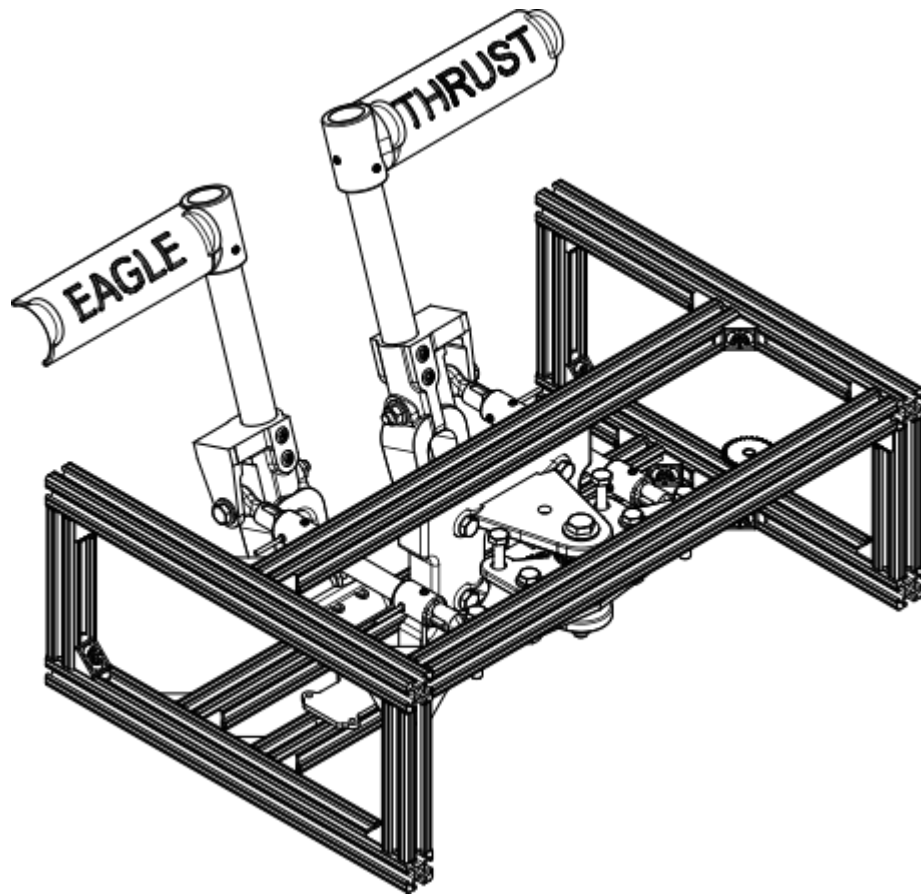


EAGLE THRUST ANTI-TORQUE PEDAL SYSTEM (1010S ALUMINUM FRAME) BUILD COMPENDIUM v.1.1

by Daniel Vercillo

February 24, 2018





Welcome to the Eagle Thrust Anti - Torque Pedal System. The main goal of the ATP-1 project is to provide for free a hobbyist level helicopter anti-torque pedal system kit consisting of documentation and 3d printable part files for use with home flight simulation software.

Additionally, the design offers the ability to pack a (future) cyclic and collective into the case or frame for easy travel. One of my first thoughts in designing this pedal system was to retain the action of real life helicopter pedals and also make them adjustable to suit a wide range of preferences.

As I continue to develop and improve this product 3d files may change and documentation will be updated as needed.

DISCLAIMER: Downloads are provided with absolutely no warranty given or implied. Parts and documentation are intended to be used for home flight simulation **ONLY!** Use at your own risk!

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1 Hardware Matrix

Eagle Thrust Parts List for 1010S Aluminum Extrusion Frame
Last Edit: 2-24-18 @ 10:21PM
www.eaglethrust.com

1.1 Tools Needed

- Rubber Mallet
- Socket Set
- Drill\Driver
- 3d Printer
- Saw or CNC
- Ball End Hex Driver - 5/32" <https://8020.net/shop/6105.html>
- Soldering Iron

1.2 Hardware:

1.2.1 Washers

QTY	Diam.	Length	Desc.
24	1/4		Washers
8	5/16	1-1/2"	Washers
4	5/16		Washers

1.2.2 Nuts & Bolts

QTY	Diam.	Length	Description
8	#6-32	1-1/2"	Machine Screw/w Nut (Rod) Home Depot Part# 887480037111
8	#10-32	2"	Machine Screw/w Nut (Foot/Pedal) Home Depot Part# 887480033717
4	1/4	2"	Hex Bolt/w Lock Nut (Wing)
4	1/4	2"	Hex Bolt/w Nut (Hub)
2	1/4	3"	Hex Bolt/w Lock Nut (Pedal)
2	1/4	2-1/2"	Hex Bolt/w Nut (Wing/Stopper)
2	5/16	2-1/2"	Hex Bolt/w Lock Nut (Hinge Bolt)
1	5/16	3-1/2"	Hex Bolt/w Lock Nut (Pivot Pin)
4	1/4	1/2"	Bronze Bearing (Rod Ends)

1.2.3 Extrusion 1010S

QTY.	Length	Description
4	18"	1010-S
4	14"	1010-S
4	5"	1010-S
1	20"x14"	Diamond Plate (Custom Cut Top Optional)

Note: I purchased all of my aluminum extrusion, hardware and tools from <https://8020.net/>

