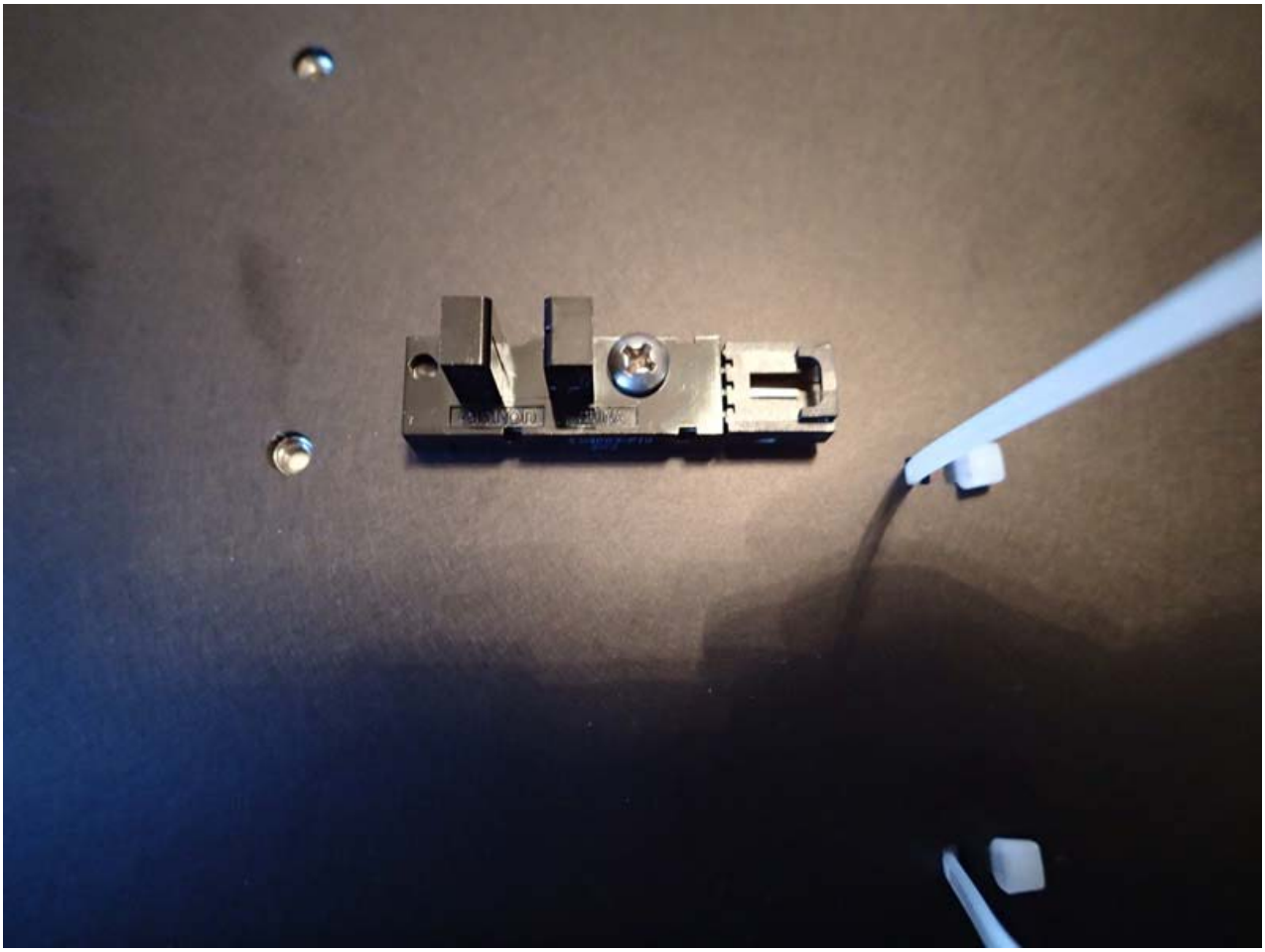
Z Axis Support Assembly

Insert 2 zip ties as shown into the Z Axis back plate
These will be used later to secure the home sensor cable.

Use Bag 3A to secure the home sensor and linear slide



Attach the Z Axis Home Sensor (1 screw, do not over tighten)



Use the hex wrench to attach the linear slide with 5 screws

Windows

Remove the protective paper from the windows and use Bag 3B screws to attach them to the side supports and hatch

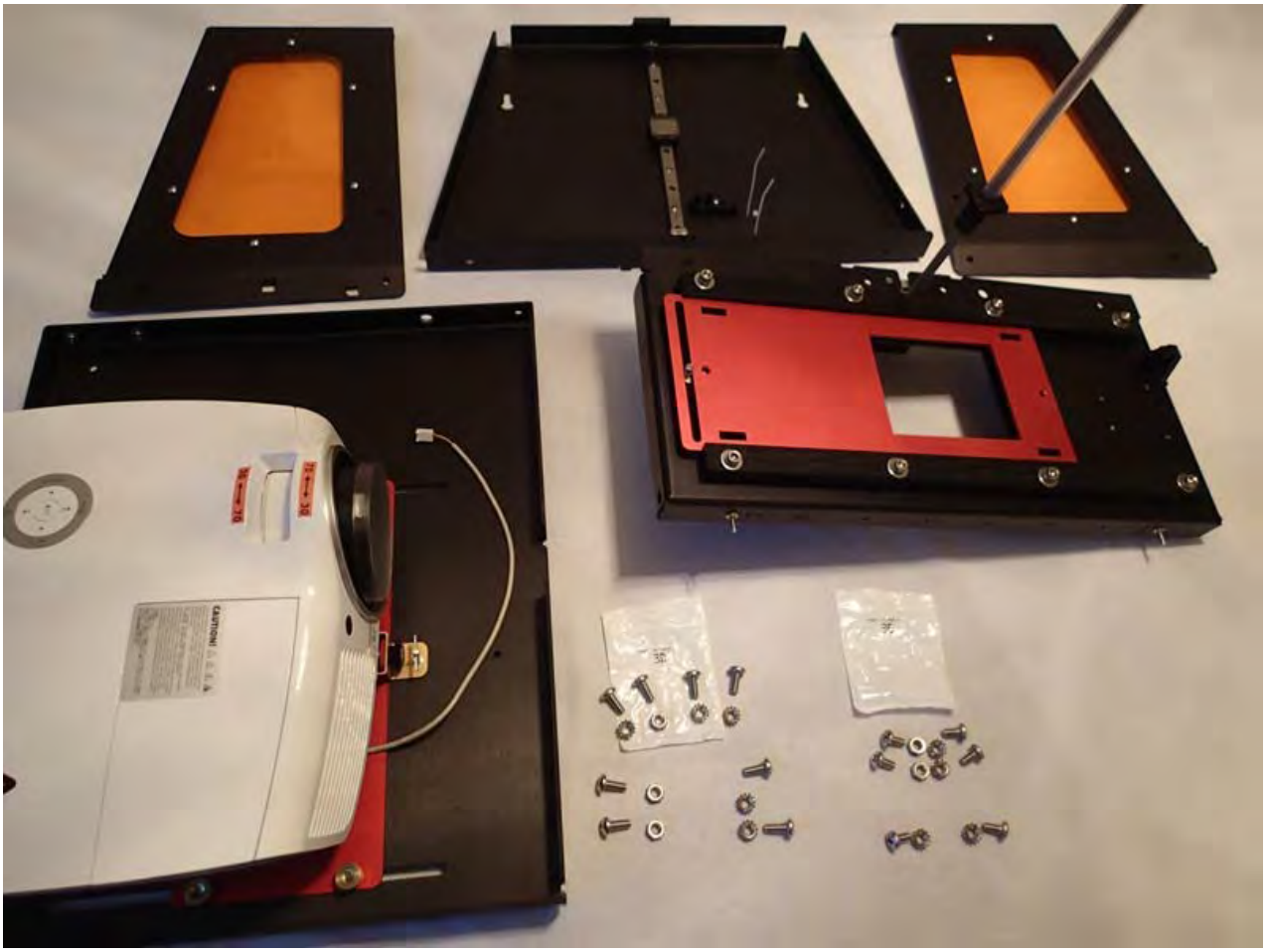
Attached

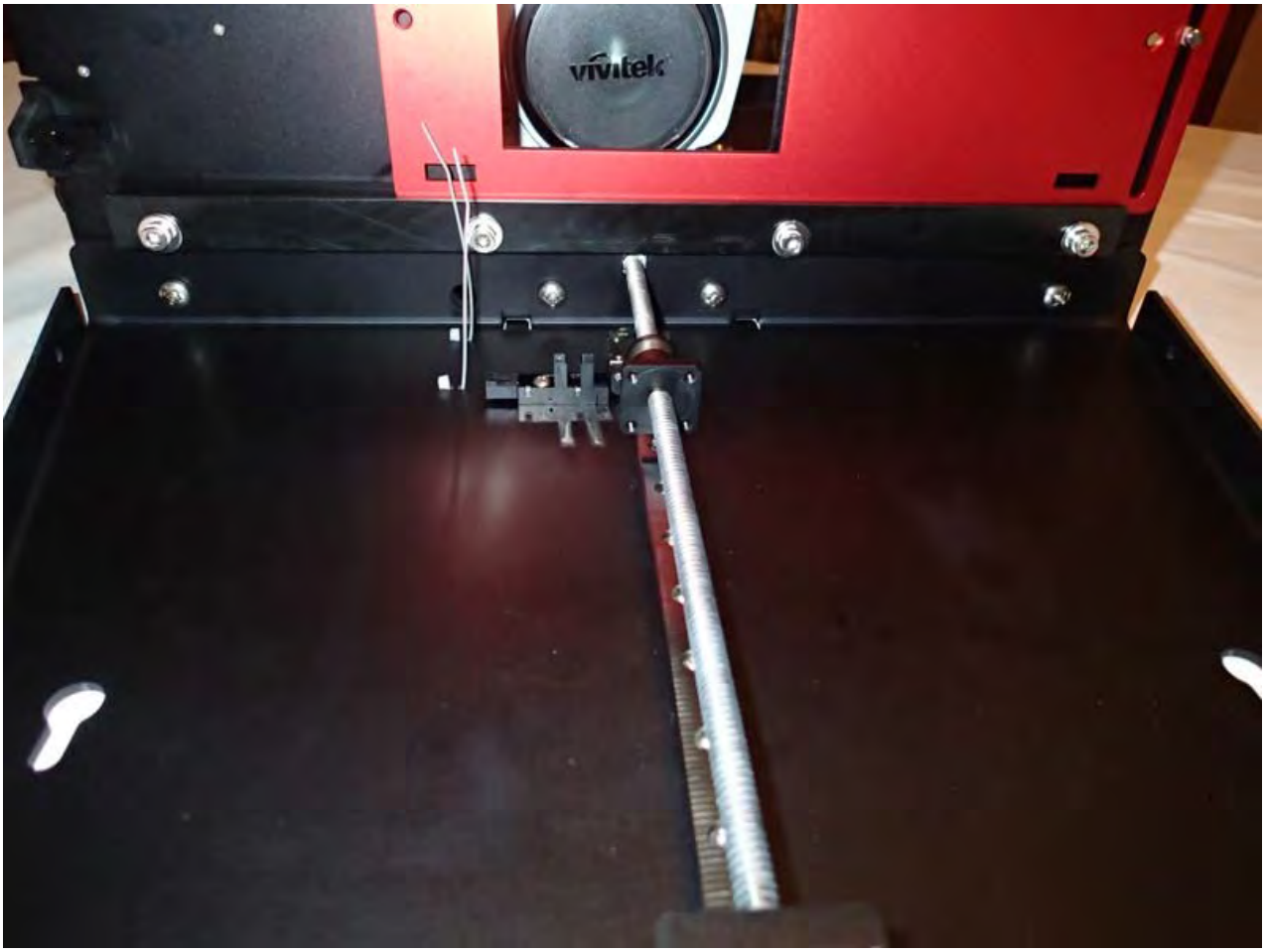
Bag 3C contains the hatch handle hardware.

