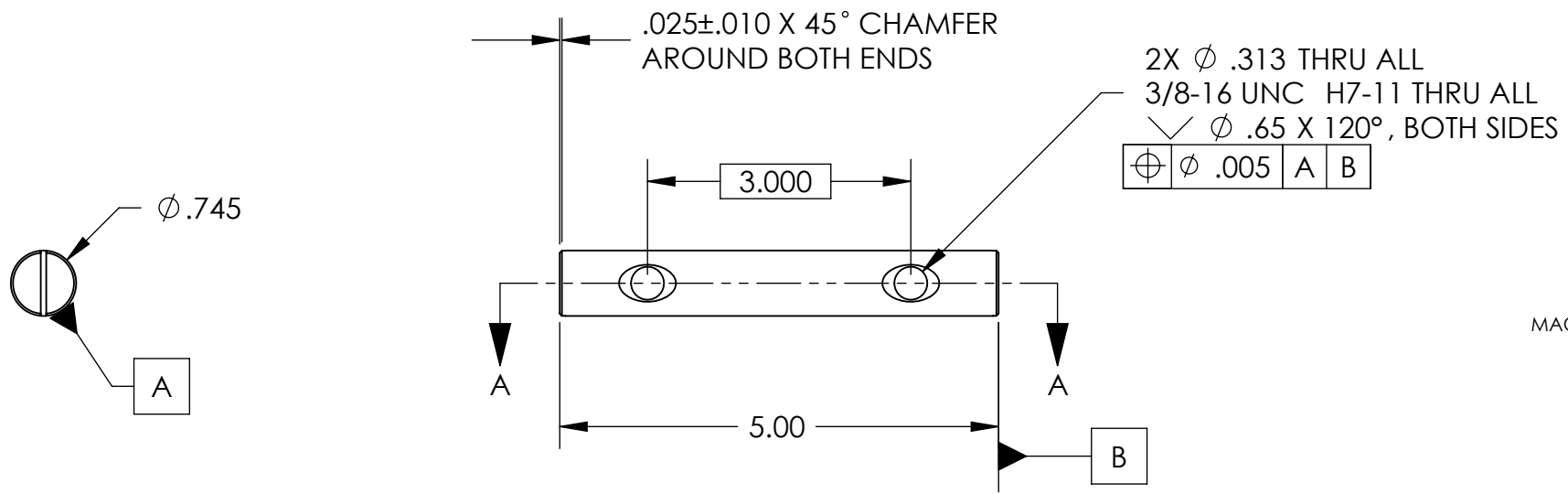
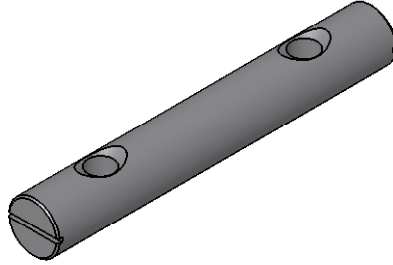
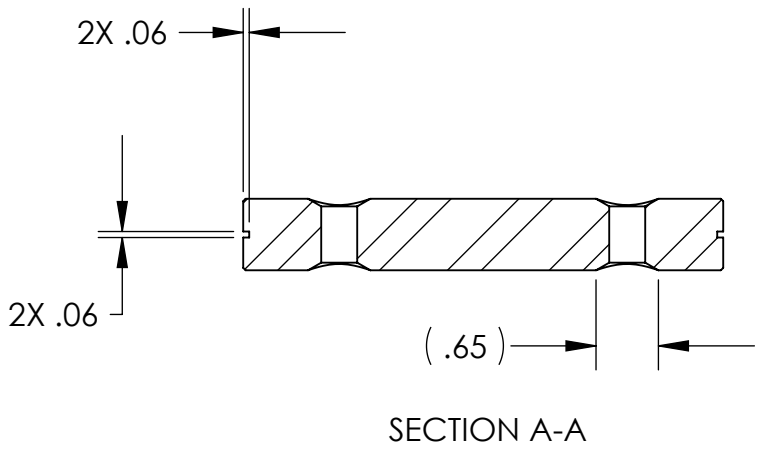


REVISION HISTORY				
REV	DATE	ECO	APPROVAL	DESCRIPTION
V1 / C	3 Jul 2007	1067	D. Bryce	Release for Enhanced LIGO.
V2	25 Mar 2009		A. Stein	Release for Advanced LIGO. Added electropolish finish.