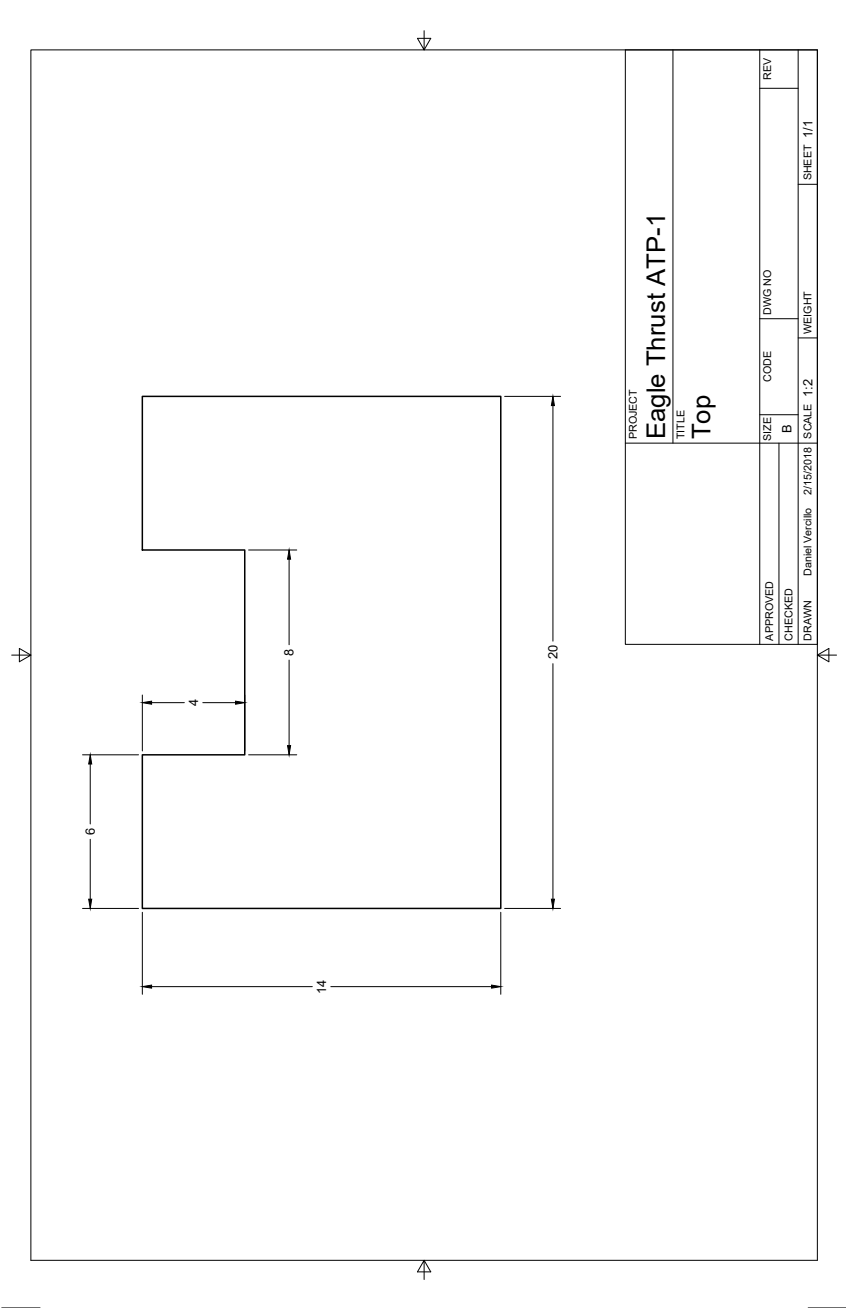
1.2.4 Extrusion Hardware

QTY	Length	Description
24		(2 Hole Corner Brackets) https://8020.net/14059-3.html
48		(Bolt Assembly) https://8020.net/3457.html
8		(10 Series End Cap with Push-In Fastener) https://8020.net/2015-plain.html

1.2.5 Misc.

QTY	Diam.	Length	Description
2	1"	9"	Wooden Dowel
2	5/8	6"	Wooden Dowel
1		20-30"	Hook and Latch Material (Used to secure top and electronics.)

