Build Guide

STEP 1
:

Using two 24/26AWG cables, Solder to the legs of the Push-button. Use different coloured wires if necessary to help identify the ground and output cables. The ground wire needs to be approx. 100mm in length, Output cable needs to be at least 500mm in length. Create two of these wired buttons per throttle. (4 in total)

Click on image for more details

STEP 2
:

Insert the cables from a push button into the throttle knob. Feed the cables through the lower hole, Not the centre one used for the attaching screw.

Click on image for more details

STEP 3
:

Pull the cables through the lower orrifice and gentley pull the push button into position inside the knob.

Click on image for more details

STEP 4
:

Adjust the push button attaching nut up or down to make the black push button flush with the end of the knob. Once satisfied with the correct height, pull the button back out a little. Use hot glue in the knob to secure the back of the push button in its correct position.
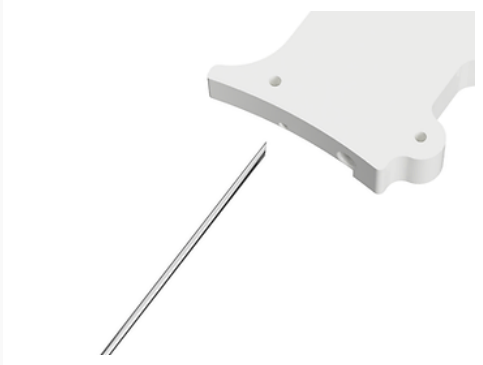
Click on image for more details

STEP 5
:

With the second push button, Place that into the spacer body. Insert the attachment nut into the external nut orifice, and screw the push button into position from the back, turning the push-button body and not the nut.

Click on image for more details

STEP 5.1
:

With a 2mm OD steel rod, cut an angle on one end with a pair of cutters. Insert the 2mm rod into a drill. Insert the angled rod end into the spacer assembly while rotating the drill at speed. This should help to clear the passage way out. Move the rod up and down the passage while its rotating to create the clearance required. This rod needs to move very easily without restriction.

Click on image for more details

STEP 6
:

Place a 604 bearing into the detent orifice

Click on image for more details
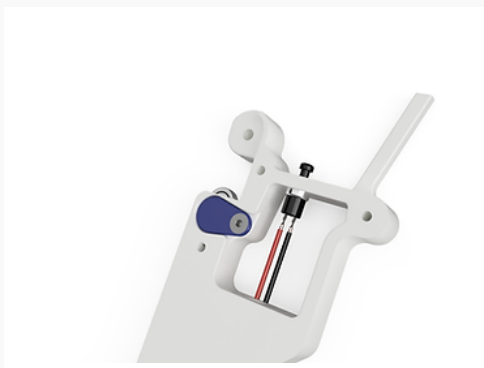
STEP 7
:

Push the bearing upwards in the channel

Click on image for more details

STEP 8
:

Squeeze the 6mm OD spring and push it into the orifice. Allow the spring to extend into the hole in the spacer and push against the bottom of the bearing.
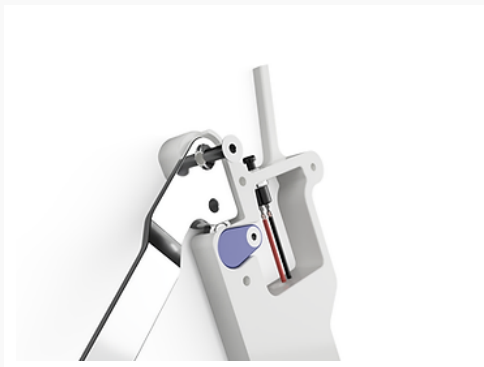
Click on image for more details

STEP 9
:

Place the detent cap into position and secure with a M4 x 6mm countersunk screw

Click on image for more details

STEP 10
:

Place the Thrust reverser lever onto the spacer body and secure with a M5 x 12mm countersunk screw. Make sure the screw is tight enough that there is no excessive play, and not to tight that operation of the lever becomes too rigid/stiff.

Click on image for more details

STEP 11
:

Turn the unit over. Ideally, I would highly recommend 3d printing the throttle stem. Then using this as a template to create the hole locations in the Aluminium bar. This bar has a thickness of 3mm x 20mm. Ensure the head of the screw is flush or below the surface. Use the 3d printed part to ensure the aluminium bar is the correct length. Secure with an M4 x 10mm screw

Click on image for more details

**STEP 12
:**

I would also 3d print the actuating link. Use this as a template to create the part on a 3mm x 15mm aluminium bar. Secure the bar to the thrust reverser lever with a M5 x 10mm countersunk screw. Again ensure operation is not too stiff by overtightening the screw.
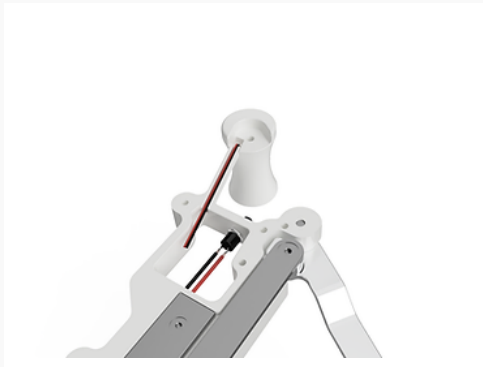
Click on image for more details

**STEP 13
:**

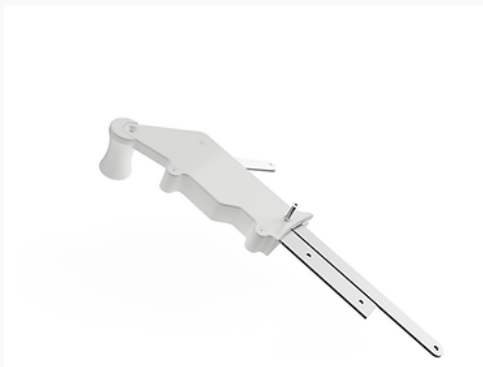Place the throttle knob on the end of the space body, guide the wires into the channel

Click on image for more details

**STEP 14
:**

Use Qty 3, M4 x 12mm countersunk screws in these locations to secure the backplate to the spacer body. Ensure you dont trap any cables.

Click on image for more details

**STEP 16
:**

Use a M4 x 20mm countersunk screw in this location to secure the backplate and stem.

Click on image for more details
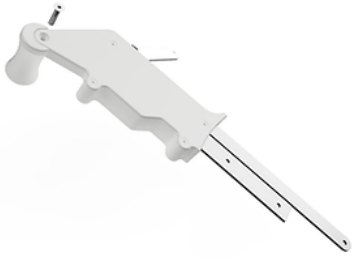
STEP 17
:

Use a M5 x 22mm screw to attach the throttle knob to the unit.

Click on image for more details

STEP 18
:

Insert the M5 x 16mm countersunk screw into the reverser knob

Click on image for more details

STEP 19
:

Attach the Top Plate to the unit with Qty 5, M4 x 10mm countersunk screws.

Click on image for more details

STEP 20
:

Place two 608 bearings onto the upper mounting lugs. Secure with an M4 penny washer and M4 x 6mm Dome head screw

Click on image for more details

STEP 21
:

Place a 608 bearing into the centre orifice, press into position, ensure no support material remains.

Click on image for more details

STEP 22
:

Turn the unit over, place a 608 bearing into the centre orifice to complete the rotational axis.

Click on image for more details

STEP 23
:

Place a 10K pot with a serrated shaft, into the stem assy. Ensure the locating spigot sits in the designed hole and the unit sits flush.

Click on image for more details

STEP 24
:

Insert a 604 bearing into the bearing runner, ensure the thick part of the tongue faces down. Secure with a M4 x 10mm dome head screw.

Click on image for more details

STEP 25
:

Insert a 7.2mm compression spring into the recess. Hold the spring in location.
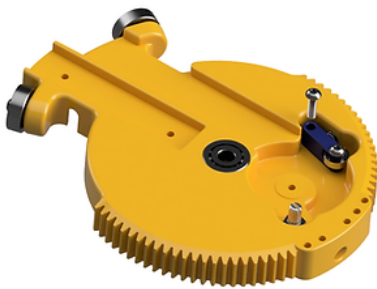
Click on image for more details

STEP 26
:

Place the bearing runner into position on the stem assy, feeding the other end of the spring into the locating recess. If you want a stronger detent feel, a second 5mm OD spring can be added inside the 7.2mm spring to increase detent tension. Secure with an M4x 16mm Dome Head Screw.
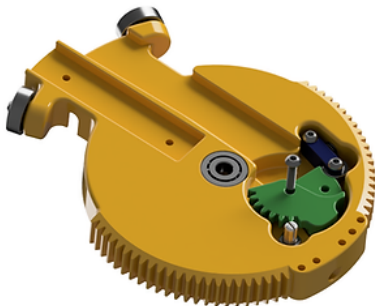
Click on image for more details

STEP 27
:

Insert the Rev Spur Gear into the unit as shown and secure with an M4 x 18mm Button Head Screw. depress the bearing runner assy to aid fitment and to check for ease of movement. Ensure the screw is free to rotate in the spur gear without any friction. If needed use a 4.2/4.3mm drill bit to ensure correct tolerances.

Click on image for more details

STEP 28
:

Push the 8 Tooth Spur gear on the Rev pot. Ensure the pot has full and free movement in both directions of travel. The internal section of the spur gear is splined to match the teeth of the pot. If the Pot is not centred right, you may restrict travel when the pot reaches its endpoints.

Click on image for more details

STEP 29
:

Put the stem assy to one side, cut a 2mm rod to length (approx 158mm) try to create a rounded end on one end with a file

Click on image for more details

STEP 30
:

On the other end of the rod, create a 2mm thread that extends approx 20mm from the end.
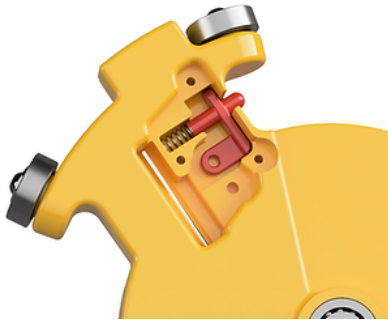
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STEP 32
:

Turn the stem assy over and insert the Rev actuator Button. Compress a 5mm OD spring and insert that behind the plunger part as shown.
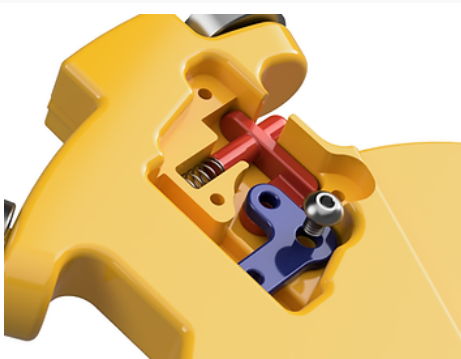
Click on image for more details

STEP 33
:

Insert the Bellcrank and secure it in place with an M4 x 6mm Button head screw. Ensure this unit is free to rotate with any restriction.
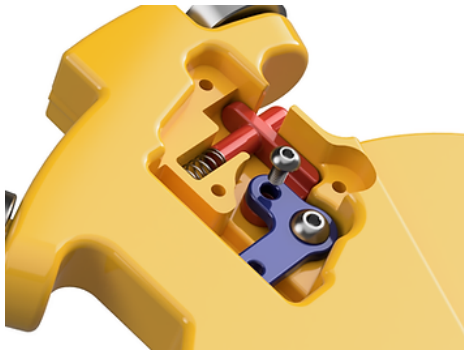
Click on image for more details

STEP 34
:

Insert an M3 x 6mm button head screw. Do not tighten to
the point of restriction of movement.

Click on image for more details

STEP 35
:

Insert the Road Adapter so the round side is down. Line
up the holes and insert an M3 x 8mm Dome Head Screw.

Click on image for more details

STEP 36
:

Inser tthe Lock cap and secure with Qty 3, M3 x 8mm
Screws
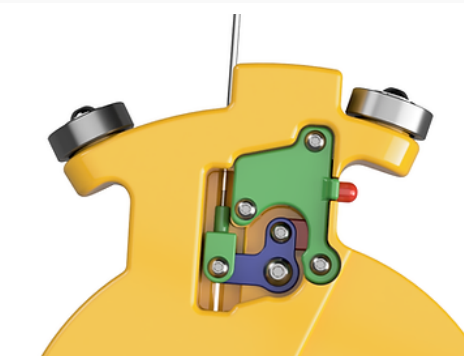
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STEP 37
:

insert the 2mm rod through the stem upper hole, and
screw the rod approx 4mm into the rod adapter.
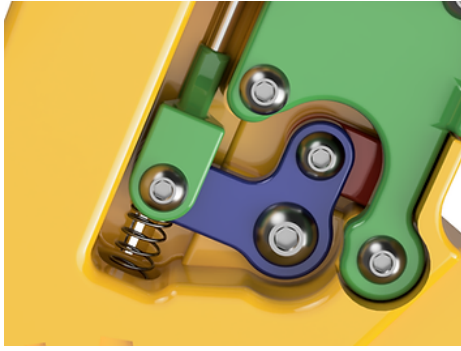
Click on image for more details

STEP 37.1
:

If the operating mechanism gets stuck or feels stiff, a 7.5 X 15 mm extra spring can be used and inserted into the spring cutout in the stem below the rod. (All the springs used can be found in an Amazon assorted spring box)

Click on image for more details

STEP 38
:

Temporarily place the throttle handle onto the stem, feed the wires and rod into the units. use one M4 x 12mm dome head screw to hold the unit in place

Click on image for more details

STEP 39
:

Ensure the 2mm rod extends into the thrust reverser lever locking the unit. Press the red button and the rod should retract and the lever can then be extended. Adust the length of the rod by screwing it into the rod adapter until the mechanism works correctly.
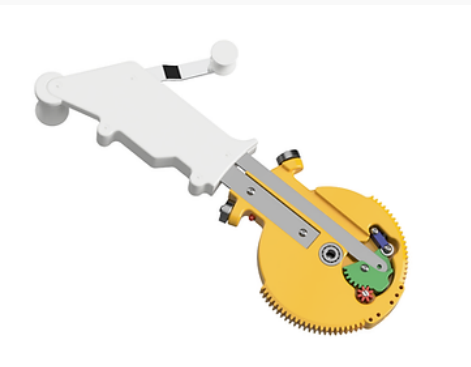
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STEP 40
:

Once happy with the operation, secure the throttle handle to the stem with two, M4 x 12mm dome head screws.
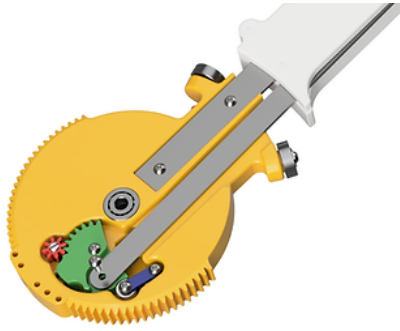
Click on image for more details

**STEP 41
:**

Secure the lower Link rod with an M4 x 10mm Dome head screw.

Click on image for more details

**STEP 42
:**

Repeat Steps 1-41 for the #2 Throttle Assy

Click on image for more details

**STEP 42.2
:**

Optional, Insert the Pre bought LED light or the newly created unit from PB1 & PB2 (L33 & L34)

Click on image for more details

**STEP 43
:**

Place L1 (Throttle Guide #1) onto C1 (LHS Body). Align the screw holes.

Click on image for more details

STEP 44
:

Insert Qty 3, M4 x 10mm countersunk screws.
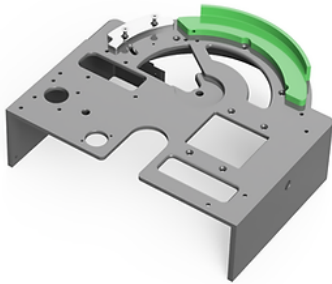
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STEP 45
:

Place L2 (start Guide #1) into position and secure with Qty 2, M4 x 10mm countersunk screws
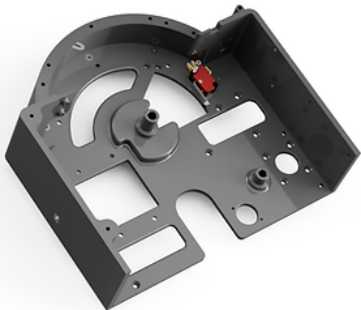
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STEP 46
:

Place the microswitch into position and Secure it with an M3 x 14mm Socket head screw In the upper corner. Make sure the microswitch is free to rotate along the lower banana slot

Click on image for more details

STEP 47
:

Place an M3 x 20mm countersunk screw through the lower banana slot and lower corner of the microswitch
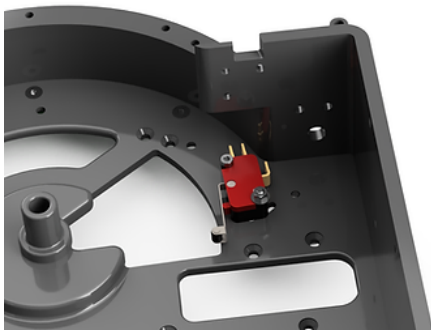
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STEP 48
:

Ensure the black roller of the arm protrudes into the pie-shaped cutout as shown, Tighten both screws. This can be adjusted later on for fine tuning.
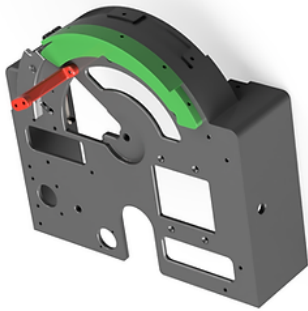
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STEP 49
:

Place L3 (Reverse Lock) below the forward edge of L1.
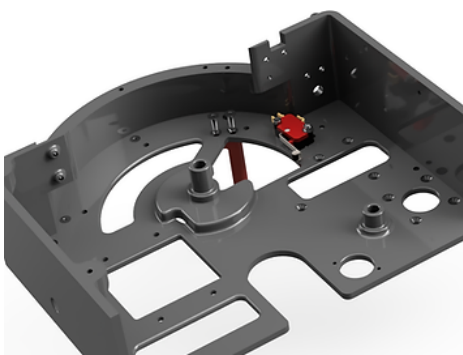
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STEP 50
:

Secure with Qty 2, M4 x 12mm Screws. These screws must be flush or below the surface.
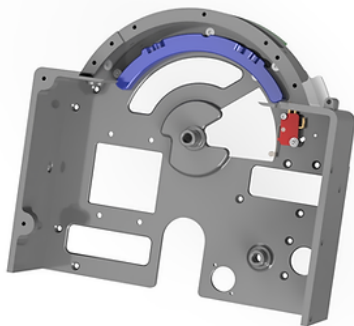
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STEP 51
:

Insert the L4 (Speed Brake Guide) into C1
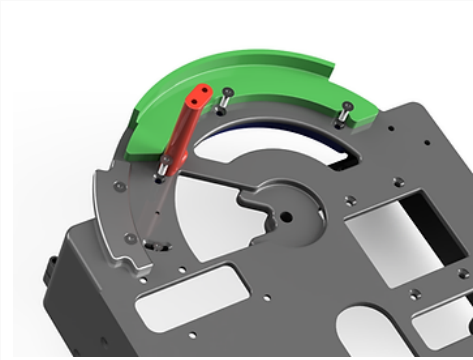
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STEP 52
:

Secure with Qty 3, M4 x 12mm countersunk screws
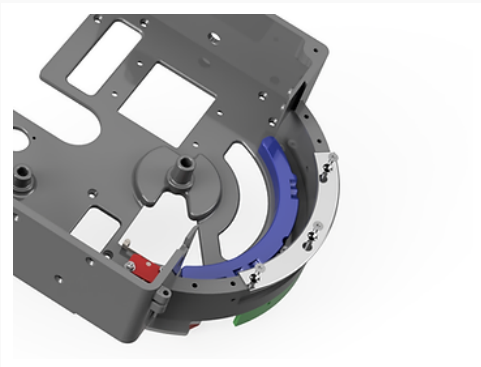
Click on image for more details

STEP 53
:

Place L5 (speed Brake Guide) onto the outer rim and secure with Qty 3, M4 x 8mm countersunk screws.