MACHINING NOTES:

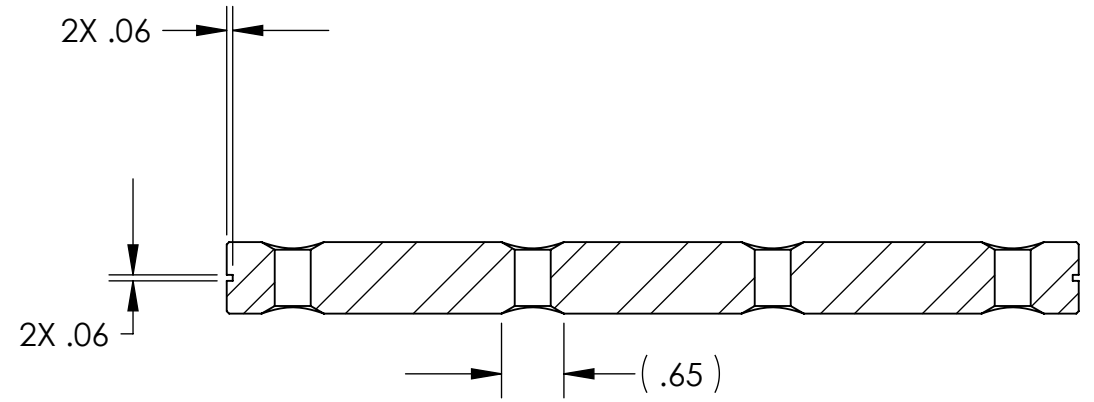
- 1) MACHINE ALL SURFACES TO REMOVE OXIDES AND MILL FINISH. ABRASIVE REMOVAL TECHNIQUES (OTHER THAN DRESSED BLANCHARD GRINDING) ARE NOT ACCEPTABLE.
- 2) ALL MACHINING FLUIDS MUST BE WATER SOLUBLE AND FREE OF SULFUR, CHLORINE, AND SILICONE, SUCH AS CINCINNATI MILACRON CIMTECH 410.
- 3) THOROUGHLY CLEAN PART TO REMOVE ALL OIL, GREASE, DIRT, AND CHIPS.

POST-MACHINING NOTES:

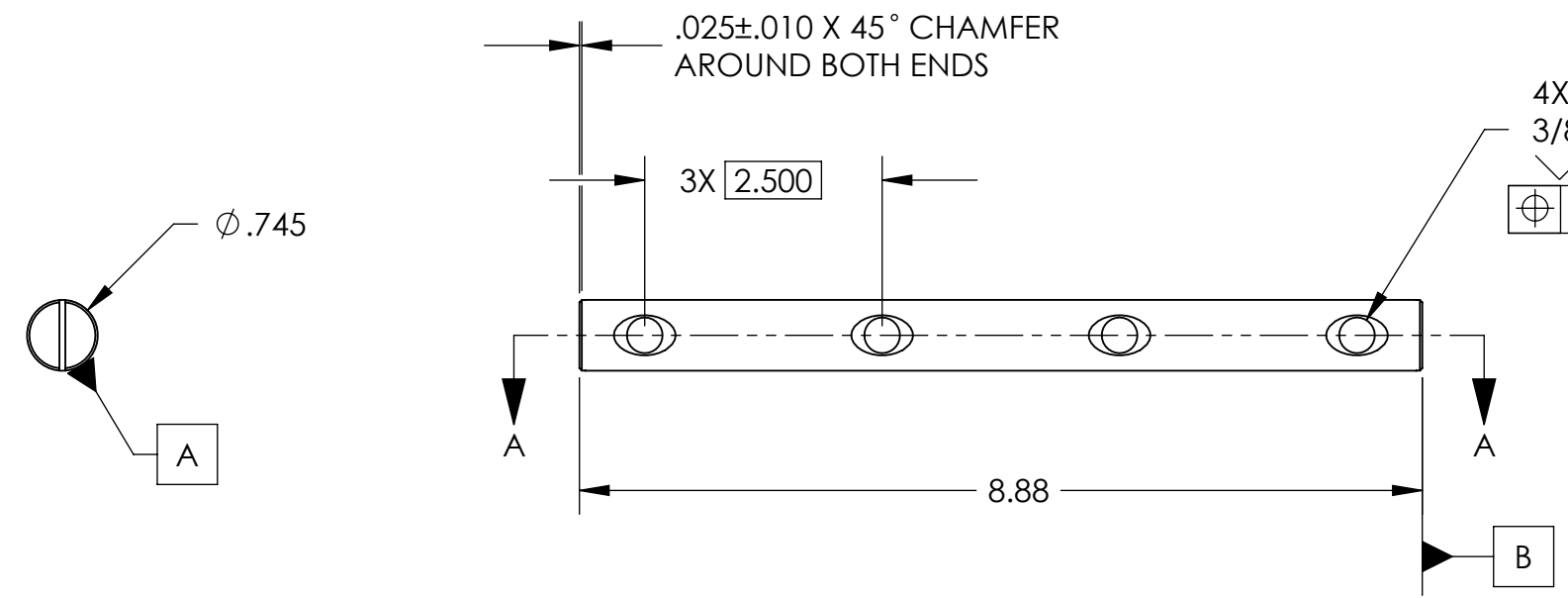
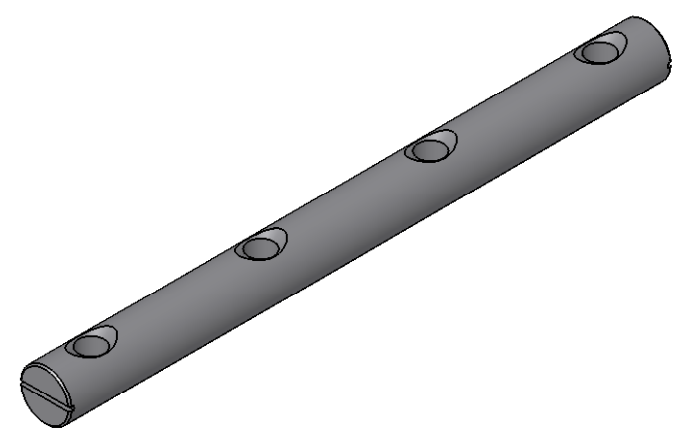
- P1) CLEAN TO LIGO STANDARDS, CLASS A.

