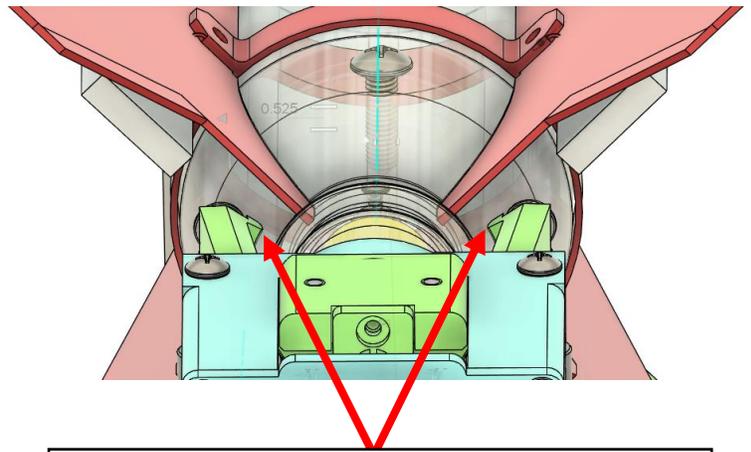
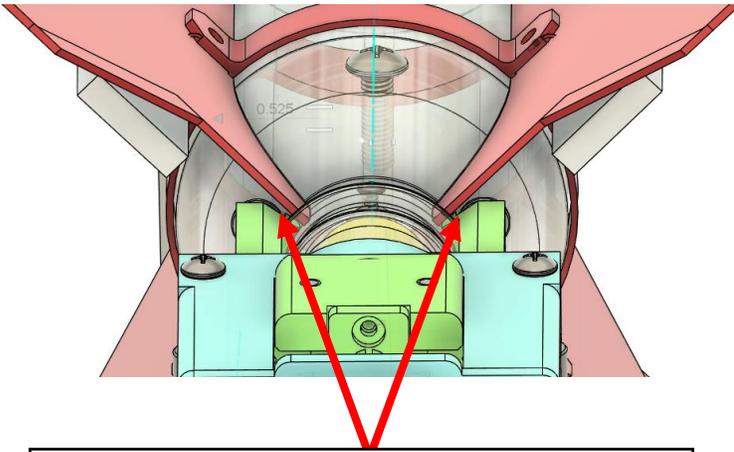


Water rocket launcher



Release Mechanism

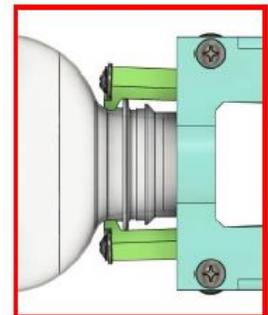
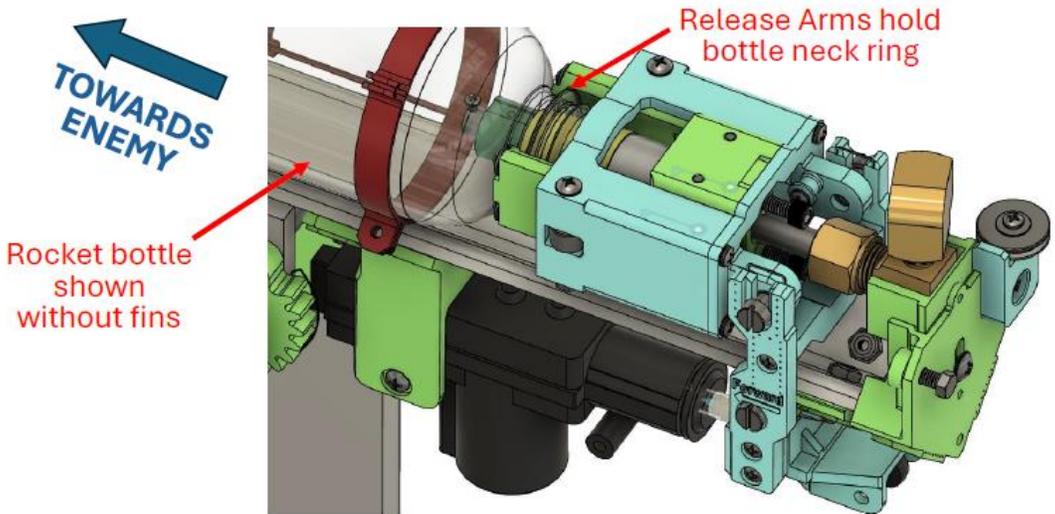


Note that there can't be any type of fin support ring near the flange of the water bottle because it would interfere with the release arms.