Click on image for more details

STEP 54
:

Place the Nema 17 stepper motor into L6 (sliding mount) and secure it with QTY 4, M3 x 6mm countersunk screws.
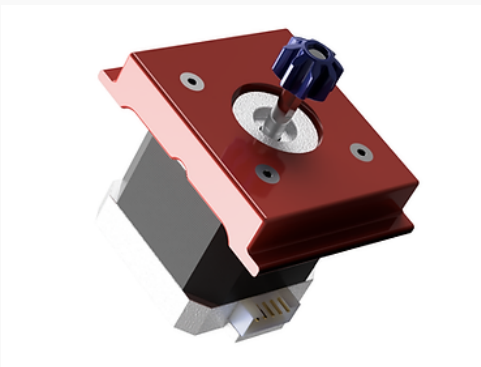
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STEP 55
:

Place the L7 spur gear 8T onto the end of the shaft. This should be a tight friction fit. If the unit is too loose, shrink the component slightly and reprint.
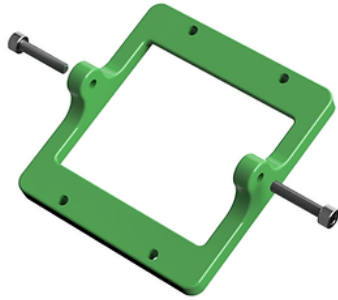
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STEP 56
:

Insert Qty 2, M4 x 40mm socket head screws into the L8 clamp Assy.
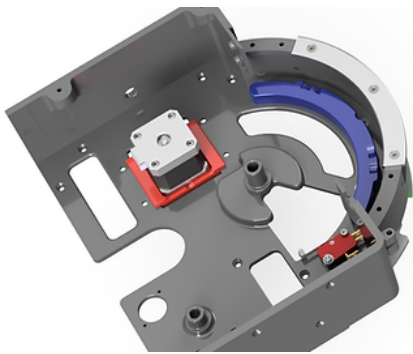
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STEP 57
:

Place the Motor assembly on the LHS body as shown
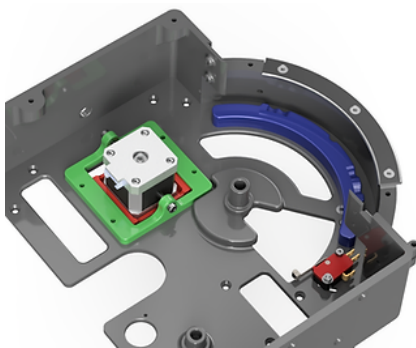
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STEP 58
:

Place the L8 clamp over the stepper assembly.
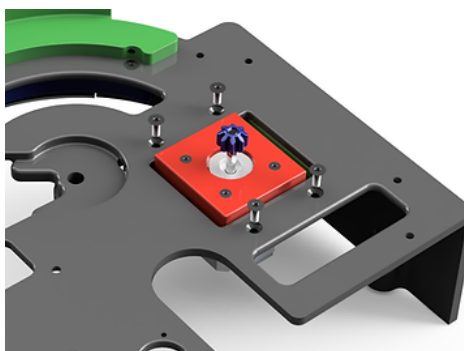
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STEP 59
:

Secure the clamp with Qty4, M4 x 10mm countersunk screws
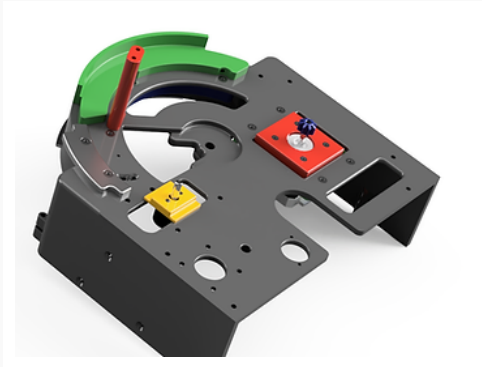
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STEP 60
:

Place the hall sensor into the L9 sliding plate. Secure with Qty 2, M2 x 8mm countersunk screws.
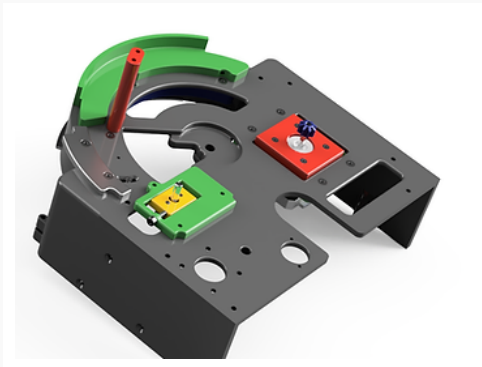
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STEP 61
:

Place L10 over the L9 slide plate, Insert the M4 x 25mm tension screw into the side.
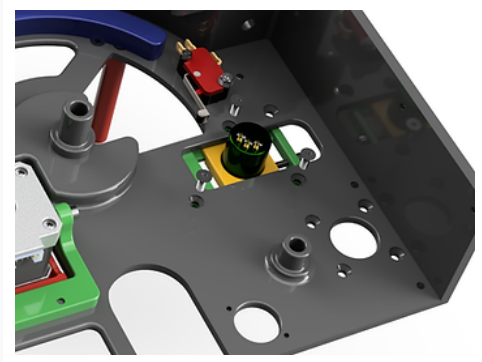
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STEP 62
:

From the other side, secure the L10 clamp plate with Qty 3, M4 x 10mm countersunk screws
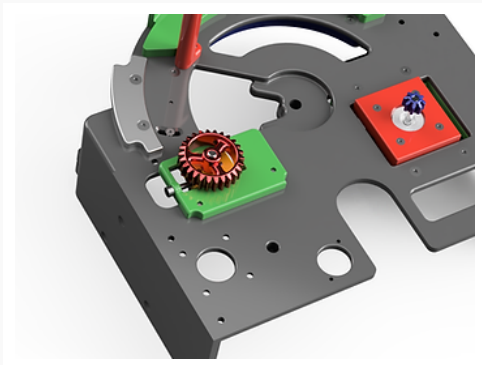
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STEP 63
:

Place L11 spur gear onto the shaft, secure with an M3 x 6mm grub screw.
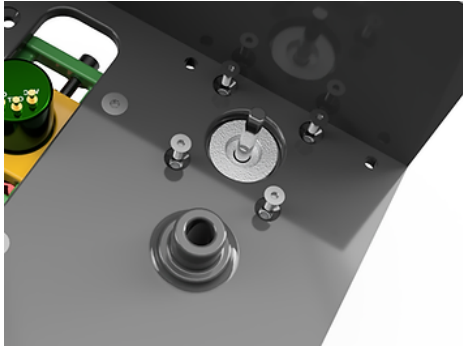
Click on image for more details

STEP 64
:

Place another Nema 17 stepper motor as shown, and secure with Qty 4, M3 x 8mm countersunk screws

Click on image for more details

STEP 65
:

Place L12 Spur gear 8TL onto the stepper shaft, this should be a tight friction fit.
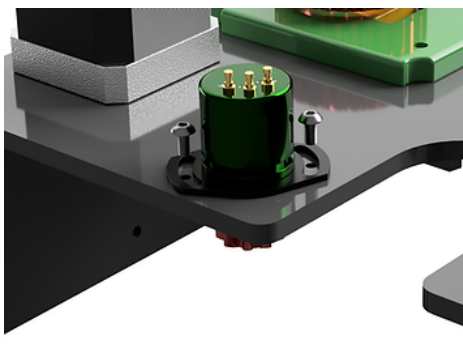
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STEP 66
:

Using the mounting plate supplied with the hall sensor, Secure the sensor with Qty 2, M3 x 6mm Dome head screws.
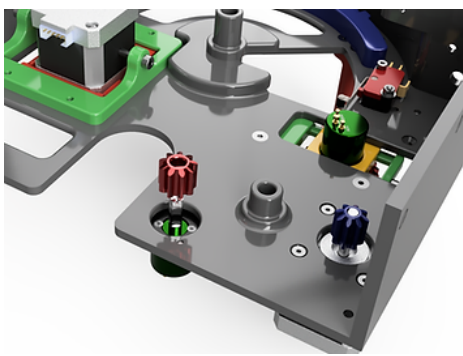
Click on image for more details

STEP 67
:

Place the L13 Spur Gear 9T onto the hall shaft.

Click on image for more details

STEP 68
:

Insert a 6202 bearing into L14 Spur Gear 44T

Click on image for more details

STEP 69
:

Place the L14 assembly into position.
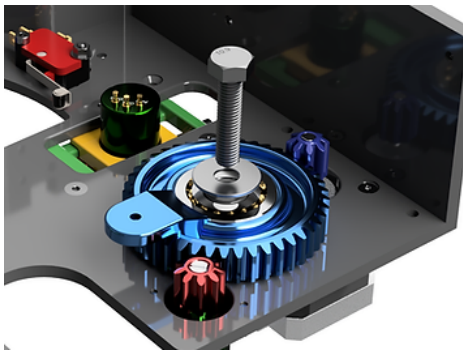
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STEP 70
:

Insert an M8 x 35mm Bolt with washer into the body to secure L14.
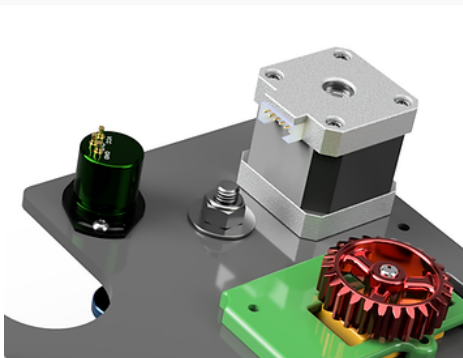
Click on image for more details

STEP 71
:

Secure with an M8 Nut and washer

Click on image for more details

STEP 72
:

Insert Qty 2, 608 bearings onto the speed brake stem studs (L15). Secure with two, M4 x 5mm dome head screws and two washers.

Click on image for more details

STEP 73
:

Place a 6002 bearing into the centre hole.

Click on image for more details

STEP 74
:

Place another 6002 bearing into the stem on the back side.

Click on image for more details

STEP 75
:

Place a 684 bearing into the stem orifice.
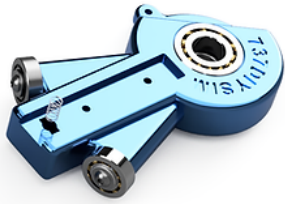
Click on image for more details

STEP 76
:

Insert a 5mm x 15mm compression spring into the orifice

Click on image for more details

STEP 77
:

Use Qty 2, M4 x 10mm screws to secure L15 to L16.
Ensure the spring is compressed (located into the orifice)
and not trapped between the lever and stem body.

Click on image for more details

STEP 78
:

Place the L17 upper-speed brake arm on the stem
assembly and secure it with an M4 x 12mm countersunk
screw.

Click on image for more details

STEP 79
:

Place L18 Speed brake Handle on the upper arm and
secure with Qty 2, M4 x 10mm countersunk screws.

Click on image for more details

STEP 80
:

Insert Qty4, 684 bearings into the L19 Link assy. You may need to apply glue to secure the bearings.
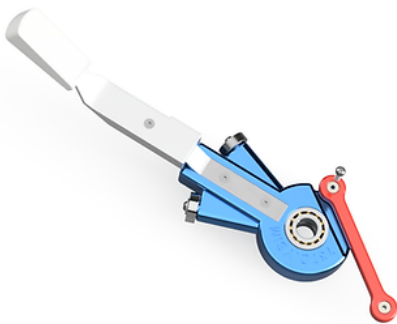
Click on image for more details

STEP 81
:

Secure the link with an M4 x 16mm dome head screw

Click on image for more details

STEP 82
:

Insert an M4 x 16mm dome head screw into the lower link bearings. At this point, you NEED to connect the hall sensor to a computer via an interface card such as a Leo Bodnar. Set the handle to the mid position and then ensure the Sensor is mid position. Secure in place. You do not want to build the whole unit to have to take it apart to align the sensors!
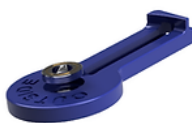
Click on image for more details

STEP 83
:

Insert a 688 bearing into the L20 Start stem.

Click on image for more details

STEP 84
:

Turn the unit over and insert another 688 bearing.

Click on image for more details

STEP 85
:

Insert an M4 x 14mm Socket head screw through the 7.9mm expansion spring hoop. Secure in the stem

Click on image for more details

STEP 86
:

Use L21 Start stem template to create an aluminium replica in 3mm x 10mm bar. Secure the L22 Start Handle with Qty2, M3 x 12mm countersunk screws.

Click on image for more details

STEP 87
:

Insert an M4 x 5mm socket head screw into the start lever L21.
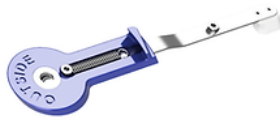
Click on image for more details

STEP 88
:

Place the start lever assy L21 into the stem L20 as shown.

Click on image for more details

STEP 89
:

Secure the L21 lever into the stem through the spring with an M4 x 14mm socket head screw.

Click on image for more details

STEP 90
:

Turn the unit over, and place another 7.9mm spring onto the screw threads that protrude through the unit.

Click on image for more details

STEP 91
:

Place start lever into position.

Click on image for more details

STEP 92
:

Place the #1 throttle assembly on top of the start lever assembly.
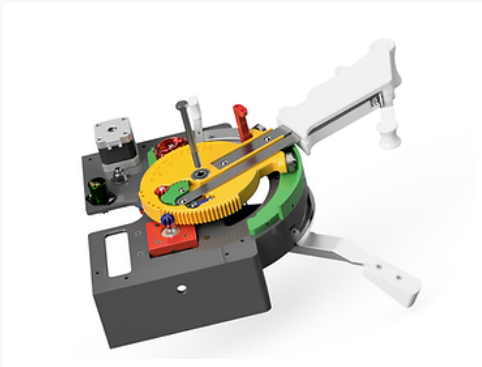
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STEP 93
:

Insert an M8 x 80mm Bolt
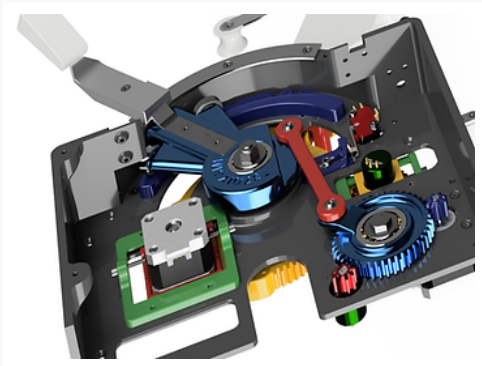
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STEP 94
:

Turn the unit over and s ecure the bolt with a washer and M8 lock nut. Do not overtighten.
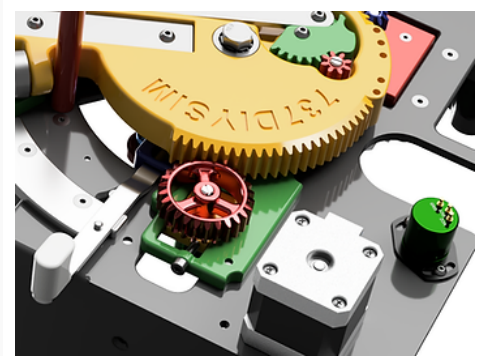
Click on image for more details

STEP 95
:

Adjust the tension of the hall sensor to the throttle spur gear by adjusting the tension on the socket head screw. At this point, you NEED to connect the hall sensor to a computer via an interface card such as a Leo Bodnar. Set the handle to the mid position and then ensure the Sensor is mid position. Secure in place. You do not want to build the whole unit to have to take it apart to align the sensors!
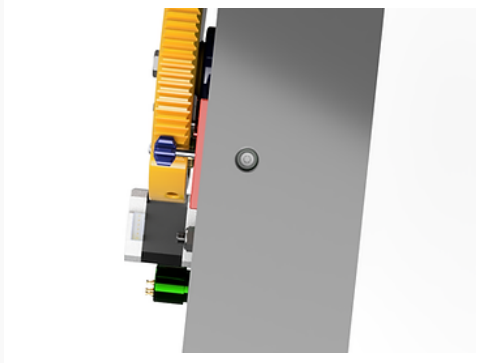
Click on image for more details

STEP 96
:

Adjust the tension of the throttle drive plate through the maintenance hole on the LHS body case.

Click on image for more details

STEP 97
:

Use 12v white or warm white led strips in the speed brake decal recess.
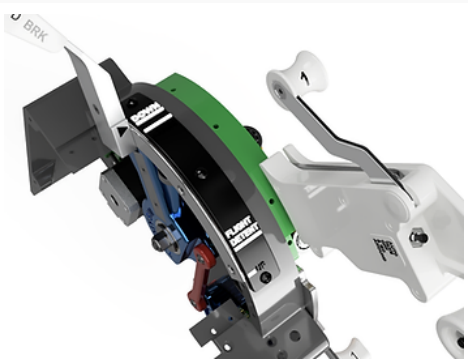
Click on image for more details

STEP 98
:

Place the Speed brake decal L23 onto the unit and secure it with Qty 3, M4 x 8mm Dome head screws.

Click on image for more details

STEP 99
:

Insert C2 centre body on the LHS body C1.
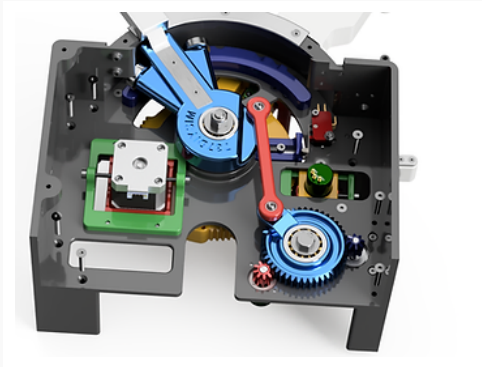
Click on image for more details

STEP 100
:

Secure the C2 centre assembly to the LHS body with Qty 7, M4 x 25mm countersunk screws.

Click on image for more details

STEP 101
:

Insert 12v LED strips into L24 SPD BRK Case

Click on image for more details

STEP 102
:

Place the L25 Trim Decal onto the L24 Spd Case. Secure with Qty 2, M4 x 8mm Dome Head Screws.
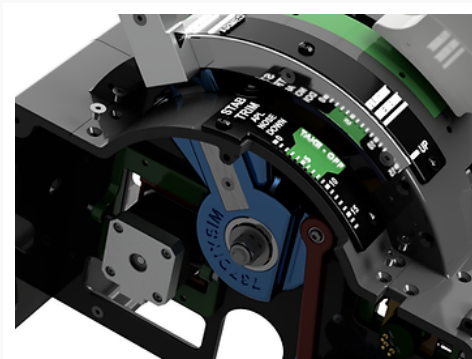
Click on image for more details

STEP 103
:

Secure with Qty 4, M4 x 10mm countersunk screws.
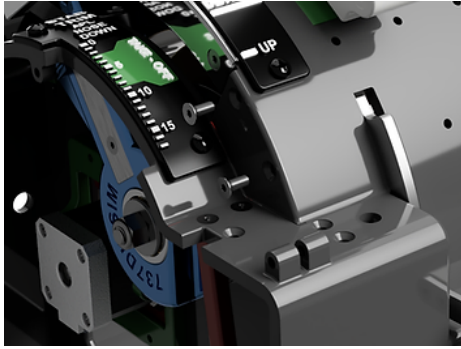
Click on image for more details

STEP 104
:

Use a further Qty 2, M4 x 10mm Countersunk screws at
this location.
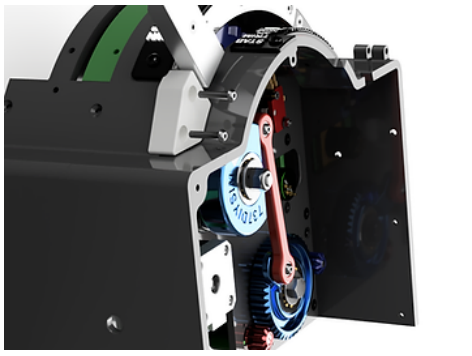
Click on image for more details

STEP 105
:

Place the L25 Speed Brake Block with Qty 2, M4 x
20mm Dome head screws.