LIGO TYPE 00

APPROVALS		DATE	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMAL TOLERANCES: .XX ±.015 .XXX ±.005 ANG TOL: ± 1° SURFACE ROUGHNESS: 63	ORIGINAL DESIGN BY:	<b>High Precision Devices</b> 1668 Valtec Lane, Suite C, Boulder, Colorado 80301 Phone: (303) 447-2558 Fax: (303) 447-2548 Web Site: www.hpd-online.com	MODIFIED BY:			
ENGINEERING (HPD): <b>J. Waterman</b>		6/15/2007		REMOVE ALL SHARP EDGES. LEAVE .005 X 45° MIN CHAMFER, OR .005 MIN RADIUS.		DESCRIPTION:		<b>Gang Barrel Nut</b>	
QUALITY (HPD): <b>C. Danaher</b>		6/15/2007	THIS PRINT & THE EMBEDDED CAD MODEL ARE THE DOCUMENTATION OF RECORD. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN THE MODEL ARE BASIC, WITH TOLERANCES GIVEN BY: $\phi$ .010 A B	P/N:	<b>D071251</b>	CONFIG:	<b>2x 3/8"-16 (spaced 3.0")</b>		
MATERIAL: <b>17-4 PH H1150</b>				CAD FILE NAME:	D071251_Gang_Barrel_Nut				
FINISH: <b>ELECTROPOLISH</b>				PROJECT:	HAM ISI, Advanced LIGO				
MASS: <b>0.6 lbs</b>				SIZE	<b>B</b>	SCALE: <b>1:2</b>	DRAWN BY: <b>Jonas Waterman (HPD)</b>	REV	<b>V2</b>
				SHEET	<b>1</b>	OF	<b>5</b>	DATE PRINTED:	<b>3/25/2009</b>



SECTION A-A



4X  $\phi$  .313 THRU ALL  
 3/8-16 UNC H7-11 THRU ALL  
 $\sqrt{\phi}$  .65 X 120°, BOTH SIDES  
 $\phi$  .005 A B

MACHINING NOTES:

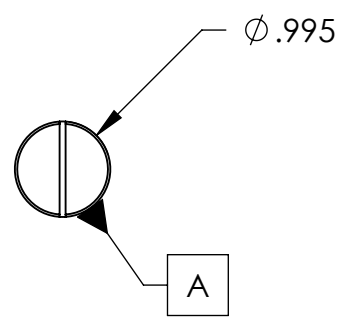
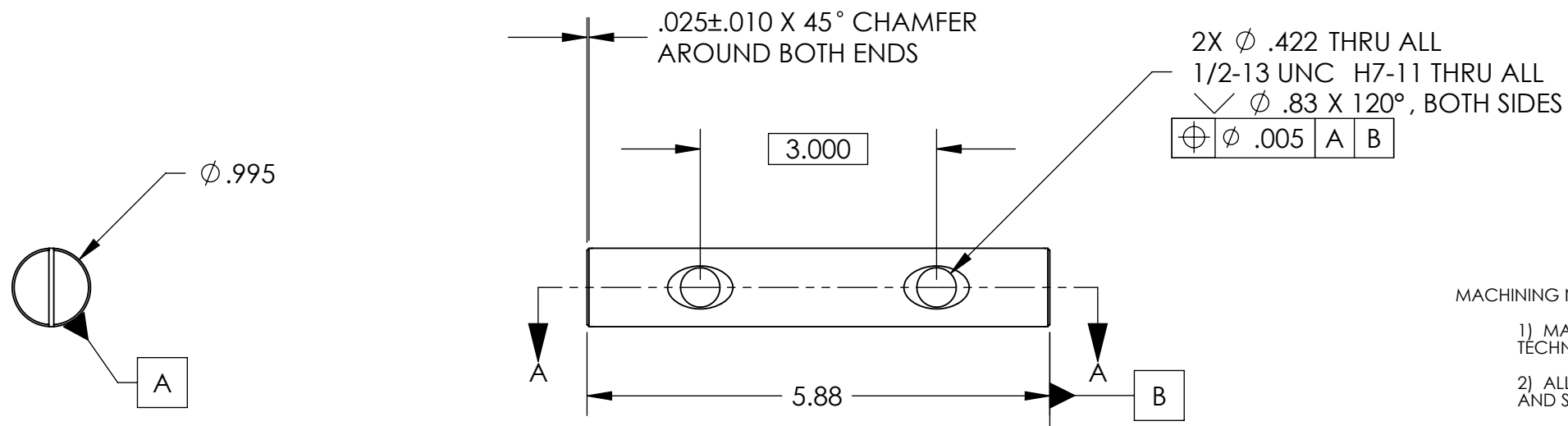
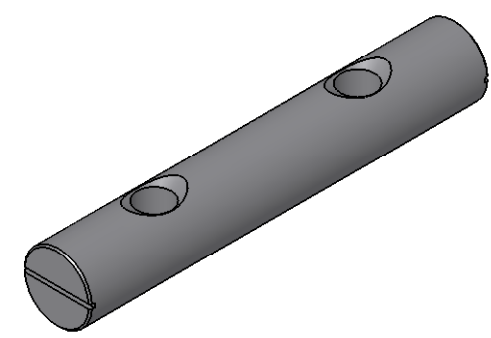
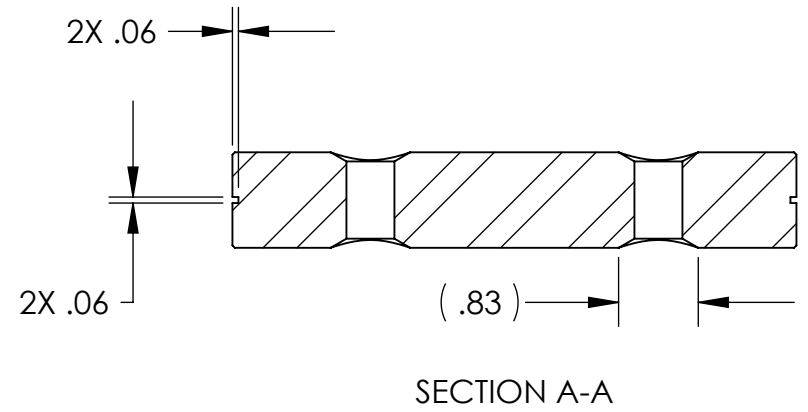
- 1) MACHINE ALL SURFACES TO REMOVE OXIDES AND MILL FINISH. ABRASIVE REMOVAL TECHNIQUES (OTHER THAN DRESSED BLANCHARD GRINDING) ARE NOT ACCEPTABLE.
- 2) ALL MACHINING FLUIDS MUST BE WATER SOLUBLE AND FREE OF SULFUR, CHLORINE, AND SILICONE, SUCH AS CINCINNATI MILACRON CIMTECH 410.
- 3) THOROUGHLY CLEAN PART TO REMOVE ALL OIL, GREASE, DIRT, AND CHIPS.

POST-MACHINING NOTES:

- P1) CLEAN TO LIGO STANDARDS, CLASS A.

