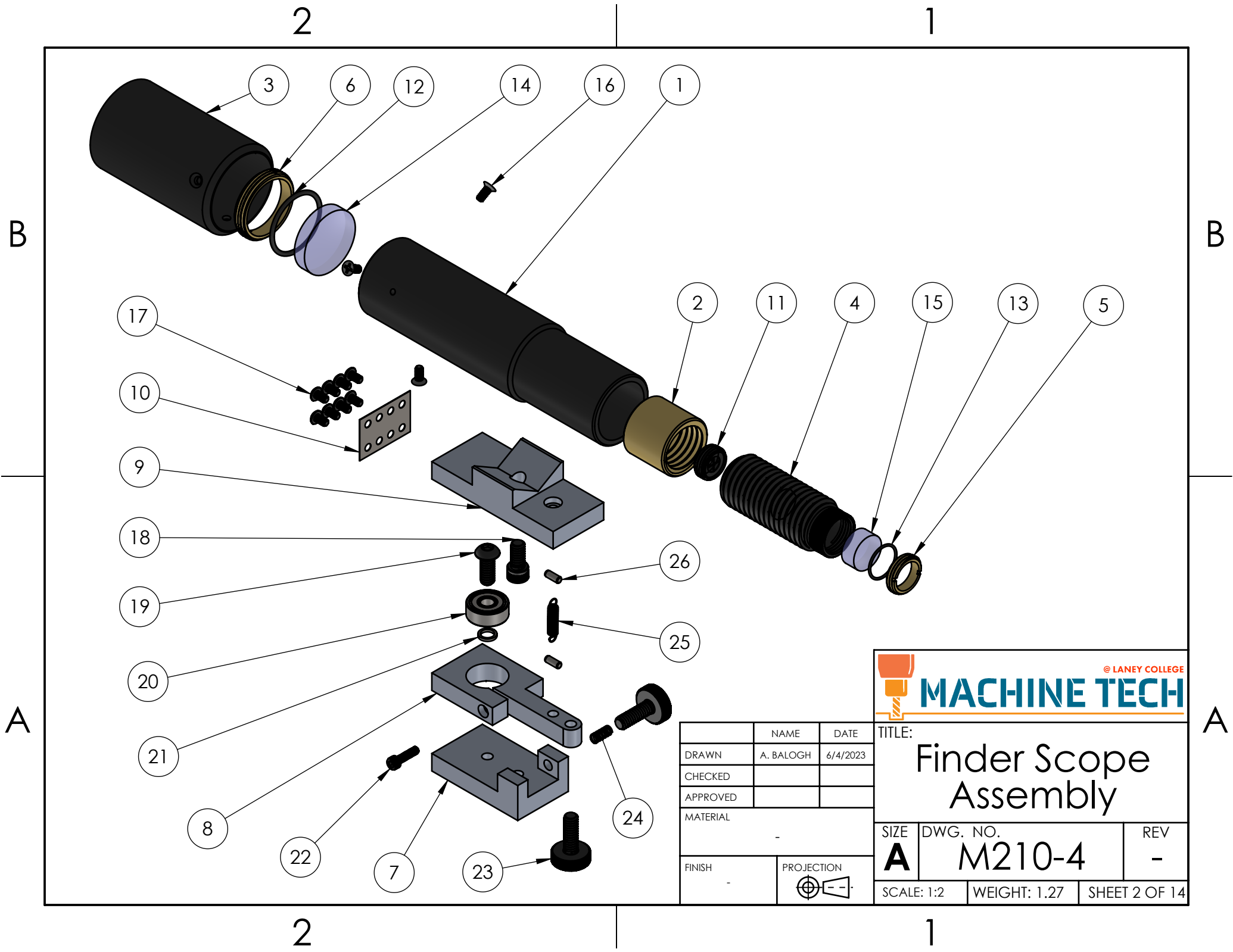


SCOPE

FINDER



	NAME	DATE
DRAWN	A. BALOGH	6/4/2023
CHECKED		
APPROVED		
MATERIAL	-	
FINISH	-	
	PROJECTION	

TITLE:		
Finder Scope Assembly		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 1:2	WEIGHT: 1.27	SHEET 2 OF 14

2

1

ITEM NO.	DESCRIPTION	ORDER NUMBER	QUANTITY
1	TUBE		1
2	THREADED INSERT		1
3	SHIELD		1
4	FOCUSER		1
5	EYEPIECE RETAINER		1
6	OBJECTIVE RETAINER		1
7	MOUNT - LOWER		1
8	MOUNT - INTERMEDIATE		1
9	MOUNT - UPPER		1
10	FLEXURE		1
11	CROSSHAIR AND CARRIER SUBASSEMBLY		1
12	28MM ID X 32MM OD X 2MM THICK BUNA-N O-RING	MCM #9262K405	1
13	15.5MM ID X 17.5MM OD X 1MM THICK BUNA-N O-RING	MCM #9262K164	1
14	32MM DIA X 130MM FL ACHROMATIC DOUBLET	SS #L1317	1
15	17.5MM DIA X 22MM FL ACHROMATIC DOUBLET	SS #L10844	1
16	#6-32 X 5/16IN LONG X 100° PHILLIPS FLAT HEAD SCREW (BLACK OXIDE)	MCM #96640A341	3
17	#6-32 X 1/4IN LONG BUTTON HEAD CAP SCREW (BLACK OXIDE)	MCM #91255A144	8
18	1/4-20 X 1/2IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE)	MCM #91251A537	1
19	1/4-20 X 5/8IN LONG BUTTON HEAD CAP SCREW (BLACK OXIDE)	MCM #91255A539	1
20	R4A-2RS BALL BEARING (1/4IN ID X 3/4IN OD X 9/32IN WIDE)		1
21	.25IN ID X .335IN OD X .05IN THICK STEEL WASHER		1
22	#6-32 X 1/2IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE)	MCM #91251A148	1
23	1/4-20 X 3/4IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE) WITH BLACK PLASTIC SCREW-HEAD MOUNT KNOB	MCM #91251A540 & #94052A033	2
24	.022IN WIRE X .18IN OD X .63IN LONG COMPRESSION SPRING	MCM #9657K646	1
25	.022IN WIRE X .18IN OD X .75IN LONG EXTENSION SPRING	MCM #9044K128	1
26	1/8IN OD X 5/16IN LONG STEEL DOWEL PIN	MCM #98381A216	2