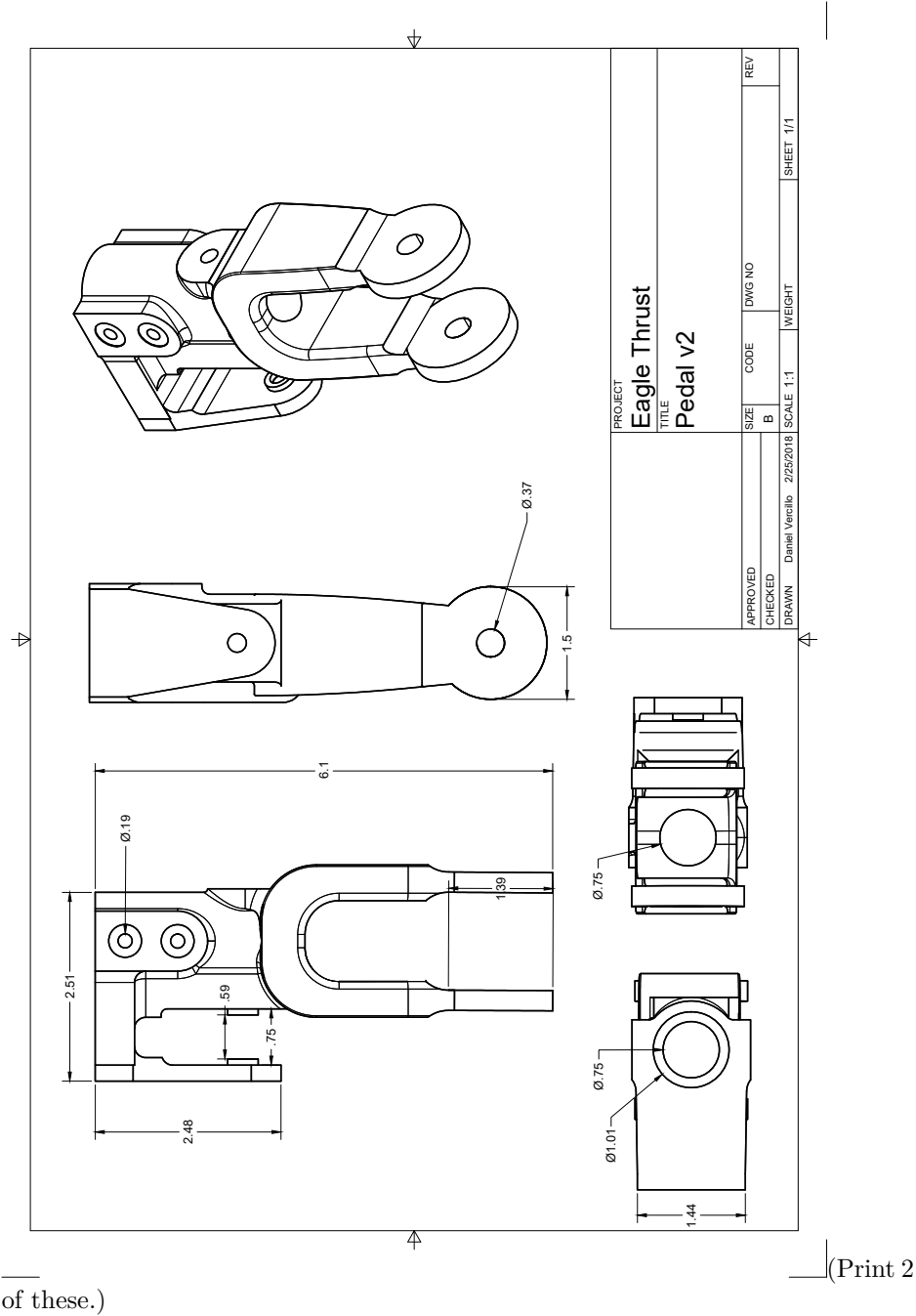
1.2.6 Diamond Plate or Wood Top Cut Out



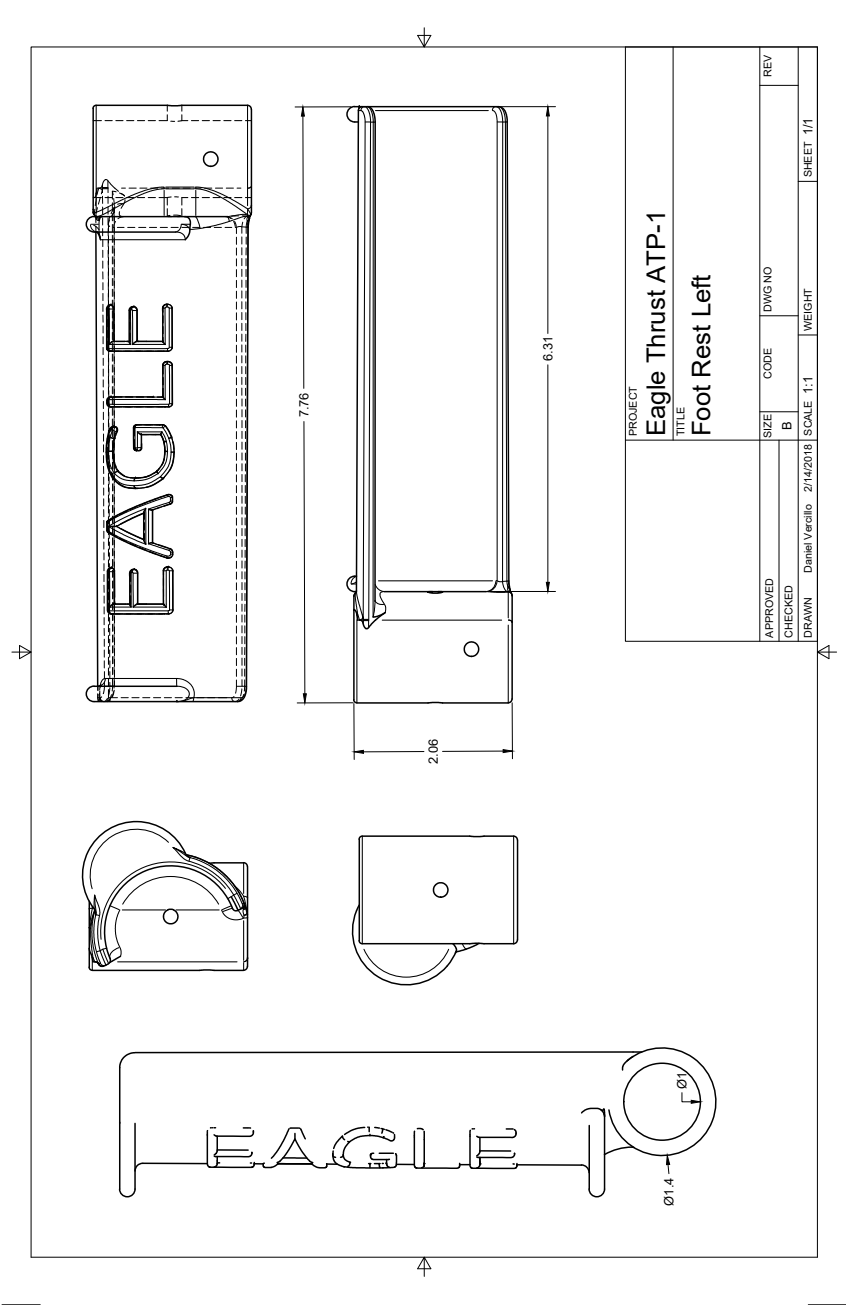
PROJECT		Eagle Thrust ATP-1			
TITLE		Top			
APPROVED	SIZE	CODE	DWG NO	REV	
	B				
CHECKED	2/15/2018		SCALE	1:2	SHEET 1/1
DRAWN	Daniel Verallo		WEIGHT		

2 3D Printable Parts List

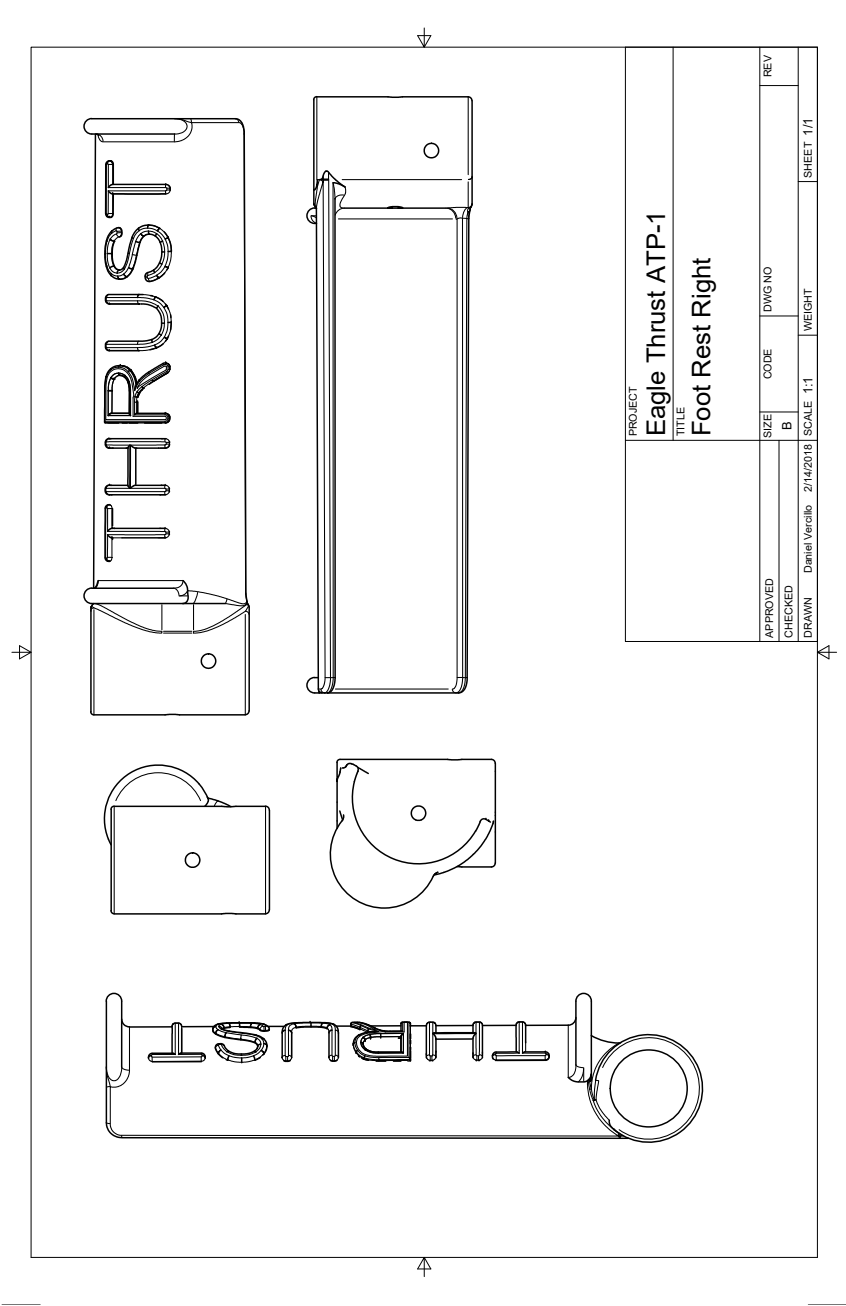
2.1 Main Pedal (Print 2 of these.)



