

Item	Size	Vendor	Vendor part number	Price	Quantity	Extended Cost	Notes
RAW MATERIAL							
6061 4x6x0.25 Rectangular tube	6"	onlinemetals.com	18004	\$ 30.54	1 \$	30.54	Shoulder - 20001 For upper arm (20002) and hull mount. For hull mount, adjust length to suit specific sub and mounting preference. Length given is for Shackleton.
6061 3x3x0.25 Square tube	24"	metalsdepot.com	T3314	\$ 43.24	2 \$	86.48	
6061 3x3x0.1875 Square tube	24"	onlinemetals.com	7058	\$ 34.43	1 \$	34.43	Forearm
6061 Flat bar	3.5x1/4 (12")	onlinemetals.com	7849	\$ 7.31	1 \$	7.31	Wrist plates - 20004
6061 Flat bar	3.5x3/8 (12")	onlinemetals.com	1160	\$ 10.96	1 \$	10.96	Pivot tabs - 20008
6061 Flat bar	2x1/2 (18")	onlinemetals.com	1168	\$ 13.68	1 \$	13.68	Knuckles (20005) and Fingers (20006)
6061 Flat bar	3x1/2 (18")	onlinemetals.com	1170	\$ 26.19	1 \$	26.19	Fingers - 20006
6061 Round bar	1" (12")	onlinemetals.com	1090	\$ 6.02	1 \$	6.02	Spacers
6061 Round bar	7/8" (12")	onlinemetals.com	1089	\$ 4.52	1 \$	4.52	Spacers
HARDWARE							
303 Flat shoulder rod end bolt	5/16-18 x 3-3/16	McMaster.com	3796K16	\$ 17.81	2 \$	35.62	Rod end pivot attaching actuator to shoulder
18-8SS Socket head cap screw	3/8-24 x 6	McMaster.com	92196A378	\$ 5.22	1 \$	5.22	Pivot point for actuator in drawing #20000
316 Hex head screw	1/2-13 x 4.5	McMaster.com	92186A730	\$ 2.19	1 \$	2.19	Attached shoulder to hull mount in drawing #20000
316 Hex head screw (box of 5)	5/16-24 x 1.5	McMaster.com	92186A350	\$ 4.08	1 \$	4.08	Attaches tendons to actuator in drawing #20036
316 Socket head screw	1/2-13 x 5	McMaster.com	92185A734	\$ 12.25	1 \$	12.25	Connects upper arm to shoulder in drawing #200012
316 Socket head screw (box of 10)	1/4-20 x 1	McMaster.com	92185A542	\$ 3.44	1 \$	3.44	Attach fingers to knuckles in drawing #20567
316 Hex drive flat head screw	3/8-16 x 4.5	McMaster.com	90585A149	\$ 4.07	1 \$	4.07	Pivot point for upper arm actuator base in drawing #20012
316 Hex drive flat head screw	3/8-24 x 1	McMaster.com	90585A067	\$ 2.79	6 \$	16.74	Attach pivot tabs in drawings #20012 and #20023
316 Hex drive flat head screw (box of 10)	1/4-20 x 7/16	McMaster.com	90585A038	\$ 3.66	1 \$	3.66	Attach wrist plates to forearm in drawing #234567
316 Socket head screw	3/8-24 x 3	McMaster.com	92185A668	\$ 2.78	2 \$	5.56	Actuator tip pivots on drawings #20012 and #20023
316 Socket head screw	3/8-16 x 3.5	McMaster.com	92185A641	\$ 2.79	2 \$	5.58	Attach fingers to wrist plate on drawing #234567
18-8 Socket head screw	3/8-16 x 5.5	McMaster.com	92196A646	\$ 3.96	1 \$	3.96	Pivot point for forearm actuator base in drawing #20023
18-8 Socket head screw	3/8-16 x 8	McMaster.com	92196A654	\$ 12.77	1 \$	12.77	Connects upper arm and forearm in drawing #20023. Cut to 7.5" length.
316 Thin locknut (box of 10)	1/2-13	McMaster.com	97367A116	\$ 10.09	1 \$	10.09	Drawing #200012
316 Thin locknut (box of 25)	3/8-16	McMaster.com	97367A115	\$ 11.10	1 \$	11.10	
316 Thin hex nut (box of 25)	3/8-24	McMaster.com	94805A217	\$ 7.18	1 \$	7.18	
316 Nylock nut (box of 25)	3/8-24	McMaster.com	90715A148	\$ 8.23	1 \$	8.23	
316 Flat washer (box of 25)	3/8	McMaster.com	90107A127	\$ 8.80	1 \$	8.80	
316 Flat washer (box of 25)	1/2	McMaster.com	90107A033	\$ 8.16	1 \$	8.16	
18-8 1/4" Helicoils (pack of 10)	1/4-20 x 1/4	McMaster.com	91732A368	\$ 4.82	1 \$	4.82	Wrist plates - 20004
18-8 1/4" Helicoils (pack of 10)	1/4-20 x 1/2	McMaster.com	91732A734	\$ 6.69	1 \$	6.69	Fingers - 20006
18-8 Slotted spring pins (pack of 25)	1/4 x 1/2	McMaster.com	92373A366	\$ 5.78	1 \$	5.78	Attaches tendons to knuckles in drawing #20567
Nylon washers (box of 50)	1OD x 0.4ID x 0.074	McMaster.com	90295A473	\$ 8.52	1 \$	8.52	
ACTUATORS							
Lenco 101 actuators (2.25" stroke, 12V)		amazon.com	15055-001	\$ 223.90	2 \$	447.80	Modify per Hank Pronk Youtube video https://www.youtube.com/watch?v=LyLMAXL09pg Drill base pivot hole to 3/8". Either the Extreme Duty or Standard Duty version of the #101 actuator may be used, but pivot hole distances may need adjustment as these actuators are of different lengths.
Lenco 102 actuators (4.25" stroke, 12V)		amazon.com	15059-001	\$ 247.15	2 \$	494.30	Modify per Hank Pronk Youtube video https://www.youtube.com/watch?v=LyLMAXL09pg Drill base pivot hole to 3/8". Either the Extreme Duty or Standard Duty version of the #102 actuator may be used, but pivot hole distances may need adjustment as these actuators are of different lengths.
ELECTRICAL							
Impulse 8 pin male connector, threaded		eBay	BH-8-MP	\$ 45.00	\$	-	
Impulse 8 pin female connector w 4' cable		eBay	IL-8-FS	\$ 55.00	\$	-	This eBay price is MUCH lower than list
					\$	23.80	
			2299-SRB1-2G				
Sealed IP56 switches (on-off-on)		Digikey	DC-1-NN-ND	\$ 5.95	4		One switch per actuator
Spade connectors for actuators		Digikey	WM13547-ND	\$ 0.39	25 \$	9.69	
M20 nylon locknut		Digikey	RPC3029-ND	\$ 0.50	1 \$	0.50	
Cord grip for control box		McMaster	69915K55	\$ 4.61	1 \$	4.61	
Super-flex cable for control box (16AWG x		McMaster	7081K81	\$ 3.68	10 \$	36.80	

Blue Globe cable seal	Digikey	2081-96572.0-		\$	4.78	
Junction box (outside hull)	Digikey	ND	\$	4.78	1	Seals the junction box end of penetrator cable
Control box (inside hull)	Digikey	377-2338-ND	\$	22.00	1	Junction box for actuator cables. Must pressure compensate with oil or air.
Speed control	eBay	XL4016	\$	7.63	1	Variable DC-DC converter 8A, 200W, 4-40V to 1.25-36V
TOTAL						\$ 1,476.01