B

B

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	NAME	DATE	TITLE:		
DRAWN	A. BALOGH	6/4/2023	Bill of Materials		
CHECKED					
APPROVED					
MATERIAL			SIZE	DWG. NO.	REV
-			A	M210-4	-
FINISH			SCALE: -		WEIGHT: -
-					SHEET 3 OF 14



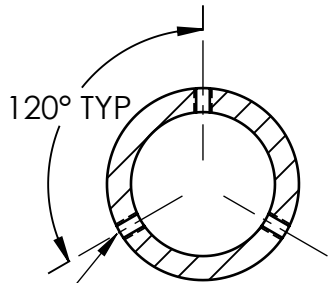
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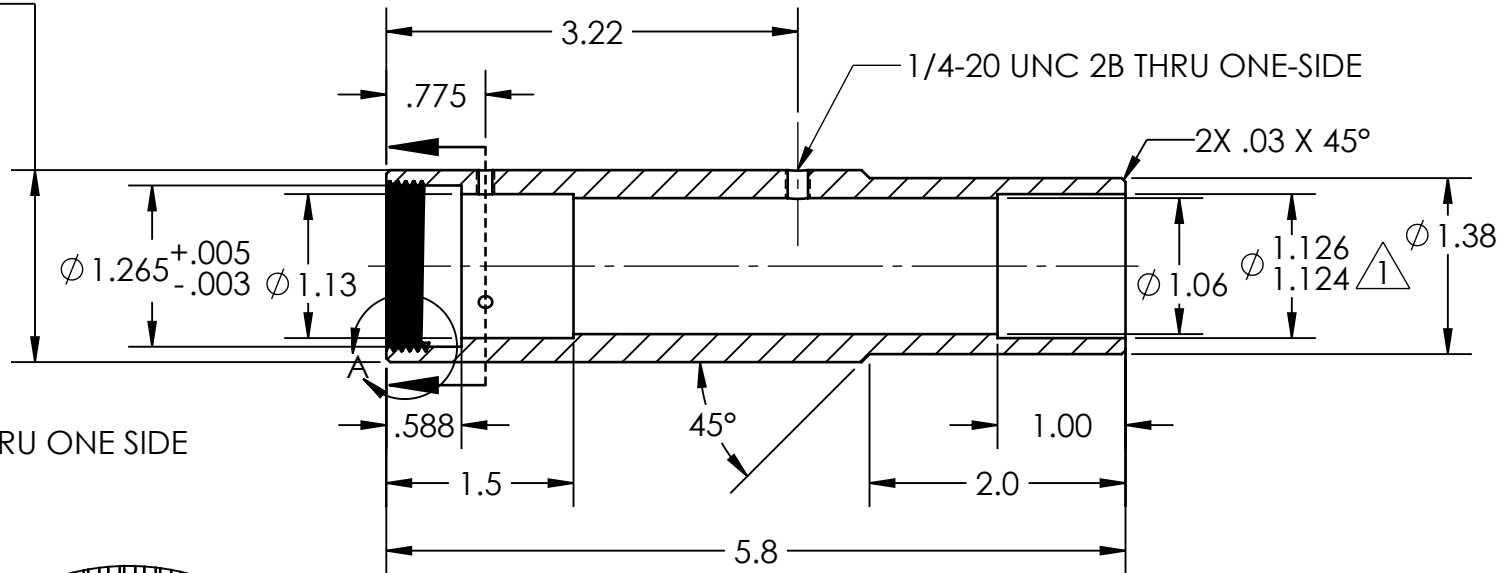
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1

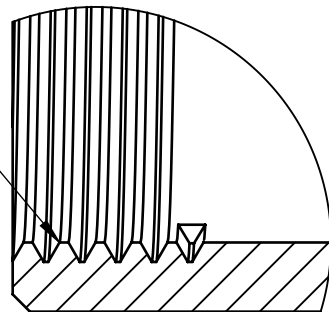
MINIMUM TO CLEAN
(ϕ 1.5 STOCK)



3X #6-32 UNC 2B THRU ONE SIDE



1 5/16 - 16 UNS 2B ∇ .3



DETAIL A
THREAD DETAIL
SCALE 3 : 1



NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE AND MILL.