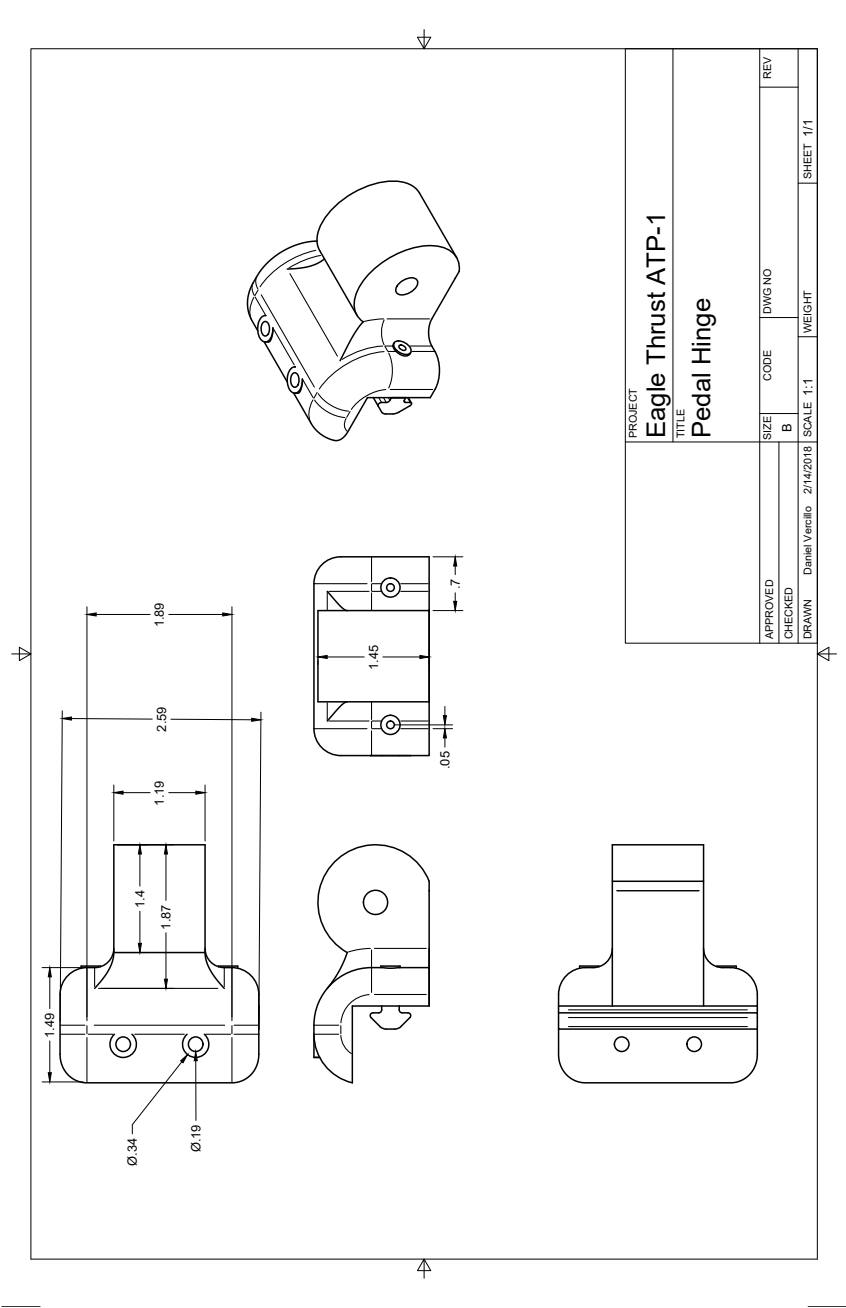
2.2 Left Foot Rest



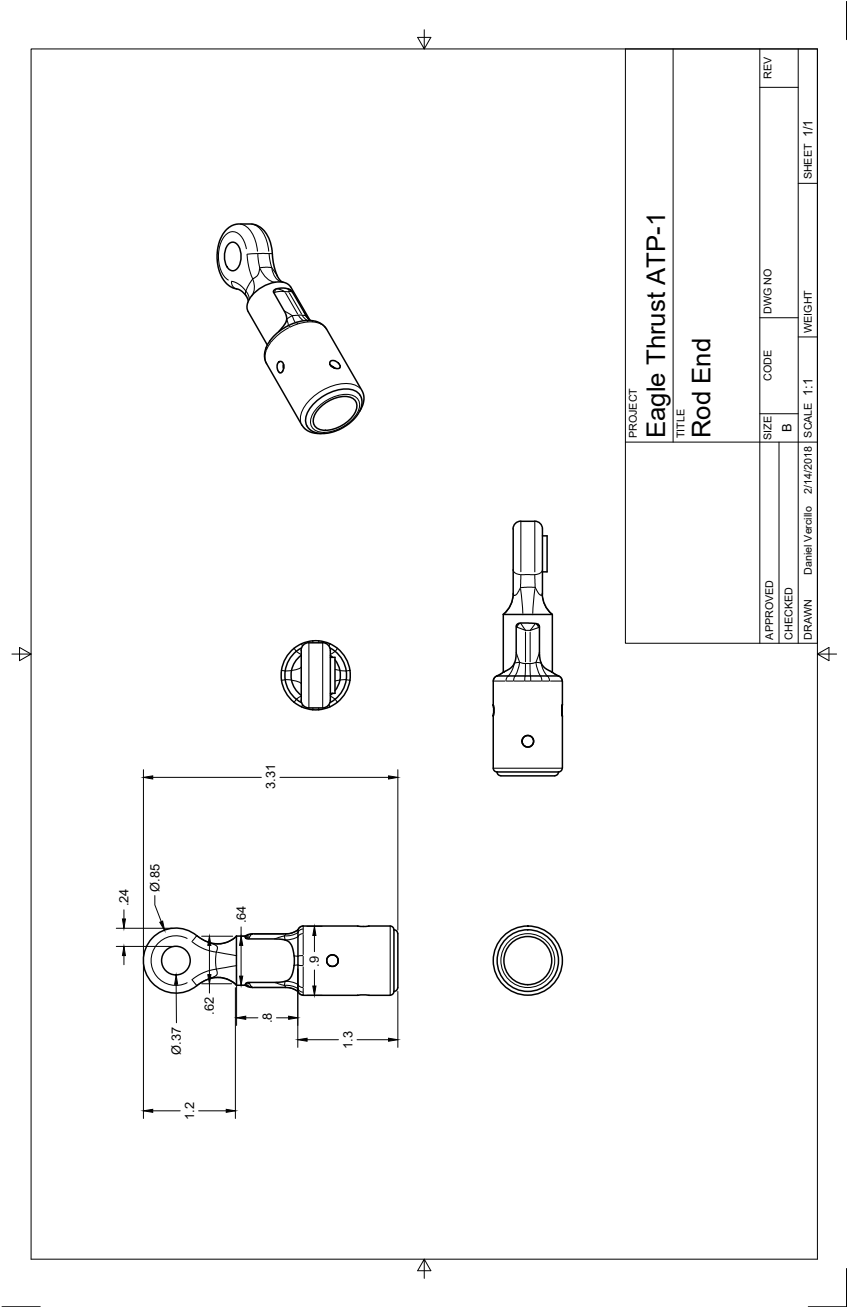
2.3 Right Foot Rest



2.4 Lower Pedal Hinge (Print 2 of these.)

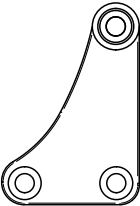
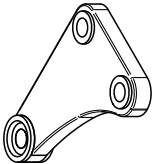