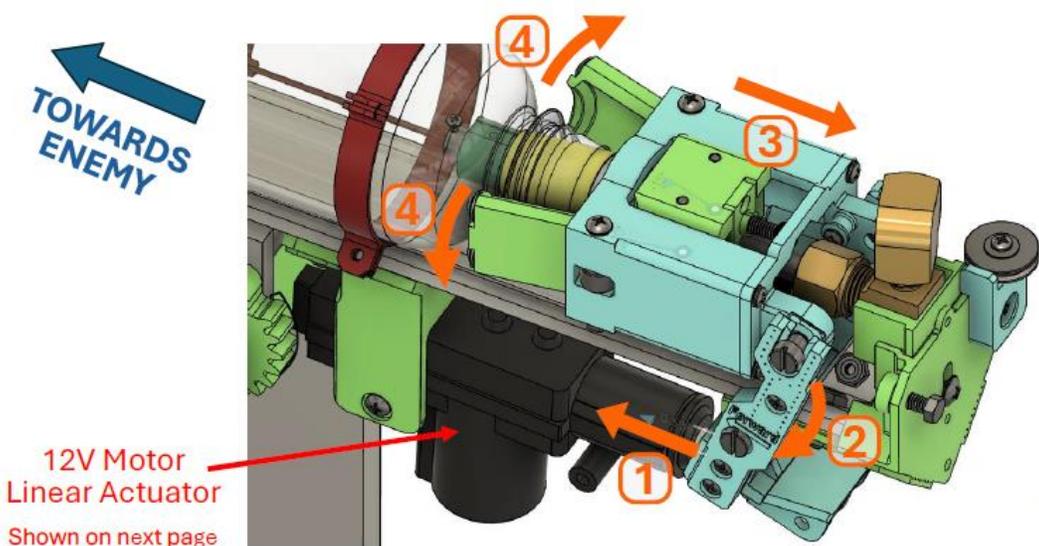
Here is a view with the release arms outward and no longer holding the bottle flange. This is when the bottle is released.

The pictures below show the details of the launch mechanism. The fins are not shown here to allow a clearer view of the mechanism.

TOP SECRET TOP SECRET Water Rocket Launcher – Release Mechanism TOP SECRET TOP SECRET