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH 6/4/2023
TOLERANCES:	CHECKED	
1/X or .X \pm 1/64 (.0156)	APPROVED	
.XX \pm .010	MATERIAL	6061-T6 ALUMINUM
.XXX \pm .005	FINISH	TYPE II BLACK ANODIZE
X \pm 1°	PROJECTION	
ALL SURFACES ∇ 125/	INTERPRET PER ASME Y14.5-2018	



TITLE:		
Tube		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 1:1.5	WEIGHT: .46	SHEET 4 OF 14

B

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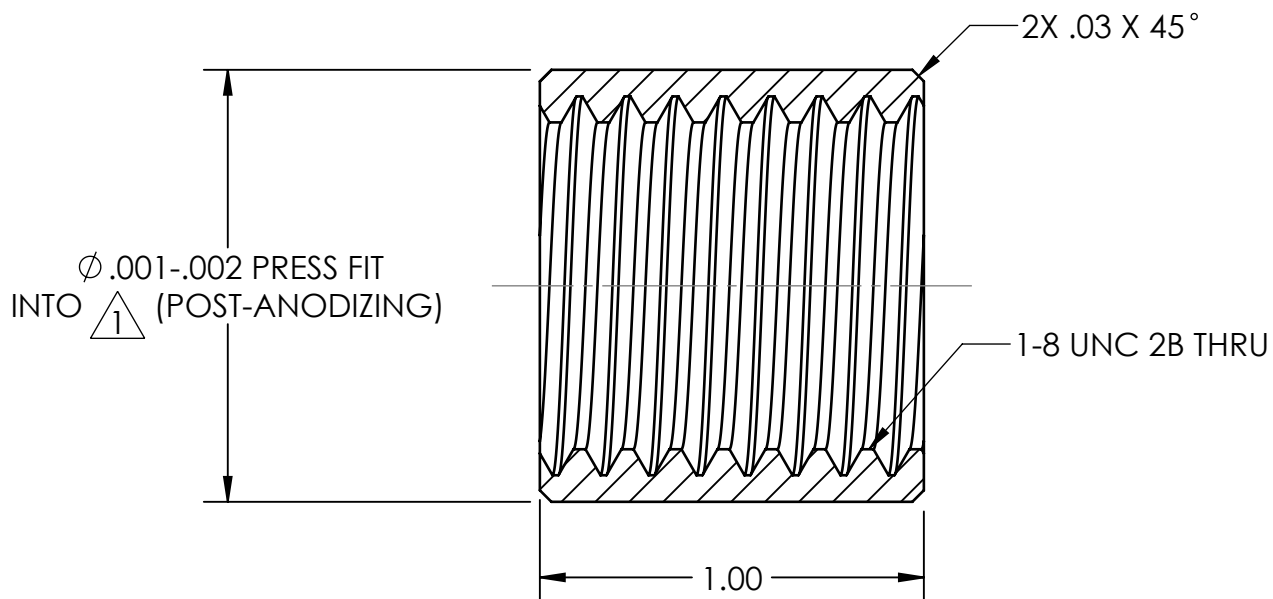
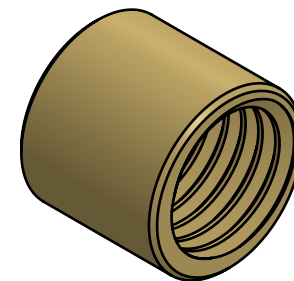
1

2

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NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE PROVIDED TO STUDENT AS CNC MACHINED COMPONENT.



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE:	
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH	6/4/2023	
TOLERANCES:		CHECKED			
1/X or .X ± 1/64 (.0156)		APPROVED			
.XX ± .010		MATERIAL		SIZE	
.XXX ± .005		932 ALU BRONZE		DWG. NO.	
X° ± 1°		FINISH		REV	
ALL SURFACES $\sqrt{125}$		PROJECTION		-	
INTERPRET PER ASME Y14.5-2018		-		SCALE: 2:1	
				WEIGHT: .11	
				SHEET 5 OF 14	

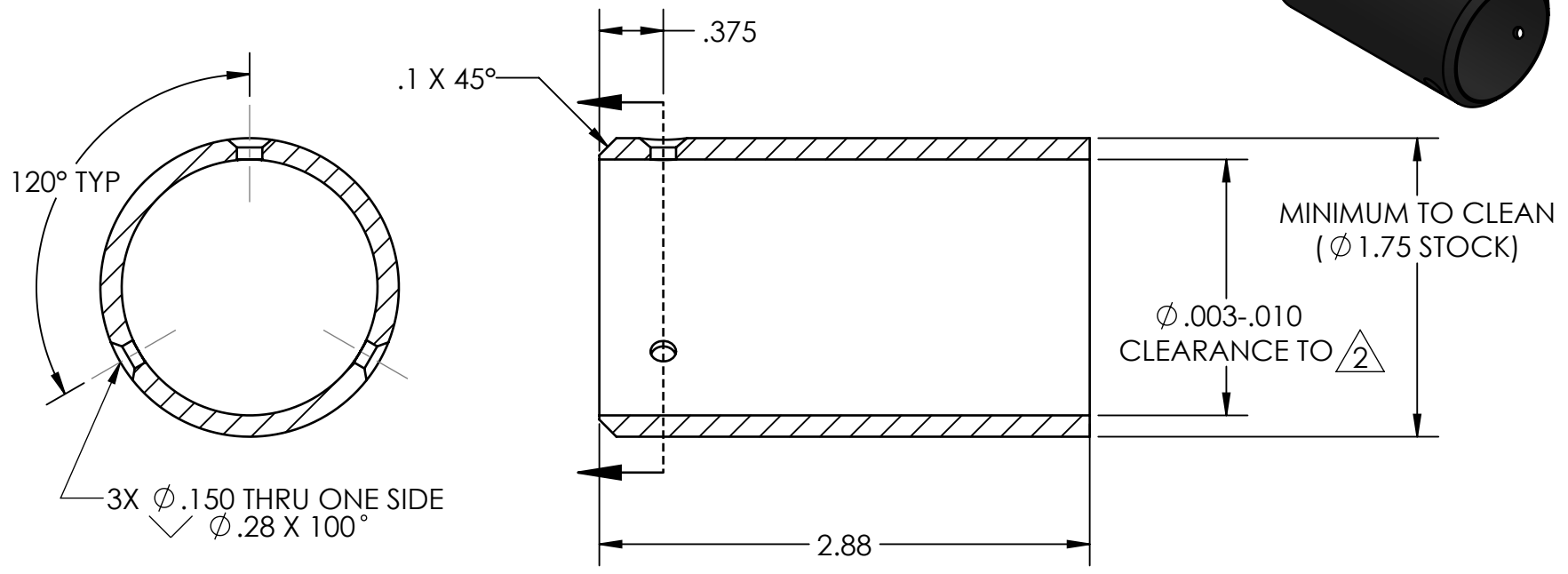
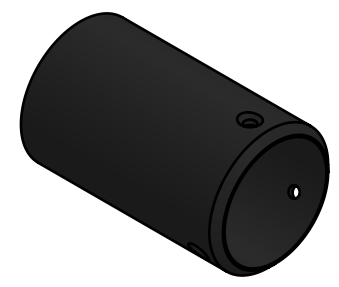
2