2.5 Rod End (Print 4 of these.)



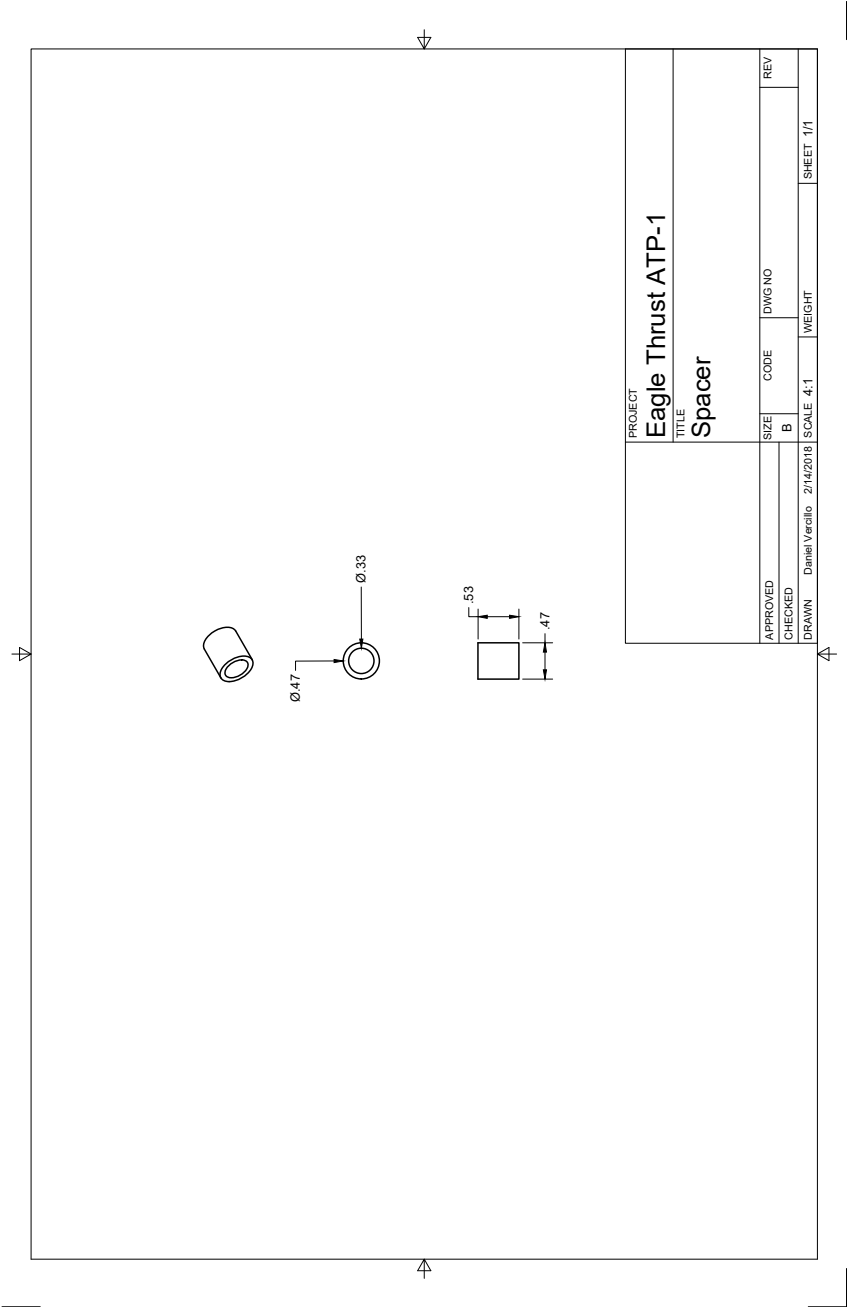
PROJECT		Eagle Thrust ATP-1			
TITLE		Rod End			
APPROVED	SIZE	CODE	DWG NO	REV	
CHECKED	B				
DRAWN	Daniel Vercillo	2/14/2018	SCALE 1:1	WEIGHT	SHEET 1/1

2.6 Wing (Print 4 of these.)

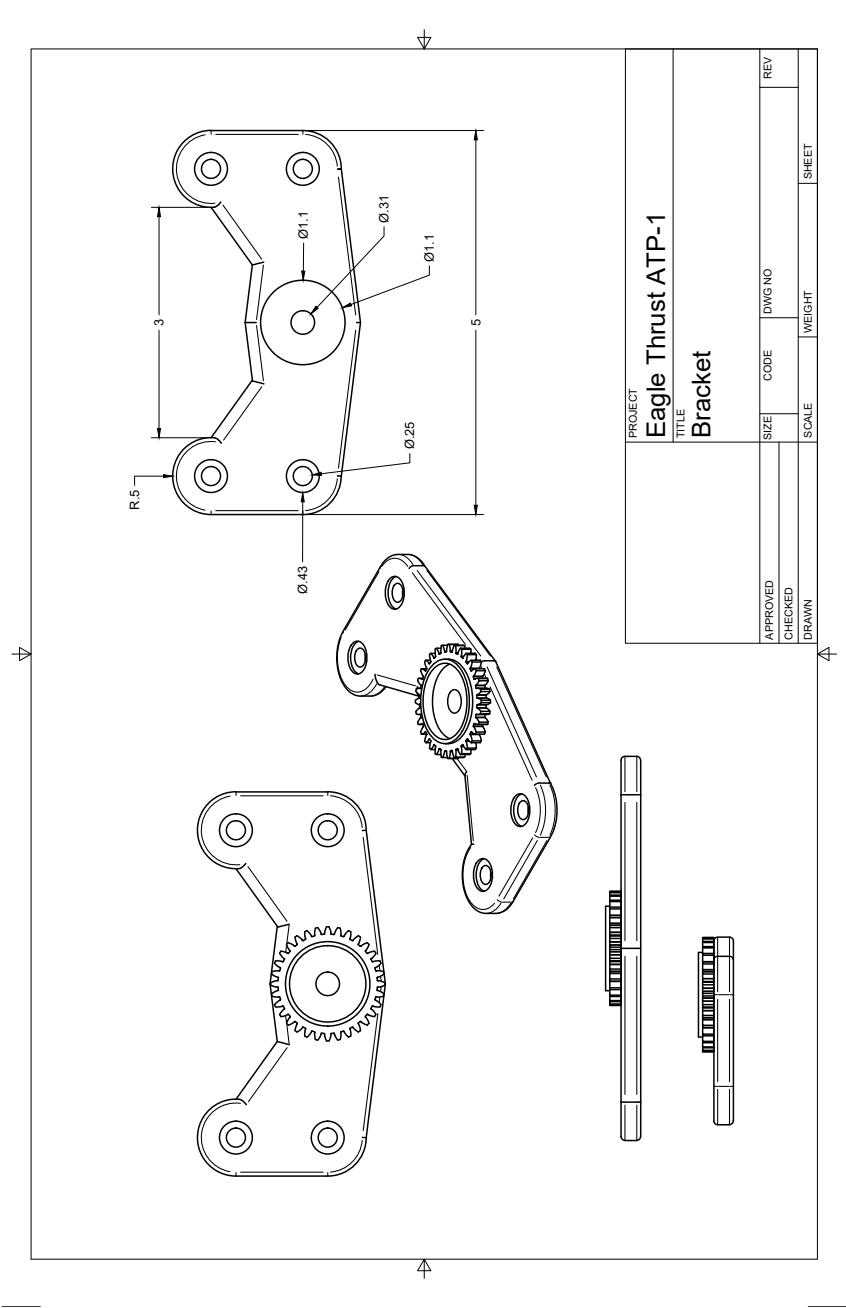


PROJECT		Eagle Thrust ATP-1			
TITLE		Wing			
APPROVED	SIZE	CODE	DWG NO	REV	
CHECKED	B				
DRAWN	Daniel Vercillo	2/14/2018	SCALE 1:1	WEIGHT	
				SHEET 1/1	