Handle Attached

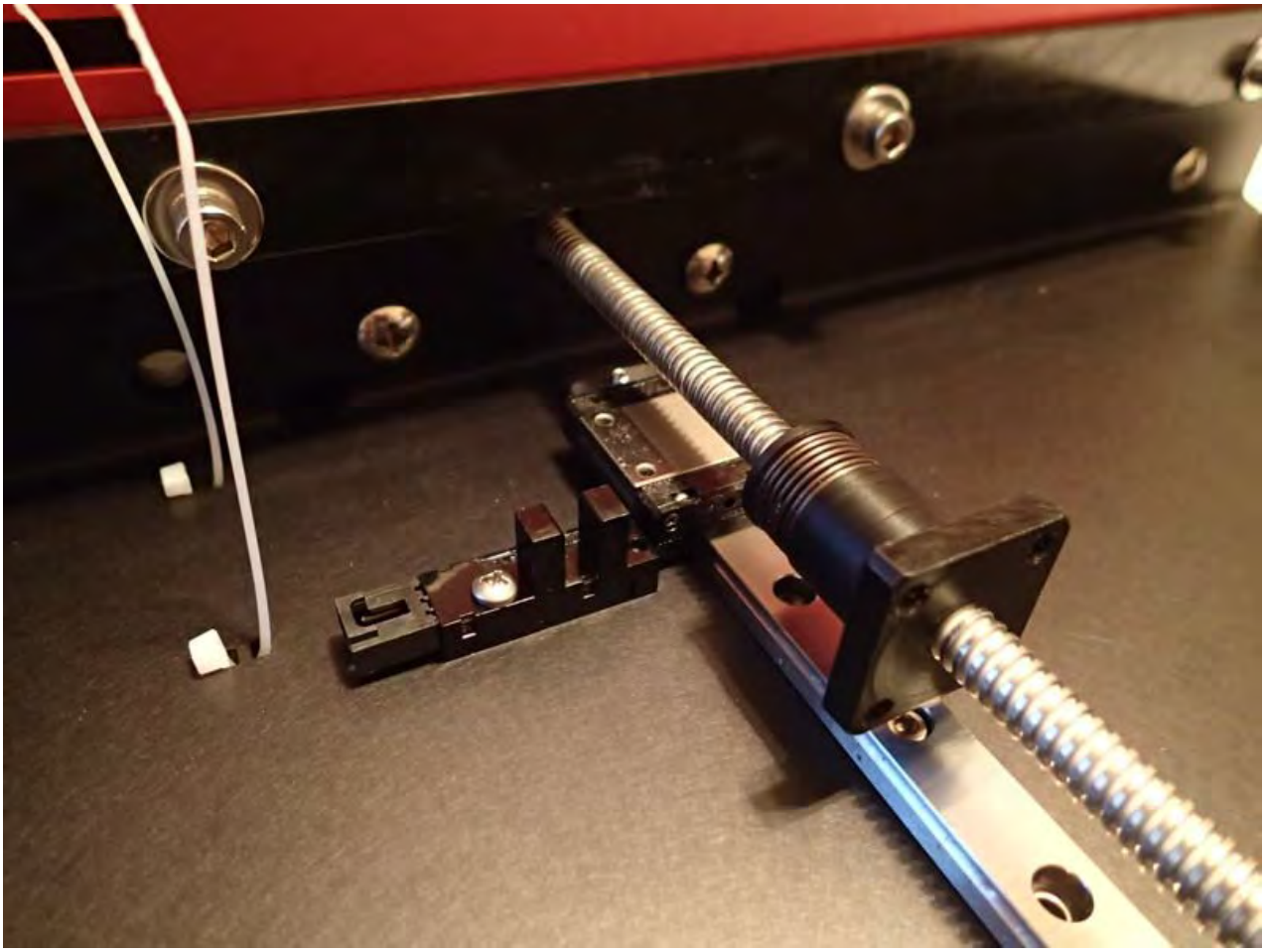
Major Section Assembly

Major Sections ready for assembly using Bags 3D & 3E

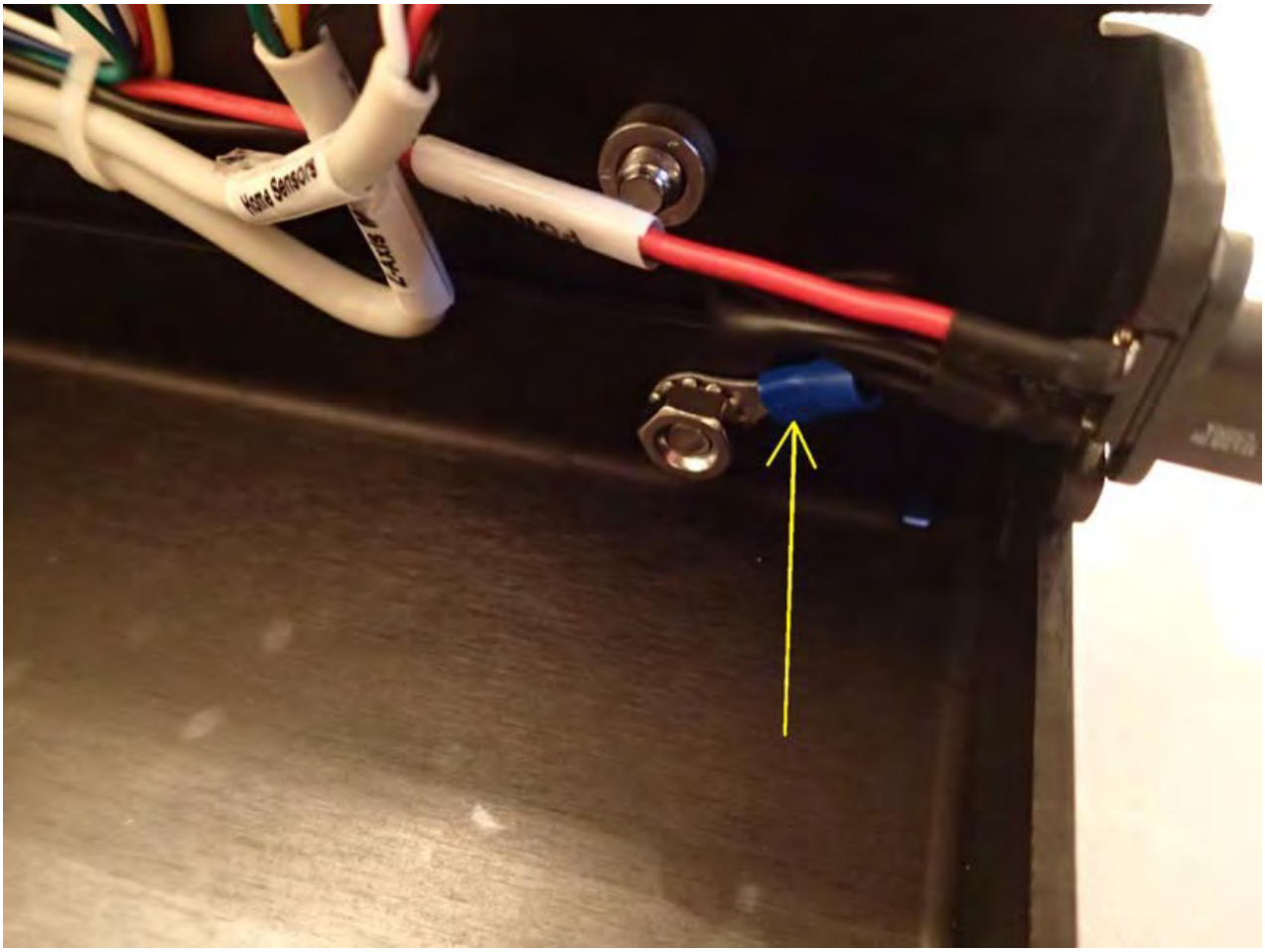




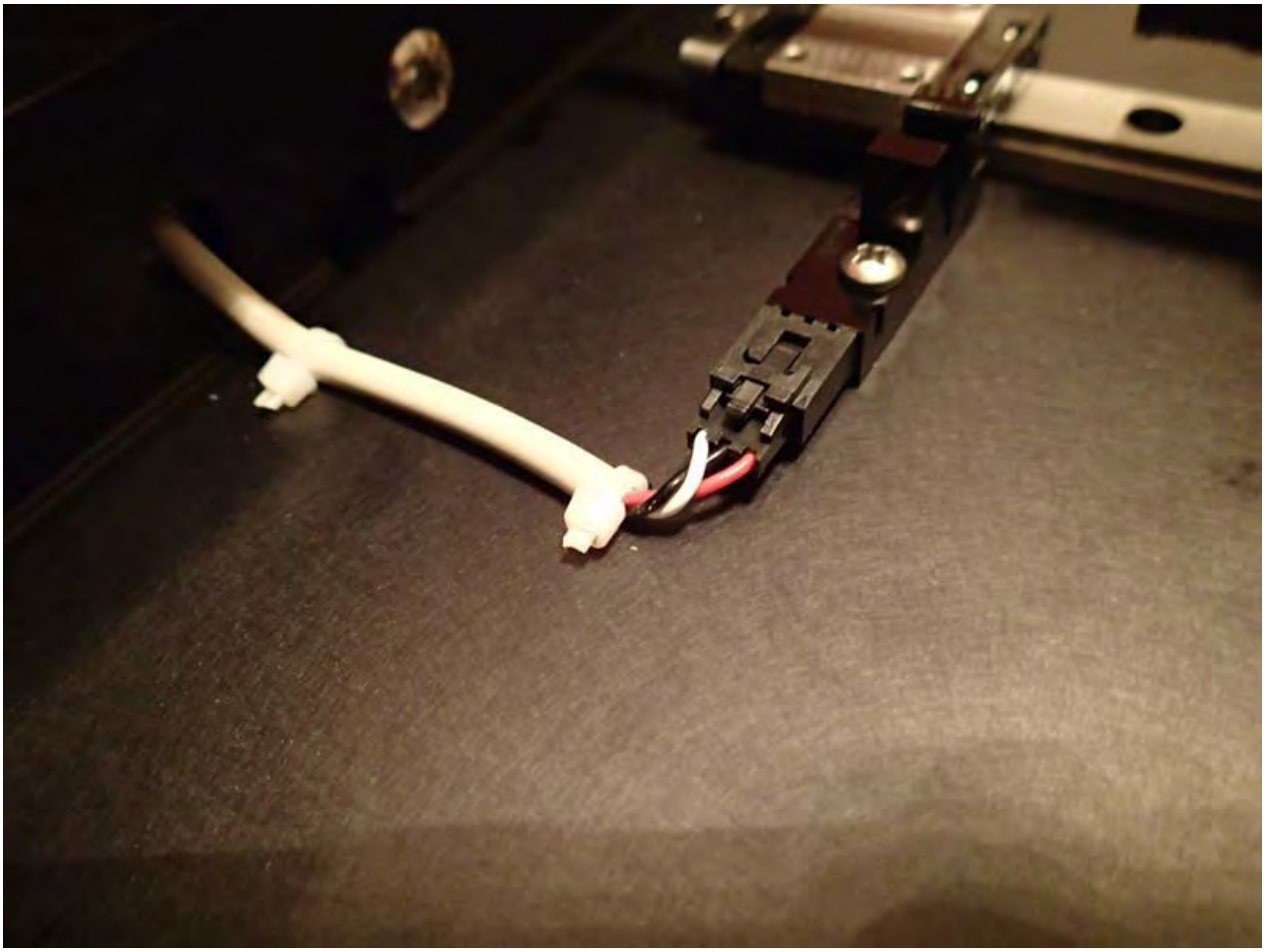
Secure the Projector, X-Axis & Z-Axis together with 4 longer screws (from Bag 3D) and nuts, finger tight only.



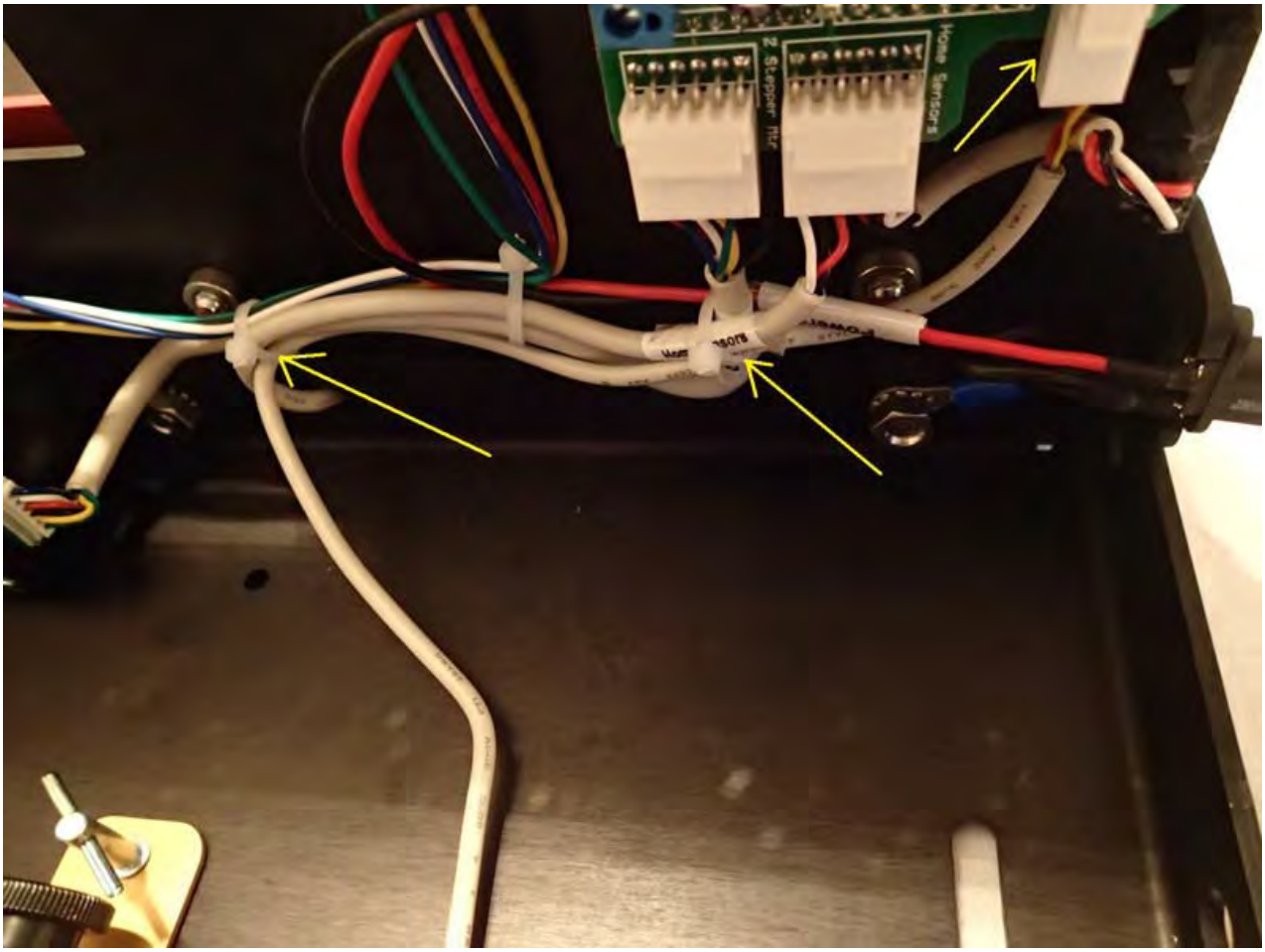
Note correct positions of the Anti-Backlash Nut and linear slide truck.



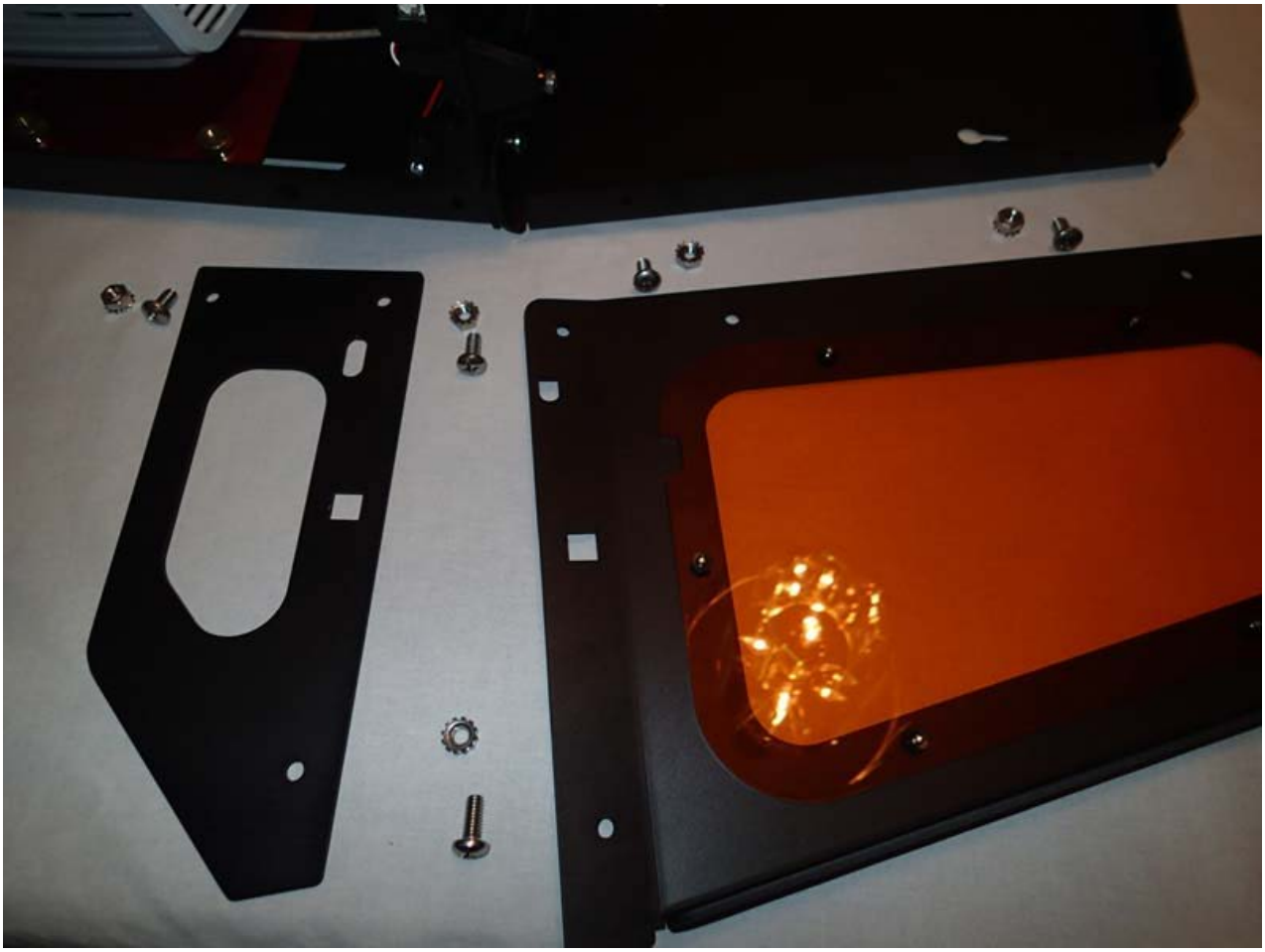
Be sure to capture the Power-1 Grounding terminal with the left most screw and nut



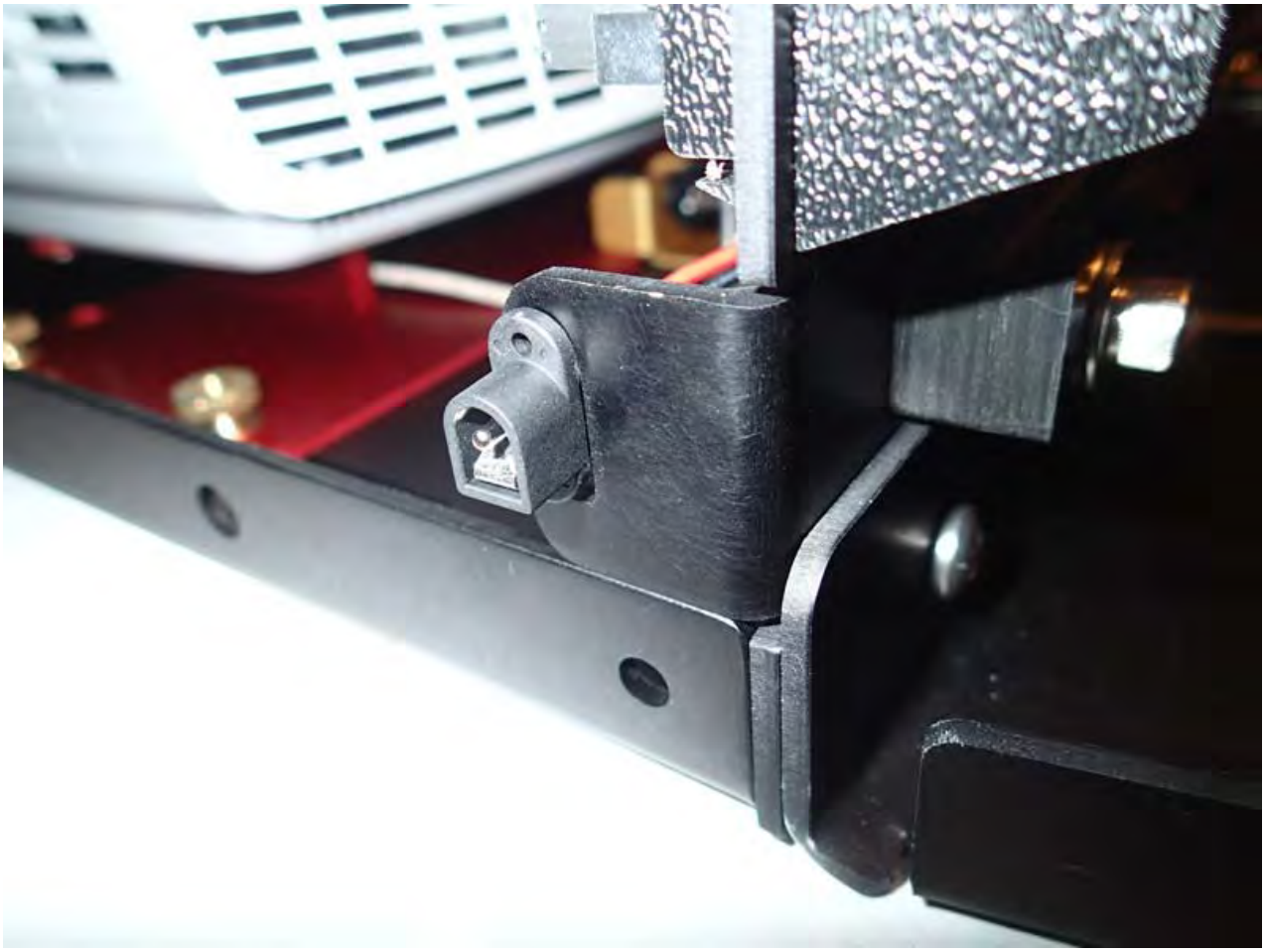
Route the Home Sensor cable through the access hole, connect it to the Z Axis Home Sensor, and secure with the two zip ties.