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NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT
ON MANUAL LATHE AND MILL.



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE:	
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH	Shield	
TOLERANCES:		CHECKED			
1/X or .X \pm 1/64 (.0156)		APPROVED			
.XX \pm .010		MATERIAL		SIZE	DWG. NO.
.XXX \pm .005		BLACK DELRIN		A	M210-4
X° \pm 1°		ACETAL PLASTIC		FINISH	PROJECTION
ALL SURFACES $\sqrt{125}$					
INTERPRET PER ASME Y14.5-2018				SCALE: 1:1	WEIGHT: .09
				REV -	
				SHEET 6 OF 14	

2

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2

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2X .10 X 45°

(1-8 UNC 2A THREADED ROD STOCK)

FINE DIAMOND KNURL

2X .02 X 45°

3/4 - 16 UNF 2B ∇ .3

5/8 - 18 UNF 2B

ϕ .83

ϕ .80^{+.00}_{-.01}

ϕ .694^{+.005}_{-.003}

.07

.32

.56

2.5



NOTES:

1) DEBURR ALL EDGES .015 MAX.

2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X \pm 1/64 (.0156)	APPROVED		
.XX \pm .010	MATERIAL	LOW CARBON STEEL	
.XXX \pm .005	FINISH	OIL BLACKENED	PROJECTION
X° \pm 1°			
ALL SURFACES $\sqrt{125}$	INTERPRET PER ASME Y14.5-2018		



TITLE:		
Focuser		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 2:1	WEIGHT: .26	SHEET 7 OF 14