Close-up of Release Arms on bottle neck



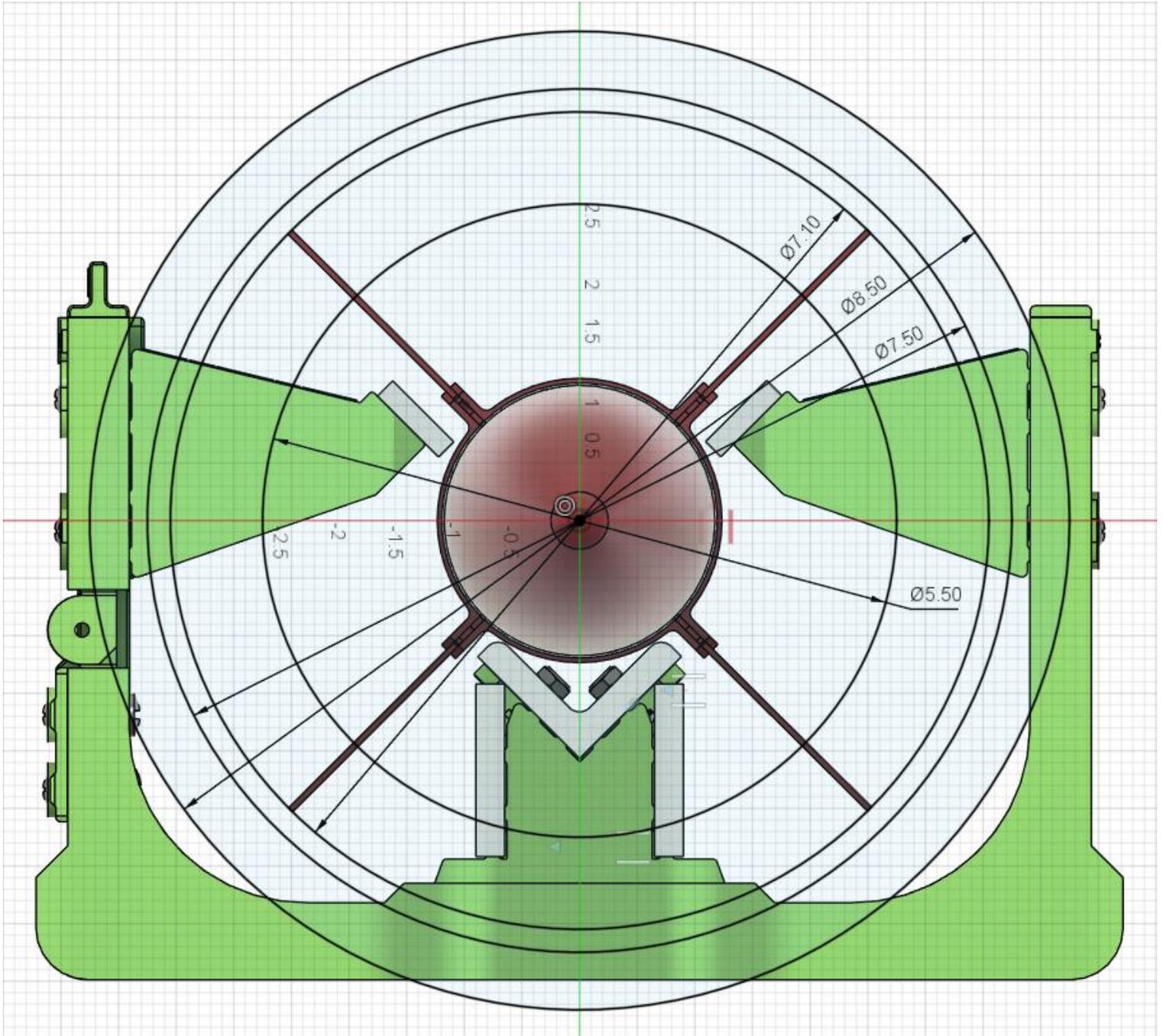
Launch sequence

- ① Actuator pulls in piston
- ② Release Linkage rotates
- ③ Release Slider shifts rearward
- ④ Release Arms pivot outward

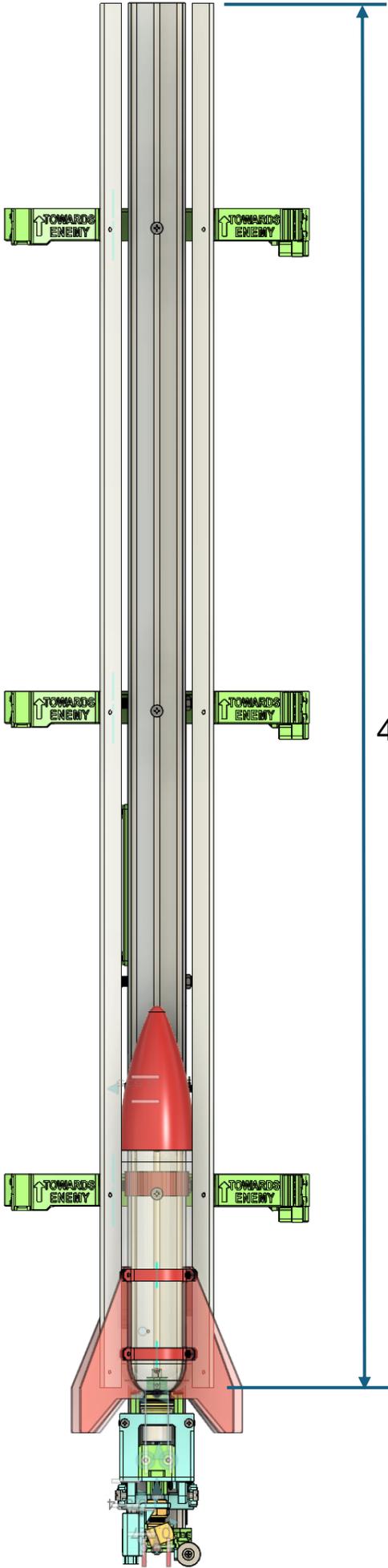
Note that the above actions occur in a synchronized manner.

This view shows clearances for the launcher.

The diameter of the example rocket fin region is 7.10 in. The maximum diameter is 8.50 in. If this diameter is any larger the fins will hit the support frames and fracture spraying the area with shrapnel.