Click on image for more details

STEP 106
:

Place a 684 onto the Bearing detent lever L26) Secure
with an M4 x 10mm Dome head screw

Click on image for more details

STEP 107
:

Place a 5mm x 15mm spring on the other end of the lever.

Click on image for more details
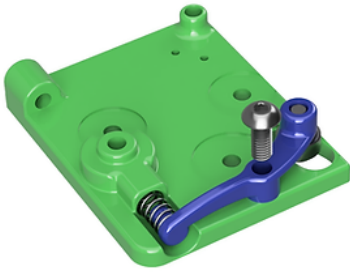
STEP 108
:

Place the L26 Detent lever on L27 Park Brk Case. Secure with an M4 x 10mm dome head screw.

Click on image for more details
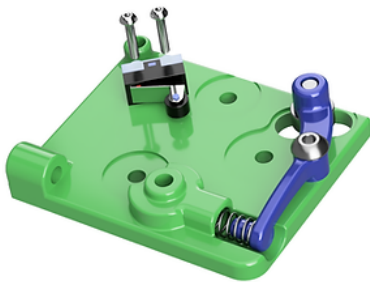
STEP 109
:

Install the ultra-mini microswitch with Qty 2, M2 x 10mm dome head screws.

Click on image for more details
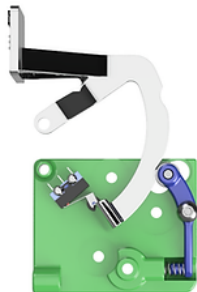
STEP 110
:

Place the parking brake lever L28 on the base.

Click on image for more details
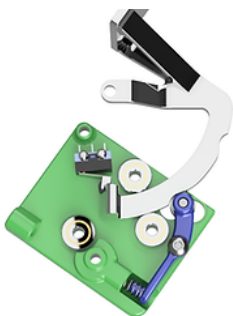
STEP 111
:

Place Qty3, 604 bearings onto the base.

Click on image for more details

STEP 112 :

Install the Park Brake Cap L29 on top of the bearings. Secure with Qty 3, M4 x 10mm countersunk screws.

Click on image for more details

STEP 113 :

Place the servo into L30 Servo Mount. Secure with M4 x 6mm screws dome head screws.

Click on image for more details
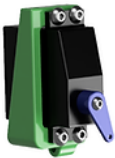
STEP 114 :

Place a standard servo arm to the servo and secure with the supplied screw.

Click on image for more details

STEP 115 :

Install a 604 bearing in the arm. Secure with an M4 x 10mm dome head screw

Click on image for more details

STEP 116:

Attach the L32 Link to the Arm L31 with an M2 x 10mm dome head screw.

Click on image for more details

STEP 117:

Place the arm assembly onto the base and secure it with an M4 x 20mm dome head screw.
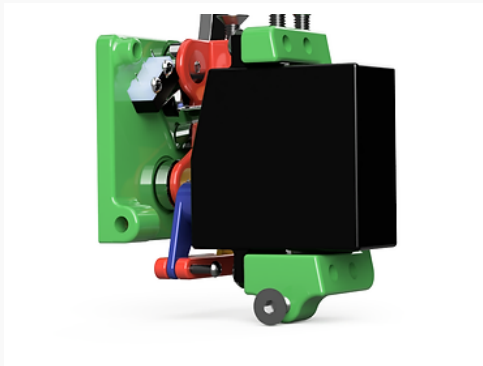
Click on image for more details

STEP 118:

Place the servo on top of the Park brake assembly. Attach the Link L32 with an M2 x 10mm dome head screw.
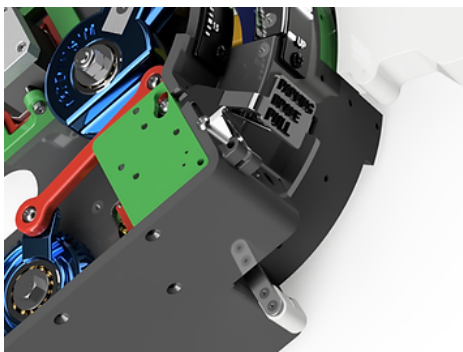
Click on image for more details

STEP 119:

Place the park brake unit into the LHS body. Ensure the brake lever arm sits between the locating spigots. Secure the lever with an M4 x 20mm dome head screw.

Click on image for more details
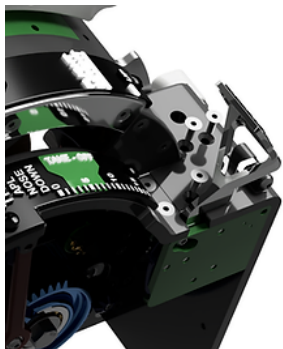
STEP 120
:

Secure the park brake assembly with Qty 3, M4 x 10mm countersunk screws

Click on image for more details
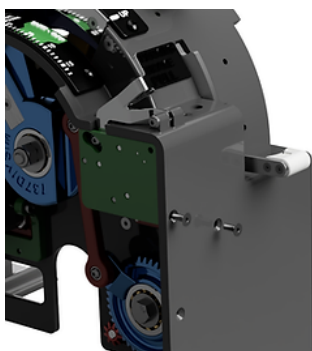
STEP 121
:

Use two further M4 x 10mm countersunk screws on the side.

Build Guide
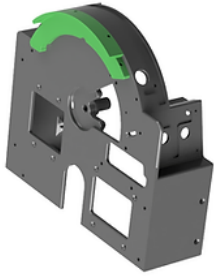
STEP 122:

Install the throttle guide Plate (R1) on the case(C3).

Click on image for more details
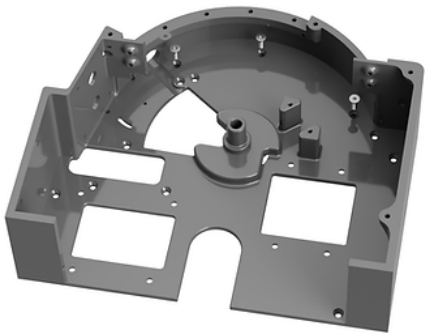
STEP 123:

Attach with Qty 3, M4 x 10mm countersunk screws.

Click on image for more details
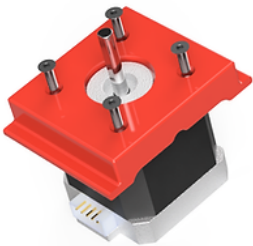
STEP 124:

Install the Nema sliding plate R3 on the stepper motor. Secure with Qty 4, M3 x 6mm Countersunk Screws.

Click on image for more details

STEP 124.1:

Place the R2 spur gear 8T onto the end of the shaft. This should be a tight friction fit. If the unit is too loose, shrink the component slightly and reprint.

Click on image for more details
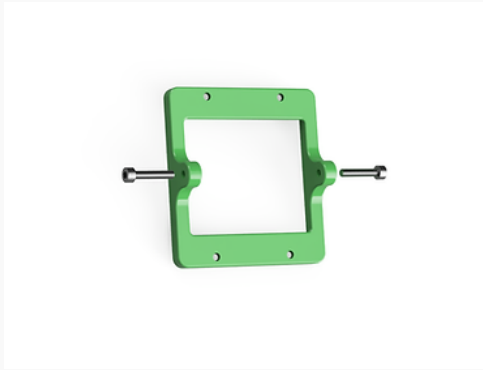
Click on image for more details

STEP 125
:

Install Qty 2, M4 x 30mm screws into the holding lugs of item R4
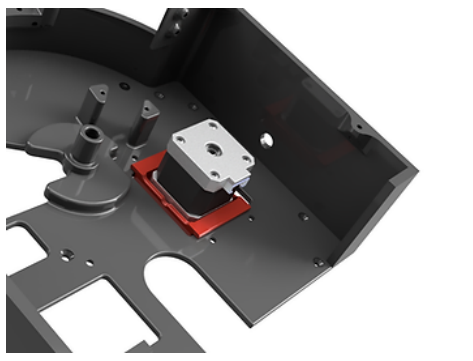
Click on image for more details

STEP 126
:

Place the motor assy on the case as shown, Ideally the stepper motor connection should face down.
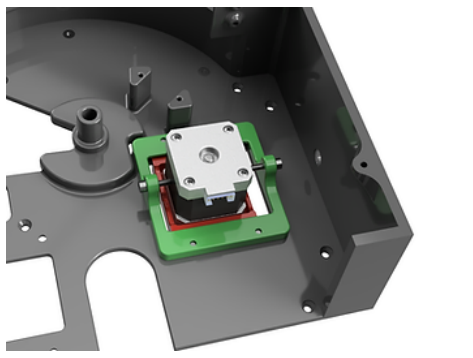
Click on image for more details

STEP 127
:

Place the Drive clamp R4 over the top and secure with Qty 4, M4 x 10mm countersunk screws from the backside.
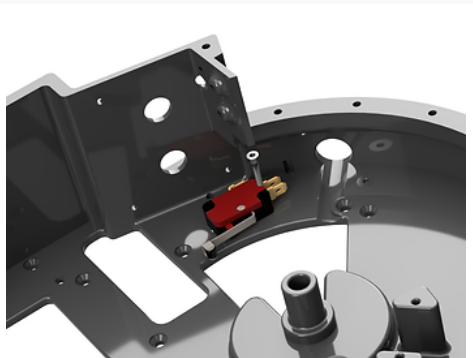
STEP 128
:

Install the long arm microswitch with a roller into position. Place an m3 x 14mm screw through the upper hole. Ensure the unit is free to rotate.
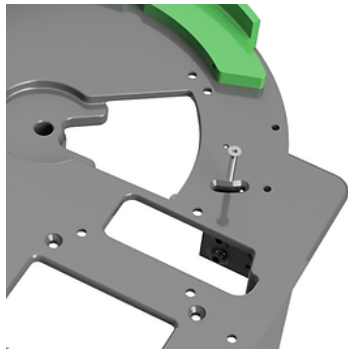
STEP 129:

Insert an M3 x 20mm countersunk screw through the banana slot into the lower hole of the microswitch. Secure with an M3 locknut. Adjust the microswitch arm so that the roller protrudes into the cutout orrifce.

Click on image for more details

STEP 130:

Install Qty2, M2 x 8mm screws into the Hall sensor and sliding plate R6

Click on image for more details

STEP 131:

Install an M4 x 25mm Bolt into the adjustment lug as shown.

Click on image for more details

STEP 132:

Install the spur gear R5 onto the pot shaft. This should be a tight friction fit. There is a hole for an M3 grub screw if required.
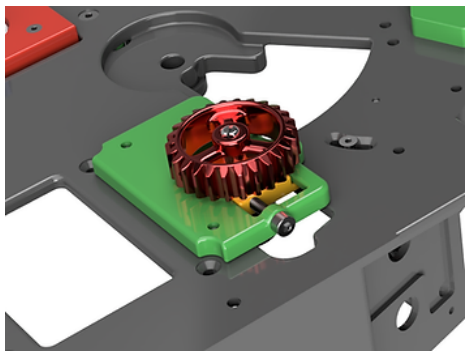
Click on image for more details

STEP 133:

Place the Hall Assy on the flat side of C3
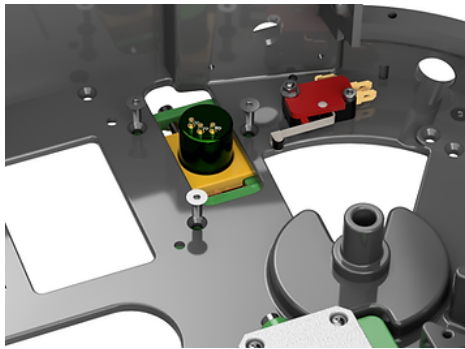
Click on image for more details

STEP 134:

Secure with Qty 3, M4 x 10mm Countersunk Screws

Click on image for more details

STEP 135:

Install the Nema 17 stepper motor onto the sliding plate R9. Secure with Qty 4, M3 x 6mm screws.

Click on image for more details

STEP 136:

Instal the tension bolt M4 x 20mm into the adjustment lug.
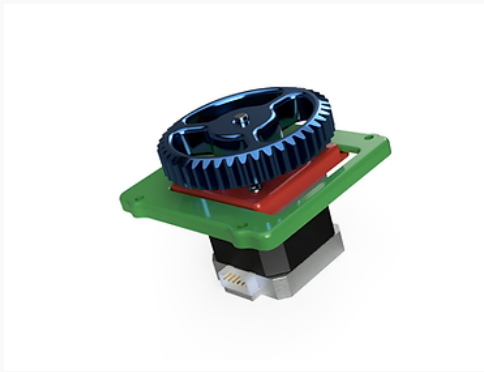
Click on image for more details

STEP 137:

Install spur gear R8 onto the shaft. This should be a very tight friction fit.
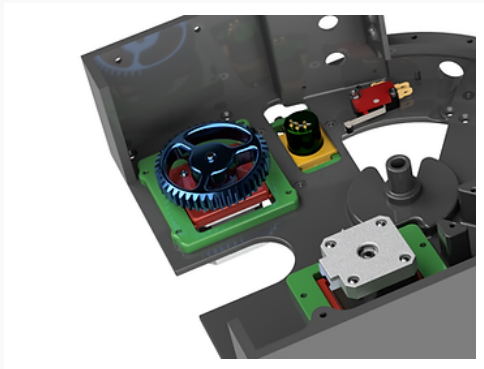
Click on image for more details

STEP 138:

Place the drive assy into the case C3
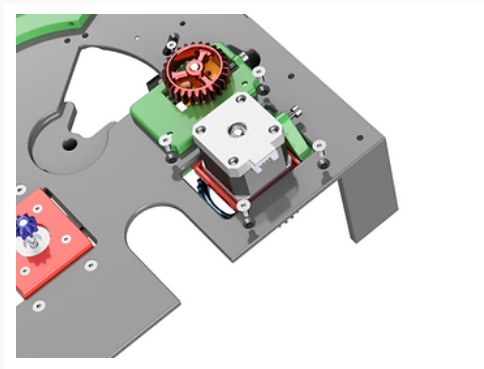
Click on image for more details

STEP 139:

Secure with Qty 4, M4 x 10mm countersunk screws.
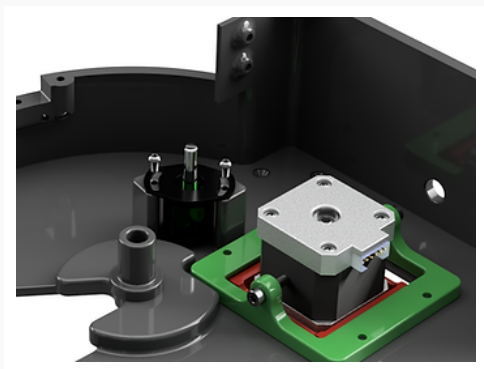
Click on image for more details

STEP 140:

Place the hall sensor with the supplied mounting plate over the support lugs. Secure with Qty 2, M3 x 6mm dome head screws.

Click on image for more details
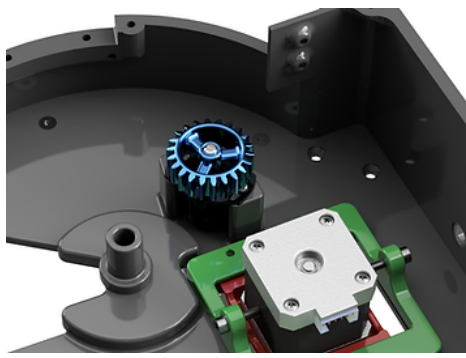
STEP 141:

Place the Spur gear R11 onto the hall sensor shaft. It should be a tight fit, there is an orifice for an additional M3 grub screw if required.

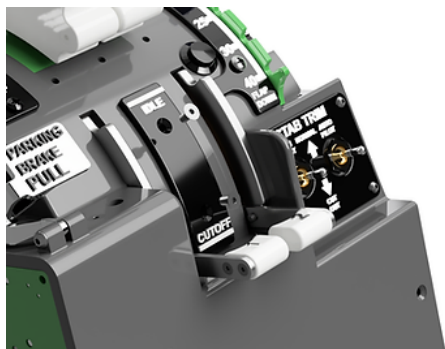**Click on image for more details**
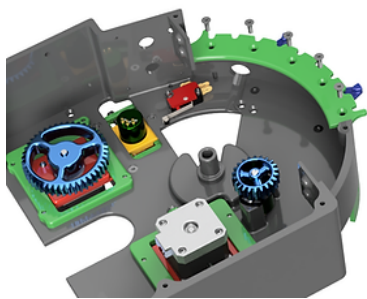
STEP 142:

Place the Flaps detent bracket (R12) into position and secure with Qty 5, M4 x 12mm countersunk screws

Click on image for more details
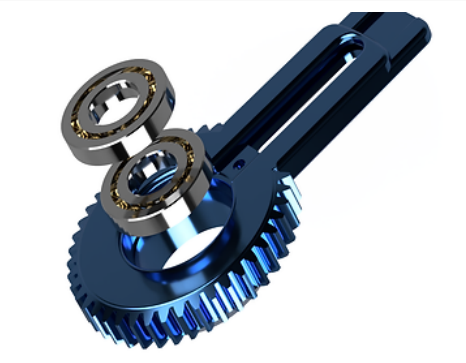
STEP 143:

Insert Qty 2, 6002 bearings into the flaps stem (R17). Ensure the bearings are flush with the inboard surface.

Click on image for more details

STEP 144:

Insert the Flaps handle R13 on flaps stem R13. Secure with an M3 x 16mm countersunk screw. You can print the upper stem (R13) and use it as a template for the aluminium bar.

Click on image for more details

STEP 145 :

Insert the Flaps Caddy R15 on the upper stem R13. Insert the lower stem R16 into the caddy and secure it with an M4 x 16mm countersunk screw. The screw should protrude out the other side. This is used for the location of the lever. You will need an M4 tap to create threads in the aluminium bar of the lower stem R16. This will enable the screw to tighten against the aluminium bar.

Click on image for more details

STEP 146 :

The shows how the assembly should look from the backside and how the screw needs to protrude out.

Click on image for more details

STEP 147 :

Place the flaps lever assy into the flaps stem assy. Use an M4 x 10mm dome head screw to secure the expansion spring (approx. 5mm x 38mm) into position at the lower end.

Click on image for more details
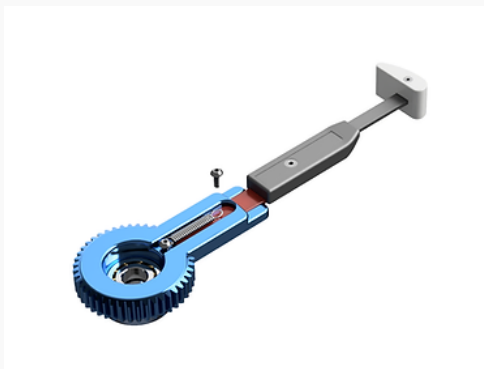
STEP 148 :

Secure the other end of the spring with an M4 x 10mm dome head screw.

Click on image for more details
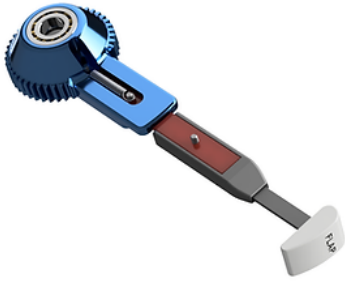
STEP 149
:

Place another expansion spring (approx. 5x38mm over the protruding screw ends.

Click on image for more details
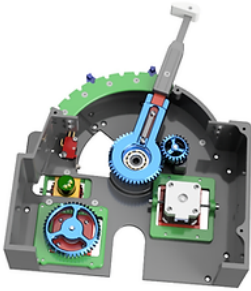
STEP 150
:

Place the flaps lever into position. At this point, you NEED to connect the hall sensor to a computer via an interface card such as a Leo Bodnar. Set the handle to the mid position and then ensure the Sensor is mid position. Secure in place. You do not want to build the whole unit to have to take it apart to align the sensors!