Connect the Projector cable to the PCB and secure with 2 zip ties as shown



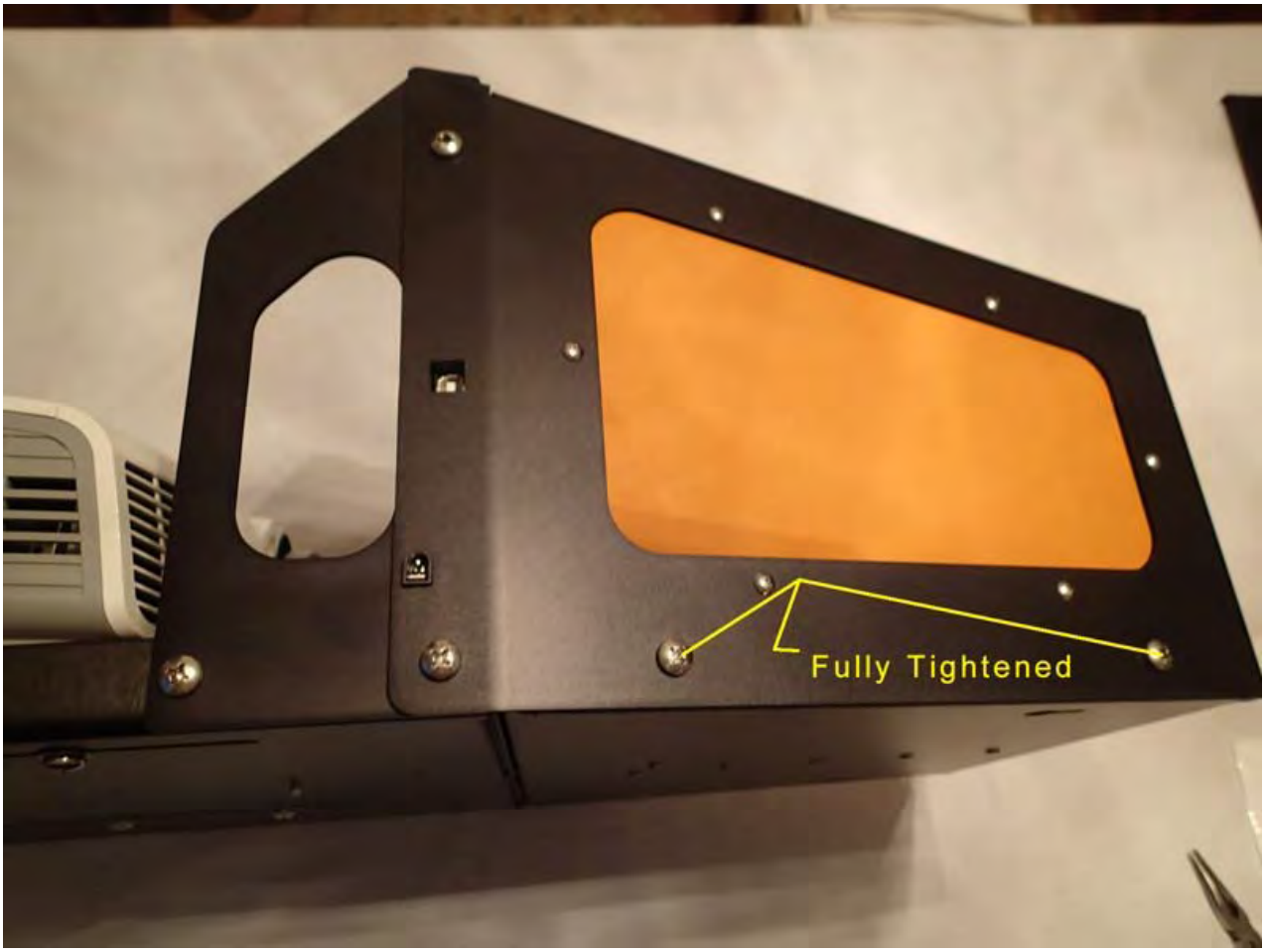
Lower and Upper left side supports ready to attach.



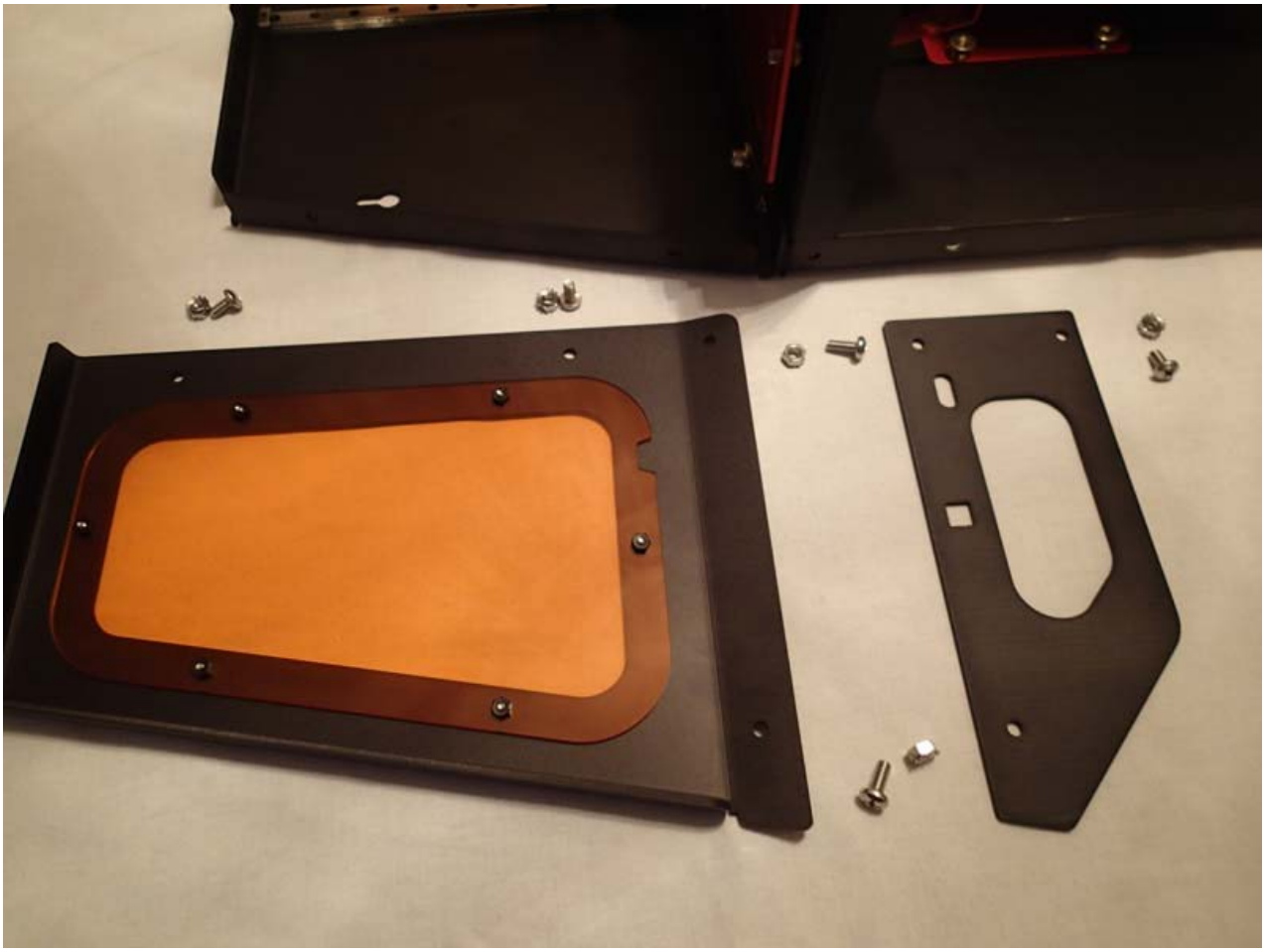
Power Port alignment detail

Secure the lower side support plate with one shorter screw and nut, finger tight only.
Note power port alignment

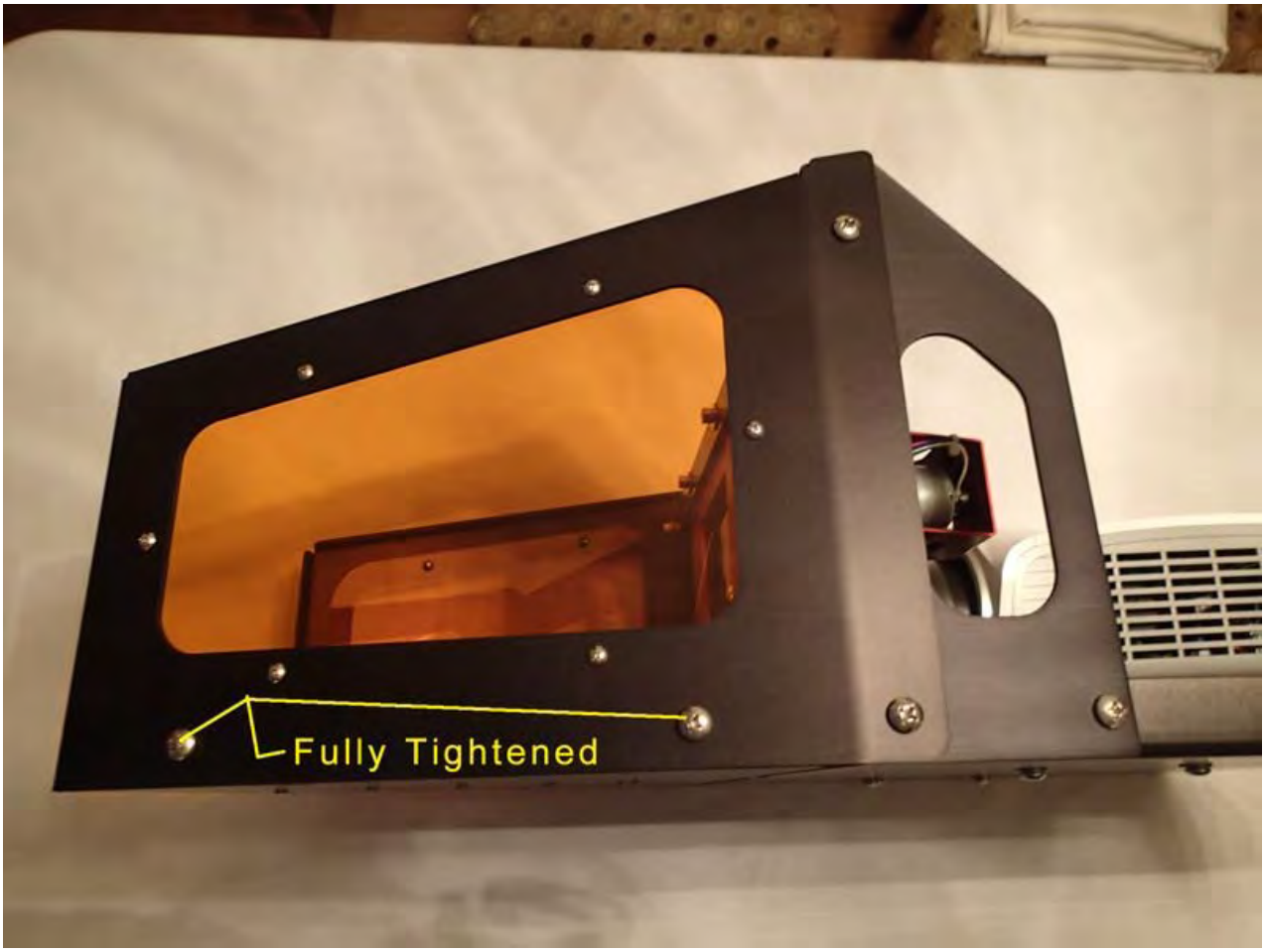
Attach upper left side support with 2 longer and 2 shorter screws and 4 nuts, finger tight only.
Note Port alignment



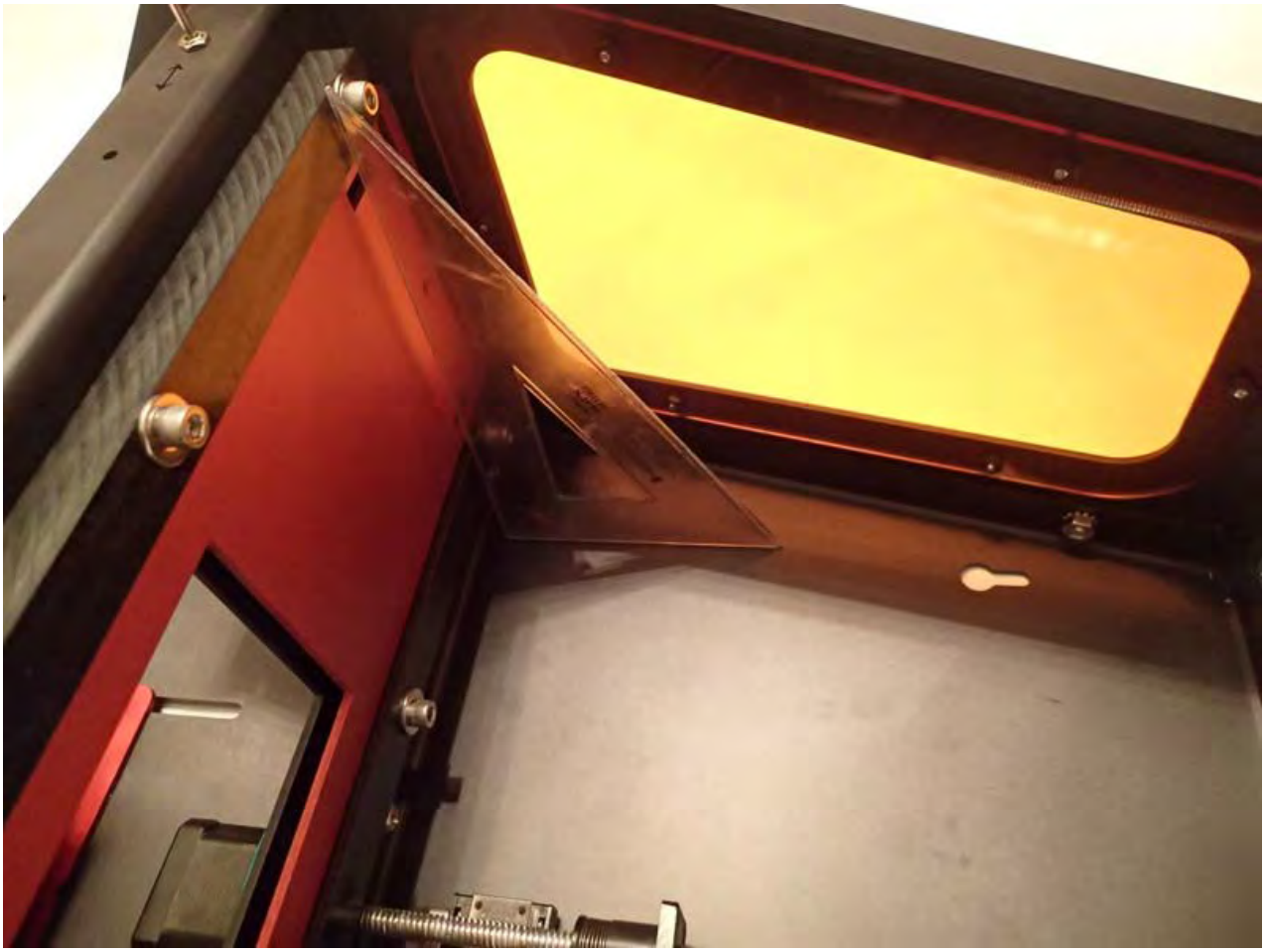
Left side supports attached, noted screws fully tight, the rest just finger tight.



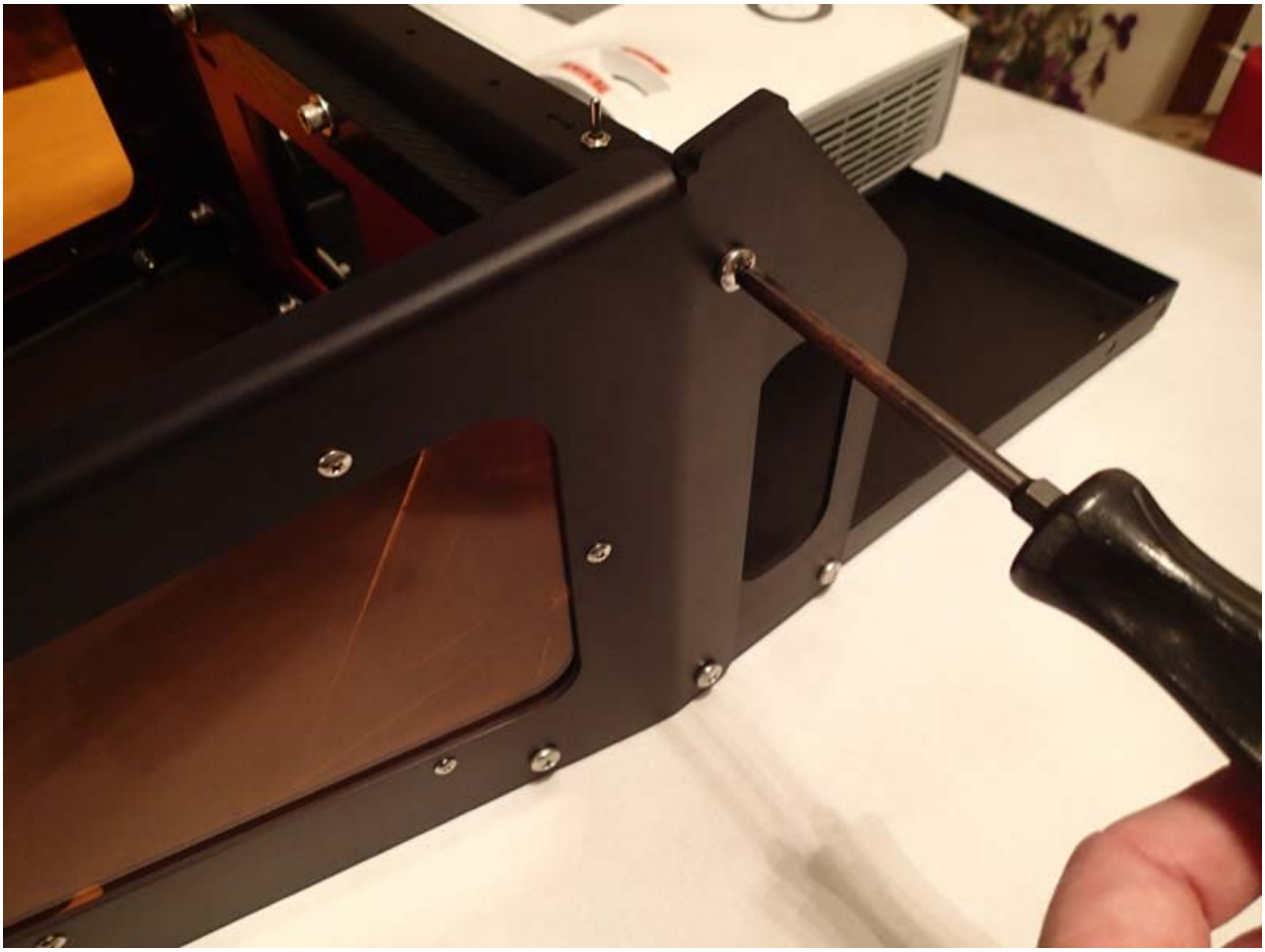
Right side supports ready to attach



Right side supports attached, noted screws fully tight, the rest just finger tight.