Rail Length



43 in

BOM (Bill of Materials)

Line	Qty	Type	Description	Part Num	Price
1	14	screw	1/4"-20 3/4"L Socket-Head 18-8SS Black-Oxide	96006A706	\$10.74(25)
2	2	screw	1/4"-20 1-1/4" SocketHead 316SS	92185A544	\$4.81(10)
3	8	screw	1/4"-20 3/8"L Socket-Head 18-8SS Black-Oxide	96006A702	\$7.52(25)
4	1	screw	1/4"-20 1-3/8" SocketHead PartiallyThreaded 316SS	92185A506	\$6.49(10)
5	3	screw	10-32 1-1/4"L Pan-Head Phillips 18-8SS Passivated	91772A835	\$12.07(50)
6	3	screw	10-32 2"L Socket-Head 18-8SS Fully-Threaded	92196A226	\$10.32(25)
7	8	screw	8-32 7/16" PanHead Phillips 18-8SS	91772A193	\$9.55(100)
8	2	screw	8-32 3/4"L PanHead Phillips 18-8SS	91772A197	\$13.19(100)
9	14	screw	8-32 7/8" PanHead Phillips 18-8SS	91772A198	\$13.48(100)
10	3	screw	8-32 5/16" SocketHead 18-8SS	92196A191	\$9.86(100)
11	6	screw	8-32 7/16" PanHead Phillips 18-8SS	91772A193	\$9.55(100)
12	3	screw	8-32 5/16" SocketHead 18-8SS	92196A191	\$9.86(100)
13	2	screw	Shoulder 8-32 5/32"SD 1/8"SL 3/16"TL	91829A201	\$1.92(1)
14	2	screw	Shoulder 8-32 3/16"SD 3/16"SL 3/16"TL	91829A202	\$2.01(1)
15	2	screw	8-32 1-1/2" SocketHead 18-8SS FullyThreaded	92196A178	\$10.25(50)
16	1	screw	8-32 1/2" HexHead FullyThreaded 316SS	91720A194	\$3.72(10)
17	2	screw	8-32 7/16" PanHead Phillips 18-8SS	91772A193	\$9.55(100)
18	5	screw	6-32 3/8"L Pan-Head Phillips 18-8SS	91772A146	\$6.46(100)
19	2	screw	6-32 1-3/8"L PanHead Phillips 18-8SS Black-Oxide	91249A622	\$6.94(25)
20	4	screw	4-40 2-3/8" PanHead Phillips 18-8SS	91772A908	\$4.76(25)
21	18	screw	#4 1/2"L RoundedHead SheetMetalBluntScrew 18-8SS	92525A207	\$6.25(100)
22	10	screw	#4 1/2"L RoundedHead SheetMetalBluntScrew 18-8SS	92525A207	\$6.25(100)
23	6	screw	#4 1/2"L RoundedHead SheetMetalBluntScrew 18-8SS	92525A207	\$6.25(100)
24	1	screw	#2 3/8" RoundHead BluntSheetMetal 18-8SS	92525A118	\$5.69(100)
25	1	screw	#2 3/8" RoundHead SheetMetalBlunt	92525A118	\$5.69(100)
26	9	nut	1/4"-20 Thin Nylon-Insert 7/16"W 13/64"H 18-8SS	90101A230	\$6.69(50)
27	6	nut	10-32 Nylon-Insert 3/8"W 11/64"H 18-8SS	90101A225	\$4.91(50)
28	6	nut	8-32 11/32"W 1/8"H 18-8SS	91841A009	\$4.56(100)
29	6	nut	Binding Barrel 8-32 1/2"L 13/64"D Steel Zinc-Plated	98002A413	\$11.12(25)
30	6	nut	1/4"-20 7/16"W 7/32"H 18-8SS	91845A029	\$5.34(100)
31	3	nut	10-32 Nylon-Insert 3/8"W 11/64"H 18-8SS	90101A225	\$4.91(50)
32	2	nut	8-32 Narrow 1/4"W 3/32"H 18-8SS	90730A009	\$5.45(100)
33	2	nut	4-40 Nylon-Insert 1/4" 7/64"H 18-8SS	90101A004	\$5.14(50)
34	4	nut	4-40 Narrow 3/16" 1/16"H 18-8SS	90730A005	\$3.76(100)
35	1	nut	8-32 Narrow 1/4"W 3/32"H 18-8SS	90730A009	\$5.45(100)
36	2	nut	6-32 Thin Nylon-Insert 18-8SS	90101A007	\$9.62(100)
37	1	nut	4-40 1/4"W 3/32"H 18-8SS	91841A005	\$3.89(100)
38	4	washer	#4 0.125"ID 0.312"OD 18-8SS	92141A005	\$1.60(100)
39	10	spacer	0.252"ID 1/2"OD 5/16"L Aluminum Unthreaded	92510A763	\$1.77(1)
40	2	spacer	#6 0.140"ID 3/8"OD 1/4"L 18-8SS	92320A502	\$2.65(1)
41	1	Spacer	3/4"OD 3/8"ID 1/2"L Aluminum	92510A798	\$3.17
42	1	pin	Clevis 1/4"D 3-23/64" UsableLength 18-8SS	92390A182	\$14.64(5)
43	1	pin	Clevis 1/4"D 1-55/64" UsableLength 18-8SS with CotterPin	92390A857	\$10.00(5)
44	2	insert	8-32 0.185"L 0.221"MaxHoleDia 8degHoleTaper Tapered-Heat-Set 303SS	97163A144	\$7.11(10)
45	2	insert	8-32 0.185"L 0.221"MaxHoleDia 8degHoleTaper Tapered-Heat-Set 303SS	97163A144	\$7.11(10)
46	2	insert	8-32 0.185"L 0.221"MaxHoleDia 8degHoleTaper Tapered-Heat-Set 303SS	97163A144	\$7.11(10)
47	2	bar	3/8"T 1-1/2"W 6061-T6	8975K41	\$14.78(2ft)
48	2	bar	3/8"T 1-1/2"W 6061-T6	8975K41	\$14.78(2ft)
49	2	bar	3/16"T 3/4"W Aluminum 6061 1ft	8975K585	\$3.05(1ft)