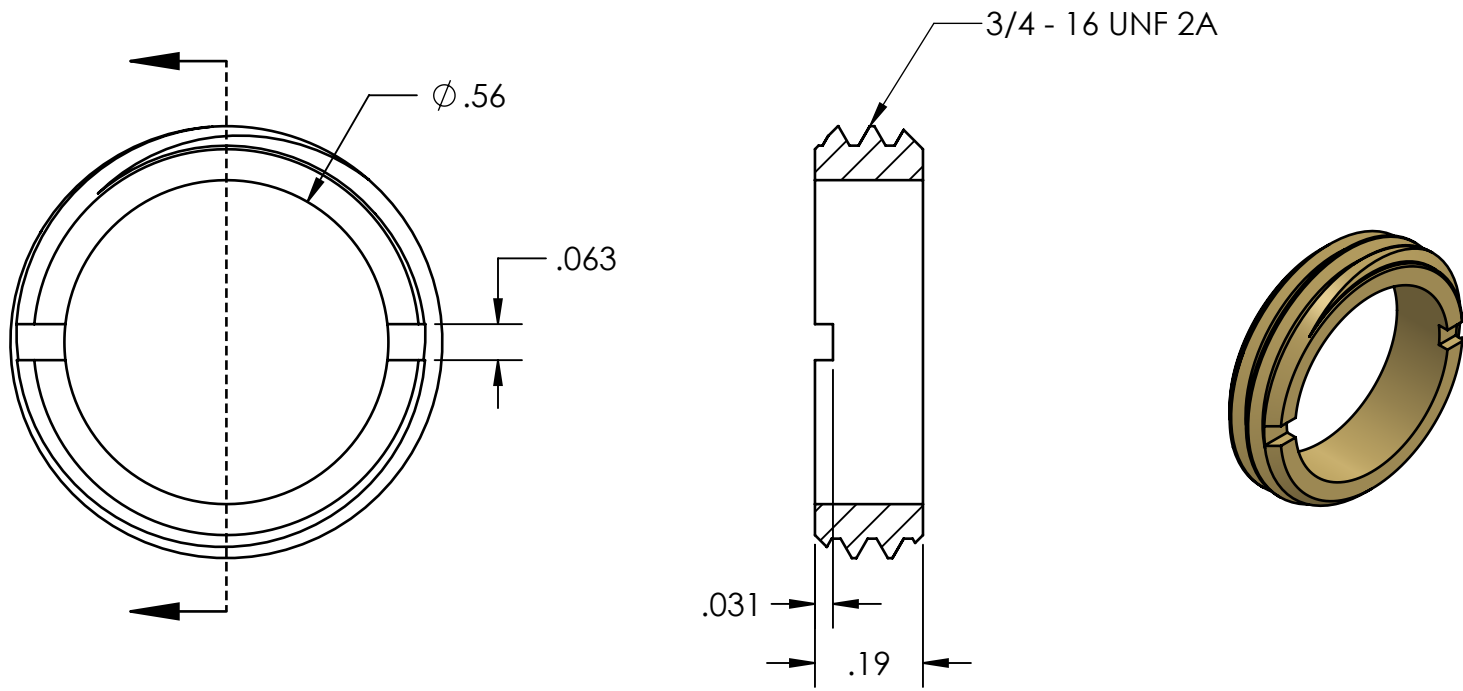
2

1

2

1

THREAD DATA FOR 3/4-16 UNF 2A	
MAJOR DIA.	.739-.749
PITCH DIA.	.703-.708
MINOR DIA.	(.674)



B

B

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A

NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE AND MILL.



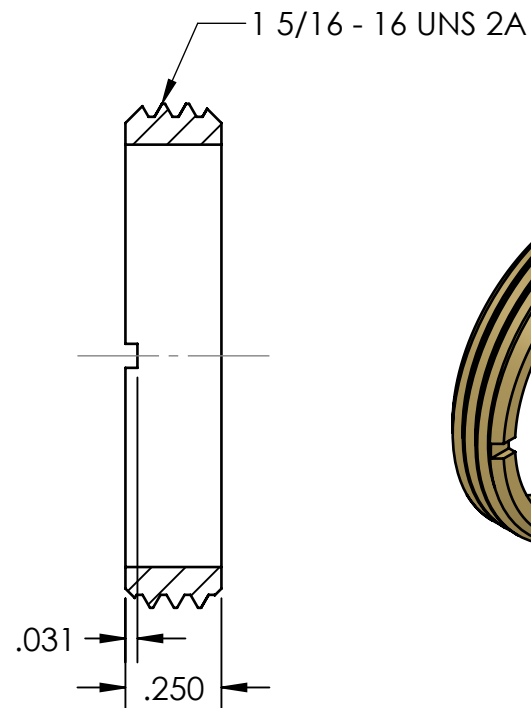
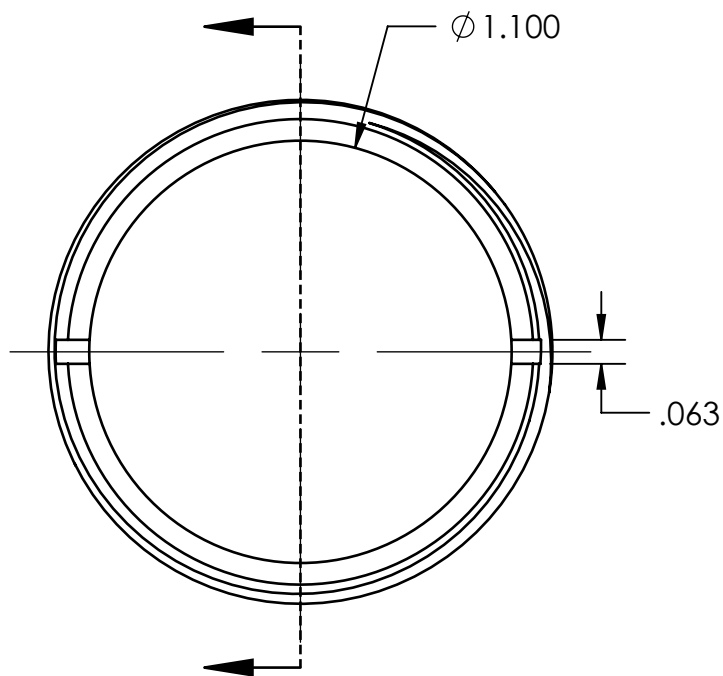
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE:	
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH	Eyepiece Retainer	
TOLERANCES:		CHECKED			
1/X or .X ± 1/64 (.0156)		APPROVED			
.XX ± .010		MATERIAL		SIZE	DWG. NO.
.XXX ± .005		360 BRASS		A	M210-4
X° ± 1°		FINISH		SCALE: 3:1	WEIGHT: .01
ALL SURFACES $\sqrt{125}$		PROJECTION		REV	
INTERPRET PER ASME Y14.5-2018		-		-	
				SHEET 8 OF 14	

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NOTES:

1) DEBURR ALL EDGES .015 MAX.

2) PART TO BE MANUFACTURED BY STUDENT ON CNC TURNING CENTER WITH LIVE TOOLING.