Click on image for more details

STEP 151
:

Insert Qty 2 on/off toggle switches into the stab trim cutout position. Secure with the supplied lock nuts.

Click on image for more details
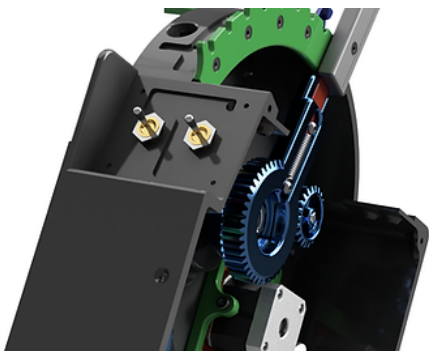
STEP 152
:

The lock nuts and thread protrusion of the toggle switches on the outside need to be adjusted to suit your needs when the decal is placed into position.

Click on image for more details

Click on image for more details
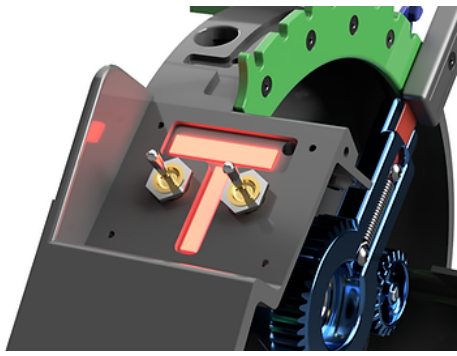
STEP 153 :

Place 12v Led strip (warm white) into the recess and connect the necessary wires. Feed the cables through the cut out into the internal body space.

Click on image for more details

STEP 154 :

Place the decal into position and secure with Qty 4, M3 x 6mm Dome head screws.

Click on image for more details
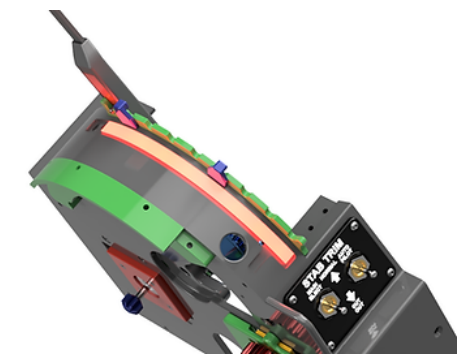
STEP 155 :

Place 12v Led warm white strip lighting into the flaps decal recess. Connect the wires and feed them through the hole into the internal body space.

Click on image for more details
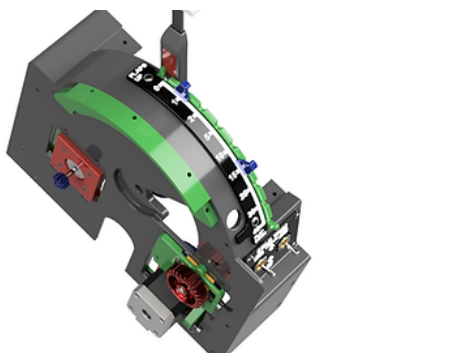
STEP 156 :

Place the flaps decal on and secure with Qty2, M4 x 6mm dome head screws.
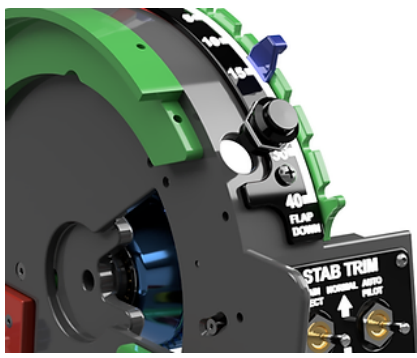
STEP 157 :

Insert the 16mm push button into position (after connecting the cables). This should be a tight friction fit. addition hot glue may be required.
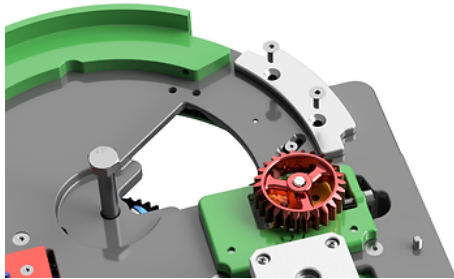
Click on image for more details

STEP 157.1 :

Using Qty2, M4 x 10mm Screws, secure R20 to the case. Ensure they are flush, or below the surface.
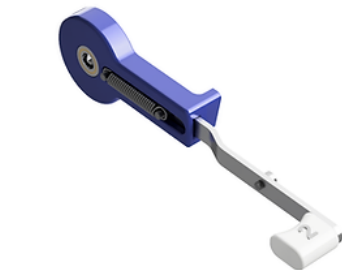
Click on image for more details

STEP 158 :

Build the No2 start lever the same way as No1 (steps 83 to 90)
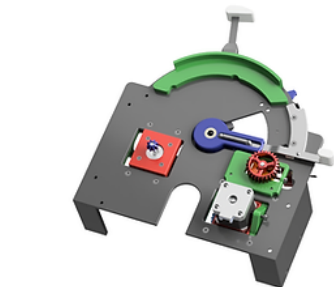
Click on image for more details

STEP 159 :

Place the No2 start lever into position.

Click on image for more details

STEP 160:

Build the no2 throttle like No1. (Steps 1 to 42)

Click on image for more details

STEP 161:

Place the No2 throttle over the start lever

Click on image for more details

STEP 162:

Insert an M8 x 80mm bolt through the unit. At this point, you NEED to connect the hall sensor to a computer via an interface card such as a Leo Bodnar. Set the handle to the mid position and then ensure the Sensor is mid position. Secure in place. You do not want to build the whole unit to have to take it apart to align the sensors!
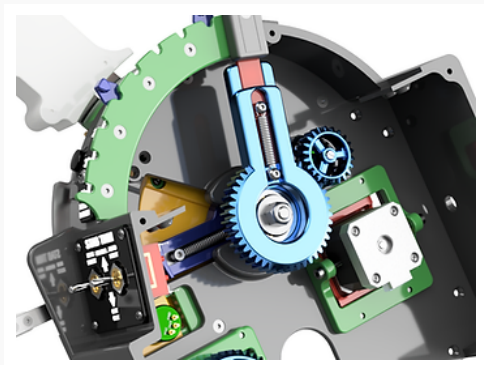
Click on image for more details

STEP 163:

Secure with an M8 washer and locknut. Do not overtighten.

Click on image for more details

STEP 164 :

Place the RHS assembly onto the LHS assembly
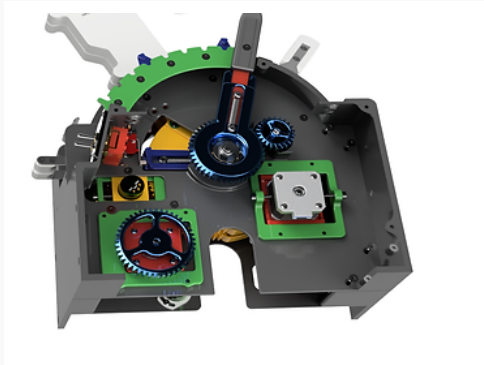
Click on image for more details

STEP 165 :

Secure the two parts together with Qty 6, M4 x 25mm countersunk screws.
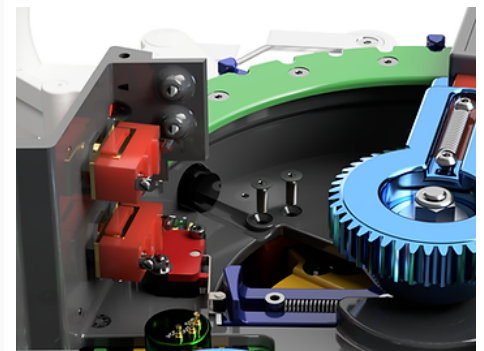
Click on image for more details

STEP 165.1 :

Secure the reverse lock with Qty 2, M4 x 12mm countersunk Screws
(Thanks to Ido for the missed step)

Click on image for more details

STEP 166 :

Place 12v led strip into the recess of R24

Click on image for more details

STEP 167:

Place the decal R25 into position and secure it with Qty 2, M4 x 8mm dome head screws.

Click on image for more details
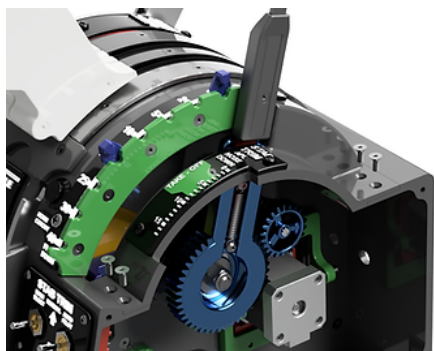
STEP 167.1:

Place the flaps case assembly into position and secure with Qty 4, M4 x 10mm Countersunk Screws.

Click on image for more details

STEP 168:

Place the Fuel Cutout Decal (Tw29) into Position and secure with Qty 2, M4 x 8mm Countersunk Screws.

Click on image for more details

STEP 169:

Place TW30 & 31 together. Secure to the centre section with Qty 3, M4 x 16mm Countersunk Screws.

Click on image for more details

STEP 170 :

Repeat for the other sections(TW30 to TW37) and secure with M4 x 16mm countersunk screws.
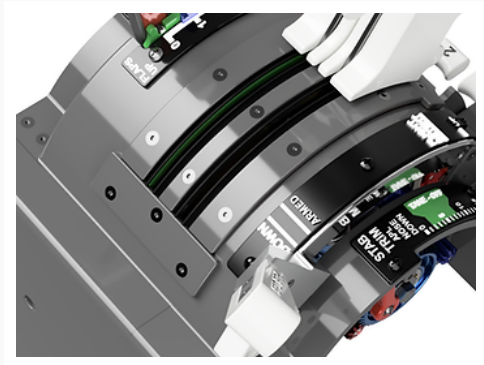
Click on image for more details

STEP 171 :

The strips should look like this when finished.

Click on image for more details

Build Guide

STEP 172
:

Insert Tw15 into TW14. Glue into position. Secure with an additional Qty 2, m4 x 6mm countersunk screws. Create two of these units.

Click on image for more details

STEP 173
:

Insert the manual handle TW18 into the trim wheel

Click on image for more details

STEP 174
:

Insert the FWD plate TW19 into position and secure it with Qty2, M4 x 6mm countersunk screws. Repeat for the aft plate TW20.

Click on image for more details

STEP 175
:

Insert a 6203 bearing into the LH end cap TW1. Secure with glue.
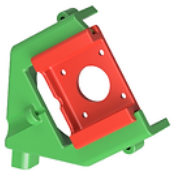
Click on image for more details

STEP 176
:

Place TW4 sliding plate into TW5 stepper mount
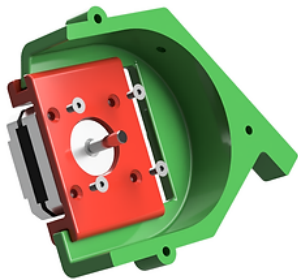
Click on image for more details

STEP 177
:

Secure the stepper with Qty 4, M3 x 6mm screws

Click on image for more details

STEP 178
:

Insert an M4 x 35mm screw for tension setting.

Click on image for more details

STEP 179
:

Place the Spur gear TW6 onto the stepper shaft. It should be a tight Friction fit.
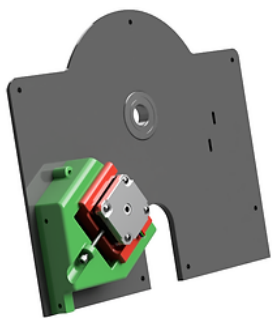
STEP 180
:

Place the assembly onto the inside the LH end cap.
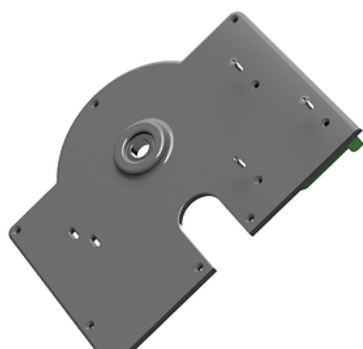
STEP 181
:

Secure with Qty3, M4 x 14mm countersunk screws.
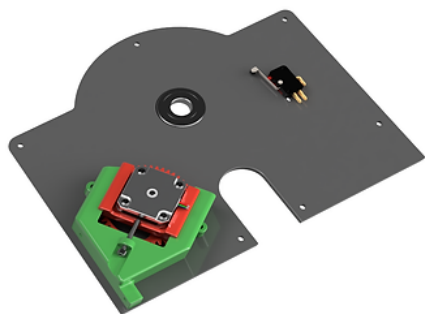
STEP 182
:

Place the microswitch on the end plate
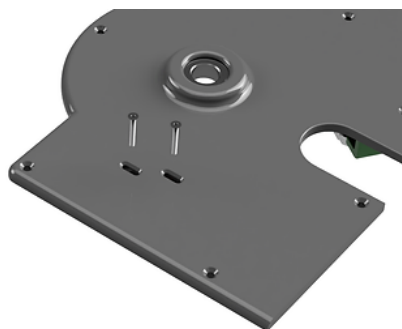
STEP 183
:

Insert Qty 2, M3 x 22mm countersunk screws.
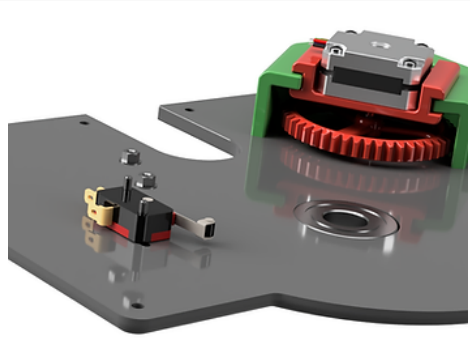
STEP 184
:

Secure the assembly with Qty 2, M3 locknuts.

Click on image for more details

STEP 184.1
:

Insert the 6203 Bearing into the trim indicator wheel

Click on image for more details

STEP 184.2
:

Insert the TW3 Spur gear into the 6203 Bearing
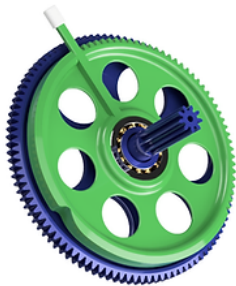
Click on image for more details

STEP 184.3
:

Place the spacer collar TW7 onto the shaft which protrudes.
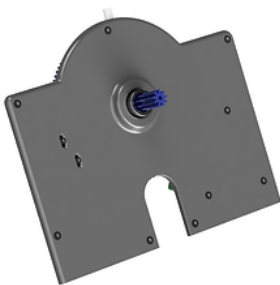
Click on image for more details
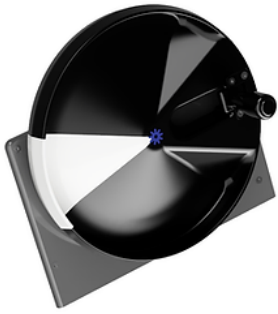
STEP 184.5
:

Place the Trim wheel onto the shaft.

Click on image for more details
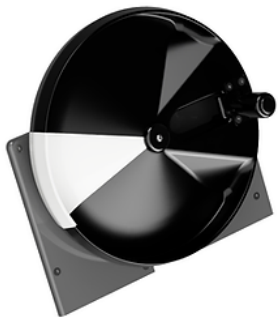
STEP 184.6
:

Place the Trim wheel cap over the shaft and secure it with an M4 x 25mm Screw.

Click on image for more details
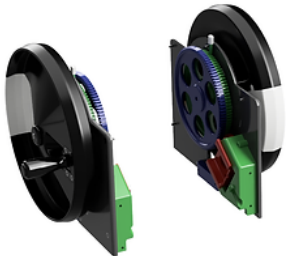
STEP 185
:

Repeat for the RHS end cap

Click on image for more details

STEP 186
:

Cut a length of m12 threaded rod to 262mm long. Place an m12 locknut on one end

Click on image for more details

STEP 187 :

Insert a 6002 bearing onto the rod

Click on image for more details

STEP 188 :

Place the bearing cap TW21 over the bearing

Click on image for more details

STEP 189 :

Insert the pinion insert Tw23

Click on image for more details

STEP 190 :

secure with an M12 locknut

Click on image for more details

STEP 191 :

Insert the spur gear Tw27

Click on image for more details

STEP 192 :

Secure again with an M12 lock nut

Click on image for more details

STEP 193 :

Place an M12 locknut approx 86mm away from the lower locknut

Click on image for more details

STEP 194 :

Place a 6002 onto the rod against the lock nut.

Click on image for more details

STEP 195 :

Insert the centre bearing cap TW26

Click on image for more details

STEP 196 :

Insert the pinion insert TW25

Click on image for more details

STEP 197 :

Secure with an M12 locknut

Click on image for more details

STEP 198 :

Place the spur gear TW28 over the locknut

Click on image for more details

STEP 199 :

Secure with an M12 locknut

Click on image for more details

STEP 200 :

Place the Spur Gear Tw27 over the lock nut

Click on image for more details

STEP 201 :

Secure with an M12 locknut

Click on image for more details

STEP 202 :

Place the RH insert TW24 into position on the rod

Click on image for more details

STEP 203:

Place the 6002 bearing and bearing cap Tw22 onto the rod

Click on image for more details

STEP 204:

Secure with a M12 locknut.

Click on image for more details
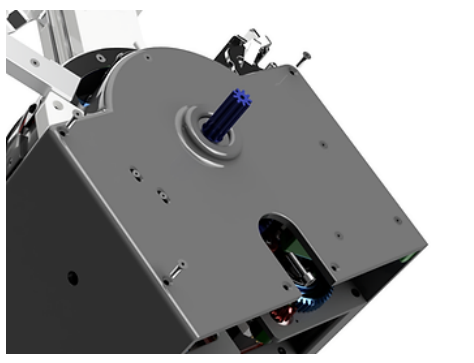
STEP 205:

Place the end cap onto the assy. Secure with M4 x 14mm countersunk screws.

Click on image for more details
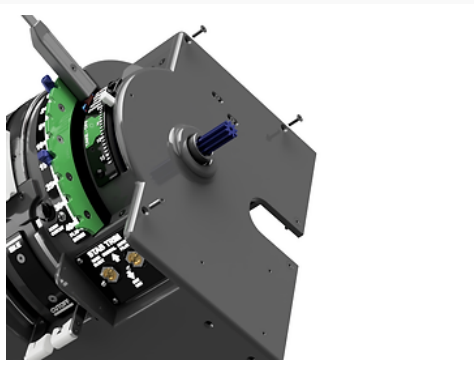
STEP 206:

Repeat for the RHS end cap assembly. M4 x 14mm screews

Click on image for more details
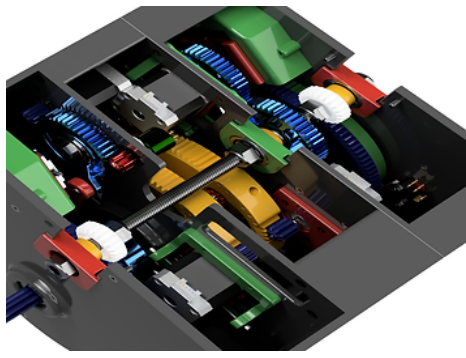
STEP 207 :

Place the drive pinion assy into position and adjust to align all the gears.

Click on image for more details
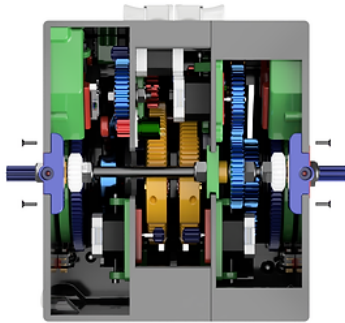
STEP 208 :

Install the push blocks with Qty 4, M4 x 16mm countersunk screws.