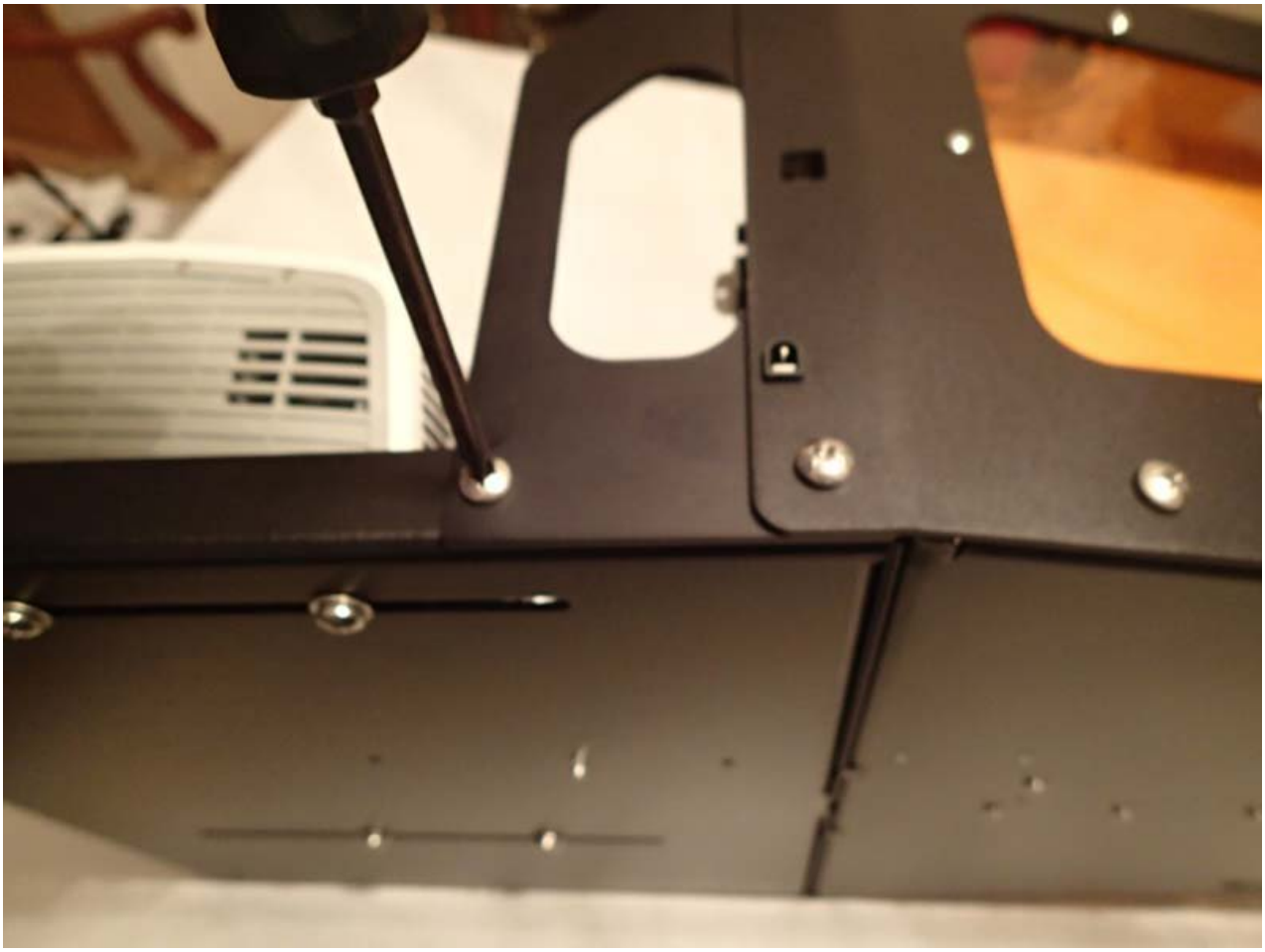


Use a 90 degree triangle to ensure the X axis is perpendicular to the Z axis.
These next alignment steps are very important to ensure the
lead screw and linear slide are properly aligned and parallel



Lock the right side once perpendicular by tightening the indicated screw.
Repeat on left side.

Use a straight edge to ensure the Projector and Z Axis backplanes are co-planer



Secure indicated screw to fix back plates in co-planer position.
Repeat on other side.

Tighten the remaining screws securely.

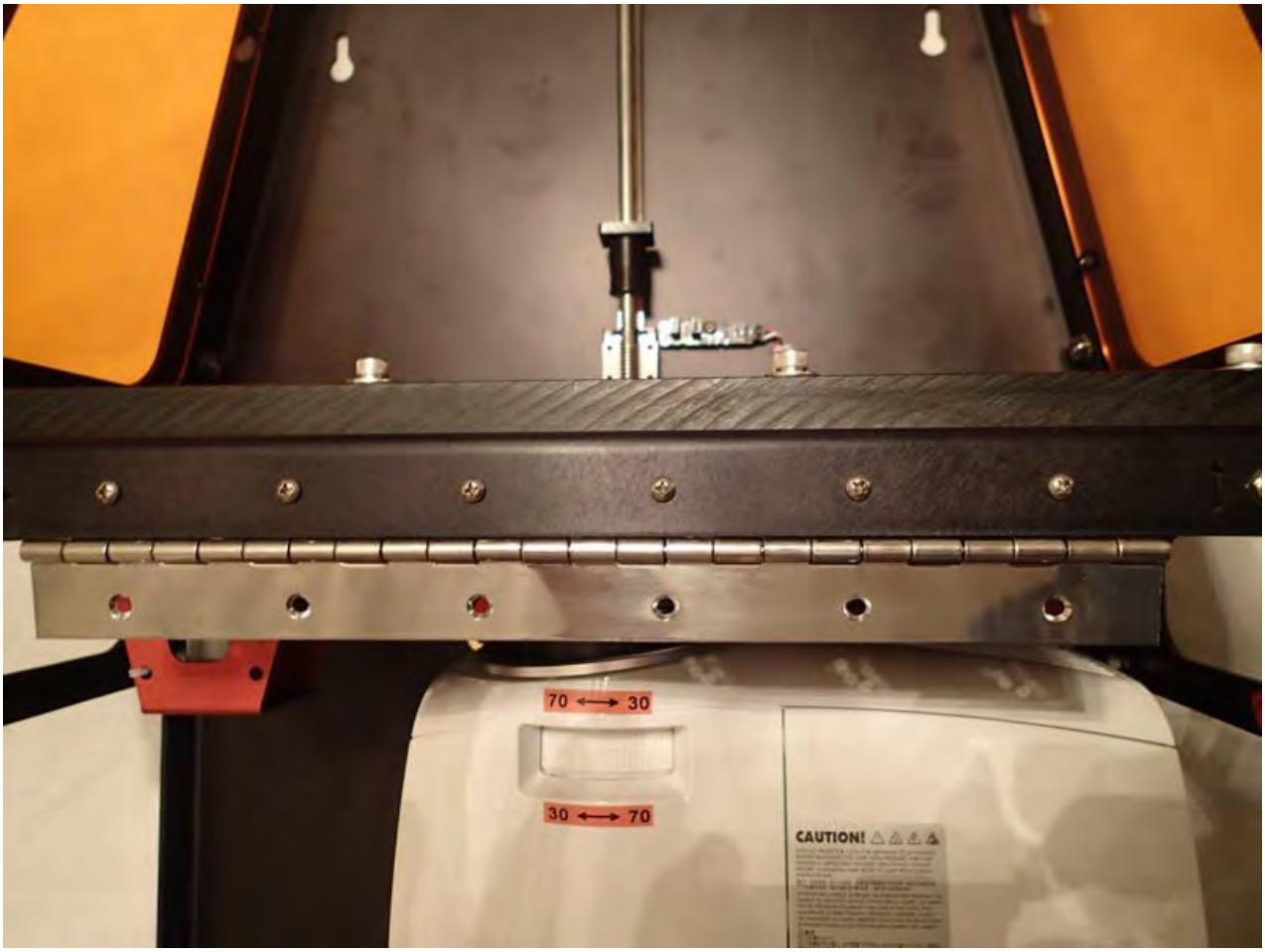
This completes Step 3!

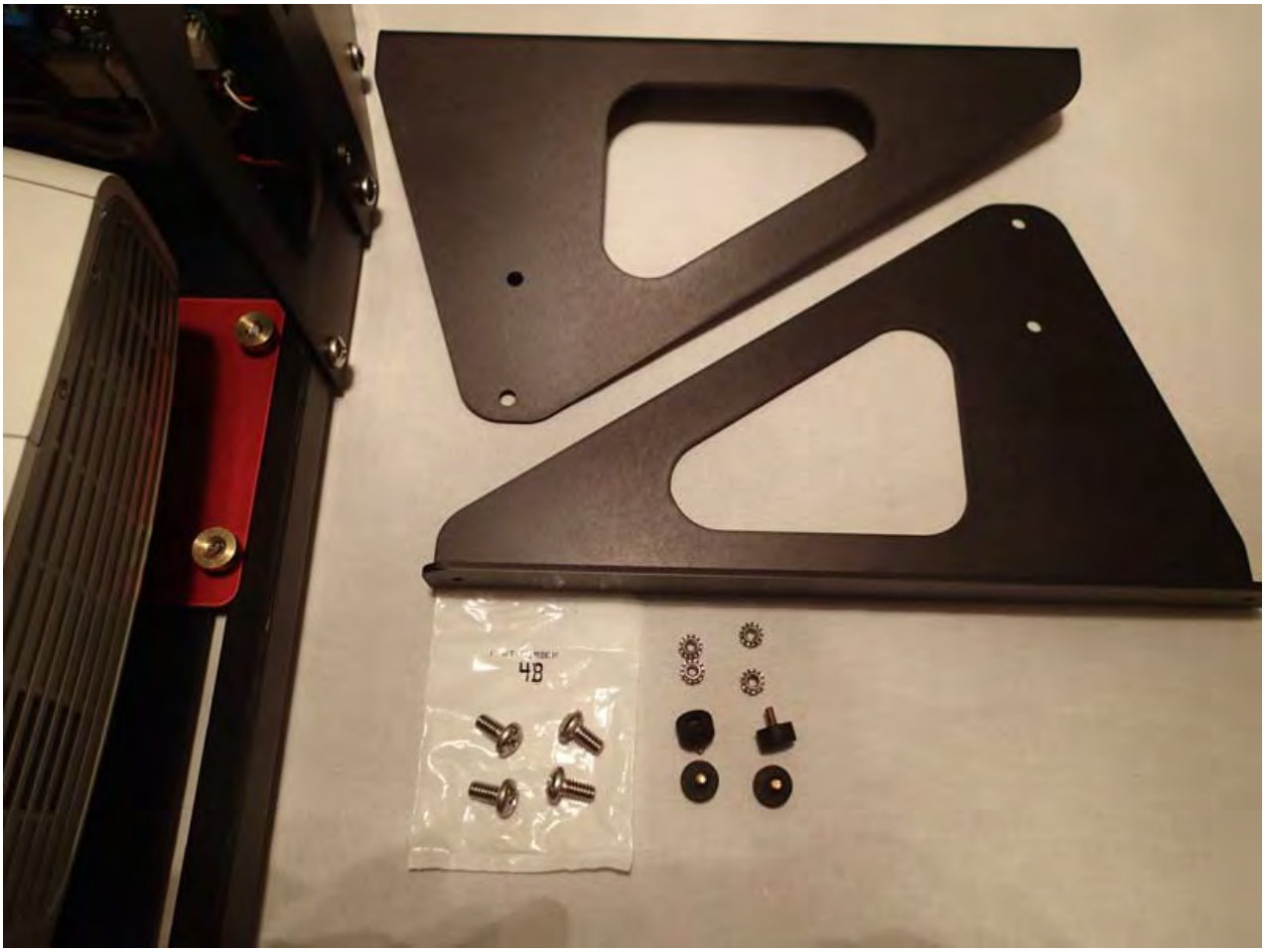
Step 4- Final Assembly

Completed B9Creator shown for reference

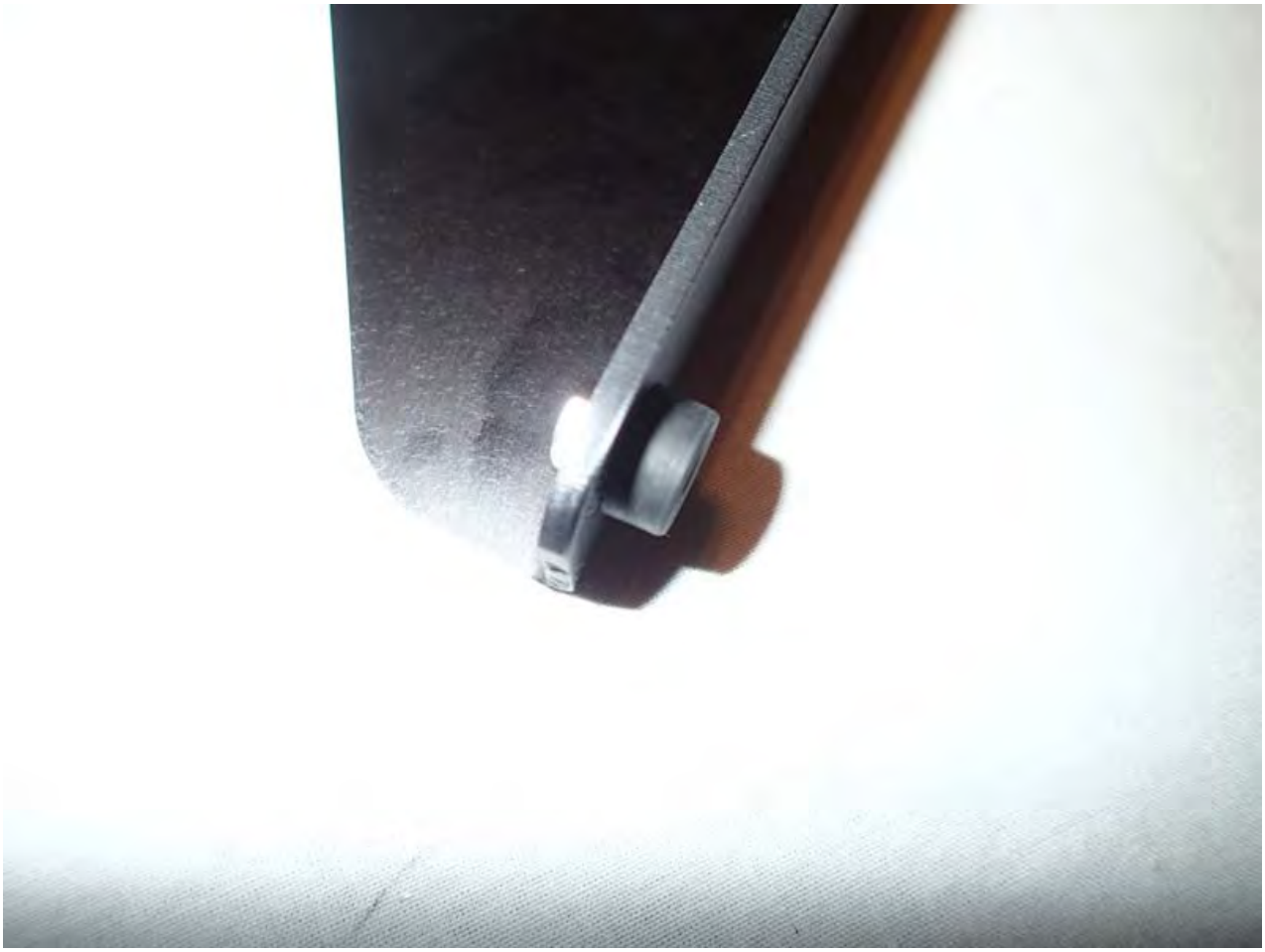
Hinge & Feet

Hinge hardware, use half of Bag 4A to attach hinge to X-Axis


70 ⟷ 30
30 ⟷ 70
CAUTION!