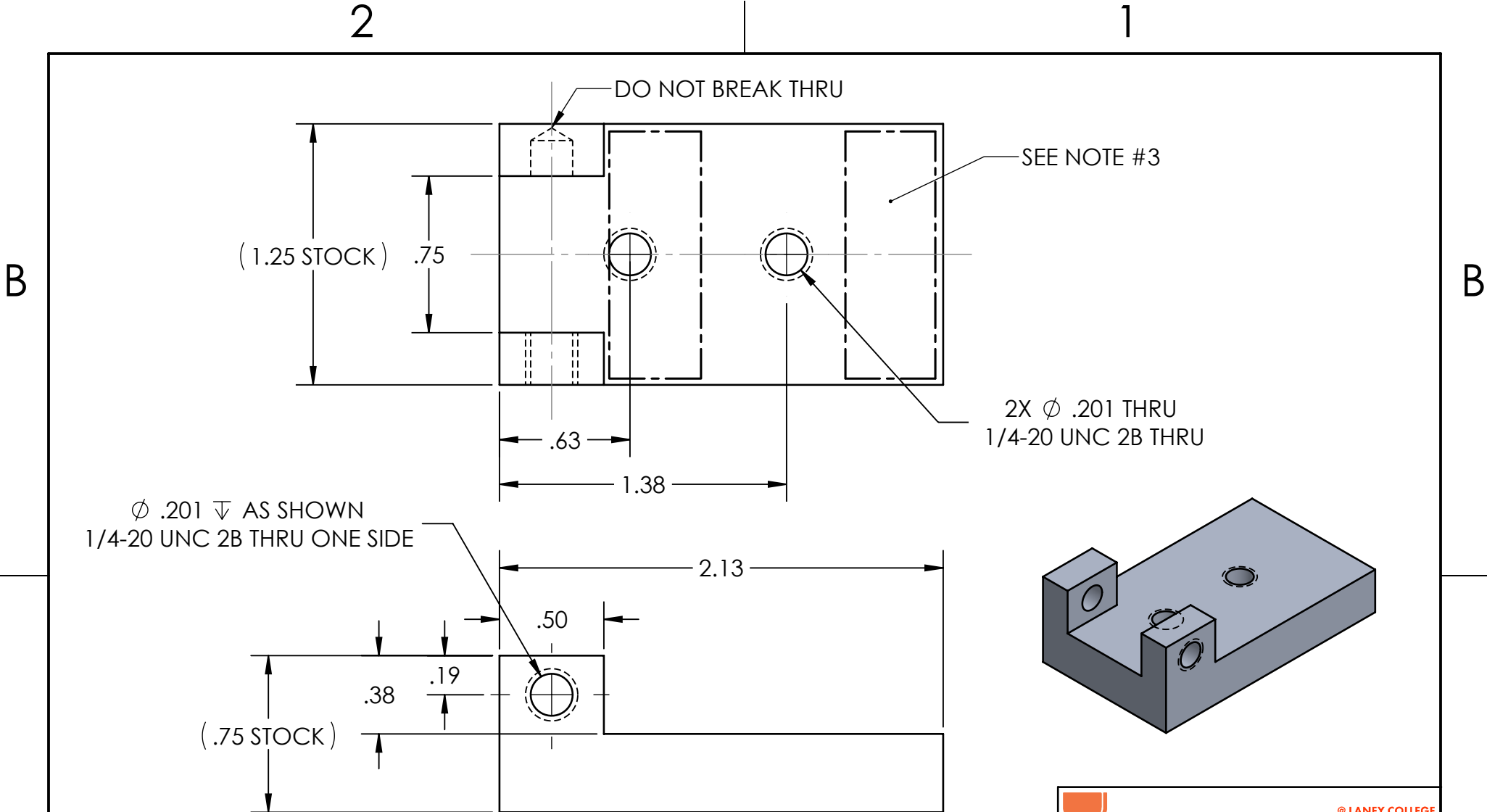
UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X \pm 1/64 (.0156)	APPROVED		
.XX \pm .010	MATERIAL	932 ALU BRONZE	
.XXX \pm .005	FINISH		
X $^{\circ}$ \pm 1 $^{\circ}$	PROJECTION		
ALL SURFACES $\sqrt{125}$			
INTERPRET PER ASME Y14.5-2018			



TITLE:		
Objective Retainer		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 2:1	WEIGHT: .02	SHEET 9 OF 14

2

1



$\phi .201 \nabla$ AS SHOWN
1/4-20 UNC 2B THRU ONE SIDE

2X $\phi .201$ THRU
1/4-20 UNC 2B THRU

NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL MILL.
- 3) LAP SURFACE FLAT AFTER BEAD BLAST. THEN APPLY .5 WIDE X .005 THICK PTFE TAPE AS SHOWN.

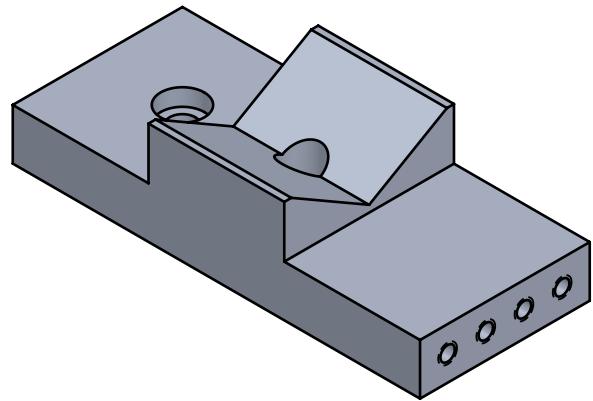
UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH 6/4/2023
TOLERANCES:	CHECKED	
1/X or .X \pm 1/64 (.0156)	APPROVED	
.XX \pm .010	MATERIAL	6061-T6 ALUMINUM
.XXX \pm .005	FINISH	FINE BEAD BLAST
X $^{\circ}$ \pm 1 $^{\circ}$	PROJECTION	
ALL SURFACES ∇_{125}	INTERPRET PER ASME Y14.5-2018	



TITLE:		
Mount - Lower		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 1.5:1	WEIGHT: .10	SHEET 10 OF 14