Click on image for more details
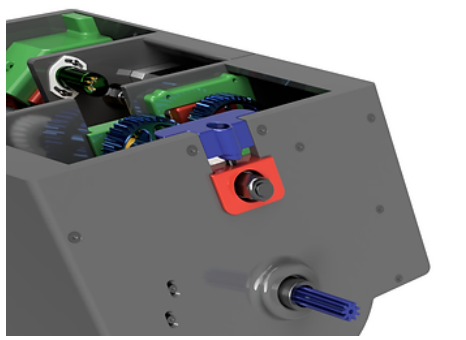
STEP 209 :

Insert two, M4 x 22mm screws and lightly tighten against the drive pinion assembly. Do not overtighten!

Click on image for more details
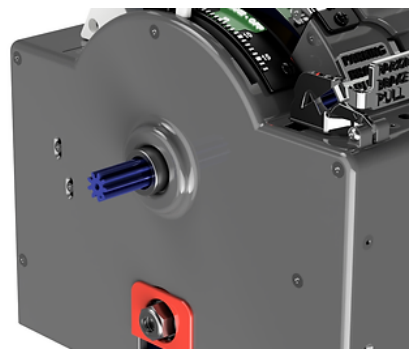
STEP 210 :

Place the spacers Tw7 into position

Click on image for more details

STEP 211
:

Place the trim wheel onto the shafts. Make sure they are indexed 180 degrees.

Click on image for more details

STEP 212
:

Secure with an M4 x 30mm screw and Tw17 cap.

Click on image for more details

Build Guide

STEP 1
:

Print parts C1A, C1B & C1C

Click on image for more details

STEP 2
:

Glue the parts C1A to C1B on the large lap joint. Ensure the glue is fully dry before moving the assembly.

Click on image for more details
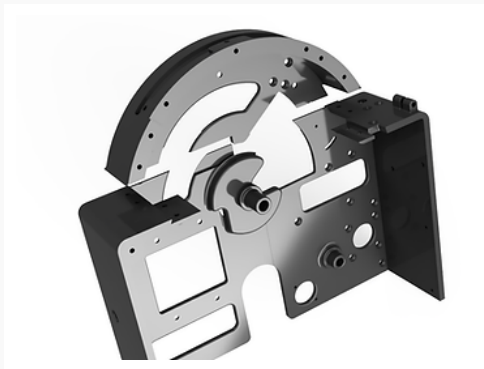
STEP 3
:

Glue the parts C1C to the assembly on the large lap joints.

Click on image for more details

STEP 4
:

Once the glue is dry insert Qty 4, M4 x 12mm Dome head screws for additional strength.

Click on image for more details

STEP 5
:

Print Parts C1a, C1b and C1C

Click on image for more details

STEP 6
:

Glue C2a & C2b, secure furthermore with Qty 3, M4 x 25mm Dome head screws.

Click on image for more details

STEP 7
:

Glue C2C to the assembly, secure furthermore with Qty 2, M4 x 18mm Countersunk head screws.

Click on image for more details

STEP 8
:

Print C3a, C3b & C3c

STEP 9

:

Glue C3a to C3c on the large lap joint. Do not move until fully cured. It will be fragile.
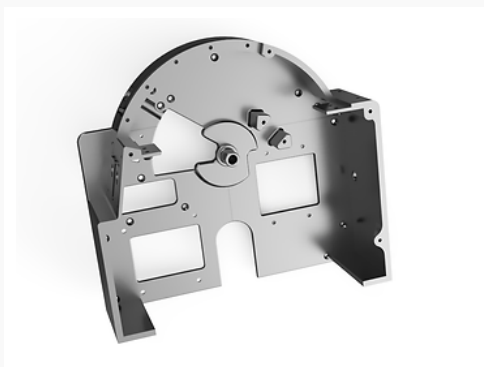
Click on image for more details

STEP 10

:

Glue C3b to the assembly on the large lap joints.

Click on image for more details

STEP 11

:

Secure the forward end with Qty 1, M4 x 18mm screw.

Click on image for more details

STEP 12

:

Secure the rear side with Qty 2, M4 x 14mm Dome head screws

STEP 13
:

Glue TW1 a,b,c together on the large lap joints. Repeat for TW8.

Click on image for more details

STEP 14
:

Push parts (102 & 103) together. make sure the screw holes align.
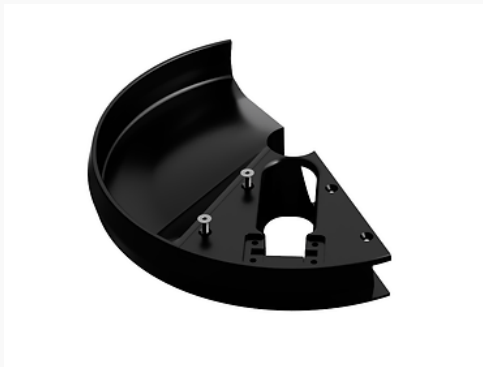
Click on image for more details

STEP 15
:

Insert QTY 2, M4 x 10mm Countersunk Screws.
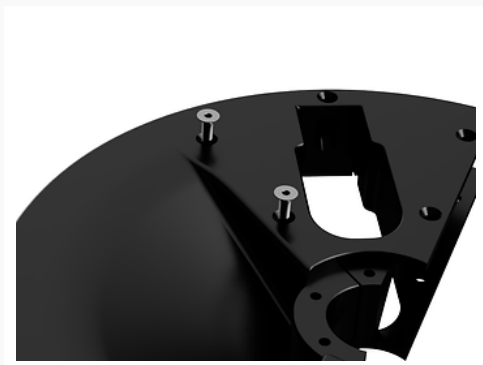
Click on image for more details

STEP 16
:

Turn the unit over and insert QTY 2, M4 x 10mm Countersunk Screws.

Click on image for more details

STEP 17

:

Insert part 101 into the assembly. ensure the screw holes align.

Click on image for more details

STEP 18

:

Insert QTY 2, M4 x 10mm Countersunk Screws.

Click on image for more details

STEP 19

:

turn the unit over and insert QTY 2, M4 x 10mm Countersunk Screws.
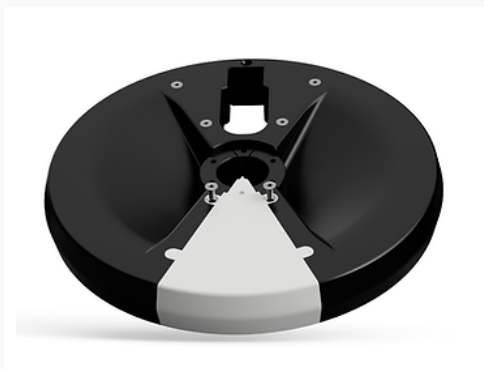
Click on image for more details

STEP 21

:

Insert part (104) of the white triangle into the assembly and secure with Qty 2, M4 x 10 mm countersunk screws. The remainder of the triangle was designed to be glued together.

Click on image for more details

STEP 22:

Insert the plug (100) into the centre

Click on image for more details
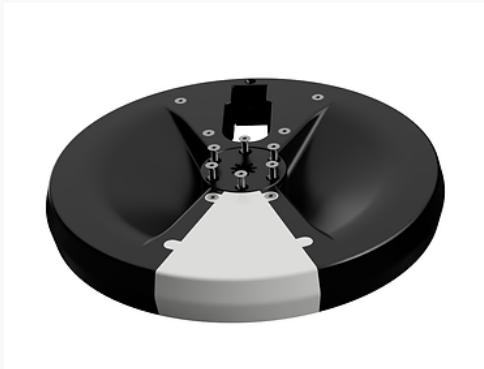
STEP 23:

Secure it with Qty 6, M4 x 10mm Screws.

Click on image for more details
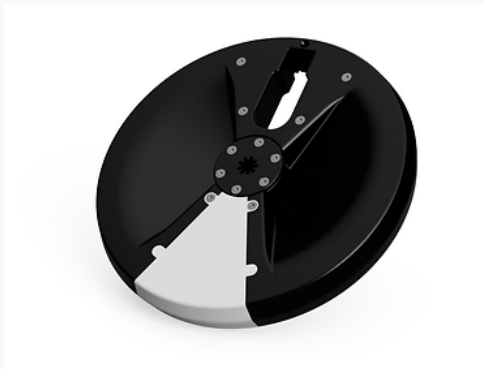
STEP 24:

The back should look like this

Click on image for more details

STEP 25:

The front should look like this. The rest of the trim wheel build is in the main build guide.

Click on image for more details

Motorized throttle quadrant V5 guide.

Only for PMDG 737 with MSFS using fsuipc7 and mobiflight.
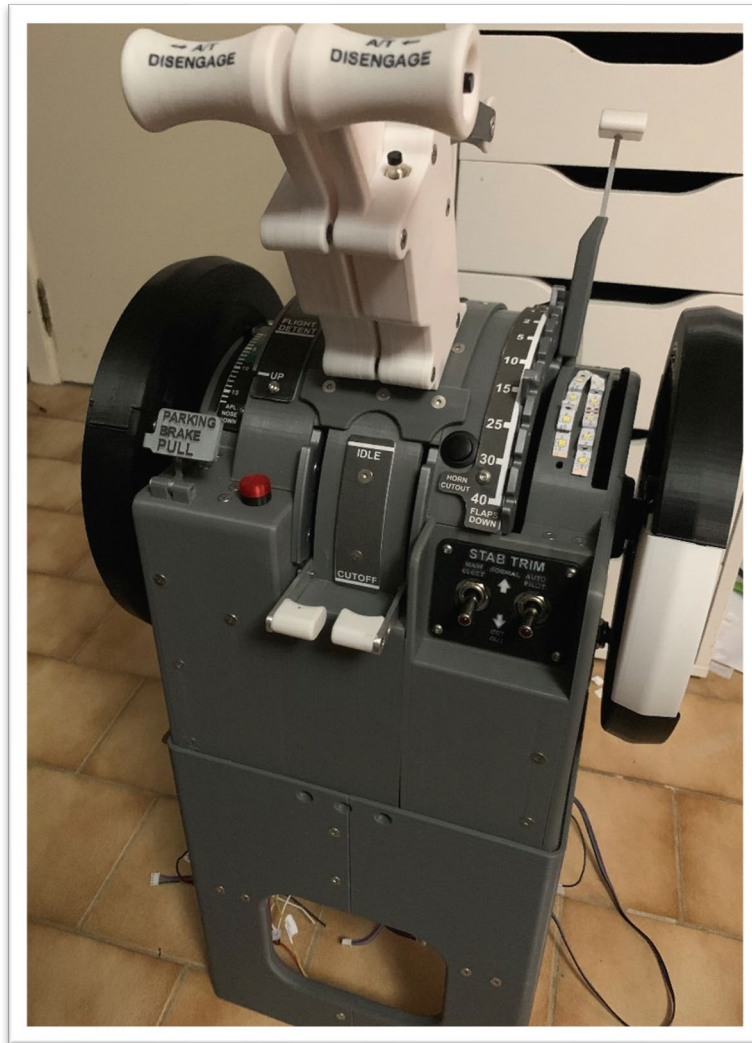
By secoendo(discord name).

Thank you ShakaZ for helping to test the system!

Design by: Karl Clarke www.737diysim.com

Introduction.

Welcome to this guide. I wanted to build the MTUv5 as realistic as possible. Unfortunately, prosim is required. After many hours I finally managed to get to a descent system. It isn't perfect but it is always a fight between realism and complexity. I hope you can get your MTU working just like mine! I divided this guide in steps going system by system (engines, parking brake, …). 1 Arduino mega is used for the whole MTU. So, in each wiring diagram the Arduino mega and power supply is always the same. After that signals go to Arduino nanos running code (included in this guide). The Arduino nanos then signal the stepper motor drivers. I recommend going step by step and testing in msfs before going to the next step. Make sure to watch each element of the links provided closely because sometimes the required changes are a bit hard to spot. For the power supply I use a 12 v 3A adapter: https://drive.google.com/file/d/1i0fOyZgviMlVDP969Zsi8FF2vJBZvsR_/view?usp=share_link

Before you start make sure the latest version of fsuipc7 for MSFS is installed and make sure that data broadcast for the PMDG 737 is enabled. You can find more information on data broadcast in the fsuipc7 folder where you can find a document called Offset Mapping for PMDG 737-700.pdf.

Step 1: Engine 1

1) Wiring diagram Eng 1 via this link:

Eng1 motor control unit
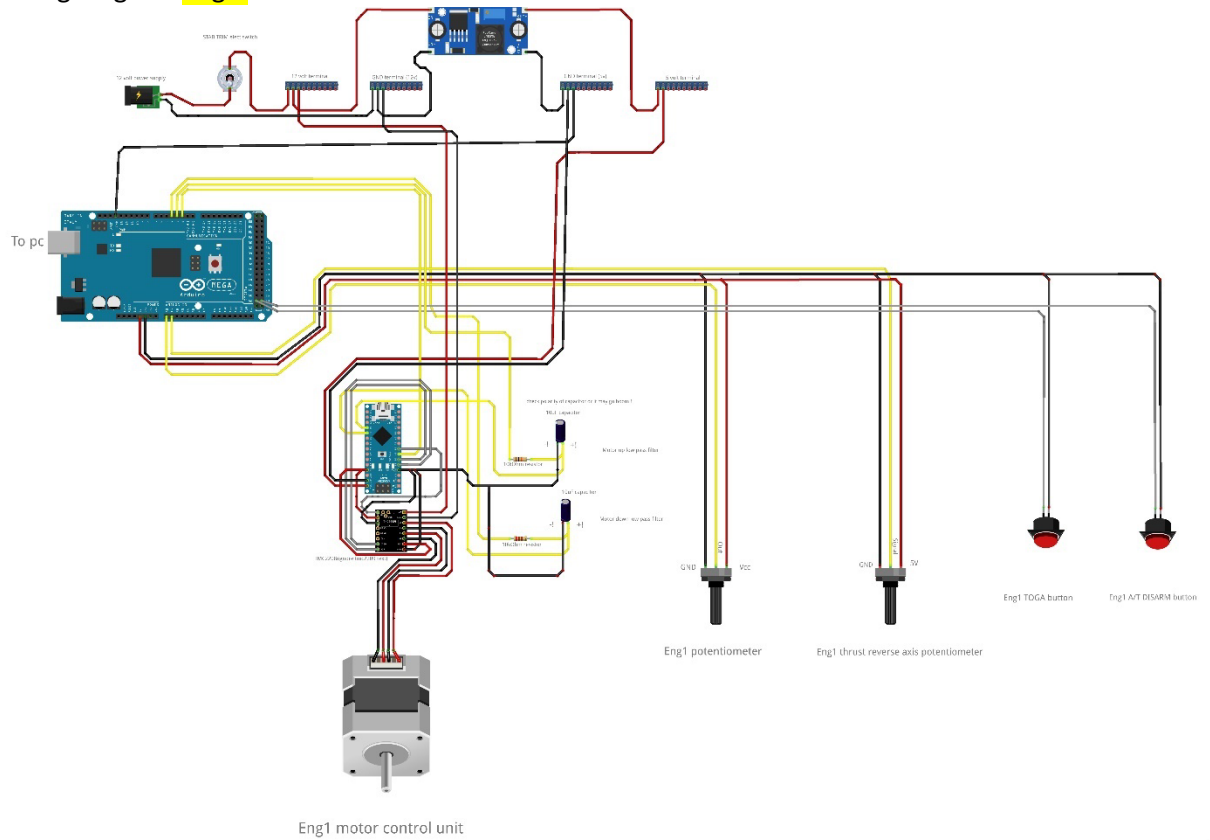
2)
Create following devices in mobiflight modules:
   a) Analog Input: Name= Eng1 thrust Sensitivity= 2 Pin= A0
   b) LED/Output: Name= Eng1 servo pwr Pin= 2
   c) LED/Output: Name= Motor up 1 Pin= 3
   d) LED/Output: Name= Motor down 1 Pin= 4
   e) Button: Name= Eng1 TOGA Pin= 52
   f) Button: Name= Eng1 AT DISARM Pin= 53
   g) Analog Input: Name= Eng1 REVERSE Sensitivity= 2 Pin= A1

3) Create a new <u>input</u> called <mark>Eng 1 RAW input</mark> with these settings:

4) Create a new <u>input</u> called <mark>Eng 1 TOGA</mark> with these settings:

5) Create a new <u>input</u> called <mark>Eng 1 A/T DISARM</mark> with these settings:

6) Create a new <u>input</u> called <mark>Eng 1 REVERSE RAW</mark> with these settings:

7) Create a new <u>output</u> called <mark>Eng 1 Reverse</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | **Compare** | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [= ▾] [1023]

set it to [0]

else set it to [ ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
150	1023
952	0

⭐ Add new   Remove

OK   Cancel

ConfigWizard

Sim Variable | Compare | **Display** | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Input Action

○ OnPress / OnRelease   ⦿ OnChange

Input Action

Define an action that will be executed when your config value changes.
You can reference the current config value with @ (not $).

On Change

Action Type   Microsoft Flight Simulator 2020

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft	Generic	Engines		Reset

Select Preset

THROTTLE1_SET   100 matches found.

Description

INTENDED FOR ANALOG POTENTIOMETER AND CUSTOM INPUT BOX.
Expected input range 0-16383.

☑ Show Preset Code

@ -6 * -6000 max 16383 min (>K:THROTTLE1_SET)

Supports input value (@) and placeholders ($,#, etc.)

OK   Cancel

Run mobi and write down the highest and lowest value (flight sim value in mobi)for the reverse line. Go to compare tab in settings and use these values to replace 150 and 952 in interpolation. This is to calibrate your reverse lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

a) Create a new <u>output</u> called <mark>Eng 1 input correction</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose [Input Action ▾]

◯ OnPress / OnRelease   ⦿ OnChange

Input Action

Define an action that will be executed when your config value changes.
You can reference the current config value with @ (not $).

On Change

Action Type [Microsoft Flight Simulator 2020 ▾]

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft ▾	Generic ▾	Engines ▾		Reset

Select Preset

[THROTTLE1_SET ▾]   100 matches found.

Description

INTENDED FOR ANALOG POTENTIOMETER AND CUSTOM INPUT BOX.
Expected input range 0-16383.

☑ Show Preset Code

@ 14.0147 * 0 max 16383 min (>K:THROTTLE1_SET)   [-]

Supports input value (@) and placeholders ($,#, etc.)

OK | Cancel

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [▾] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
404	1024
990	0

⭐ Add new   ✖ Remove

OK   Cancel

MF ConfigWizard

Sim Variable Compare Display Precondition

Select Variable Type ○ SimConnect (MSFS2020) ● MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

Variable Settings
Access a local variable by type and name.