Feet and Bag 4B

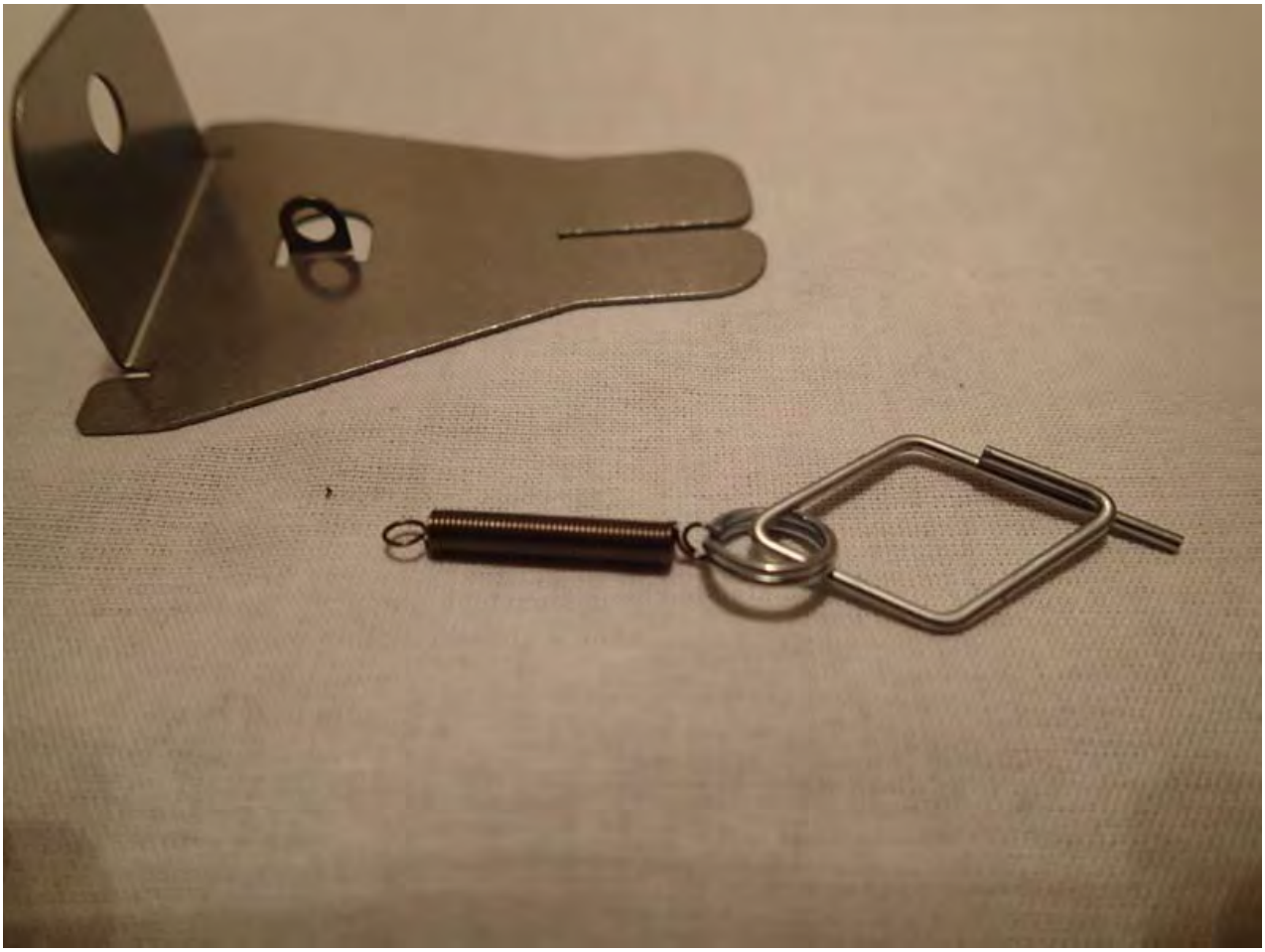


Foot pad attached (4 places)

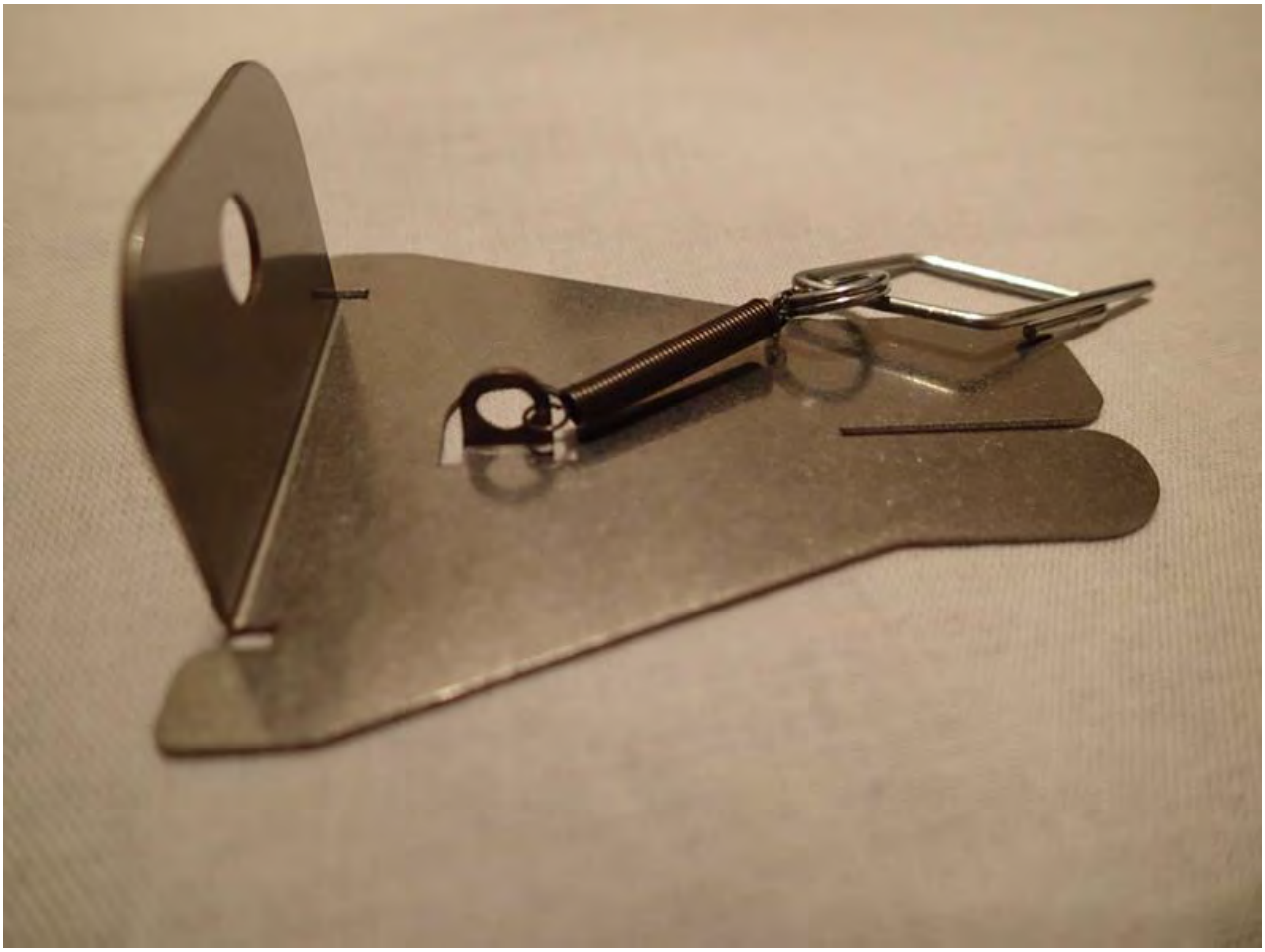
Feet attached, both sides

Sweeper Supports Assembly

Sweeper Support hardware, bag 4C



Spring, ring and handle assembled



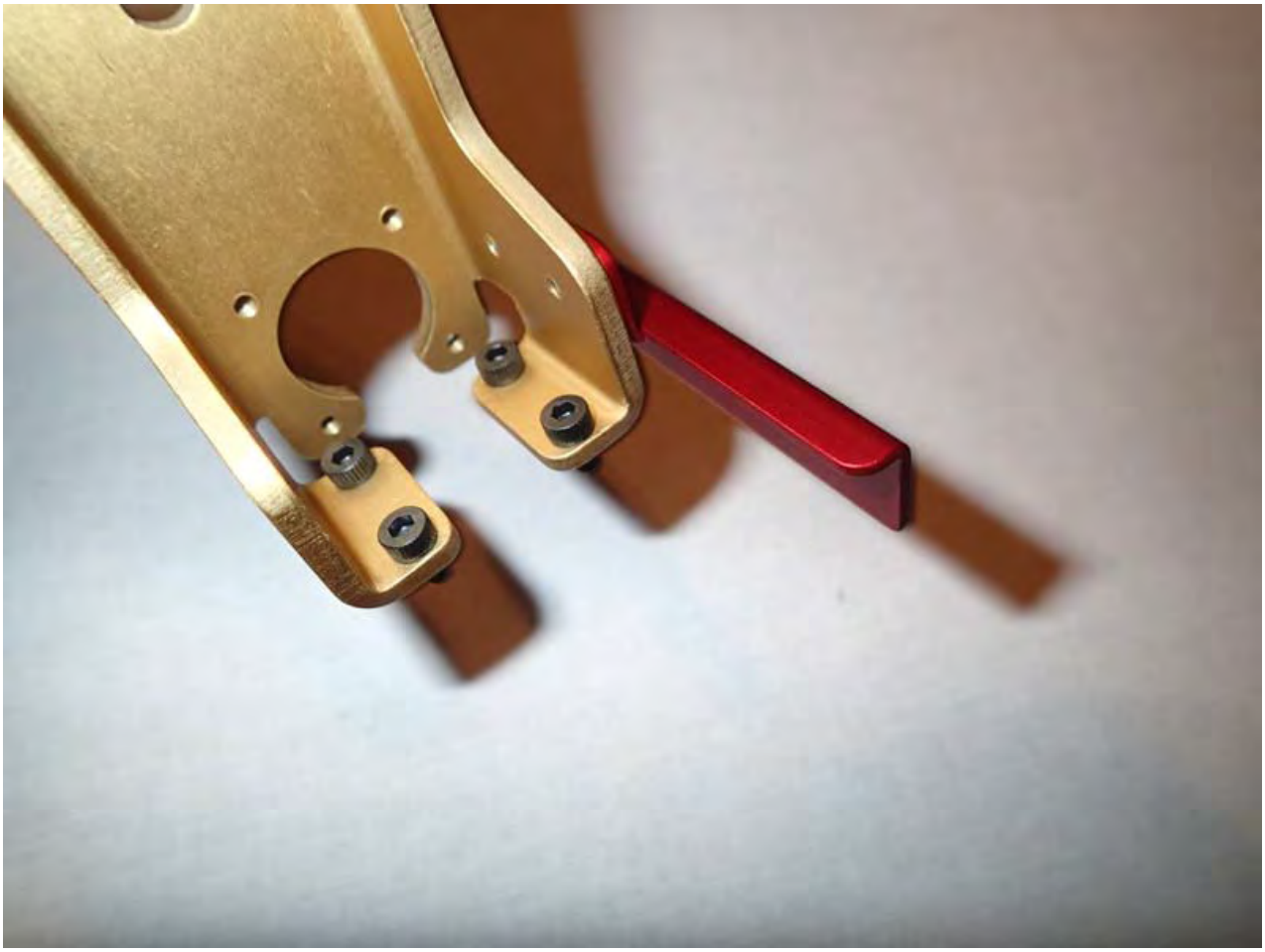
Spring hold down attached to support

Finish both supports

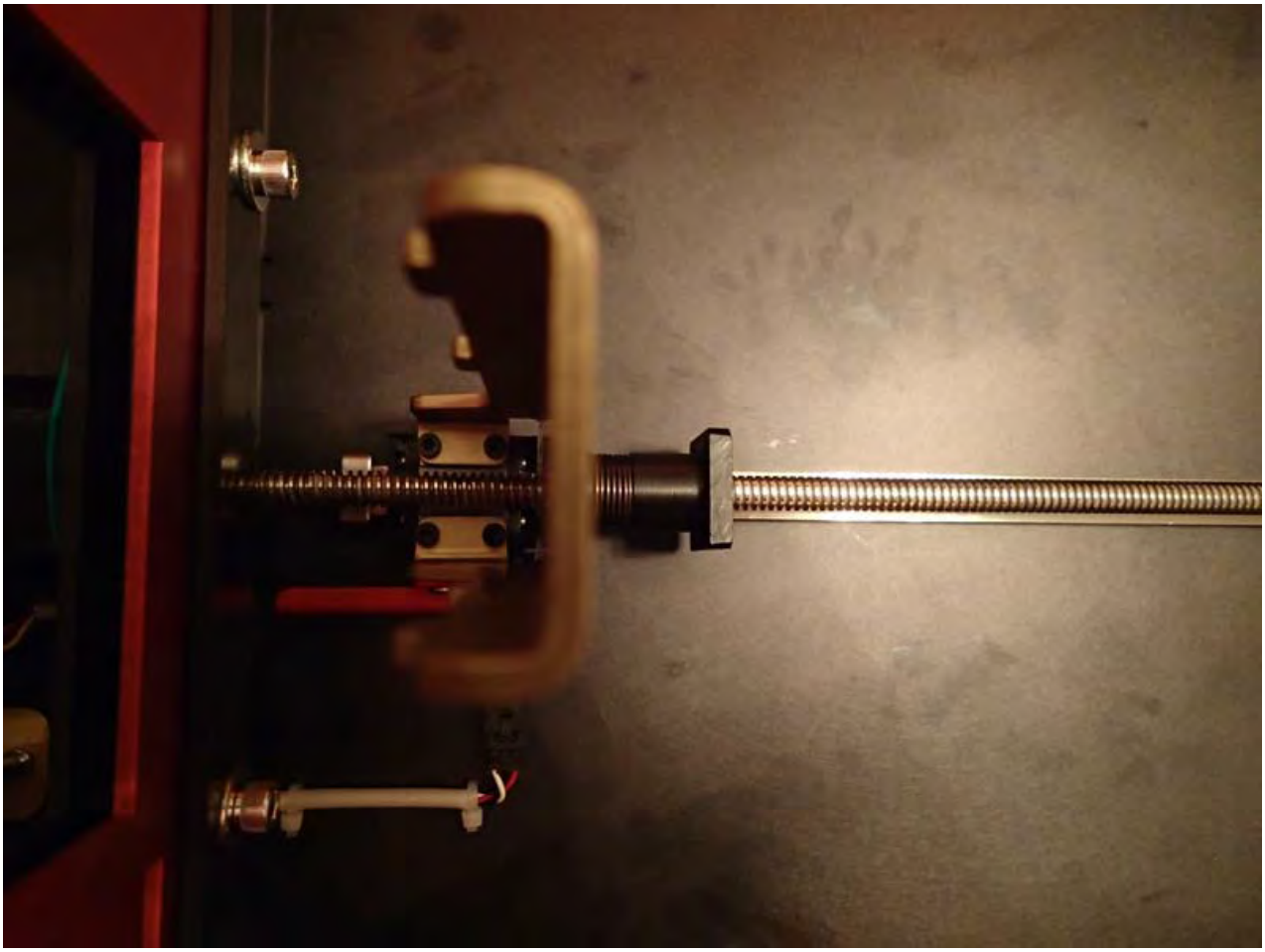
Z Arm Assembly

Z Arm, Sensor strip and Bag 4D

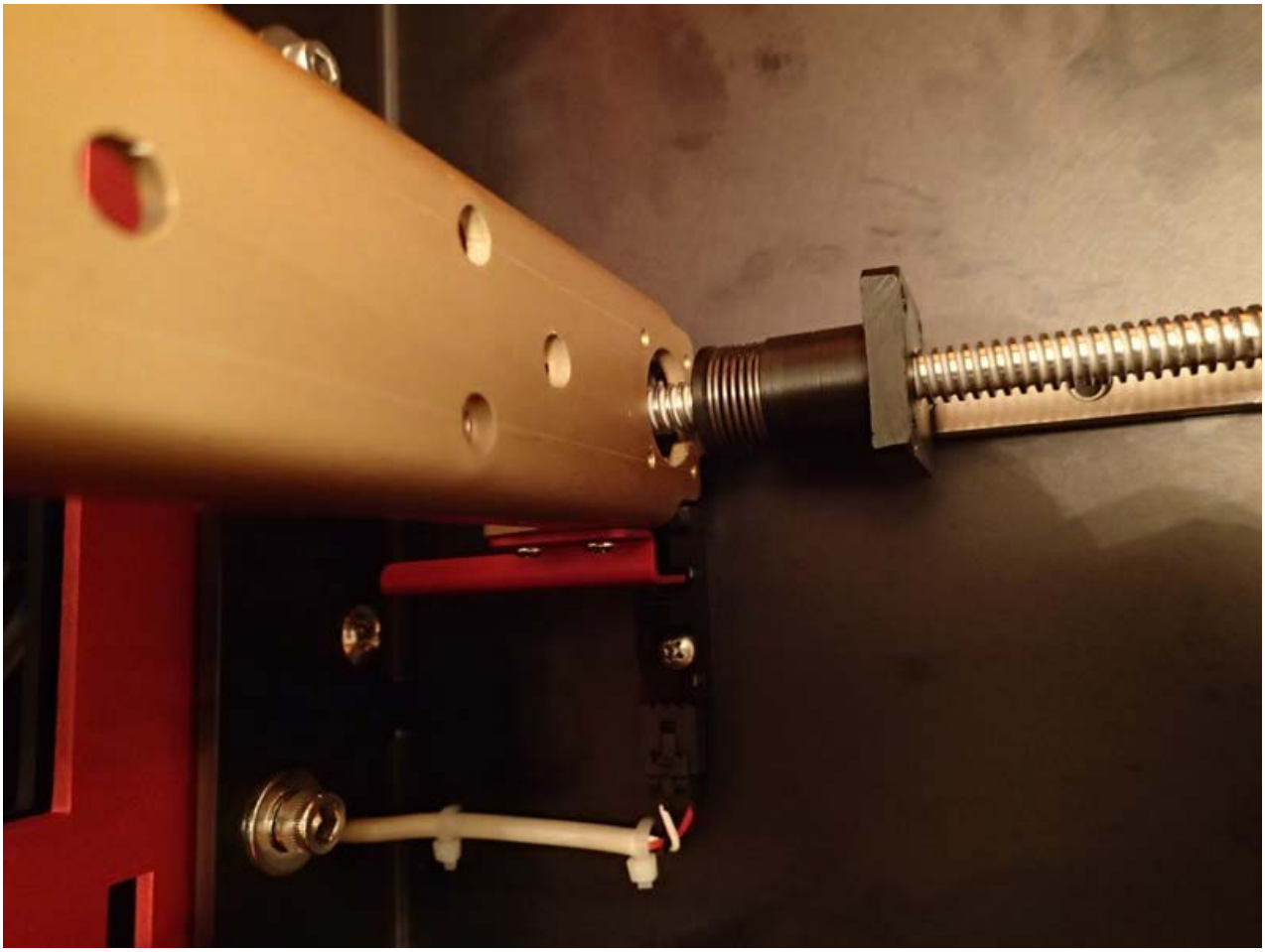
Attach Sensor Strip to Arm with 2 short screws