50	2	bar	3/16"T 3/4"W Aluminum 6061 1ft	8975K585	\$3.05(1ft)
51	4	bar	1/4"T 1-1/2"W 6061 Aluminum 2ft	8975K518	\$9.80(2ft)
52	2	bar	1/4"T 1-1/2"W 6061 Aluminum 2ft	8975K518	\$9.80(2ft)
53	1	bar	3/16"T 3/4"W 6ft Aluminum 6061	8975K585	\$13.85
54	1	bar	3/16"T 3/4"W 6ft Aluminum 6061	8975K585	\$13.85
55	3	bar	3/16"T 1"W 6061-T6 Bar	8975K586	\$8.82(3ft)
56	2	tube	3/4"OD 1/8"T Aluminum 6061	9056K33	9.07(1ft)
57	1	rod	Threaded 1/4"-20 18-8SS	98804A487	\$2.63(1ft)
58	3	rod	Threaded 1/4"-20 18-8SS	98804A487	\$2.63(1ft)
59	3	rod	1/4-20 Threaded 18-8SS 5"	95412A562	\$16.75(10)
60	3	rod	Threaded 1/4"-20 18-8SS 2ft	98804A029	\$3.74
61	1	angle	1/4"T 1-1/4" 6061-T6 90deg RoundEdge	8982K31	\$34.72(4ft)
62	1	latch	ToggleLatchClamp 3.8inMax	Amazon B07S896GLP	\$8.99(2)
63	1	latch	ToggleLatchClamp 3.8inMax Plate	Amazon B07S896GLP	
64	2	coupling	1/4"Hose 1/4"NPTF Male Quick-Disconnect Brass	1077T17	\$2.50
65	1	coupling	1/4"Hose 1/4"NPTF Socket Quick-Disconnect Brass	6534K26	\$12.31
66	1	fitting	1/4NPT Female Tee High-Pressure Brass	50785K72	\$7.01
67	1	fitting	90deg 3/8"TubeID 1/8"NPTF Male	51835K253	\$5.86
68	1	fitting	90deg 1/8"NPT Female Brass	50785K35	\$3.31
69	4	hinge	1-1/2" x 1-3/8" Door-Leaf 0.08"T 304SS	1549A57	\$6.50
70	1	actuator	Linear 10" Stroke	Amazon B07PN341M5	\$37.04
71	1	actuator	Linear 12V Black	Amazon B012VOUQFQ	\$15.59(4)
72	1	sensor	AS5600 Magnetic Encoder	Amazon B097QNG1CN	\$15.99(5)
73	1	sensor	Pressure 1/8"NPT	Amazon B074QPD5RT	\$16.78
74	1	pulley	3/64"RopeDia 3/4"OD 1/8"Shaft Nylon	9466T42	\$3.75
75	1	magnet	1/16"Thick 1/4"OD Neodymium Magnetized-Through-Diameter	5862K413	\$0.97
76	4	magnet	Neodymium Disc Magnets 0.59"Dia 0.12"Thick	Amazon B09TB2PJN4	\$13.99(40)
77	1	Plug	Silicone Rubber Tapered Plug 17mm to 23mm with Hole	Amazon B09QX99FYK	\$9.79(2)
78	1	undef	Rotating LED Warning Light	Adafruit 5134	\$12.50