**LIGO TYPE 01**

APPROVALS J. Waterman 6/15/2007 C. Danaher 6/15/2007		DATE 6/15/2007	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMAL TOLERANCES: .XX ±.015 .XXX ±.005 ANG TOL: ± 1° SURFACE ROUGHNESS: 63	ORIGINAL DESIGN BY: <b>High Precision Devices</b> 1668 Valtec Lane, Suite C, Boulder, Colorado 80301 Phone: (303) 447-2558 Fax: (303) 447-2548 Web Site: www.hpd-online.com		MODIFIED BY: 
MATERIAL: <b>17-4 PH H1150</b> FINISH: <b>ELECTROPOLISH</b> MASS: <b>1.0 lbs</b>		REMOVE ALL SHARP EDGES. LEAVE .005 X 45° MIN CHAMFER, OR .005 MIN RADIUS.		DESCRIPTION: <b>Gang Barrel Nut</b> P/N: <b>D071251</b> CONFIG: <b>4x 3/8"-16 (spaced 2.5")</b>		CAD FILE NAME: D071251_Gang_Barrel_Nut
THIS PRINT & THE EMBEDDED CAD MODEL ARE THE DOCUMENTATION OF RECORD. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN THE MODEL ARE BASIC, WITH TOLERANCES GIVEN BY:			.010 A B	PROJECT: HAM ISI, Advanced LIGO		SIZE: <b>B</b> SCALE: <b>1:2</b> DRAWN BY: <b>Jonas Waterman (HPD)</b> REV: <b>V2</b>
			SHEET <b>2</b> OF <b>5</b> DATE PRINTED: <b>3/25/2009</b>			



MACHINING NOTES:

- 1) MACHINE ALL SURFACES TO REMOVE OXIDES AND MILL FINISH. ABRASIVE REMOVAL TECHNIQUES (OTHER THAN DRESSED BLANCHARD GRINDING) ARE NOT ACCEPTABLE.
- 2) ALL MACHINING FLUIDS MUST BE WATER SOLUBLE AND FREE OF SULFUR, CHLORINE, AND SILICONE, SUCH AS CINCINNATI MILACRON CIMTECH 410.
- 3) THOROUGHLY CLEAN PART TO REMOVE ALL OIL, GREASE, DIRT, AND CHIPS.

POST-MACHINING NOTES:

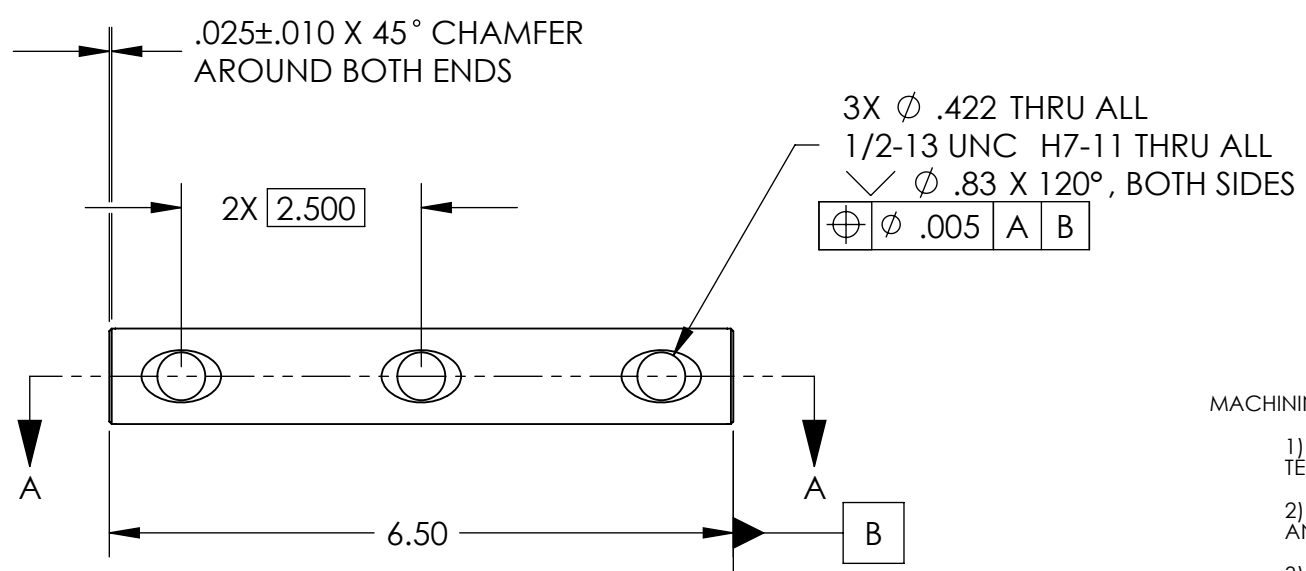
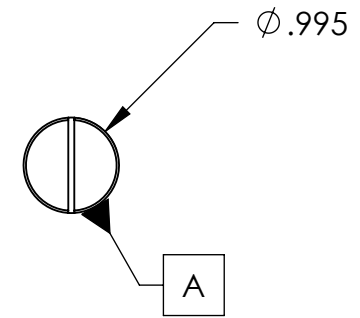
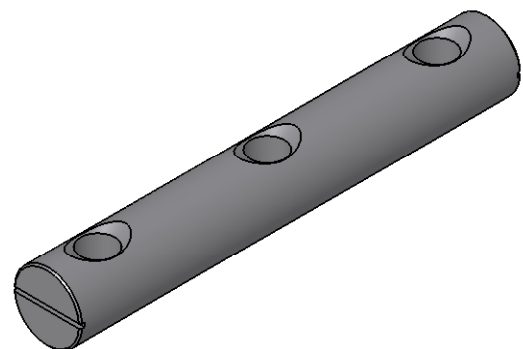
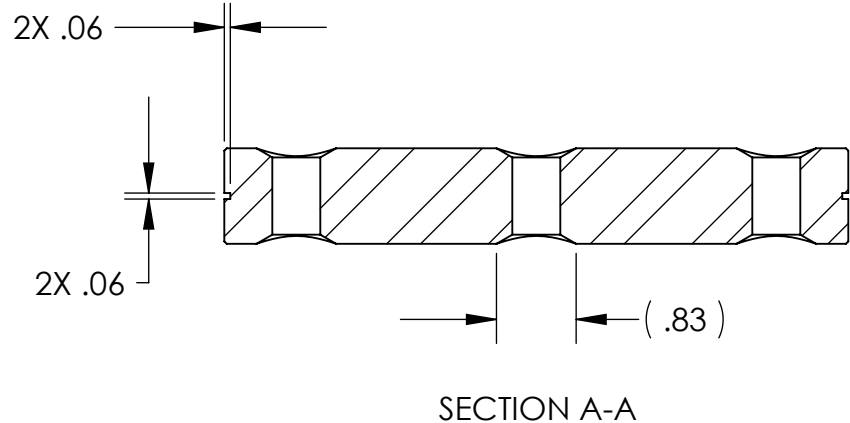
- P1) CLEAN TO LIGO STANDARDS, CLASS A.