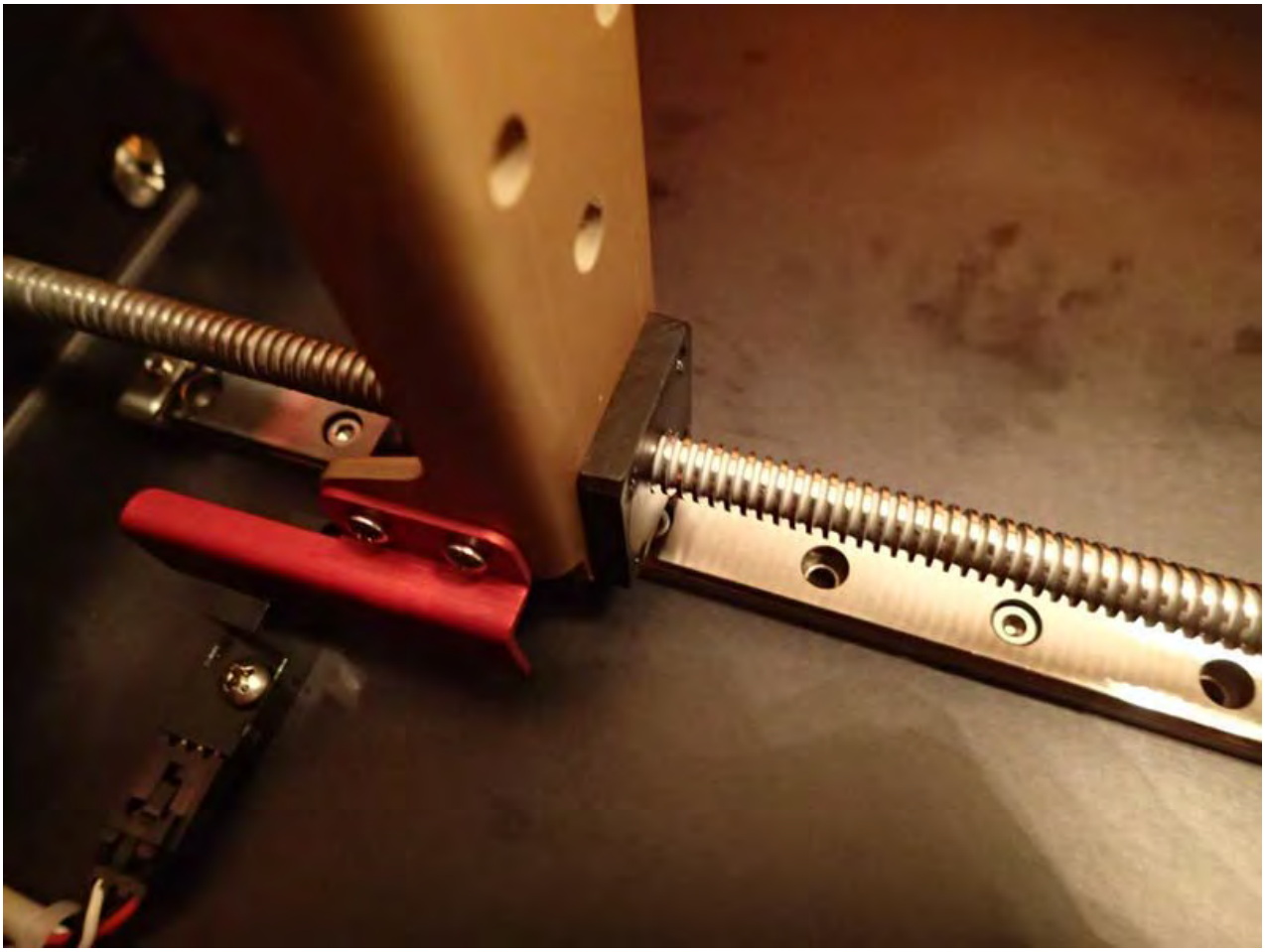
Hex head screws in place, ready to attach to slide truck



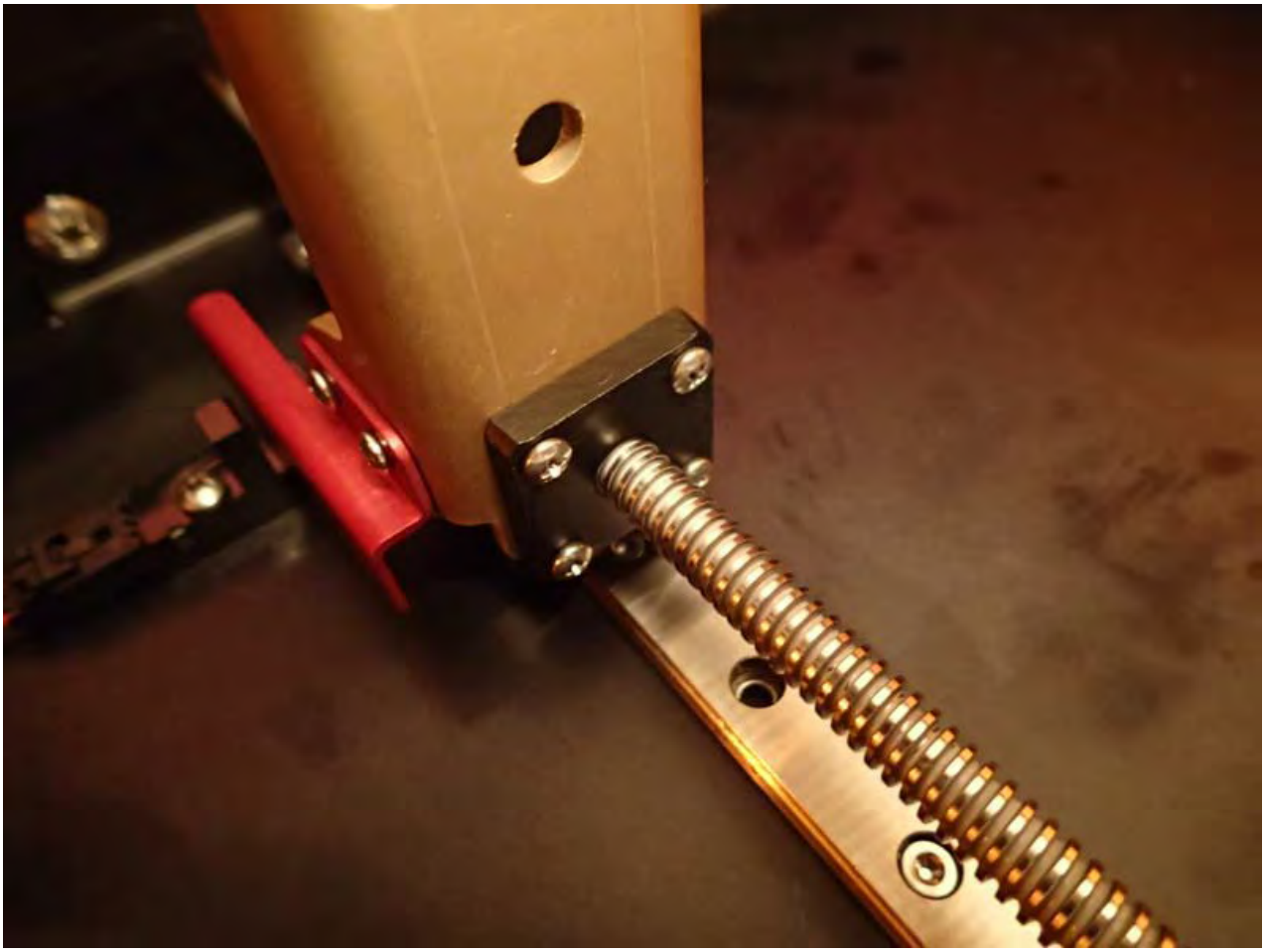
Arm attached to truck using hex wrench and 4 screws.



Check that nut aligns with arm hole.
If it does not, revisit Step 3 alignment procedures



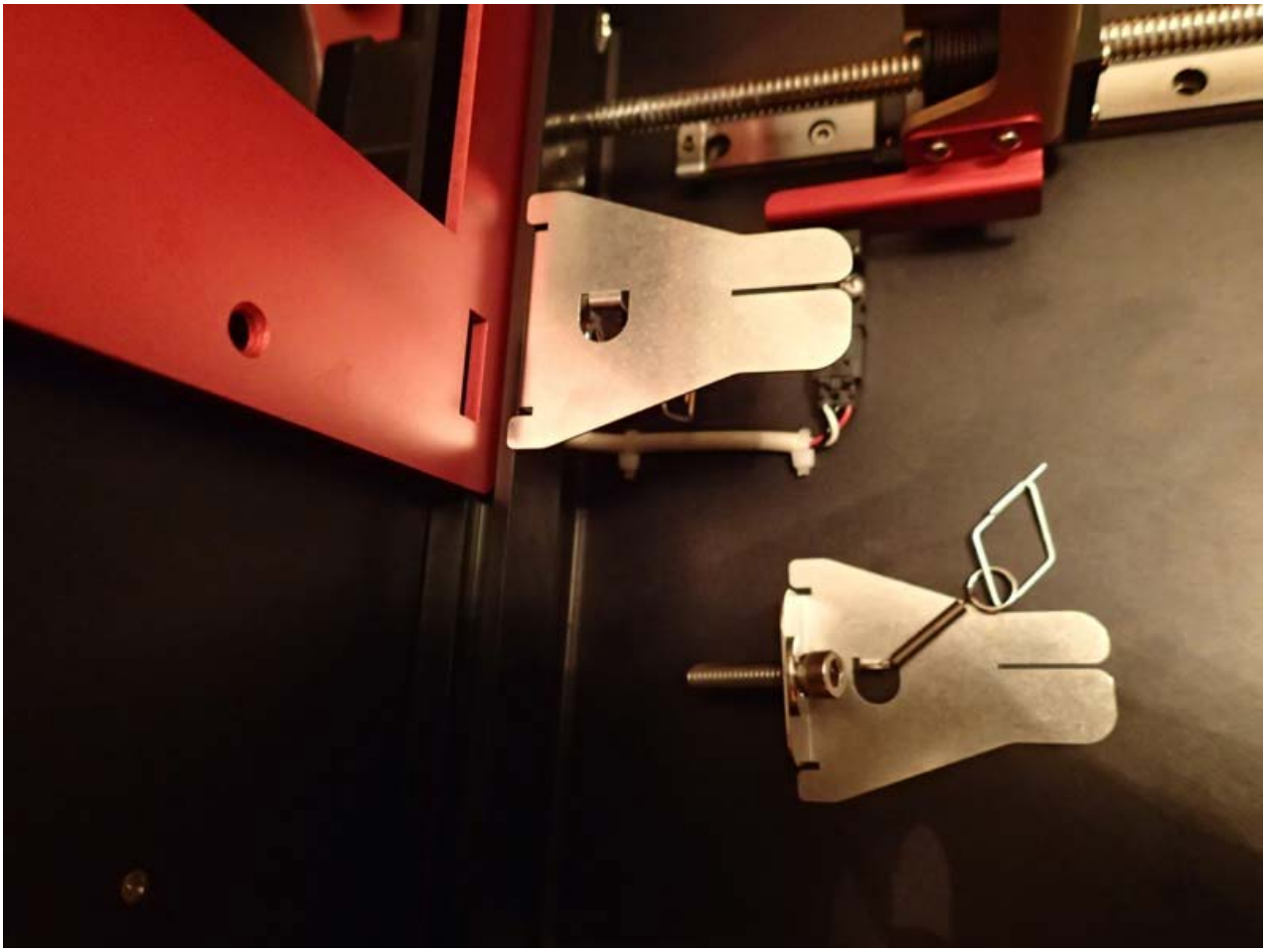
Nut should sit flush on arm



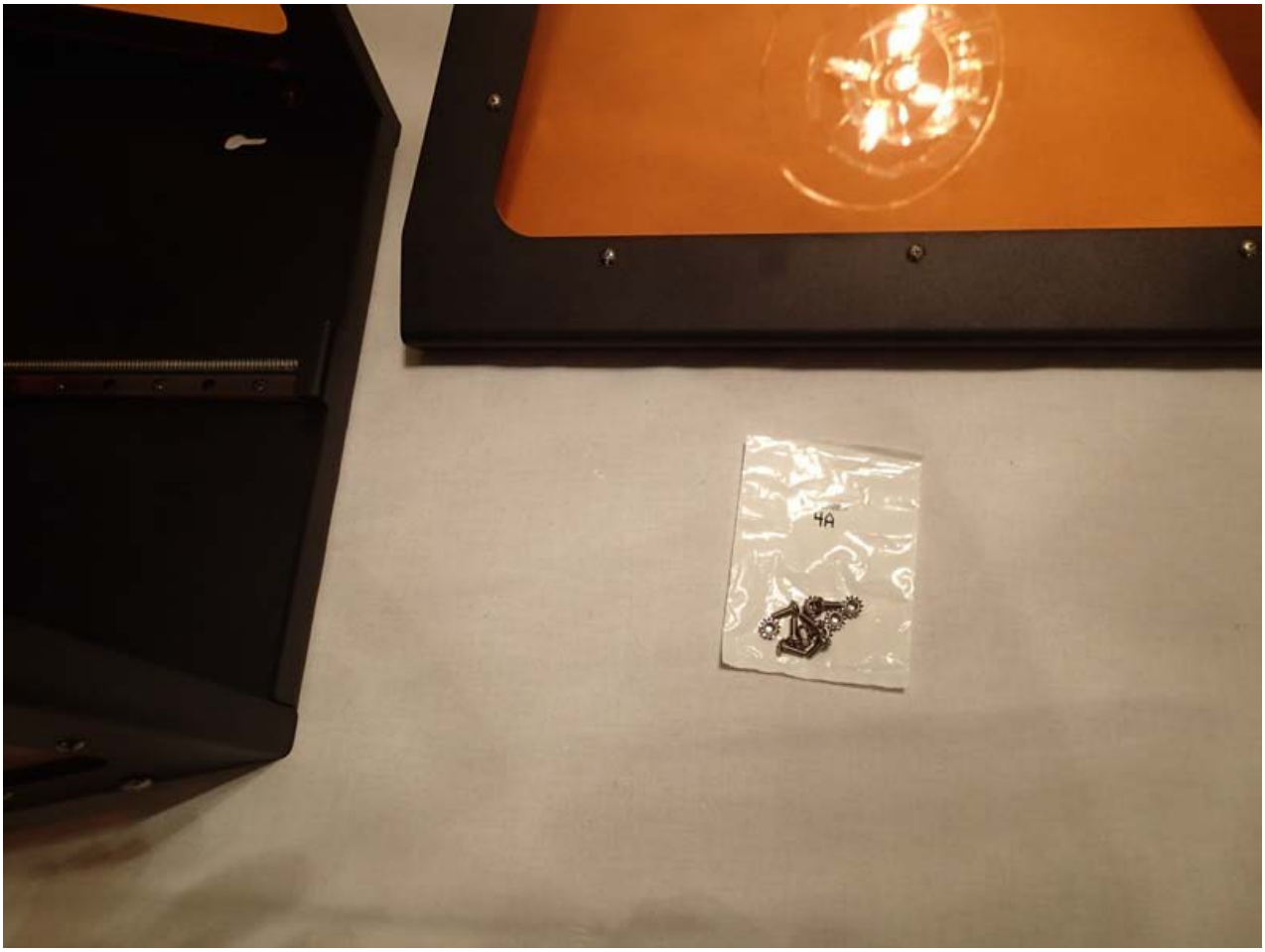
Secure nut to arm with 4 screws.
Do not over tighten.

Sweeper and Hatch

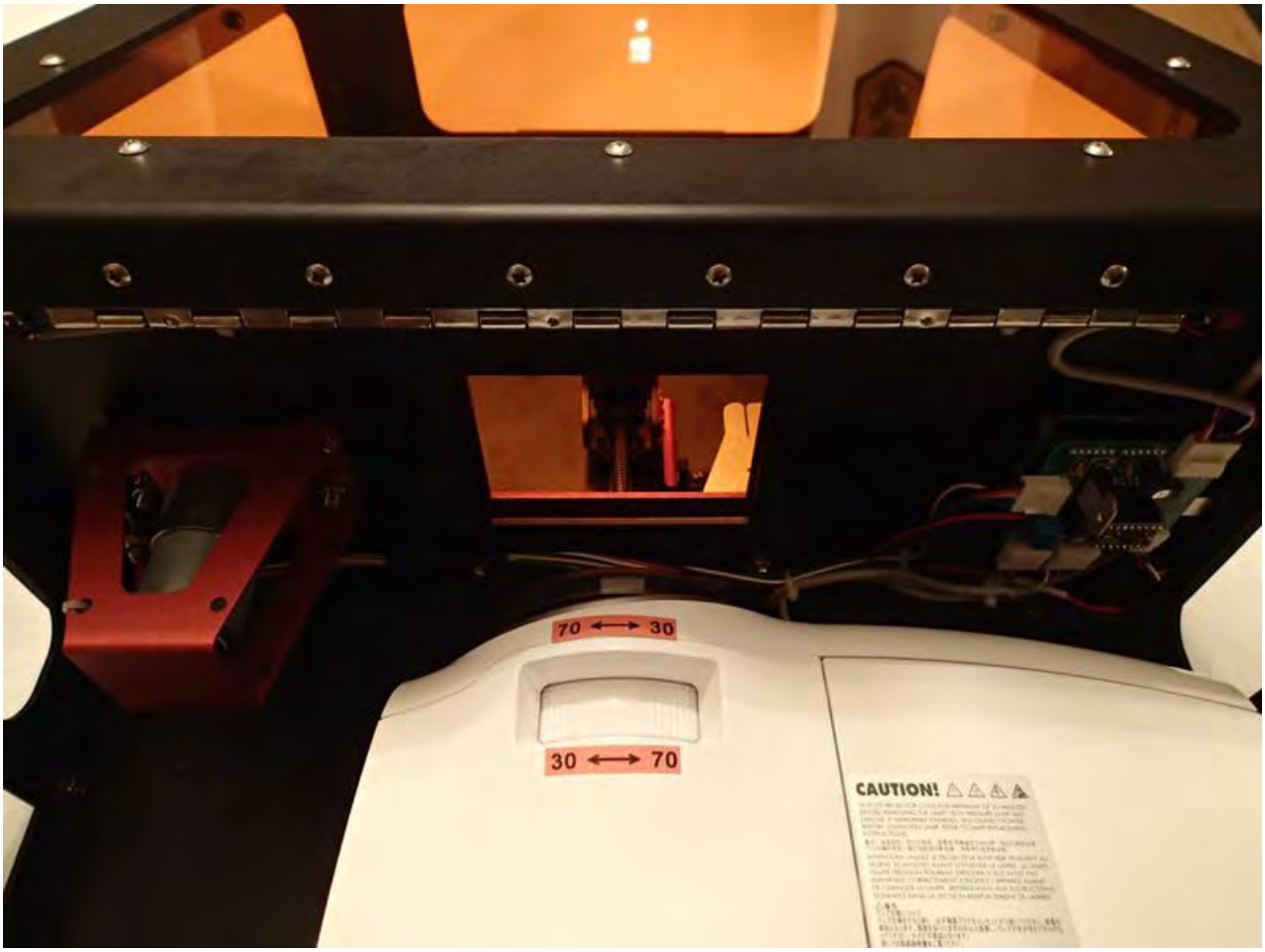
Install rear sweeper support. Note orientation of "D" hole



Install front sweeper support. Note orientation of "D" hole.