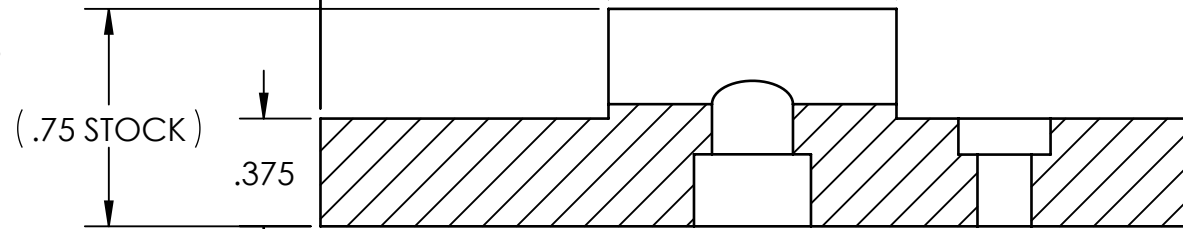
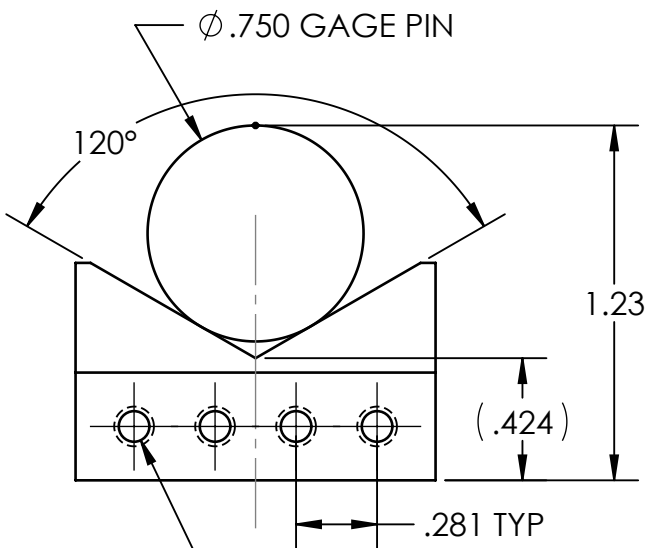
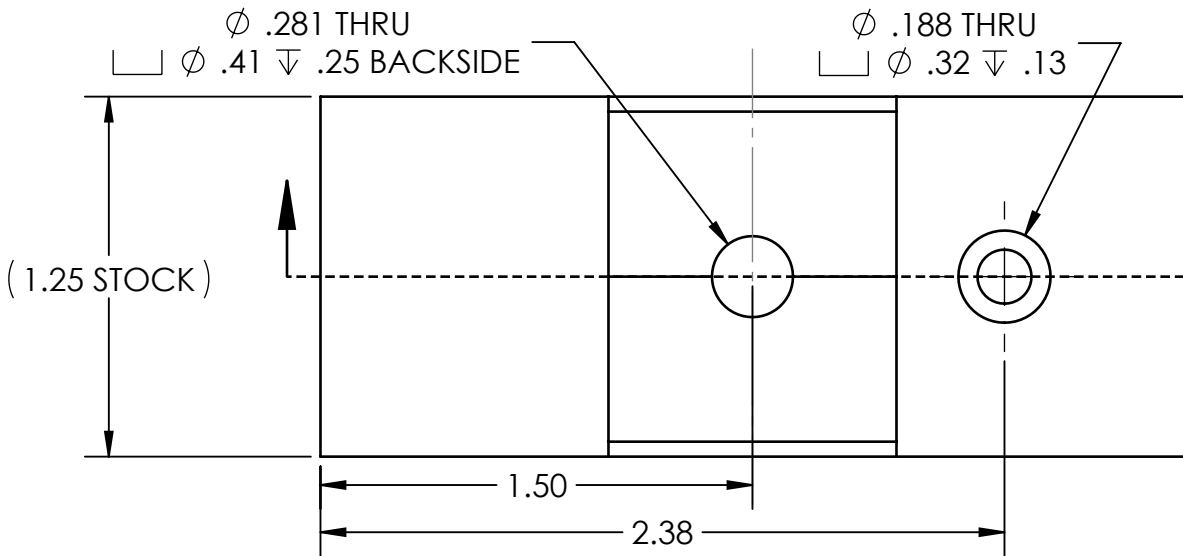
2

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NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL MILL.



UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH 6/4/2023
TOLERANCES:	CHECKED	
1/X or .X $\pm 1/64$ (.0156)	APPROVED	
.XX $\pm .010$	MATERIAL	6061-T6 ALUMINUM
.XXX $\pm .005$	FINISH	FINE BEAD BLAST
X $^\circ \pm 1^\circ$	PROJECTION	
ALL SURFACES $\sqrt{125}$	INTERPRET PER ASME Y14.5-2018	

TITLE:		
Mount - Upper		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 1.5:1	WEIGHT: .16	SHEET 12 OF 14