**LIGO TYPE 02**

APPROVALS J. Waterman 6/15/2007 C. Danaher 6/15/2007		DATE 6/15/2007	<b>UNLESS OTHERWISE SPECIFIED:</b> DIMENSIONS ARE IN INCHES DECIMAL TOLERANCES: .XX ±.015 .XXX ±.005 ANG TOL: ± 1° SURFACE ROUGHNESS: 63	ORIGINAL DESIGN BY: <b>High Precision Devices</b> 1668 Valtec Lane, Suite C, Boulder, Colorado 80301 Phone: (303) 447-2558 Fax: (303) 447-2548 Web Site: www.hpd-online.com		MODIFIED BY: 
MATERIAL: <b>17-4 PH H1150</b> FINISH: <b>ELECTROPOLISH</b> MASS: <b>1.2 lbs</b>		REMOVE ALL SHARP EDGES. LEAVE .005 X 45° MIN CHAMFER, OR .005 MIN RADIUS.		DESCRIPTION: <b>Gang Barrel Nut</b> P/N: <b>D071251</b> CONFIG: <b>2x 1/2"-13 (spaced 3.0")</b>		CAD FILE NAME: D071251_Gang_Barrel_Nut
THIS PRINT & THE EMBEDDED CAD MODEL ARE THE DOCUMENTATION OF RECORD. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN THE MODEL ARE BASIC, WITH TOLERANCES GIVEN BY:				PROJECT: HAM ISI, Advanced LIGO		SIZE: <b>B</b>
			SCALE: <b>1:2</b> DRAWN BY: <b>Jonas Waterman (HPD)</b>		REV: <b>V2</b>	
			SHEET <b>3</b> OF <b>5</b> DATE PRINTED: <b>3/25/2009</b>			

D  
C  
B  
A

D  
C  
B  
A



MACHINING NOTES:

- 1) MACHINE ALL SURFACES TO REMOVE OXIDES AND MILL FINISH. ABRASIVE REMOVAL TECHNIQUES (OTHER THAN DRESSED BLANCHARD GRINDING) ARE NOT ACCEPTABLE.
- 2) ALL MACHINING FLUIDS MUST BE WATER SOLUBLE AND FREE OF SULFUR, CHLORINE, AND SILICONE, SUCH AS CINCINNATI MILACRON CIMTECH 410.
- 3) THOROUGHLY CLEAN PART TO REMOVE ALL OIL, GREASE, DIRT, AND CHIPS.

POST-MACHINING NOTES:

- P1) CLEAN TO LIGO STANDARDS, CLASS A.