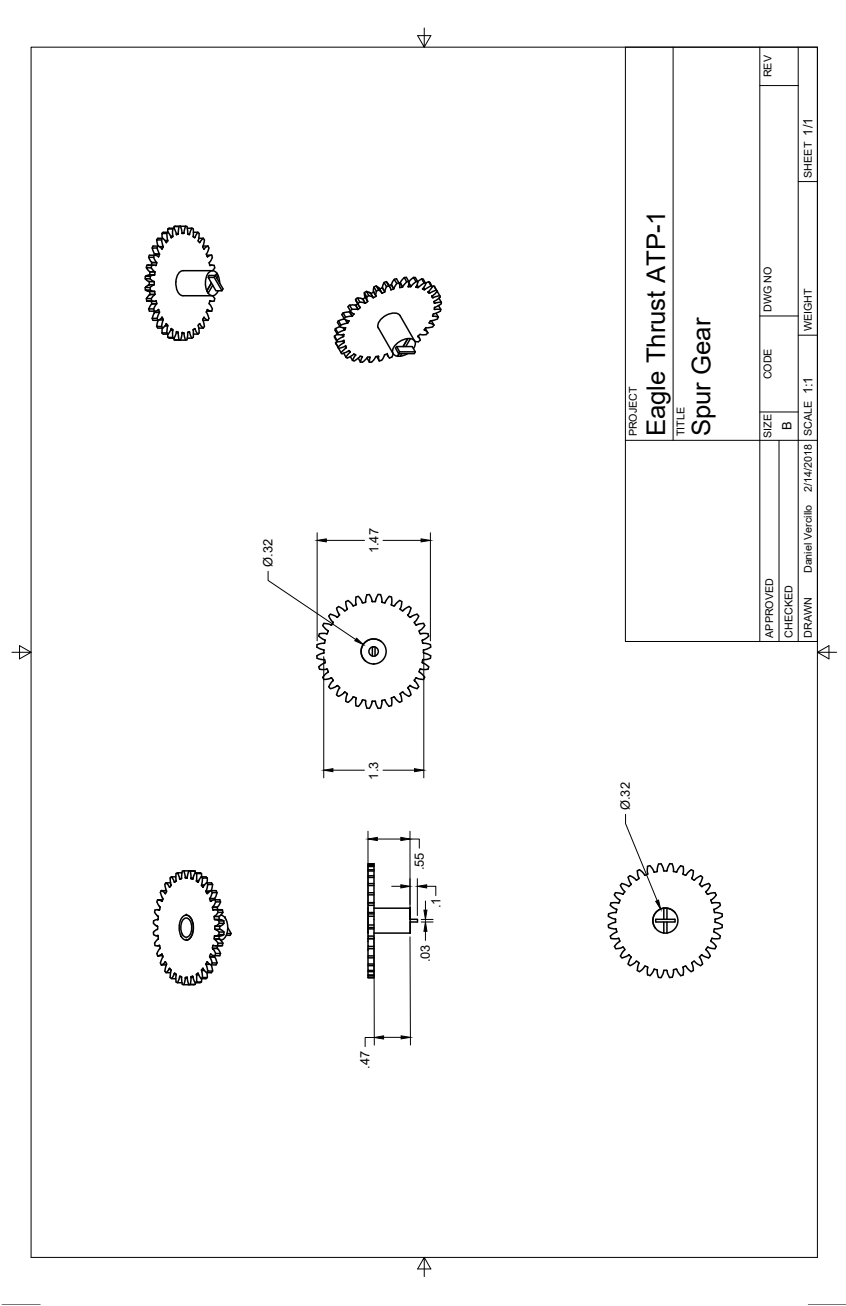
2.7 Spacers (Print 4 of these.)



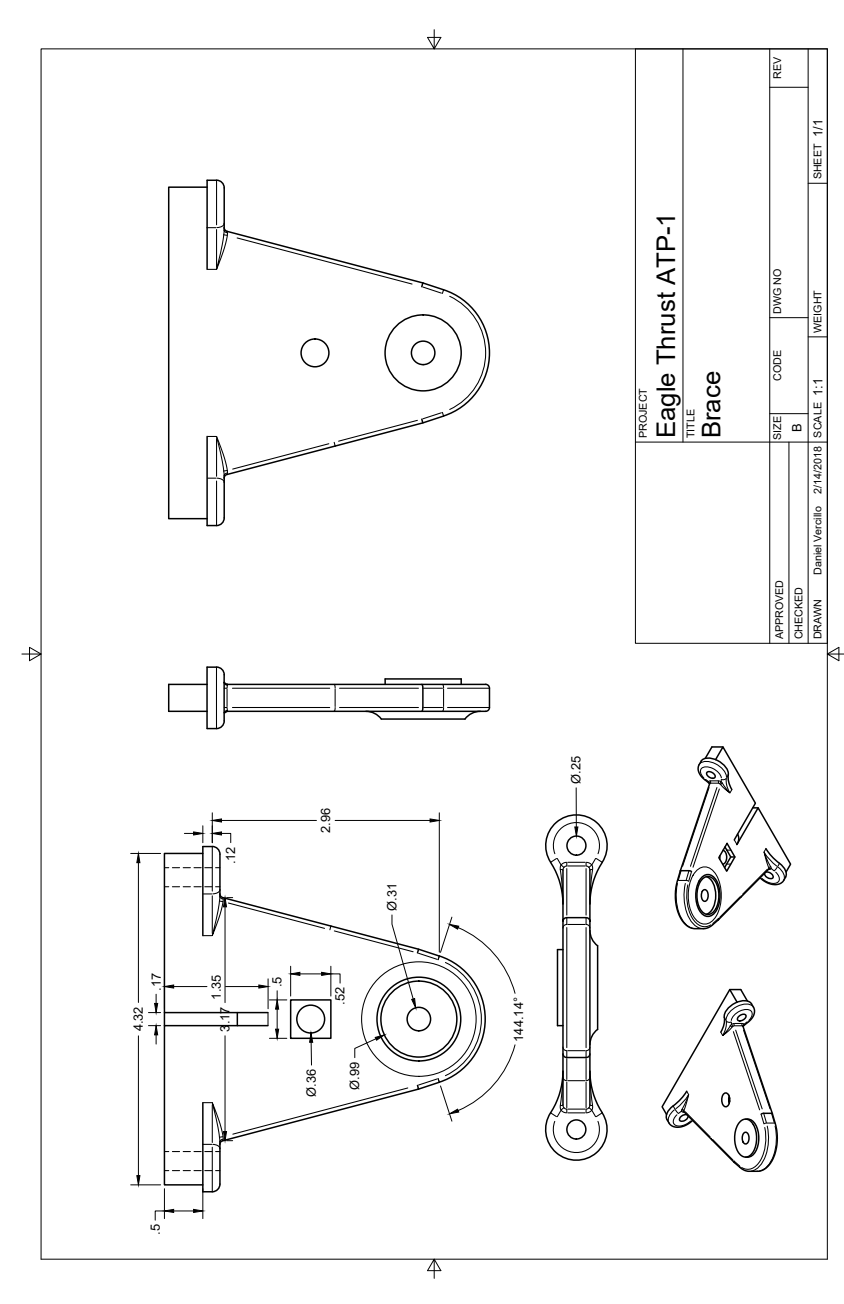
2.8 Bracket (Print 2 of these.)