Type Number ▾

Name potentiometereng1 ▾

More Options

☐ Transform $

Config References
Add references to other configs so that their values can be used in this config: Add Reference
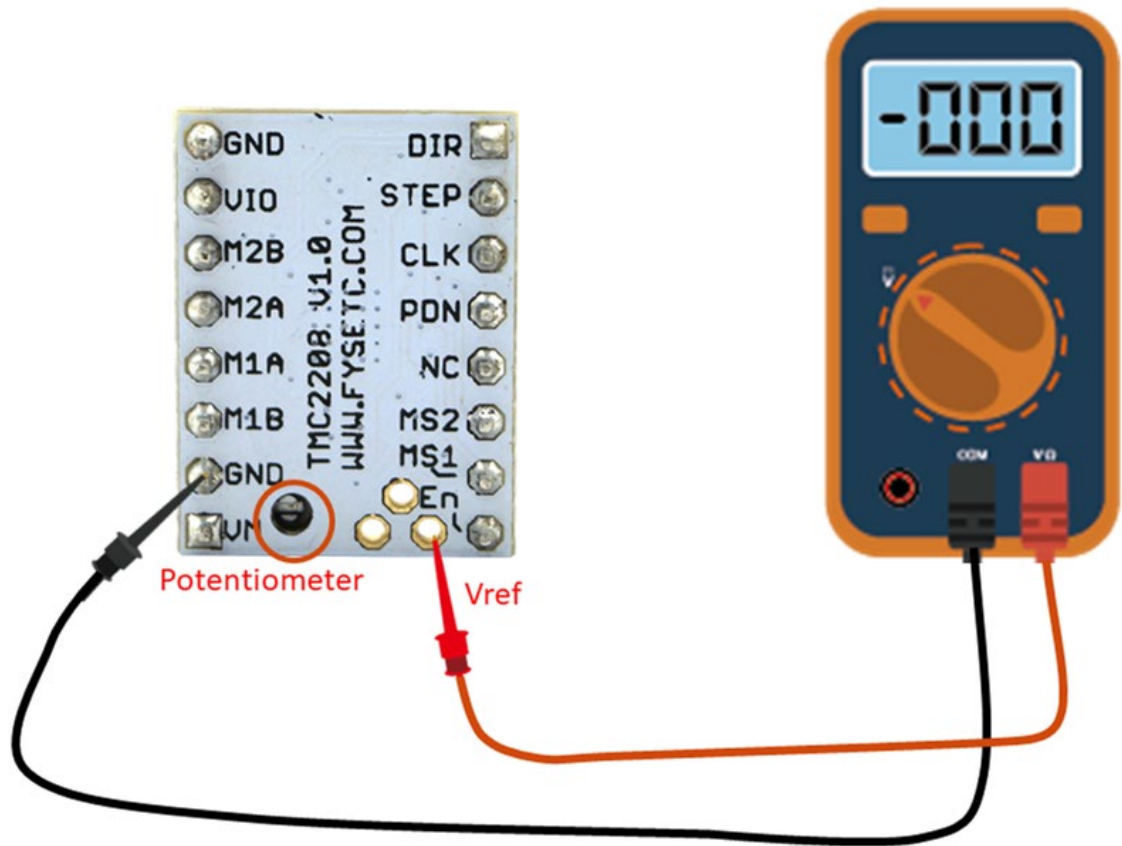
OK   Cancel

b) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the
    Eng1 input correction line. Go to compare tab in settings and use these values to replace
    404 and 990 in interpolation. This is to calibrate your thrust lever. If the lever in the sim
    works reversed, then swap the places of 0 and 1024.

8) Create a new <u>output</u> called <mark>Eng 1 sim position</mark> with these settings:

a)

MF ConfigWizard — ☐ ✕

Sim Variable Compare Display Precondition

Select Variable Type ⦿ SimConnect (MSFS2020) ○ MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

MSFS2020 (WASM)

Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft ∨	Generic ∨	Engines ∨		Reset

Select Preset

GENERAL ENG THROTTLE LEVER POSITION:index ∨   118 matches found.

Description

Percent of max throttle position

☐ Show Preset Code

More Options

☐   Transform $

Config References

Add references to other configs so that their values can be used in this config: [Add Reference]

[OK]   [Cancel]

b) Move the throttle levers on the MTU and make sure the output value for Eng 1 sim
position changes from 0 to 255. If this doesn't happen go to the compare tab in settings
and change the number 88 in interpolation so that you get close to 255. (don't use
numbers with a comma here).

9) Create a new <u>output</u> called <mark>Eng 1 real position</mark> with these settings:

MF ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [⌄] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value	Output Value
0	0
1024	255

⭐ Add new   ❌ Remove

OK   Cancel

10) Create a new <u>output</u> called <mark>Eng 1 sim vs real</mark> with these settings:

11) Create a new <u>output</u> called <mark>Eng 1 servo enabled</mark> with these settings: (uses fsuipc)

ConfigWizard   — □ ✕

Sim Variable   Compare   Display   Precondition

Choose your display type which is used for output from the list below.

Display type
Choose   Output Device   ⌄
Module   MobiFlight MTU/ SN-3e9-036   ⌄
Use type of   LED / Output   ⌄

Display settings
Select Pins   Eng1 servo pwr   ⌄   ☐ select multiple
PWM Mode   ☐ Enabled (Values 0-255)

Test current settings
▶ Test   ⬛ Stop

OK   Cancel

MF ConfigWizard   — ▢ ✕

Sim Variable | Compare | Display | Precondition

Select Variable Type ○ SimConnect (MSFS2020) ○ MobiFlight Variable ● FSUIPC Offset ○ X-Plane DataRef

Define the necessary FSUIPC information. Use an existing preset for common values.

Load preset

Use preset [∨] [use]

Base settings

Offset [0x643E]

Value Type [Int ∨]   Size in Bytes [1 ∨]

Mask value with [0xFF   ] [...]   ☐ BCD Mode

More Options

☐ Transform [$]

Config References

Add references to other configs so that their values can be used in this config: [Add Reference]

[OK]   [Cancel]

12) Create a new <u>output</u> called <mark>Eng 1 move up</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [< ∨] [13]

set it to [0]

else set it to [if($>254,254,$)]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value	Output Value
0	0
1024	1024

[Add new] [Remove]

[OK] [Cancel]

ConfigWizard

Sim Variable | Compare | Display | Precondition

Select Variable Type ● SimConnect (MSFS2020) ○ MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

MSFS2020 (WASM)

Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search
- show all - ∨	- show all - ∨	- show all - ∨		Reset

Select Preset

- Select Preset - ∨   3441 matches found.

Description

[   ]

☐ Show Preset Code

More Options

☑ Transform `A*12.7`

Config References

Add references to other configs so that their values can be used in this config: [Add Reference]

☑ use | ENG #1 sim vs real ∨ | as | A | [X]

[OK] [Cancel]

13) Create a new <u>output</u> called <mark>Eng 1 move down</mark> with these settings:

MF ConfigWizard   — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ▾

Module   MobiFlight MTU/ SN-3e9-036 ▾

Use type of   LED / Output ▾

Display settings

Select Pins   Motor down 1 ▾   ☐ select multiple

PWM Mode   ☑ Enabled (Values 0-255)

Test current settings

▶ Test   ◼ Stop

OK   Cancel

MF ConfigWizard   —   □   ✕

Sim Variable   Compare   Display   Precondition

Select Variable Type   ◉ SimConnect (MSFS2020)   ○ MobiFlight Variable   ○ FSUIPC Offset   ○ X-Plane DataRef

MSFS2020 (WASM)
Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search	
- show all - ✕	- show all - ✕	- show all - ✕		Reset

Select Preset

- Select Preset - ✕   3441 matches found.

Description

[   ]

☐ Show Preset Code

More Options
☑   Transform   A*-12.7

Config References
Add references to other configs so that their values can be used in this config: [Add Reference]

☑ use   ENG #1 sim vs real   ✕   as   A   ✕

[OK]   [Cancel]

14) Upload the Arduino sketch to the Arduino nano for engine 1
     a) https://drive.google.com/file/d/1saeciDUUgZgshfGzDahQWJrMWN0PdQCH/view?usp=s hare_link
15) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the thrust levers increase the reference voltage (this increases current to motor). Try to set a current level that is just enough so power consumption and heat production

is limited. I highly suggest using a heat sink on the stepper driver (if you don't already have one).

16) Make sure mobiflight is running and power is connected to the MTU (make sure stab trim is turned on if you used it as a power switch) you can now test engine 1 with and without auto throttle. Make sure to also test toga and auto throttle disconnect buttons.

Step 2: Engine 2

1) Wiring diagram <mark>Eng 2</mark> via this link:

Eng2 motor control unit
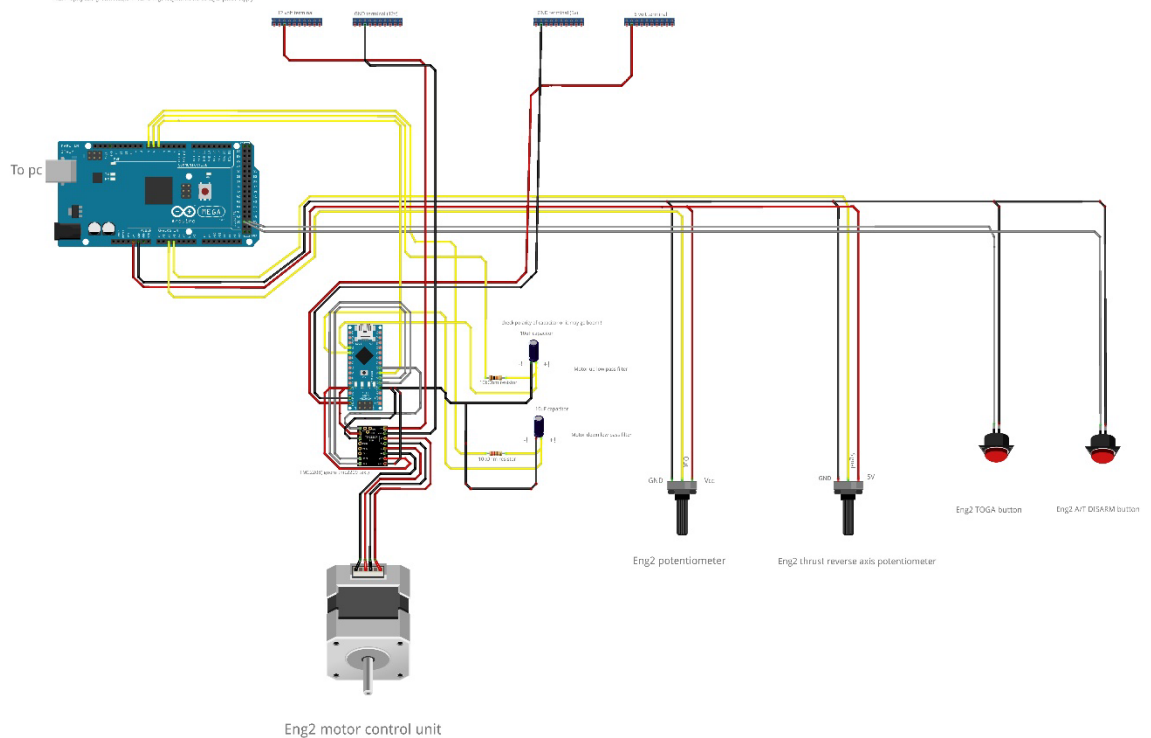
2) Create following devices in mobiflight modules:
   a) Analog Input: <u>Name</u>= Eng2 thrust <u>Sensitivity</u>= 2 <u>Pin</u>= A2
   b) LED/Output: <u>Name</u>= Eng2 servo pwr <u>Pin</u>= 5
   c) LED/Output: <u>Name</u>= Motor up 2 <u>Pin</u>= 6
   d) LED/Output: <u>Name</u>= Motor down 2 <u>Pin</u>= 7
   e) Button: <u>Name</u>= Eng2 TOGA <u>Pin</u>= 51
   f) Button: <u>Name</u>= Eng2 AT DISARM <u>Pin</u>= 50
   g) Analog Input: <u>Name</u>= Eng2 REVERSE <u>Sensitivity</u>= 2 <u>Pin</u>= A3

3) Create a new <u>input</u> called <mark>Eng 2 RAW input</mark> with these settings:

4) Create a new <u>input</u> called <mark>Eng 2 TOGA</mark> with these settings:

5) Create a new <u>input</u> called <mark>Eng 2 A/T DISARM</mark> with these settings:

6) Create a new <u>input</u> called <mark>Eng 2 REVERSE RAW</mark> with these settings:

7) Create a new <u>output</u> called <mark>Eng 2 Reverse</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Input Action ⌄

○ OnPress / OnRelease   ● OnChange

Input Action

Define an action that will be executed when your config value changes.
You can reference the current config value with @ (not $).

On Change

Action Type   Microsoft Flight Simulator 2020 ⌄

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft ⌄	Generic ⌄	Engines ⌄		Reset

Select Preset

THROTTLE2_SET ⌄   100 matches found.

Description

INTENDED FOR ANALOG POTENTIOMETER AND CUSTOM INPUT BOX.
Expected input range 0-16383.

☑ Show Preset Code

@ -6 * -6000 max 16383 min (>K:THROTTLE2_SET)   ˄   [-]

˅

Supports input value (@) and placeholders ($,#, etc.)

OK   Cancel

ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [▼] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value	▲	Output Value
150		1023
952		0

⭐ Add new   ❌ Remove

OK   Cancel

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Select Variable Type ○ SimConnect (MSFS2020) ● MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

Variable Settings
Access a local variable by type and name.

Type | Number ∨
Name | Reverse raw input 2 ∨

More Options
☐ Transform $

Config References
Add references to other configs so that their values can be used in this config:
[Add Reference]

[OK] [Cancel]

a) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the reverse line. Go to compare tab in settings and use these values to replace 150 and 952 in interpolation. This is to calibrate your reverse lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

8) Create a new <u>output</u> called <mark>Eng 2 input correction</mark> with these settings:

ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose [Input Action ▾]

○ OnPress / OnRelease   ⦿ OnChange

Input Action

Define an action that will be executed when your config value changes.
You can reference the current config value with @ (not $).

On Change

Action Type [Microsoft Flight Simulator 2020 ▾]

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft ▾	Generic ▾	Engines ▾		Reset

Select Preset

[THROTTLE2_SET ▾]   100 matches found.

Description

INTENDED FOR ANALOG POTENTIOMETER AND CUSTOM INPUT BOX.
Expected input range 0-16383.

☑ Show Preset Code

@ 14.0147 * 0 max 16383 min (>K:THROTTLE2_SET)   [-]

Supports input value (@) and placeholders ($,#, etc.)

OK | Cancel

MF ConfigWizard   — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [▾] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
95	0
686	1024

⭐ Add new   ✖ Remove

OK   Cancel

a) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the Eng2 input correction line. Go to compare tab in settings and use these values to replace 95 and 686 in interpolation. This is to calibrate your thrust lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

9) Create a new <u>output</u> called <mark>Eng 2 sim position</mark> with these settings:

MF ConfigWizard   — ☐ ✕

Sim Variable   Compare   Display   Precondition

Select Variable Type   ◉ SimConnect (MSFS2020)   ○ MobiFlight Variable   ○ FSUIPC Offset   ○ X-Plane DataRef

MSFS2020 (WASM)

Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search	
Microsoft ⌄	Generic ⌄	Engines ⌄		Reset

Select Preset

GENERAL ENG THROTTLE LEVER POSITION:index   ⌄   118 matches found.

Description

Percent of max throttle position

☐ Show Preset Code

More Options

☐   Transform $

Config References

Add references to other configs so that their values can be used in this config:

Add Reference

OK   Cancel

a) Move the throttle levers on the MTU and make sure the output value for Eng 2 sim position changes from 0 to 255. If this doesn't happen go to the compare tab in settings and change the number 88 in interpolation so that you get close to 255. (don't use numbers with a comma here).

10) Create a new <u>output</u> called <mark>Eng 2 real position</mark> with these settings:

MF ConfigWizard   — ☐ ✕

Sim Variable | **Compare** | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [⌄] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
0	0
1024	255

⭐ Add new   Remove

OK   Cancel

Create a new <u>output</u> called <mark>Eng 2 sim vs real</mark> with these settings:

MF ConfigWizard ☐ ☐ ✕

| Sim Variable | Compare | Display | Precondition |

Select Variable Type ◉ SimConnect (MSFS2020) ○ MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

MSFS2020 (WASM)

Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search	
- show all - ⌄	- show all - ⌄	- show all - ⌄		Reset

Select Preset

| - Select Preset - | ⌄ | 3441 matches found. |

Description

☐ Show Preset Code

More Options

☑ Transform B-A

Config References

Add references to other configs so that their values can be used in this config: [Add Reference]

☑ use | Eng2 sim position | ⌄ | as | B | X |

☑ use | Eng2 real position | ⌄ | as | A | X |

[OK]   [Cancel]

11) Create a new <u>output</u> called <mark>Eng 2 servo enabled</mark> with these settings:　　　　　(uses fsuipc)

MF ConfigWizard — ☐ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose | Output Device ▾

Module | MobiFlight MTU/ SN-3e9-036 ▾

Use type of | LED / Output ▾

Display settings

Select Pins | Eng2 servo pwr ▾ ☐ select multiple

PWM Mode | ☐ Enabled (Values 0-255)

Test current settings

▶ Test ⬛ Stop

OK | Cancel

12) Create a new <u>output</u> called <mark>Eng 2 move up</mark> with these settings:

MF ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [< ▼] [13]

set it to [0]

else set it to [if($>254,254,$)]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value	Output Value
0	0
1024	1024

[⭐ Add new] [⭐ Remove]

[OK] [Cancel]

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Select Variable Type ● SimConnect (MSFS2020) ○ MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

MSFS2020 (WASM)

Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

Vendor	Aircraft	System	Search	
- show all - ⌄	- show all - ⌄	- show all - ⌄		Reset

Select Preset

- Select Preset -   ⌄   3441 matches found.

Description

☐ Show Preset Code

More Options

☑ Transform   A*12.7

Config References

Add references to other configs so that their values can be used in this config: [Add Reference]

☑ use   Eng2 sim vs real   ⌄   as A   X

[OK]   [Cancel]

13) Create a new <u>output</u> called <mark>Eng 2 move down</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [< ▾] [13]

set it to [0]

else set it to [if($>254,254,$)]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
0	0
1024	1024

[⚙ Add new] [✂ Remove]

[OK] [Cancel]

14) Upload the Arduino sketch to the Arduino nano for engine 2
    a) https://drive.google.com/file/d/1saeciDUUgZgshfGzDahQWJrMWN0PdQCH/view?usp=share_link
15) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the thrust levers increase the reference voltage (this increases current to motor). Try to set a current level that is just enough so power consumption and heat production

is limited. I highly suggest using a heat sink on the stepper driver (if you don't already have one).

Potentiometer

Vref

16) Make sure mobiflight is running and power is connected to the MTU (make sure stab trim is turned on if you used it as a power switch) you can now test both engines with and without auto throttle. Make sure to also test toga and auto throttle disconnect buttons.