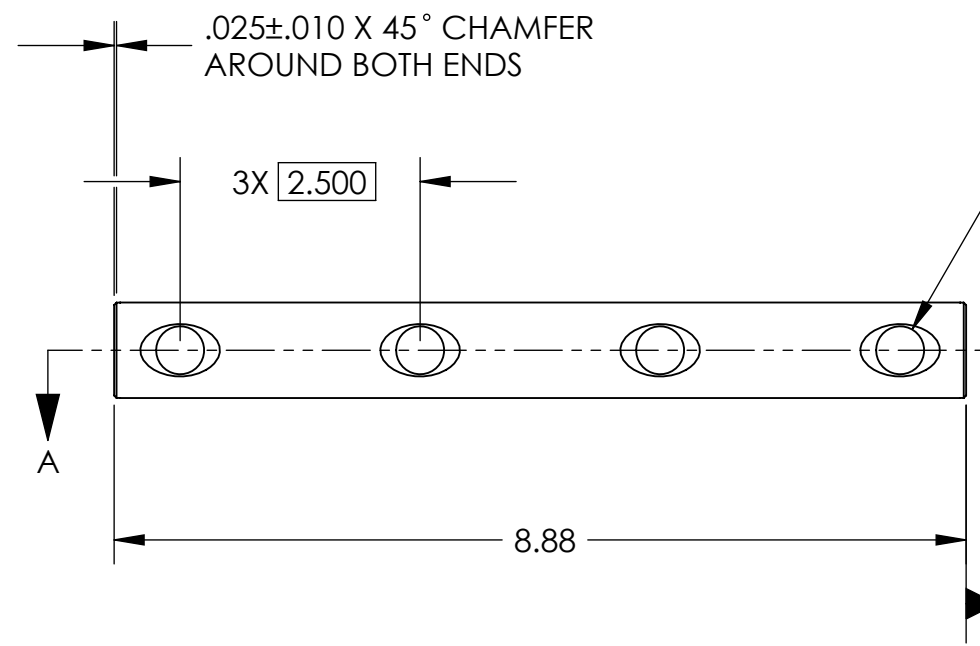
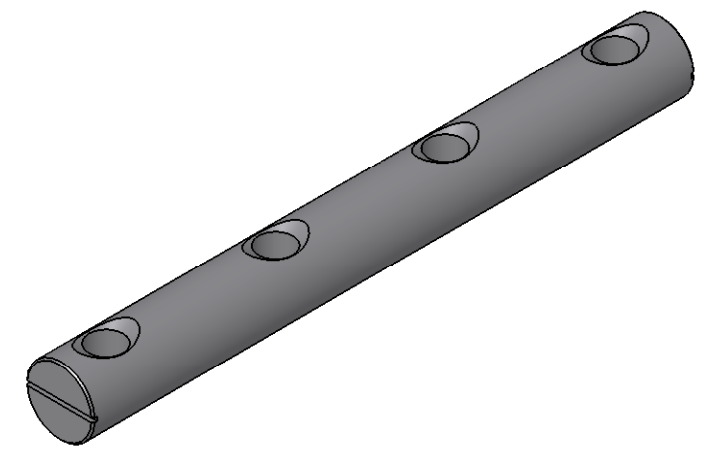
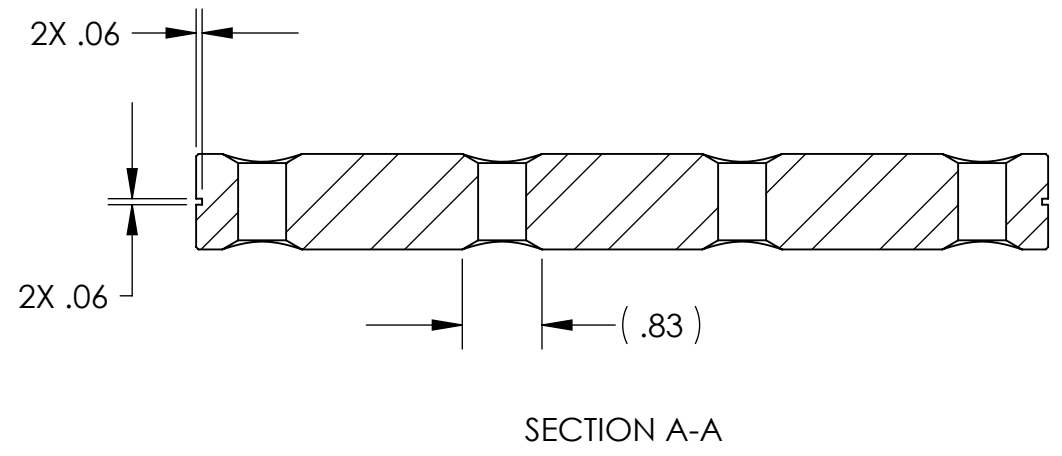
**LIGO TYPE 03**