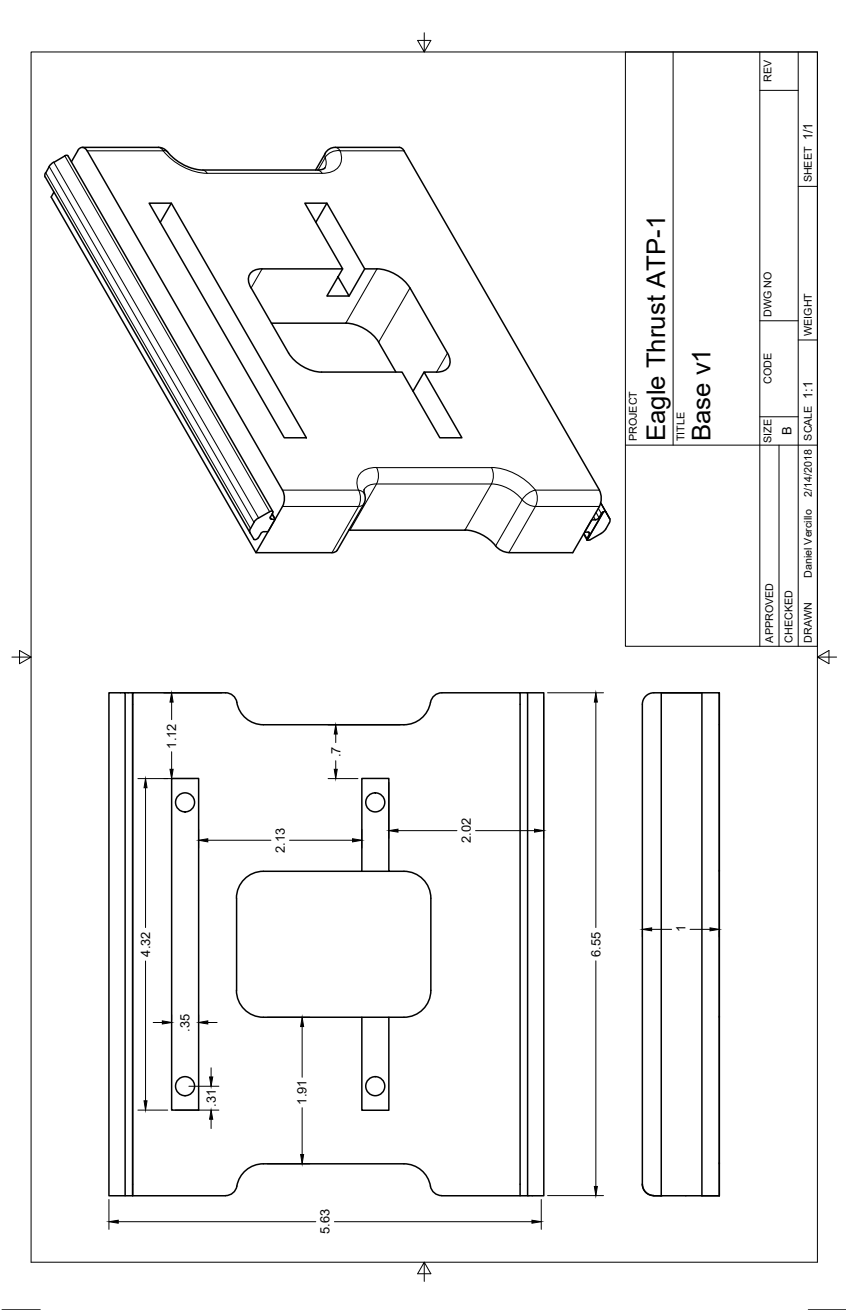
2.9 Spur Gear for Rotary Potentiometer P260



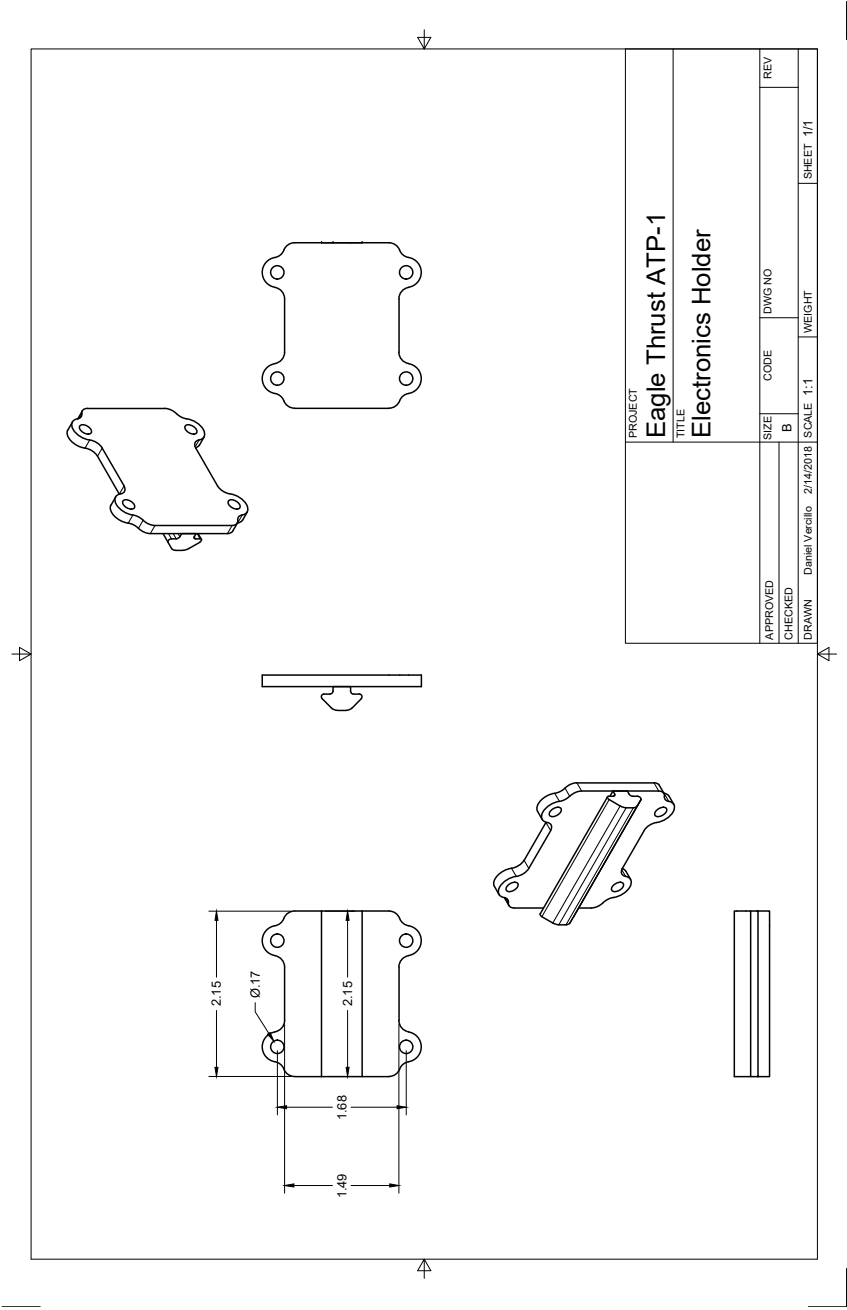
2.10 Brace (Print 2 of these.)