Step 3: Flaps lever

1) Wiring diagram <mark>Flaps</mark> via this link:

Power supply wiring is not complete. Check Eng1 diagram for full wiring of power supply

12 volt terminal   GND terminal   GND terminal   5 volt terminal

flaps potentiometer

fritzing
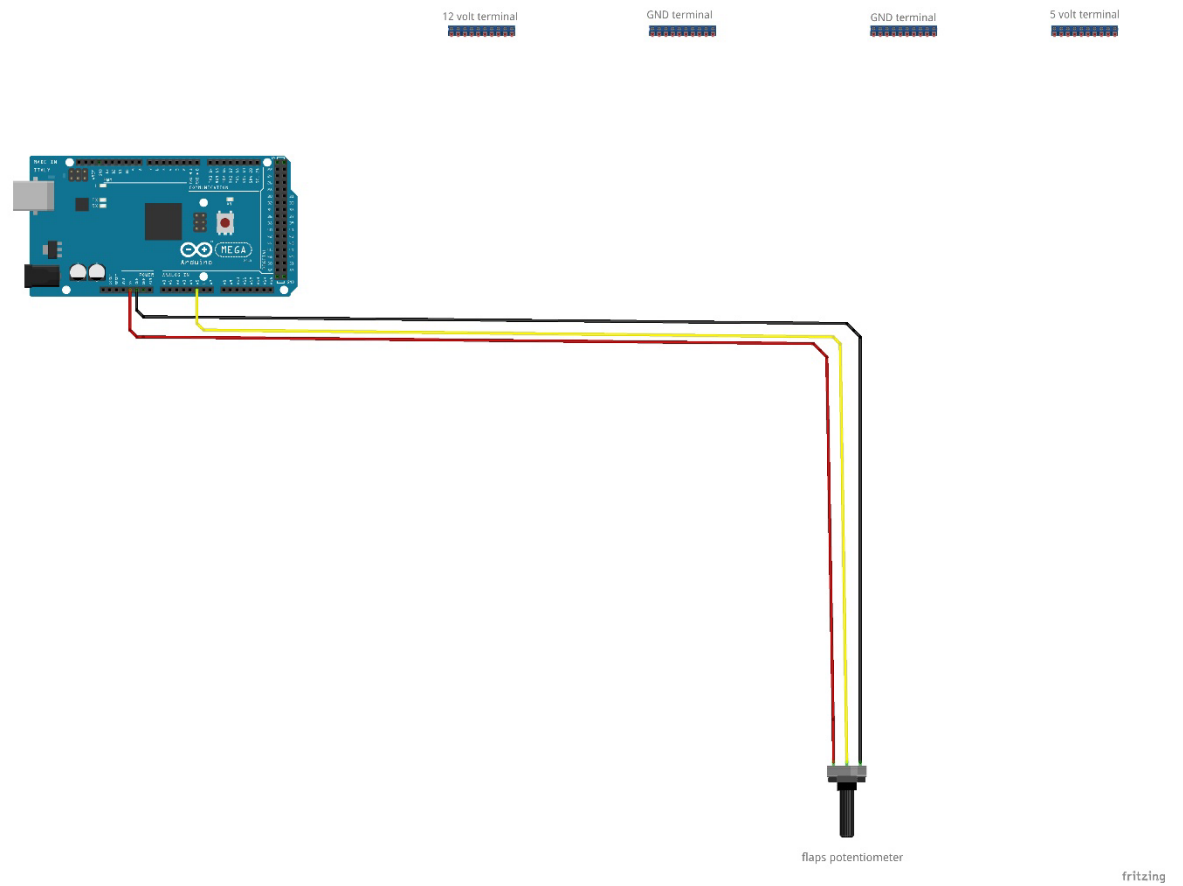
2) Create following devices in mobiflight modules:
   a. Analog Input: Name= Flaps Sensitivity= 2 Pin= A5

3) Create a new <u>input</u> called <mark>Flaps RAW input</mark> with these settings:

4) Create a new <u>output</u> called <mark>Flap lever</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is ⌄ [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
416	30
831	1023

⭐ Add new   ❌ Remove

OK   Cancel

5) Move the flap lever to flaps 0.
   a. Write down the <u>flight sim value</u> (to the left of output value in mobi).
6) Move the flap lever to flaps 40.
   a. Write down the <u>flight sim value</u> (to the left of output value in mobi).
7) Go to edit (settings) and click on the compare tab. Replace 416 with the value you wrote down for flaps 0. Replace 831 with the value you wrote down for flaps 40. Make sure next to the output value 30 you have the value for flaps 0 and next to 1023 you have the value for flaps 40.

8) If you ever find that the flaps lever misses to move for a certain flap setting enable the transform setting (sim variable tab for flaps lever output) and use $+10 (change number 10 until all flap settings are in sync with the movement off the flap lever on the MTU.

Step 4: Speed brake lever

1) Wiring diagram <mark>Speed brake</mark> via this link:
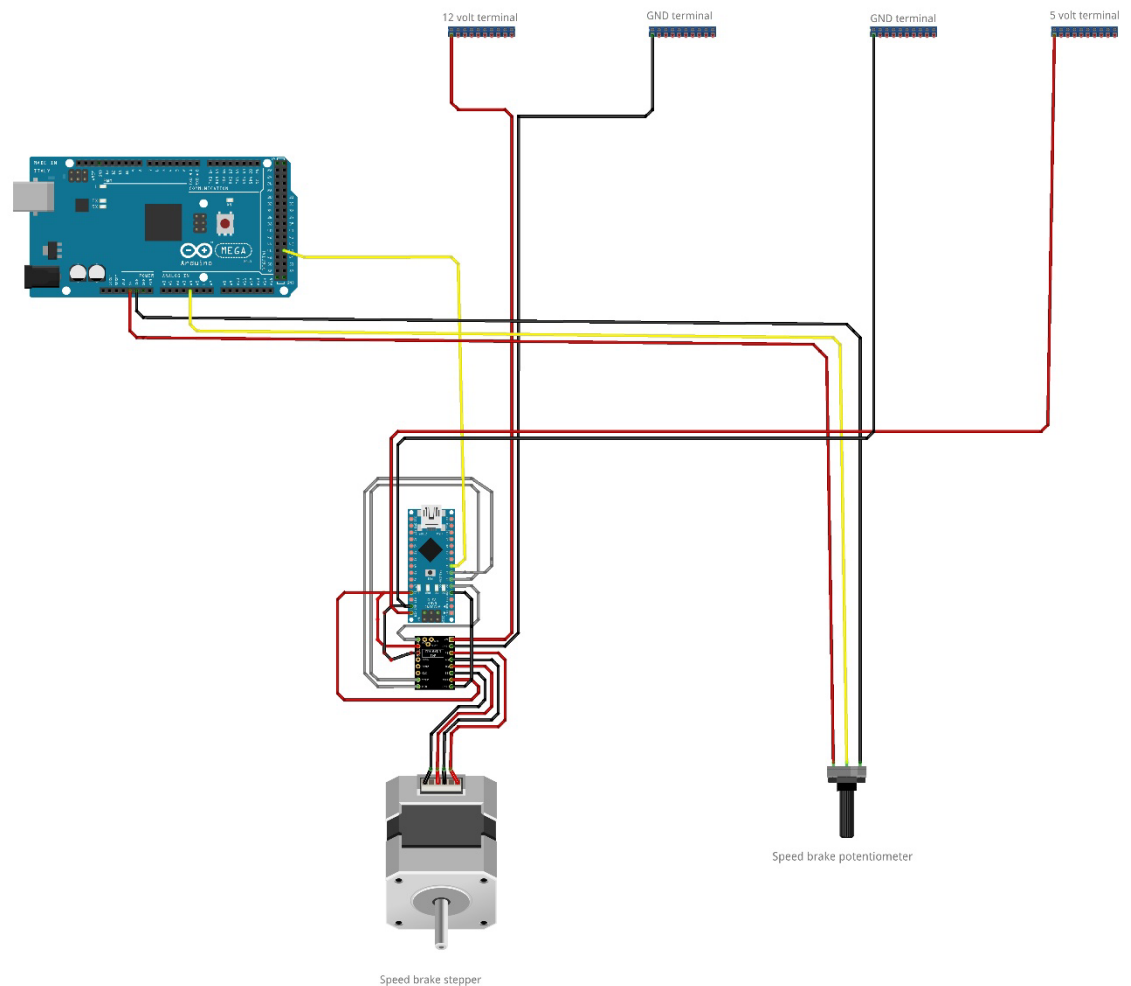
Create following devices in mobiflight modules:
   a. Analog Input: <u>Name</u>= SPD BRK <u>Sensitivity</u>= 2 <u>Pin</u>= A4
   b. LED/Output: <u>Name</u>= SPD BRK deploy Pin= 47

2) Create a new <u>input</u> called <mark>SPD BRK RAW input</mark> with these settings:

3) Create a new <u>output</u> called SPD BRK with these settings:

MF ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [= ▾] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
17	0
1017	1020

[⭐ Add new] [✖ Remove]

[OK] [Cancel]

InputConfigWizard — □ ✕

Input Precondition Config References

Choose your input from the list below.

Choose input

Module MobiFlight MTU (COM7) ⌄ [Scan for input]

Device SPD BRK ⌄

Input settings

On Change

Action Type MobiFlight - Variable ⌄

Variable Settings

Type Number ⌄

Name potentiometerspdbrk ⌄

Value @

Supports variable value ($), input value (@) and placeholders (?,#, etc.)

[OK] [Cancel]

4) Make sure the full range of movement (SPD BRK lever) is covered by the potentiometer. Range must be between the min and max value (min 0 max 1023).
   a. Move the speed brake lever to the down position (not extended).
      i. Write down the _flight sim value_ (to the left of output value in mobi).
   b. Move the speed brake lever to the up position (extended).
      i. Write down the _flight sim value_ (to the left of output value in mobi).
   c. Go to edit (settings) and click on the compare tab. Replace 17 with the value you wrote down for speed brake down. Replace 1017 with the value you wrote down for speed brake up. Run mobi and test the movement of speed brake. If movement is reversed, you can reverse the values in the compare tab in settings.

5) Create a new output called ==Ground speed== with these settings:

6) Create a new <u>output</u> called <mark>Airplane on ground check</mark> with these settings:

7) Create a new <u>output</u> called SPD BRK arm light with these settings:

8) Create a new <u>output</u> called <mark>SPD BRK do not arm light</mark> with these settings:

9) Create a new <u>output</u> called <mark>SPD BRK sim position</mark> with these settings:

MF ConfigWizard

Sim Variable | **Compare** | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [= ▾] [1]

set it to [590]

else set it to [0]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
0	0
1024	1024

[Add new] [Remove]

[OK] [Cancel]

MF ConfigWizard   — ☐ ✕

Sim Variable | Compare | Display | **Precondition**

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

☑ 🟧 Config: SPD BRK < 1000 (AND)
☑ 🟧 Config: Ground speed > 80 (AND)
☑ 🟧 Config: Ground speed < 170

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of | none ▾

OK   Cancel

10) Create a new <u>output</u> called <mark>SPD BRK difference</mark> with these settings:

11) Create a new <u>output</u> called <mark>SPD BRK auto deploy</mark> with these settings:

MF ConfigWizard   — ☐ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ▾

Module   MobiFlight MTU/ SN-3e9-036 ▾

Use type of   LED / Output ▾

Display settings

Select Pins   SPD BRK deploy ▾   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ⬛ Stop

OK   Cancel

MF ConfigWizard   —   □   ✕

| Sim Variable | Compare | Display | Precondition |

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

☑ 🟧 Config: SPD BRK difference > 300 (AND)
☑ 🟧 Config: Ground speed > 60

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of | none ⌄ |

OK   Cancel

12) Create a new <u>output</u> called <mark>SPD BRK retract</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device   ⌄

Module   MobiFlight MTU/ SN-3e9-036   ⌄

Use type of   LED / Output   ⌄

Display settings

Select Pins   SPD BRK deploy   ⌄   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ⬛ Stop

OK   Cancel

MF ConfigWizard — □ ✕

| Sim Variable | Compare | Display | Precondition |

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

- ☑ 🟧 Config: Eng 1 input correction = 10 (OR)
- ☑ 🟧 Config: Eng 2 input correction > 10 (AND)
- ☑ 🟧 Config: Airplane on ground check = 1 (AND)
- ☑ 🟧 Config: SPD BRK sim position = 590 (AND)
- ☑ 🟧 Config: Eng 1 input = 590 (AND)

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of [Config item ▾]

Precondition settings

Choose config [Eng 1 input correction ▾]

If current value is [= ▾] [10]

[OK] [Cancel]

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | **Precondition**

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

- ☑ 🟧 Config: Airplane on ground check = 1 (AND)
- ☑ 🟧 Config: SPD BRK sim position = 590 (AND)
- ☑ 🟧 Config: Flap lever > 500 (AND)
- ☑ 🟧 Config: SPD BRK do not arm light = 1

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of | none ∨

OK | Cancel

13) Create a new <u>output</u> called <mark>SPD BRK auto deploy off</mark> with these settings:

MF ConfigWizard   — ☐ ✕

| Sim Variable | Compare | Display | Precondition |

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device   ⌄

Module   MobiFlight MTU/ SN-3e9-036   ⌄

Use type of   LED / Output   ⌄

Display settings

Select Pins   SPD BRK deploy   ⌄   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ⏸ Stop

OK   Cancel

MF ConfigWizard — □ ×

Sim Variable | Compare | Display | **Precondition**

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

- ☑ 🟧 Config: SPD BRK > 1000 (AND)
- ☑ 🟧 Config: SPD BRK retract = 1

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of [none ⌄]

[OK] [Cancel]

14) Create a new <u>output</u> called <mark>SPD BRK retract off</mark> with these settings:

ConfigWizard

Sim Variable | Compare | Display | Precondition

Select Variable Type ● SimConnect (MSFS2020) ○ MobiFlight Variable ○ FSUIPC Offset ○ X-Plane DataRef

MSFS2020 (WASM)
Define the sim variable name that you would like to read from MSFS2020.

Filter Preset List

	Vendor	Aircraft	System	Search	
	- show all -	- show all -	- show all -		Reset

Select Preset

- Select Preset -   3504 matches found.

Description

☐ Show Preset Code

More Options

☑ Transform 0

Config References
Add references to other configs so that their values can be used in this config: Add Reference

OK   Cancel

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ▼

Module   MobiFlight MTU/ SN-3e9-036 ▼

Use type of   LED / Output ▼

Display settings

Select Pins   SPD BRK deploy ▼   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ☐ Stop

OK   Cancel

15) Upload the Arduino sketch to the Arduino nano for the speed brake.
    a. https://drive.google.com/file/d/1922QezRMPPZz8AIMDIxfdbgyawL2U6hQ/view?usp=share_link
16) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the motor, you can increase current by increasing the reference voltage. https://drive.google.com/file/d/1Wva4lbLbk_FKW-IfKSp1Raa9vyan00eO/view?usp=share_link
17) Calibration step for retracting amount of speed brake. Disable the precondition the same as in link a (SPD BRK auto deploy). This allows the speed brake to move while stationary. Make sure

power to the MTU is on. Extend the speedbrake lever in the sim by clicking on the up mark next to the speed brake lever. This should make the speedbrake lever on the MTU rise by itself. After the lever on the MTU has extended move the thrust levers on the MTU a bit forward until the speed brake lever moves to the down position by itself. The goal is for the lever to move back to the down position and the speed brake armed light must go out. If the lever doesn't move far enough (lever might move back to up position) increase the number of retraction steps in the Arduino sketch (highlighted in link b). If the lever moves too far and makes the motor click reduce the number of retraction steps in the Arduino sketch (highlighted in link b). Remember to upload the Arduino sketch again and keep doing this until you are happy with the position of the speedbrake when it has retracted. After completing make sure to re enable the precondition for SPD BRK auto deploy (link a).

File Edit Sketch Tools Help

MTU_SPD_BRK_sketch

```
void setup() {
  Serial.begin(9600);
  pinMode(enableInput,INPUT);
  pinMode(enableOutput,OUTPUT);
  pinMode(stepPin, OUTPUT);
  pinMode(dirPin, OUTPUT);
  i = 0;
  autodeploy = 0;
  retract = 0;
  deploycount = 0;
}

void loop() {
  deploy = digitalRead(enableInput);
  Serial.println(deploy);
  if((deploy == 1)&&(autodeploy == 0)){
  autodeploy = 1;
  }
  //Serial.println(autodeploy);

    if((autodeploy == 1)&&(deploy == 1)){
      digitalWrite(enableOutput, LOW);
      digitalWrite(dirPin, HIGH);
      digitalWrite(stepPin, HIGH);
      delayMicroseconds(2000);
      digitalWrite(stepPin, LOW);
      delayMicroseconds(2000);

  }else{
    digitalWrite(enableOutput, HIGH);
  }
  if((deploy == 0)&&(autodeploy == 1)){
    autodeploy = 2;
    //Serial.println(autodeploy);
  }
  while((autodeploy == 2)&&(deploy == 1)){
    digitalWrite(enableOutput, LOW);
      digitalWrite(dirPin, LOW);
      digitalWrite(stepPin, HIGH);
      delay(2);
      digitalWrite(stepPin, LOW);
      delay(2);
      retract++;
    if(retract > 435){
    autodeploy = 0;
  retract =0 ;
  delay(1000);
  }else{
    digitalWrite(enableOutput, HIGH);
  }
  }
  //Serial.println(retract);


  }
```

a.

Arduino Nano, ATmega328P on COM4

Step 5: Trim indicator

1) To get the trim indicator and trim wheel to work accurately I added a potentiometer to the trim indicator on the left side indicator. The motors for the left and right indicators are connected to the same driver so they work in tandem. I created some extra 3D printed parts which you can find in the following links.

   a. https://drive.google.com/file/d/1B_JJbo72X95GssIEFpSINxzZqZdxrS0M/view?usp=share_link

      b. https://drive.google.com/file/d/1cLTz9LOH0PoK8svp1WHxogsDBWYd4U50/view?usp=share_link

      c. https://drive.google.com/file/d/1bq7GRNUaqCaJF0uIGZ2R4TxcZriNPp4O/view?usp=share_link

2) In these pictures you can see how to assemble these extra parts. You will need to glue the outer gear to the trim indicator wheel. Make sure the outer gear is glued to the wheel in a position so that the full range of motion of the trim indicator is covered. Also make sure the gears aren't too close so the trim indicator wheel can move unobstructed.

      a. https://drive.google.com/file/d/1ZOa8Izt_FWgfAmOXhSgJ_bIa5ci3mHql/view?usp=share_link

      b. https://drive.google.com/file/d/1n4IrNu8dFZpyS1LhB0RWeK-85Ql2LrOl/view?usp=share_link

      c. https://drive.google.com/file/d/1nFAESe47UVJ7TLEX3M5mn-Q_yw1XnsB9/view?usp=share_link

      d. https://drive.google.com/file/d/1yfbRMJySPQIBT07UTBIZOlcEOKNkVexY/view?usp=share_link

      e. https://drive.google.com/file/d/1OiLCh0Etf9Itndrr1IALqPtKFgrqi4OQ/view?usp=share_link

      f. https://drive.google.com/file/d/1gE4jWmsguYoE0hiJ6xcAJfy4CRm97qx2/view?usp=share_link

3) Wiring diagram <mark>trim indicator</mark> via this link:

Power supply wiring is not complete. Check Eng1 diagram for full wiring of power supply
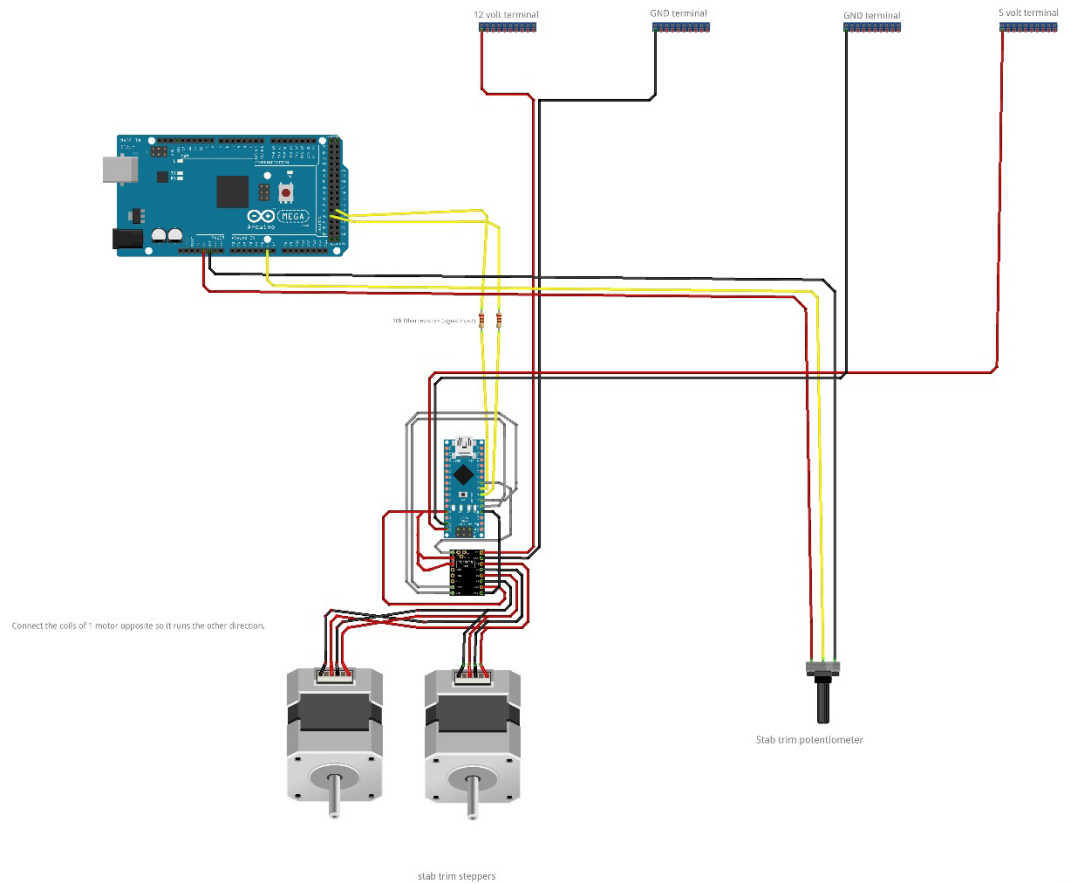
4) Create following devices in mobiflight modules:
   a. Analog Input: <u>Name</u>= Stab trim pot <u>Sensitivity</u>= 2 <u>Pin</u>= A6
   b. LED/Output: <u>Name</u>= Trimup Pin= 46
   c. LED/Output: <u>Name</u>= Trimdown Pin= 45