APPROVALS	DATE
ENGINEERING (HPD): <b>J. Waterman</b>	6/15/2007
QUALITY (HPD): <b>C. Danaher</b>	6/15/2007
MATERIAL: <b>17-4 PH H1150</b>	
FINISH: <b>ELECTROPOLISH</b>	
MASS: <b>1.3 lbs</b>	

**UNLESS OTHERWISE SPECIFIED:**  
 DIMENSIONS ARE IN INCHES  
 DECIMAL TOLERANCES:  
 .XX ±.015 .XXX ±.005  
 ANG TOL: ± 1° SURFACE ROUGHNESS: 63  
 REMOVE ALL SHARP EDGES.  
 LEAVE .005 X 45° MIN CHAMFER,  
 OR .005 MIN RADIUS.  
 THIS PRINT & THE EMBEDDED CAD  
 MODEL ARE THE DOCUMENTATION OF  
 RECORD. UNLESS OTHERWISE SPECIFIED,  
 ALL DIMENSIONS IN THE MODEL ARE  
 BASIC, WITH TOLERANCES GIVEN BY:



ORIGINAL DESIGN BY:		<b>High Precision Devices</b>		MODIFIED BY:
		1668 Valtec Lane, Suite C, Boulder, Colorado 80301		
		Phone: (303) 447-2558 Fax: (303) 447-2548 Web Site: www.hpd-online.com		
DESCRIPTION:		<b>Gang Barrel Nut</b>		
P/N: <b>D071251</b>	CONFIG: <b>3x 1/2"-13 (spaced 2.5")</b>			
CAD FILE NAME: D071251_Gang_Barrel_Nut				
PROJECT: HAM ISI, Advanced LIGO				
SIZE <b>B</b>	SCALE: <b>1:2</b>	DRAWN BY: <b>Jonas Waterman (HPD)</b>	REV	
SHEET <b>4</b> OF <b>5</b>	DATE PRINTED: <b>3/25/2009</b>	<b>V2</b>		



$\phi$	$\phi$	.005	A	B
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MACHINING NOTES:

- 1) MACHINE ALL SURFACES TO REMOVE OXIDES AND MILL FINISH. ABRASIVE REMOVAL TECHNIQUES (OTHER THAN DRESSED BLANCHARD GRINDING) ARE NOT ACCEPTABLE.
- 2) ALL MACHINING FLUIDS MUST BE WATER SOLUBLE AND FREE OF SULFUR, CHLORINE, AND SILICONE, SUCH AS CINCINNATI MILACRON CIMTECH 410.
- 3) THOROUGHLY CLEAN PART TO REMOVE ALL OIL, GREASE, DIRT, AND CHIPS.

POST-MACHINING NOTES:

- P1) CLEAN TO LIGO STANDARDS, CLASS A.

**LIGO TYPE 04**

APPROVALS	DATE
ENGINEERING (HPD): <b>J. Waterman</b>	6/15/2007
QUALITY (HPD): <b>C. Danaher</b>	6/15/2007
MATERIAL: <b>17-4 PH H1150</b>	
FINISH: <b>ELECTROPOLISH</b>	
MASS: <b>1.7 lbs</b>	

<b>UNLESS OTHERWISE SPECIFIED:</b>	
DIMENSIONS ARE IN INCHES	
DECIMAL TOLERANCES:	
.XX ±.015	.XXX ±.005
ANG TOL: ± 1° SURFACE ROUGHNESS: 63	
REMOVE ALL SHARP EDGES. LEAVE .005 X 45° MIN CHAMFER, OR .005 MIN RADIUS.	
THIS PRINT & THE EMBEDDED CAD MODEL ARE THE DOCUMENTATION OF RECORD. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN THE MODEL ARE BASIC, WITH TOLERANCES GIVEN BY:	
	.010 A B

ORIGINAL DESIGN BY:		MODIFIED BY:	
<b>High Precision Devices</b>			
1668 Valtec Lane, Suite C, Boulder, Colorado 80301 Phone: (303) 447-2558 Fax: (303) 447-2548 Web Site: www.hpd-online.com			
DESCRIPTION: <b>Gang Barrel Nut</b>			
P/N: <b>D071251</b>	CONFIG: <b>4x 1/2"-13 (spaced 2.5")</b>		
CAD FILE NAME: D071251_Gang_Barrel_Nut			
PROJECT: HAM ISI, Advanced LIGO			
SIZE: <b>B</b>	SCALE: <b>1:2</b>	DRAWN BY: <b>Jonas Waterman (HPD)</b>	REV: <b>V2</b>
SHEET <b>5</b> OF <b>5</b>	DATE PRINTED: <b>3/25/2009</b>		