2

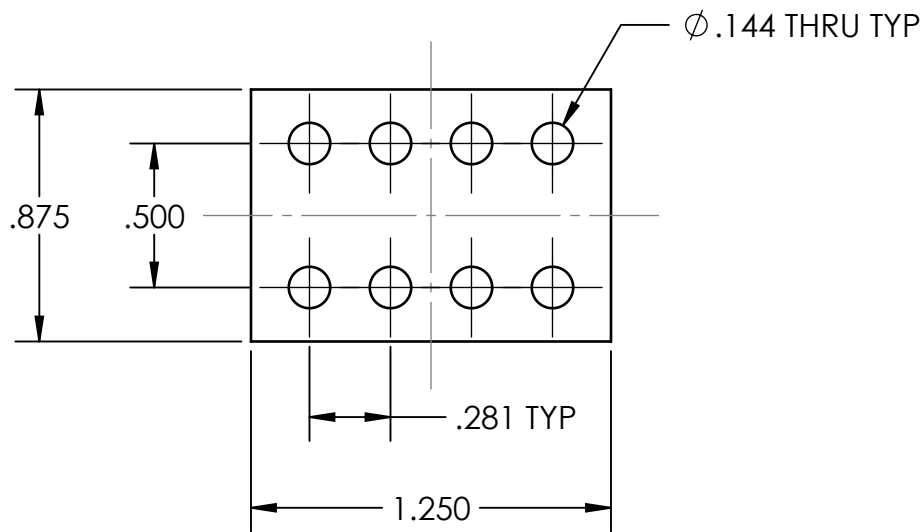
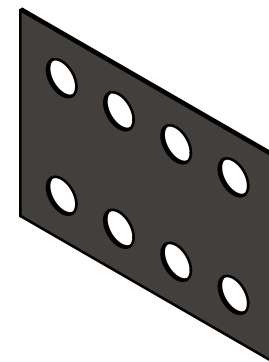
1

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NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) VECTOR FILE AVAILABLE FROM INSTRUCTOR.
- 3) PART TO BE FABRICATED BY STUDENT ON WATERJET CUTTER AT LANEY FABLAB.



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE:	
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH	Flexure	
TOLERANCES:		CHECKED			
1/X or .X ± 1/64 (.0156)		APPROVED			
.XX ± .010		MATERIAL		SIZE	DWG. NO.
.XXX ± .005		.015 THICK SHEET		A	M210-4
X° ± 1°		420 STAINLESS STEEL		REV	-
ALL SURFACES 125/		FINISH	PROJECTION	SCALE: 1.5:1	
INTERPRET PER ASME Y14.5-2018		GROUND		WEIGHT: .003	SHEET 13 OF 14

2

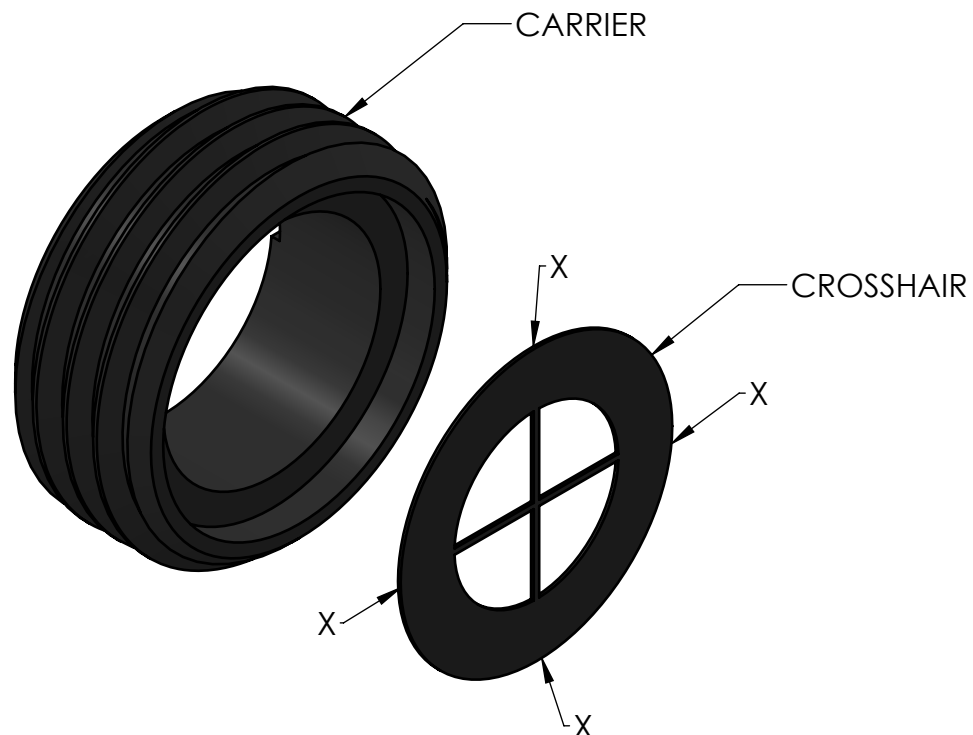
1

2

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B

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NOTES:

- 1) MODEL AND VECTOR FILES AVAILABLE FROM INSTRUCTOR.
- 2) CROSSHAIR TO BE FABRICATED BY STUDENT FROM STEEL SHIM STOCK USING LASER MARKER/CUTTER IN MACH TECH DEPT.
- 3) CARRIER TO BE FABRICATED BY STUDENT FROM BLACK ABS PLASTIC USING 3D PRINTER IN MACH TECH DEPT OR AT LANEY FABLAB.
- 4) AFTER ASSEMBLY, TACK CROSSHAIR TO CARRIER USING CYANOACRYLATE ADHESIVE IN FOUR PLACES SHOWN WITH X'S

A

A



UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
	CHECKED		
	APPROVED		
	MATERIAL		SEE NOTES
	FINISH	PROJECTION	
	-		
INTERPRET PER ASME Y14.5-2018			

TITLE:		
Crosshair and Carrier Subassembly		
SIZE	DWG. NO.	REV
A	M210-4	-
SCALE: 4:1	WEIGHT: .01	SHEET 14 OF 14

2

1