5) Create a new <u>input</u> called <mark>Stab trim input</mark> with these settings:

6) Create a new <u>output</u> called <mark>Stab trim position</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is [⌄] [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
-4905	0
16384	255

⭐ Add new   ❌ Remove

[OK]   [Cancel]

7) Create a new _output_ called <mark>Trim potentiometer</mark> with these settings:

MF ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☐ Apply comparison to modify the current value

If current value is ☐ [   ]

set it to [   ]

else set it to [   ]

Interpolation Settings

☑ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value	Output Value
357	255
970	0

[⭐ Add new] [❌ Remove]

[OK] [Cancel]

8) Create a new <u>output</u> called <mark>Trim real vs sim</mark> with these settings:

9) Create a new <u>output</u> called <mark>Trim up</mark> with these settings:

MF ConfigWizard   —   □   ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ⌄

Module   MobiFlight MTU/ SN-3e9-036 ⌄

Use type of   LED / Output ⌄

Display settings

Select Pins   Trimup ⌄   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ▉ Stop

OK   Cancel

ConfigWizard

Sim Variable | Compare | Display | **Precondition**

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

☑ ▇ Config: Trim real vs sim < -2

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of   none ▾

OK   Cancel

10) Create a new <u>output</u> called <mark>Trim down</mark> with these settings:

MF ConfigWizard   —   □   ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ▾

Module   MobiFlight MTU/ SN-3e9-036 ▾
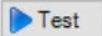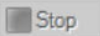
Use type of   LED / Output ▾

Display settings

Select Pins   Trimdown ▾   ☐ select multiple

PWM Mode   ☐ Enabled (Values 0-255)

Test current settings

     ▶ Test   ☐ Stop

OK   Cancel

MF ConfigWizard — □ ✕

| Sim Variable | Compare | Display | Precondition |

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

☑ ▮ Config: Trim real vs sim < -2

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of none ⌄

OK   Cancel

11) Create a new <u>output</u> called <mark>Trim up off</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose | Output Device ▼

Module | MobiFlight MTU/ SN-3e9-036 ▼

Use type of | LED / Output ▼

Display settings

Select Pins | Trimup ▼   ☐ select multiple

PWM Mode | ☐ Enabled (Values 0-255)

Test current settings

▶ Test | ⬛ Stop

OK | Cancel

MF ConfigWizard   —   □   ✕

| Sim Variable | Compare | Display | Precondition |

Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.

Precondition list

☑ 🟧 Config: Trim real vs sim < 2

Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.

Precondition type

Use type of [none ▾]

[OK] [Cancel]

12) Create a new <u>output</u> called <mark>Trim down off</mark> with these settings:

MF ConfigWizard — ☐ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose | Output Device ▾

Module | MobiFlight MTU/ SN-3e9-036 ▾

Use type of | LED / Output ▾

Display settings

Select Pins | Trimdown ▾   ☐ select multiple

PWM Mode | ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ⬛ Stop

OK | Cancel

13) Upload the Arduino sketch to the Arduino nano for the trim indicator.
   a. https://drive.google.com/file/d/1tXhLlPi-sxzSv-
      zYsGKPKlHB_aGfN3Yh/view?usp=share_link
14) Make sure power to the MTU is off and start running mobi (and sim). Move the trim indicator manually to minimum position (0 on the indicator). Write down the potentiometer value you get. After this move the trim indicator manually to the maximum position (17 to the indicator). Again, write down this value. Go to the compare tab for trim potentiometer and replace 357 with the position you got at 0 and replace 970 with the position at 17. If later, you notice the

trim indicator moving in the wrong direction switch these 2 values. Now the trim indicator should work (make sure power is on).

15) If the trim indicator is a little bit off target you can add a small correction factor in trim real vs sim (highlighted in link). Make sure to do step 14 first. Change the correction factor (can be positive or negative depending on direction) until the trim indicator is where you want it.

Step 6: Trim wheels (extension of trim indicator)

1) Wiring diagram <mark>Trim wheels</mark> via this link:

Power supply wiring is not complete. Check Eng1 diagram for full wiring of power supply

Trim wheel stepper

fritzing
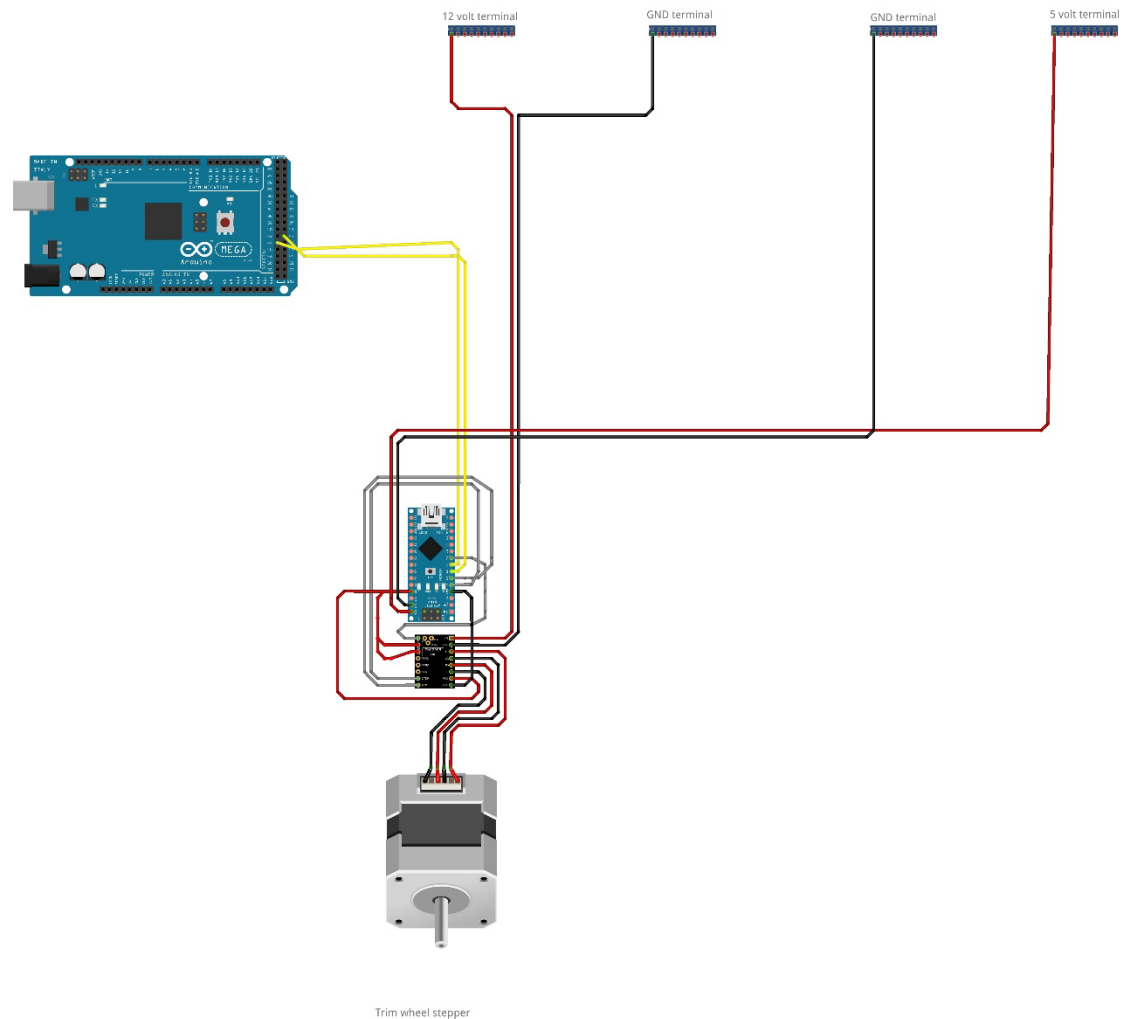
2) Create following devices in mobiflight modules:
   a. LED/Output: <u>Name</u>= Trim wheel up <u>Pin</u>= 44
   b. LED/Output: <u>Name</u>= Trim wheel down <u>Pin</u>= 43
3) Change the display tab for the following lines:

a. Trim up

b. Trim down

c. Trim up off:

ConfigWizard

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose: Output Device

Module: MobiFlight MTU/ SN-3e9-036

Use type of: LED / Output

Display settings

Select Pins:
- ☑ Trimup
- ☐ Trimdown
- ☐ BACKLIGHT
- ☐ Parking LED
- ☑ Trim wheel up
- ☐ Trim wheel down

☑ select multiple

PWM Mode ☐ Enabled (Values 0-255)

Test current settings

▶ Test   ⬛ Stop

OK   Cancel

d. Trim down off:

4) Upload the Arduino code to the Arduino nano for the trim wheels
   a. https://drive.google.com/file/d/1KOtntap_-0-
      REB7Zf7tvtqA378o1q5Ff/view?usp=share_link

Step 7: Parking brake servo and light

5) Wiring diagram Parking brake via this link:

Power supply wiring is not complete. Check Eng1 diagram for full wiring of power supply
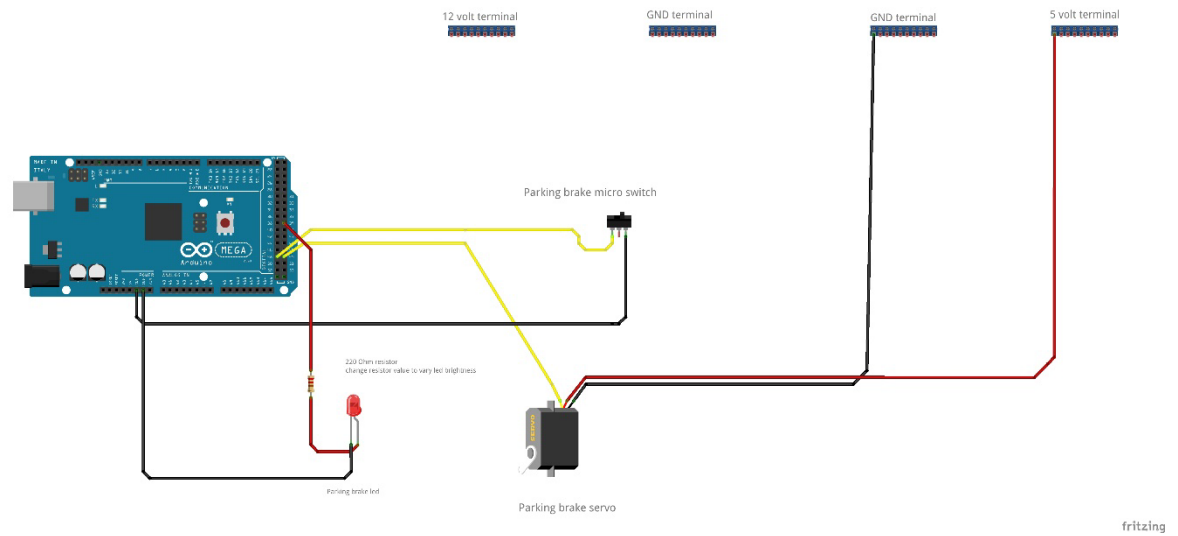
6) Create following devices in mobiflight modules:
    a. Servo: Name= Parking servo Pin= 49
    b. Button: Name= Parking switch Pin= 48
    c. LED/Output: Name= Parking LED Pin= 39

7) Create a new <u>input</u> called <mark>Parking switch</mark> with these settings:

8) Create a new output called Brake status with these settings:

MF ConfigWizard

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [= ⌄] [3]

set it to [1]

else set it to [0]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
0	0
1024	1024

[Add new] [Remove]

[OK] [Cancel]

MF ConfigWizard   —   □   ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

┌─ Display type ──┐
│   │
│   Choose   Output Device   ▼   │
│   │
│   Module   MobiFlight MTU/ SN-3e9-036   ▼   │
│   │
│   Use type of Servo   ▼   │
│   │
└──┘
┌─ Display settings ──────────────────────────────────────┐
│   Servo   Parking Servo   ▼   │
│   Min. value   0   │
│   Max. value   1   │
│   Max. rotation 20   ▲▼   %   │
│   │
│   │
│   │
│   │
│   │
│   │
│   │
│   │
│   │
┌─ Test current settings ─────────────────────────────────┐
│   ▶ Test   ▮ Stop │
└──┘

                                          OK   Cancel

9) Create a new <u>output</u> called <mark>Parking servo open</mark> with these settings:

MF ConfigWizard   — □ ✕

Sim Variable   Compare   Display   Precondition

Select Variable Type   ⦿ SimConnect (MSFS2020)   ◯ MobiFlight Variable   ◯ FSUIPC Offset   ◯ X-Plane DataRef

┌─ MSFS2020 (WASM) ───
Define the sim variable name that you would like to read from MSFS2020.

┌─ Filter Preset List ──
      Vendor   Aircraft   System   Search
      - show all - ▾   - show all - ▾   - show all - ▾   [_____]   [Reset]

┌─ Select Preset ───
      [- Select Preset -   ▾]   3504 matches found.
      Description
      [   ]
      ☐ Show Preset Code

┌─ More Options ──
   ☑   Transform   [A   ]

┌─ Config References ───
Add references to other configs so that their values can be used in this config: [Add Reference]

   ☑ use   [Brake status   ▾]   as   [A]   [X]

                                                 [OK]   [Cancel]

MF ConfigWizard   —   □   ✕

| Sim Variable | Compare | Display | Precondition |

Choose your display type which is used for output from the list below.

Display type

Choose   Output Device ▾

Module   MobiFlight MTU/ SN-3e9-036 ▾

Use type of   Servo ▾

Display settings

Servo   Parking Servo ▾

Min. value   0

Max. value   1

Max. rotation   20 ⇕   %

Test current settings

▶ Test   ■ Stop

OK   Cancel

10) Create a new <u>output</u> called <mark>Parking brake light check</mark> with these settings:

11) Add the following preconditions:

a. Brake status

b. Parking servo open:

12) Create a new <u>output</u> called <mark>Parking brake LED output</mark> with these settings:

MF ConfigWizard — □ ✕

Sim Variable | Compare | Display | Precondition

Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.

Comparison Settings

☑ Apply comparison to modify the current value

If current value is [= ˅] [2]

set it to [1]

else set it to [ ]

Interpolation Settings

☐ Apply interpolation to modify the current value

Assign various input / output value mappings. Linear interpolization will be used between the values.

Input Value ▲	Output Value
0	0
1024	1024

[⭐ Add new] [⭐ Remove]

[OK] [Cancel]

MF ConfigWizard　　　　　　　　　　　　　　　　　— □ ✕

Sim Variable | Compare | Display | Precondition

Choose your display type which is used for output from the list below.

Display type

Choose　　Output Device ▾

Module　　MobiFlight MTU/ SN-3e9-036 ▾

Use type of　LED / Output ▾

Display settings

Select Pins　Parking LED ▾　　　☐ select multiple

PWM Mode　☐ Enabled (Values 0-255)

Test current settings

▶ Test　　☐ Stop

OK　　Cancel

Step 8: Backlighting

1) Wiring diagram <mark>Backlighting</mark> via this link:

Power supply wiring is not complete. Check Eng1 diagram for full wiring of power supply
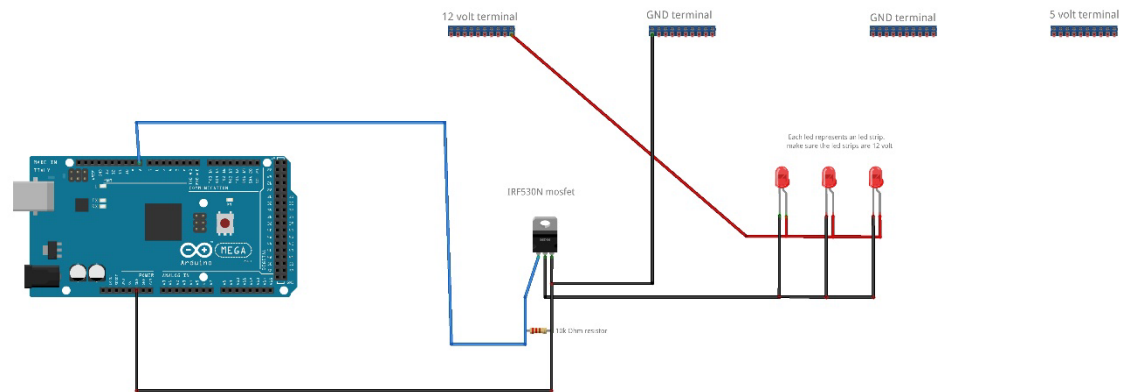
2) Create following devices in mobiflight modules:
    a. LED/Output: <u>Name</u>= Backlight <u>Pin</u>= 8

3) Create a new <u>output</u> called <mark>MTU backlight</mark> with these settings:

a. Change the highlighted number between 0 and 255 depending on the desired maximum led brightness on the MTU

The backlight is controlled by the center pedestal panel knob highlighted in the link

Step 9: Start levers

1) Create following devices in mobiflight modules:
    a. Button: <u>Name</u>= Start lever 1 <u>Pin</u>= 9
    b. Button: <u>Name</u>= Start lever 2 <u>Pin</u>= 11
2) For the wiring simply wire each start lever switch ground to a ground on the Arduino Mega and the output for each switch to the corresponding Arduino Mega pin (start lever 1 to pin 9 and start lever2 to pin 11).

3) Create a new <u>input</u> called <mark>Start lever 1</mark> with these settings:

MF InputConfigWizard — ☐ ✕

Input | Precondition | Config References

Choose your input from the list below.

Choose input

Module   MobiFlight MTU (COM7) ▾   [Scan for input]

Device   Start lever 1 ▾

Input settings

On Press | On Release

Action Type   Microsoft Flight Simulator 2020 ▾   [Copy] [Paste]

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
PMDG ▾	B737-700 ▾	Fuel ▾		[Reset]

Select Preset

PMDG_B737-7_FUEL_CUT_OFF_LEVER1_UP ▾   39 matches found.

Description

☐ Show Preset Code

[OK]   [Cancel]

4) Create a new <u>input</u> called <mark>Start lever 2</mark> with these settings:

If the start levers work backwards simply swap the onpress and onrelease actions (up to down or down to up).

Step 10: Horn cutout

1) Create following devices in mobiflight modules:
    a. Button: Name= Horn cutout Pin= 42
2) Wire the ground from the horn cutout to a ground on the Arduino Mega and the output to the corresponding Arduino Mega pin(pin42).

3) Create a new <u>input</u> called <mark>Horn cutout</mark> with these settings:

MF InputConfigWizard	— ☐ ✕

Input   Precondition   Config References

Choose your input from the list below.

Choose input

Module   MobiFlight MTU (COM7)   ⌄   [Scan for input]

Device   Horn cutout   ⌄

Input settings

On Press   On Release

Action Type   Microsoft Flight Simulator 2020   ⌄   [Copy] [Paste]

Your Custom Code that will be executed in MSFS2020

Filter Preset List

Vendor	Aircraft	System	Search	
PMDG ⌄	B737-700 ⌄	Gear ⌄	[ ]	[Reset]

Select Preset

PMDG_B737-7_GEAR_HORN_CUTOUT   ⌄   25 matches found.

Description

[   ]

☐ Show Preset Code

[OK]   [Cancel]

Step 11: enjoy flying!!!