2.11 Base



2.12 Electronics Holder (Optional)



3 Electronics

3.0.1 Electronics

QTY	Type	Description
1	BU0836A Enclosure	(Optional Controller Clear Plastic Case)
1	BU0836A 12-Bit Joystick Controller	(Controller Board)
1	Potentiometer P260	(Potentionmeter)
1	Cable with 3 pin connector	

Links:

(Optional Controller Clear Plastic Case)

http://www.leobodnar.com/shop/index.php?main_page=product_info&cPath=102&products_id=222

(Controller Board)

http://www.leobodnar.com/shop/index.php?main_page=product_info&cPath=94&products_id=204

(Potentiometer)

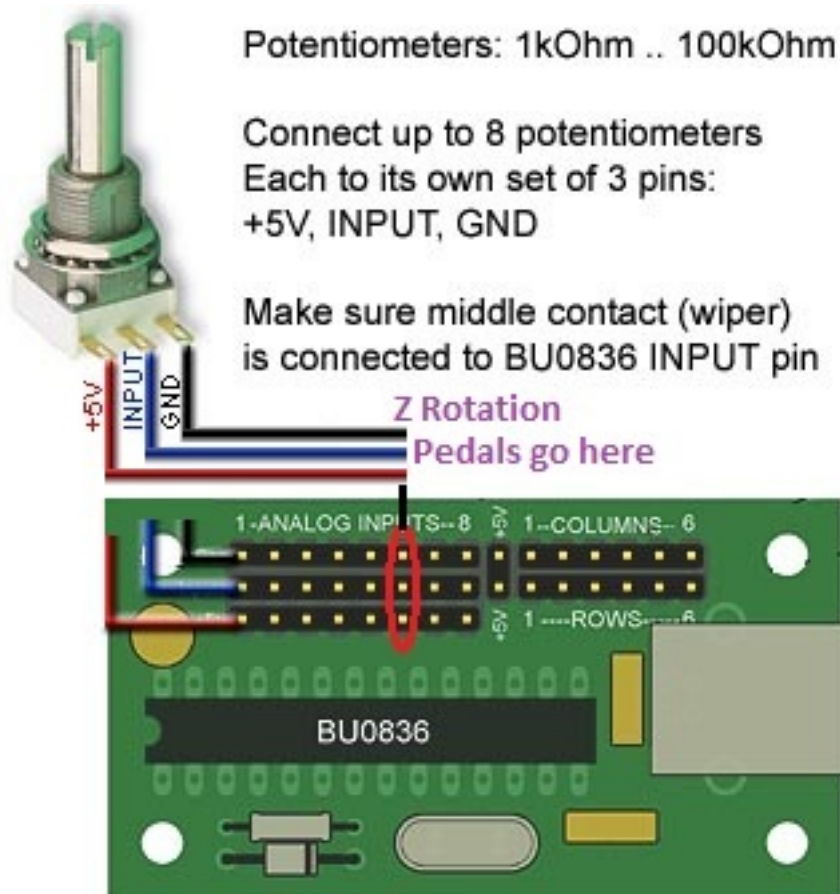
http://www.leobodnar.com/shop/index.php?main_page=product_info&cPath=103_81&products_id=193

(Cable with 3 pin connector)

http://www.leobodnar.com/shop/index.php?main_page=product_info&cPath=83&products_id=202

3.0.2 Align and Wire the P260

- Make sure when installing the P260 it turns equal distance to the left and to the right. Recenter and install Spur Gear =.
- If using the BU0836A 12-Bit Joystick Controller remember to calibrate your controller with your PC: "Setup USB Game Controllers->Properties->Settings->Calibrate" before use in sim software.
- Additionally you can download the BU0836A configuration program for more tweak-able options.
- Make sure all soldering is done and wires are in place before plugging the BU0836A into your PC.



4 Build Tips & Tricks

4.1 Basic Building Tips

- Parts should fit snugly.
- A few taps from a rubber mallet might be needed.
- Never force a part to fit, you could damage the part and yourself.
- Sand down parts and test fit them to ensure a smooth build.
- Be prepared to reprint a part in the event of breakage or a warped print.
- Refer to the build guide video for visually guided instructions.

4.2 3D Printing Tips

The use of 3D printing make up a large portion of your pedal system:

- Make sure your 3d printer has a build volume of 10500 cm³ (25 x 21 x 20 cm or 9,84 x 8,3 x 8 in) like the Prusa i3 MK2S <https://shop.prusa3d.com/en/3d-printers/59-original-prusa-i3-mk2-kit.html>
- Printing at a layer height of 0.15 or better is highly recommended for good fitting parts, although draft quality may work just fine 0.3.
- 30% infill or higher should be used for strong and durable parts.
- PETG filament is preferred as it's much less prone to shrinkage than ABS.

4.3 End of Build Tricks and Tweaking

Prevent binding and over-tightening.

- Use Lock Nuts where noted to dial in tension.
- Lubrication may be used to reduce or eliminate any binding.
- 2 1010S 18 inch bars are adjustable, and when moved will change the angle and subsequently the height of the pedals.
- Use “Hook and Latch Material” for an easily removable top and wire management.

5 End Statement

The action of your pedals is a close approximation of real helicopter pedal movement. Make pedals for others. Substitute the costlier or scarce 1010S frame for a wood one (Wood Version).

Feel free to modify and/or change this design to better suit your needs.

Updates to parts, documentation, and designs will occur from time to time so make sure you have the latest build package.

Thank you for building a serviceable, modifiable, lifetime simulation product.



www.eaglethrust.com