Use remaining bag 4A hardware to attach hatch.



Secure the hatch in place with six screws. **Note the hinge is "inside" the hatch.**

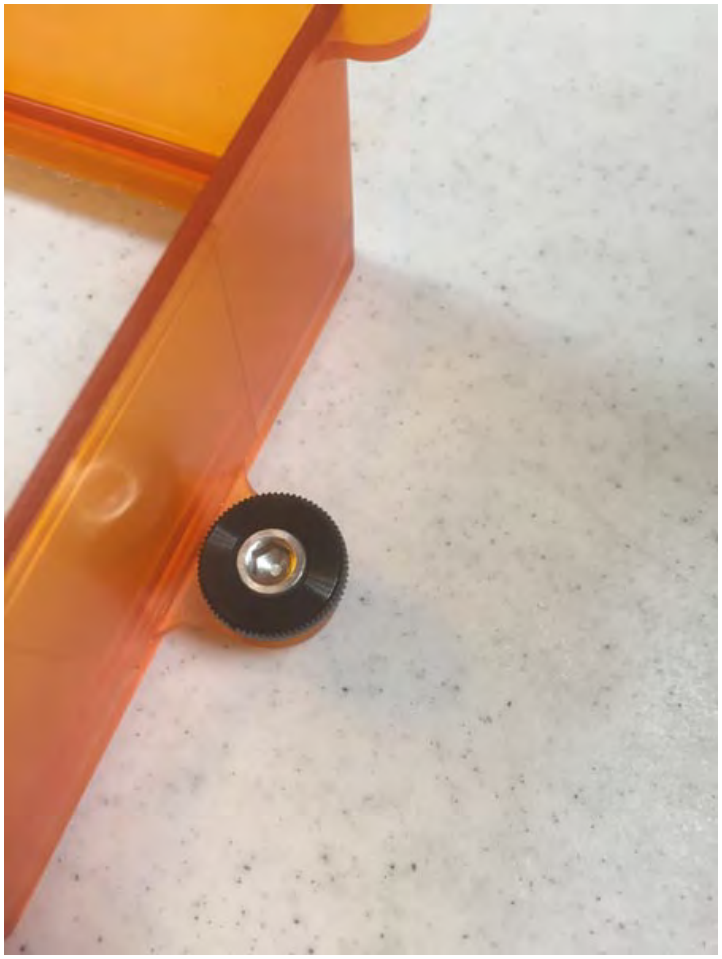
Inside view of hatch and hinge, secured with 6 nuts.

Build Table, Sweeper and Vat

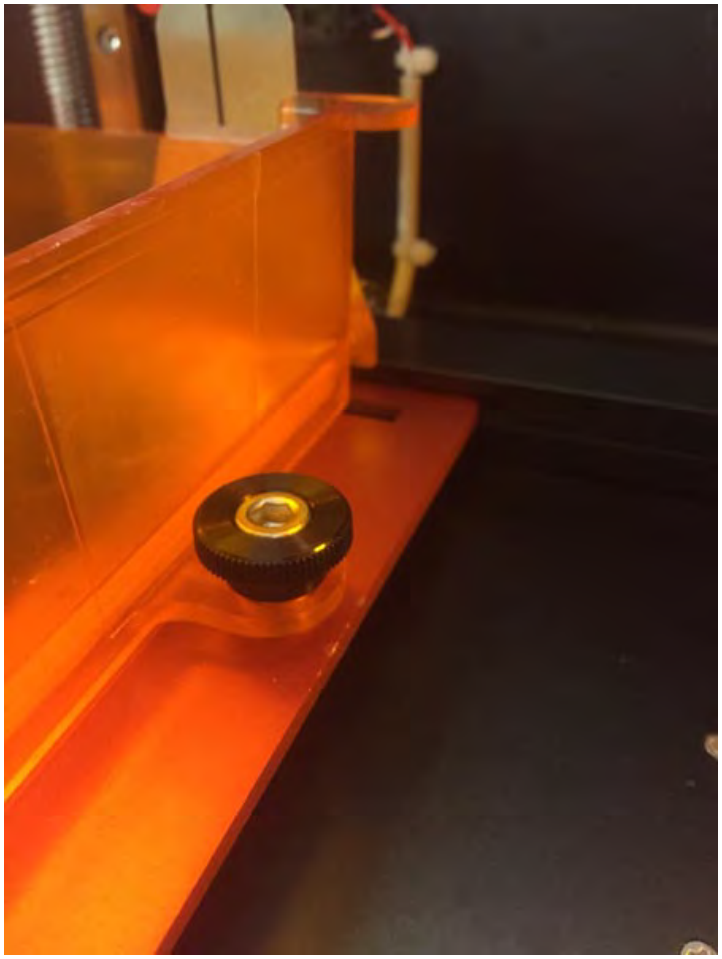
Ready to assemble build platform using Bag 4E, the build table and mount

Finished build platform, must be calibrated before use.

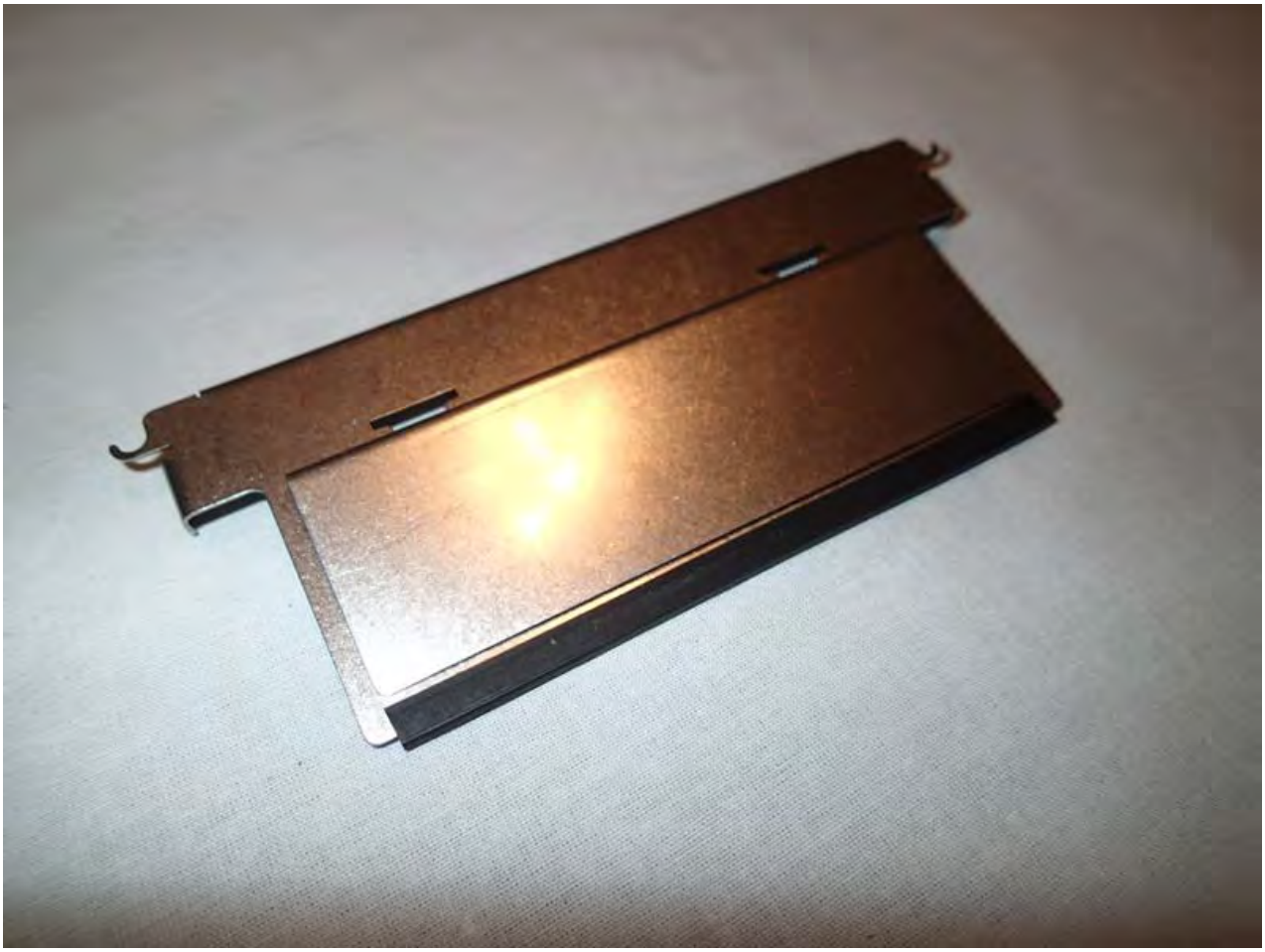
Sweeper, Vat, Bag 4F and Build Platform



The 2 short thumbscrews secure the removable Vat to the slide table



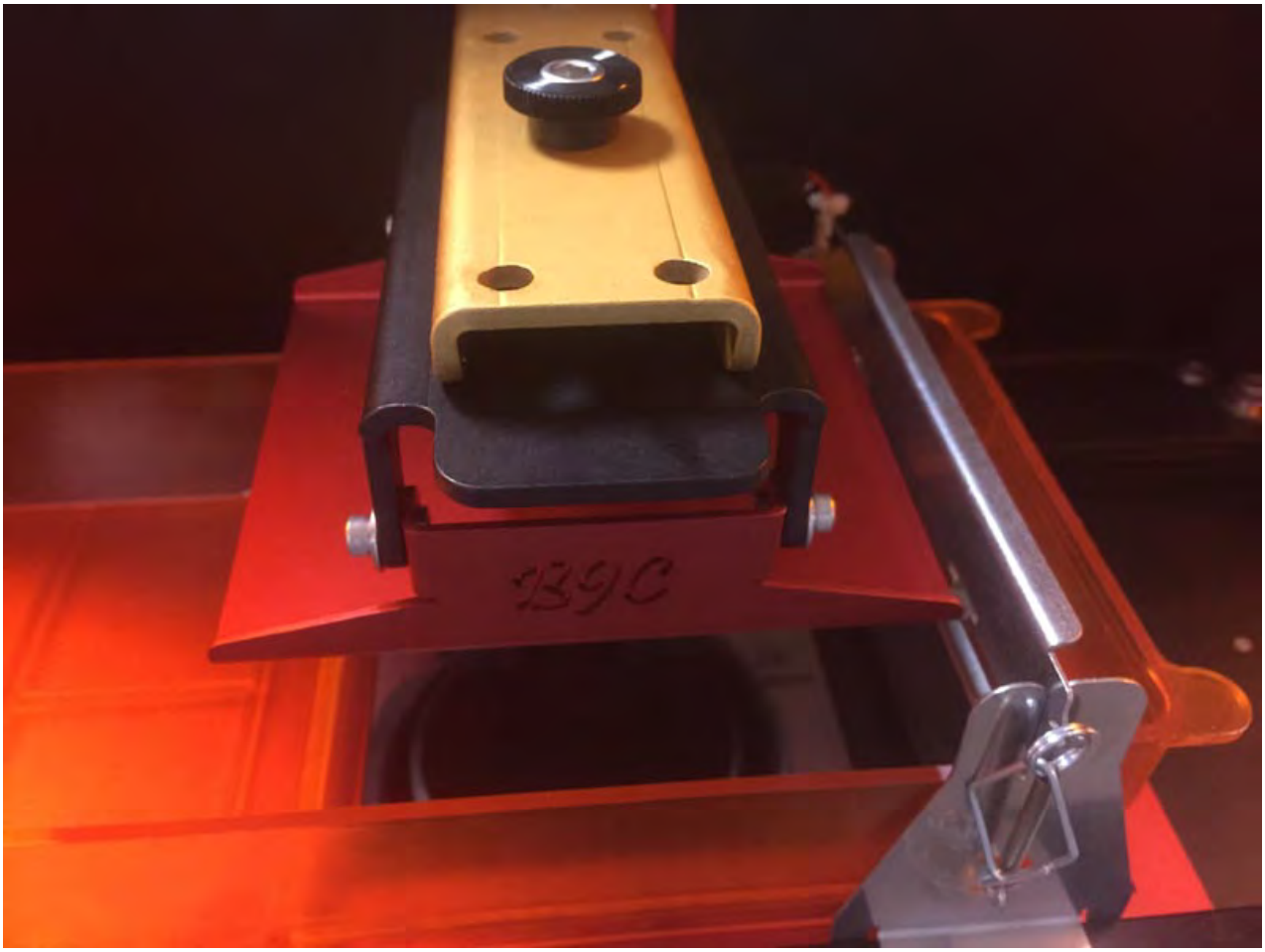
Vat secured in place in the printer (both sides)



Sweeper assembly showing correct placement of flap and wiper.

Sweeper held down by support springs.

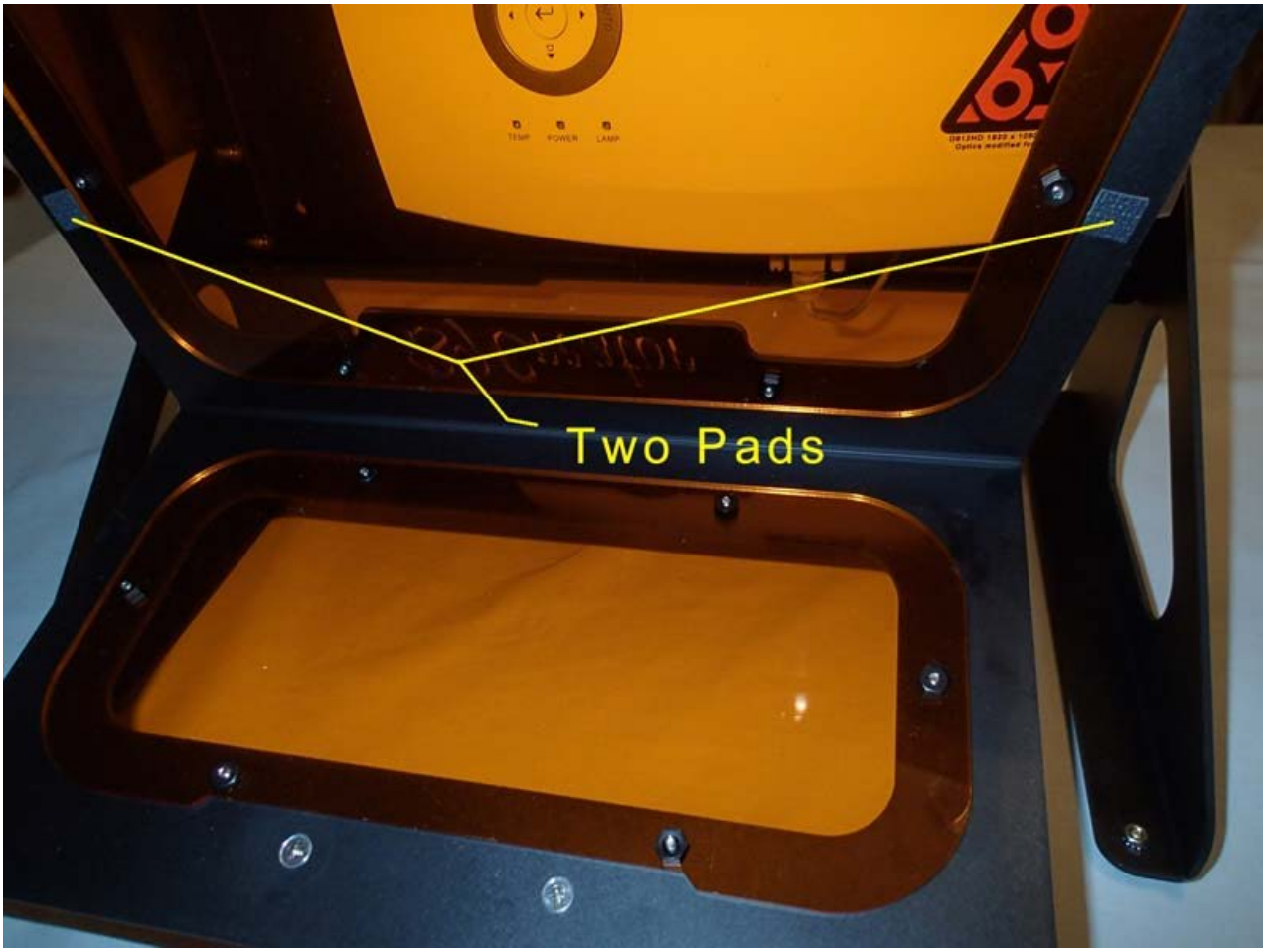
Note: Never use sweeper on dry vat, the coating may be damaged without the lubricating effect of the resin.