3D Printed Parts – 78 part designs – 116 total parts

1	1	printPLA	SensorHousing		
2	1	printPLA	SensorMagnetMount		
3	1	printPLA	SensorSpurGear		
4	1	printPLA	BaseTubeInsert		
5	1	printPLA	RestSpacer		
6	2	printPLA	RearSpacer0.500		
7	2	printPLA	LegLockCenter		
8	1	printPLA	CableMountLower		
9	1	printPLA	CableMountMiddle		
10	1	printPLA	CableMountUpper		
11	2	printPLA	RearSpacer0.610		
12	1	printPLA	CableMountLower4Cable		
13	1	printPLA	CableMountPiston		
14	1	printPLA	CableMountTop4Wire		
15	1	printPLA	CableMountKnob		
16	1	printPLA	CableMountTopStop		
17	1	printPLA	ToggleClampMount		
18	1	printPLA	MotorCover		
19	4	printPLA	SwingLockLeg		

20	4	printPLA	LegCap		
21	4	printPLA	HingeLockBase		
22	1	printPLA	ExtensionBarLock		
23	1	printPLA	SupportBarMountLower		
24	1	printPLA	SupportBarMountUpper		
25	1	printPLA	SirenMount		
26	1	printPLA	HoseCouplingMount		
27	3	printPLA	FrameBottom		
28	3	printPLA	RailToFrameMountLower		
29	3	printPLA	SideRailMountLeft		
30	3	printPLA	HingeLower		
31	3	printPLA	HingeStop		
32	3	printPLA	FrameCapLeft		
33	3	printPLA	SideRailMountRight		
34	3	printPLA	HingeUpper		
35	3	printPLA	FrameRight		
36	3	printPLA	FrameCapRight		
37	3	printPLA	HingeStopMagnetMount		
38	1	printPLA	RailToBarMount		
39	1	printPLA	ActuatorMount		
40	1	printPLA	BottomRailRearCap		
41	1	printPLA	RearLockExtension		
42	1	printPLA	RearLockKnob		
43	1	printPLA	RearLockArm		
44	1	printPLA	GearOnRail		
45	1	printPLA	RailPivotSpacer		
46	1	printPLA	RailLabelFrame		
47	1	printPLA	ProtractorPlate		
48	1	printPLA	ReleaseSliderBody		
49	1	printPLA	ReleaseSliderRear		
50	1	printPLA	ReleaseSliderBushing		
51	1	printPLA	PivotBase		
52	1	printPLA	PivotBaseBar		
53	1	printPLA	StopperLock		
54	1	printPLA	Housing		
55	1	printPLA	ActuatorRod		
56	1	printPLA	Ver2 Green		
57	1	printPLA	ReleasePivotLeft		
58	1	printPLA	ReleaseArmLinkLower		
59	1	printPLA	ReleaseArmRight		
60	1	printPLA	ReleaseArmLinkUpper2		
61	1	printPLA	ReleaseArmActuatorLink		
62	1	printPLA	Bottle-SparklingIce 17oz		
63	1	printPLA	Nosecone		
64	4	printPLA	Fins		
65	2	printPLA	FinRing		
66	1	printPLA	RailCoupling		
67	1	printPLA	MotorHousing		
68	1	printPLA	RodAndLink		
69	1	printPLA	FittingMountV3		
70	1	printPLA	PulleyArm		
71	1	printPLA	ReleasePivotMount		

72	1	printPLA	Template-Leg		
73	1	printPLA	Template-BaseBarRear		
74	1	printPLA	Template-FrameLowerBar		
75	1	printPLA	Template-Base-Ground-Rear		
76	1	printPLA	Template-BaseVertBar		
77	1	printPLA	Template-RailSideBar		
78	1	printPLA	Template-GuideRailHoles		