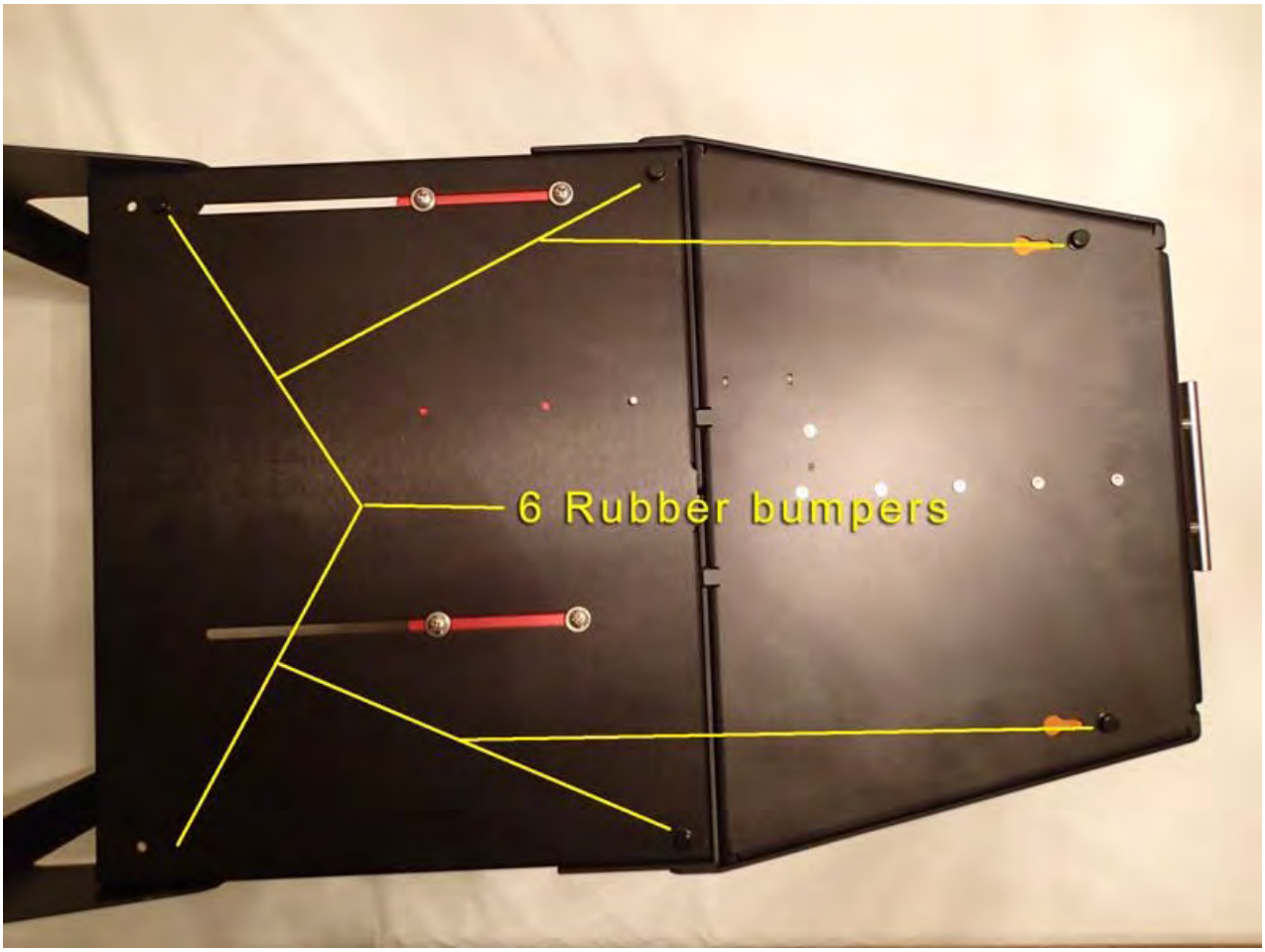


Long thumb screw used to attach Build Platform to Arm

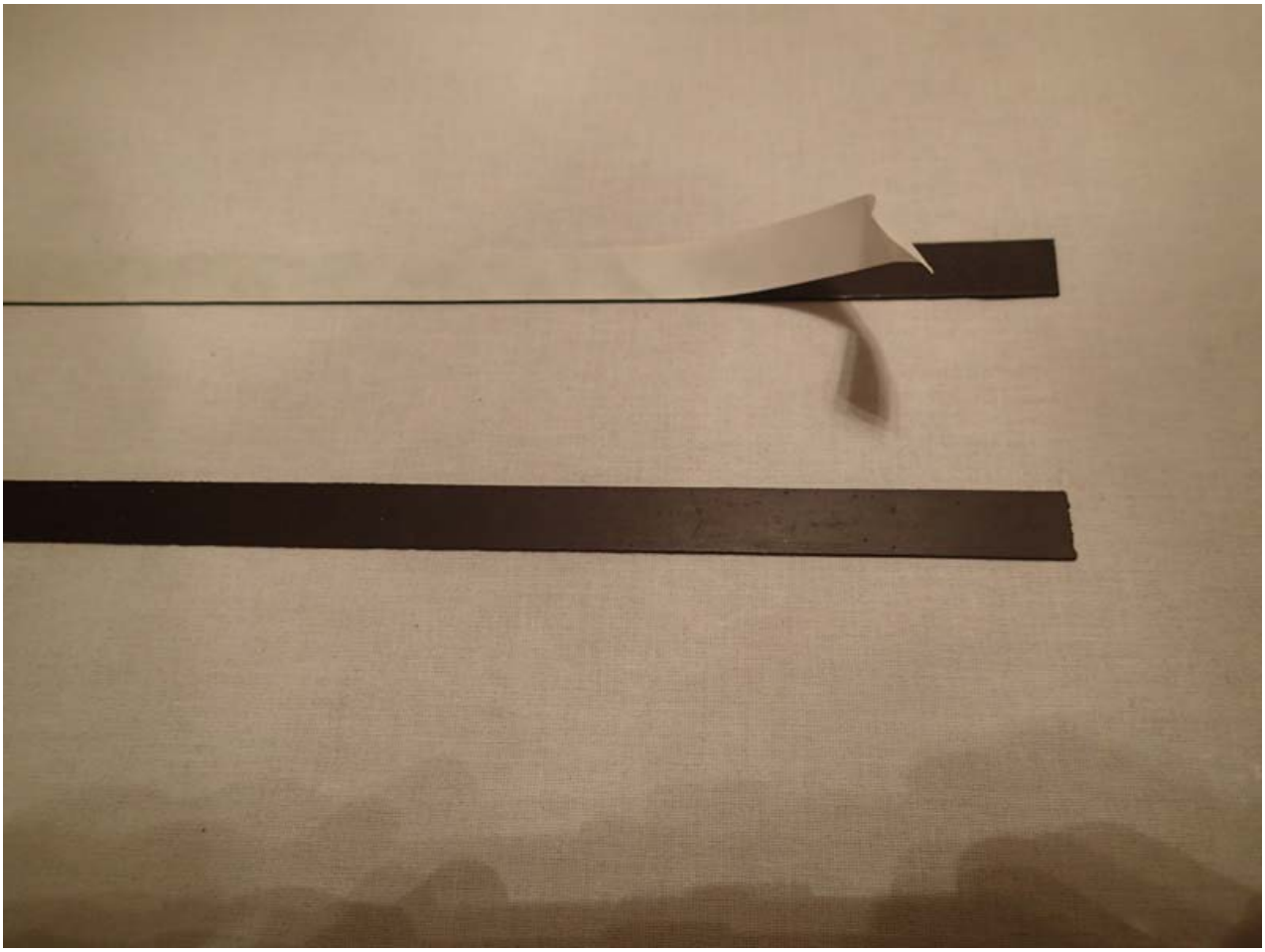
Bumpers and Magnetic Strips

Remove the protective backing and attach the two hatch pads from Bag 4G as shown.

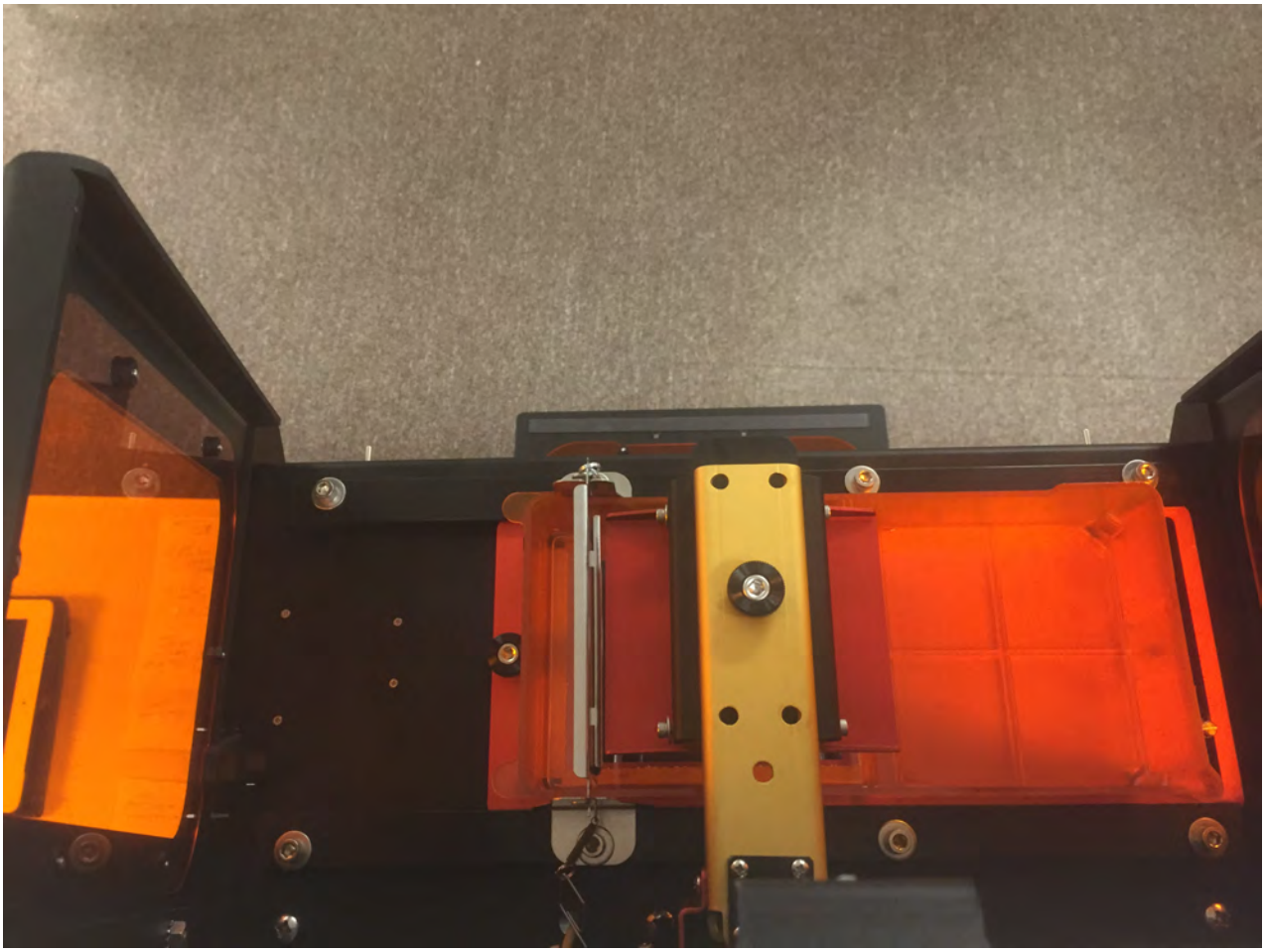




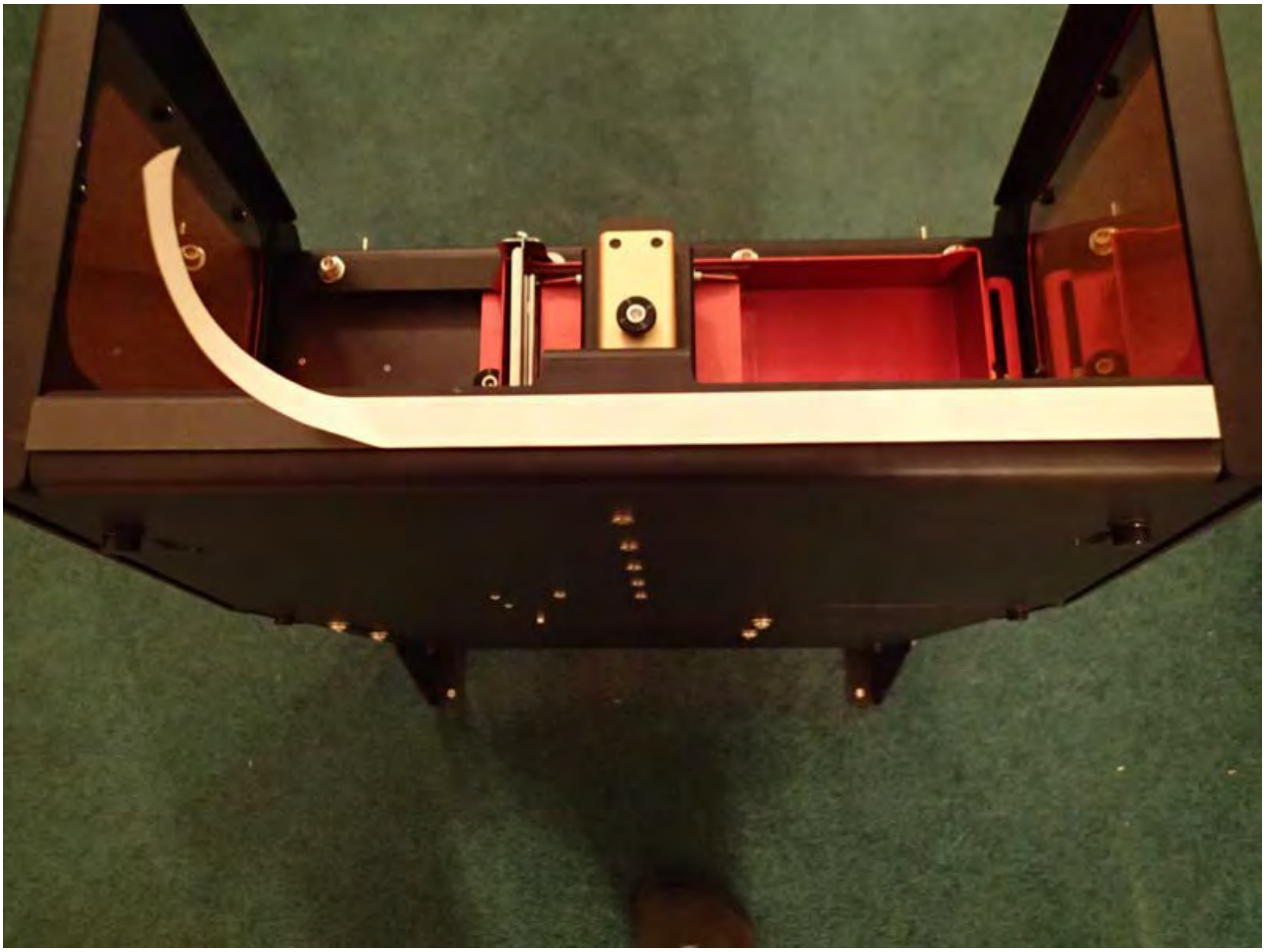
Apply the 6 adhesive backed bumpers as shown.



The 2 adhesive backed magnetic strips.

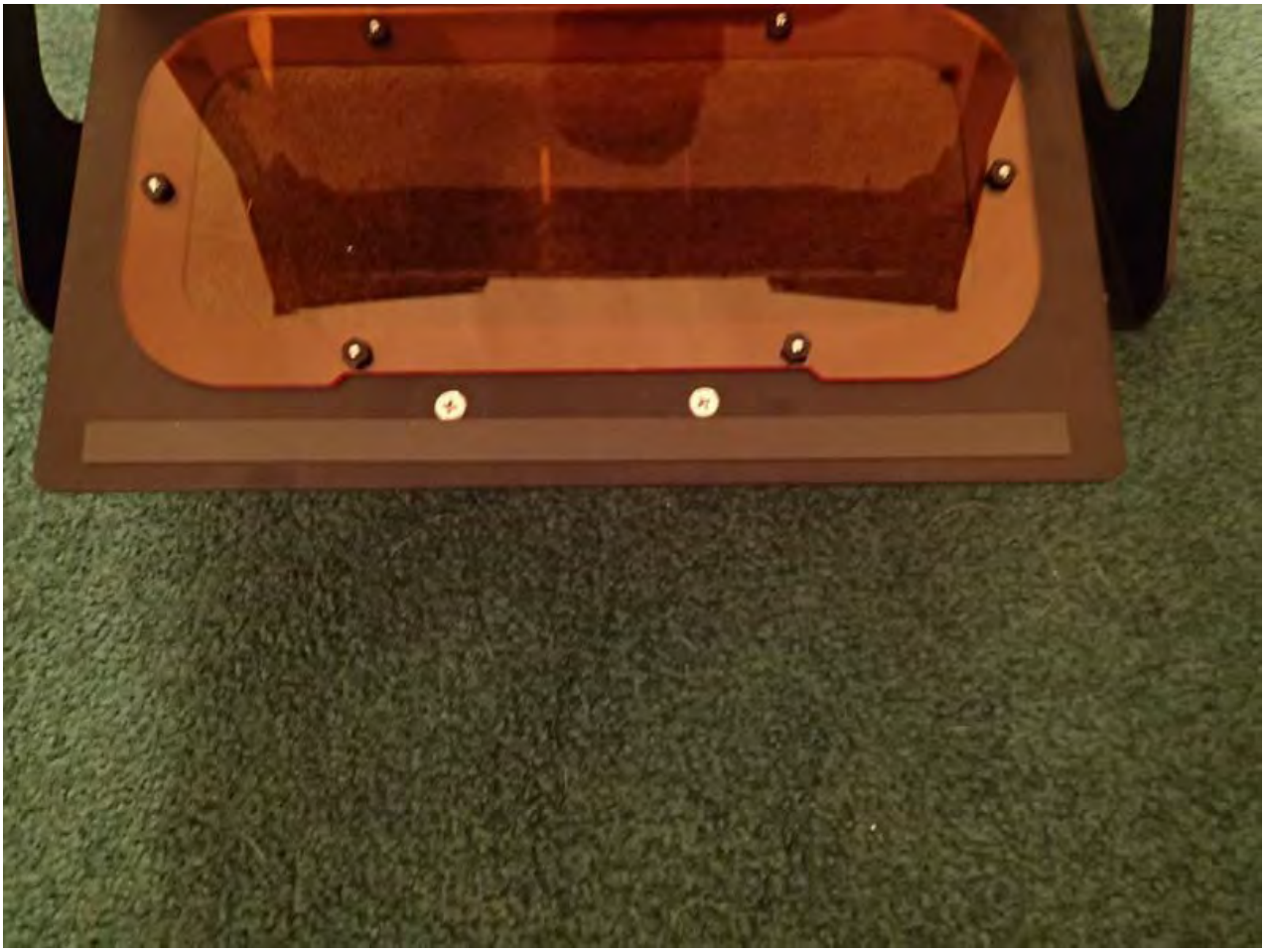


Carefully apply the first strip as shown (sticky side down)



Align the second strip on top of the first (sticky side up) and remove the protective backing.

Carefully close the hatch to secure the second strip to the hatch



The second magnetic strip is now adhered to the inside of the hatch in the proper position.

Congratulations! Your B9Creator is now assembled and ready to be calibrated.