

**ME317**  
**Mini Project 2**  
**Assigned: December 13, 2007**  
**Due: January 10, 2008**

**Assignment:**

- Ensure that the provided design concept for an airless paint sprayer can be assembled and will safely function.

**Items provided:**

- assembly drawings for the sprayer in various operating modes
- part drawings for the six parts of the assembly

**Background:**

Assume that you are part of a team that has been given the task of designing a new airless paint spray gun. A co-worker has developed a design concept and given you a fully dimensioned set of drawings. However the co-worker has not yet considered the issues associated with tolerances and tolerance stack-up. Your task is to review the drawings and make suggestions to your co-worker regarding the tolerancing of the part that will ensure that the spray gun can be will safely function.

The flow of fluid in an airless paint sprayer is controlled by a needle valve. To stop the fluid flow, the tip of the needle valve seals an orifice at the tip of the spray gun (see drawing titled "Valve Closed, Safety Off"). To allow the fluid to flow, the needle valve is retracted providing a fluid path from the input at the bottom of the spray gun to the exit orifice (see drawing titled "Valve Open, Safety Off"). To retract the needle valve, the trigger is squeezed. Squeezing the trigger causes rectangular pins to push on the endcap. The motion of the endcap causes the needle valve to retract since the needle valve is threaded into the endcap. The trigger safety operates by blocking the motion of the trigger such that the needle valve cannot be retracted (see drawing titled "Valve Closed, Safety On").

**Motivation/Objective:**

- Illustrate the impact tolerances can have on the function of a device
- Practice conducting tolerance analyses
- Illustrate the difficulty of doing tolerance analyses
- Strengthen print reading skills

**Deliverables:**

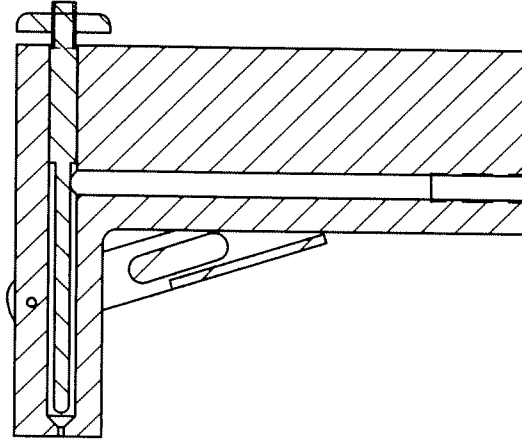
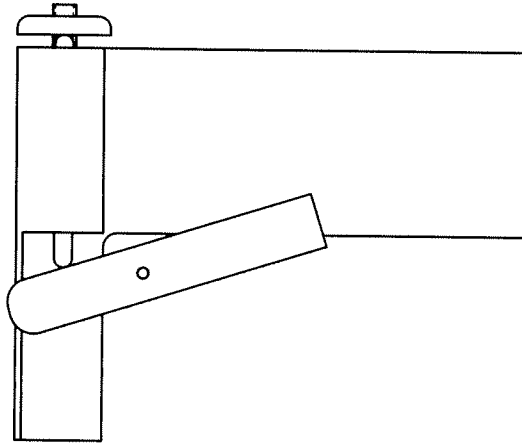
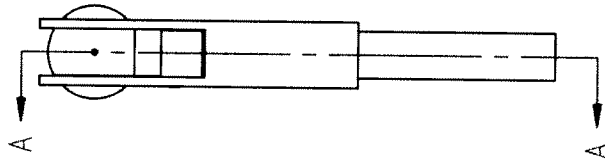
The deliverable for this assignment is a copy of the drawings marked-up in red ink that clearly indicate the changes you suggest. There are two types of changes that you are allowed to make. You can add a tolerance to an individual dimension. You may also change the nominal dimension. You are not allowed to change the design concept or the placement of dimensions.

**Grading:**

Your suggestions result in a device that:

- does not ensure the function of the safety and does not ensure that the device can be assembled: 60
- ensures assembly, but does not ensure the function of the safety: 70
- ensures assembly, ensures the function of the safety, but doesn't function as a sprayer: 70
- ensures the function of the safety, but there are several instances where assembly of the device is not ensured: 80
- ensures the function of the safety, but there is one instance where assembly of the device is not ensured: 85
- ensures the function of the safety, ensures assembly, and uses tolerance ranges equal to or smaller than 0.002 inch (e.g.  $\pm 0.001$ ): 90
- ensures the function of the safety, ensures assembly, and uses tolerance ranges equal to or smaller than 0.010 inch (e.g.  $\pm 0.005$ ), but greater than 0.002 inch (e.g.  $\pm 0.001$ ): 95
- ensures the function of the safety, ensures assembly, and uses tolerance ranges are greater than 0.010 inch (e.g.  $\pm 0.005$ ): 100

REVISION HISTORY		
REV	DESCRIPTION	DATE

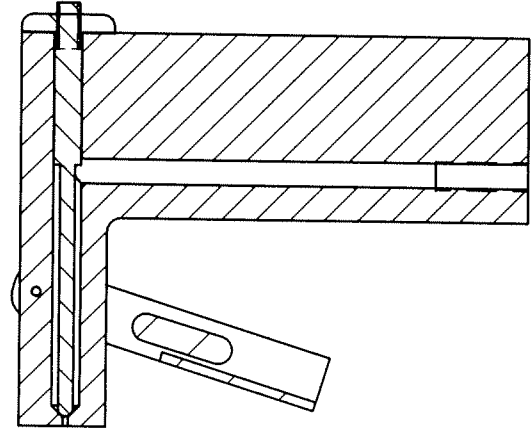
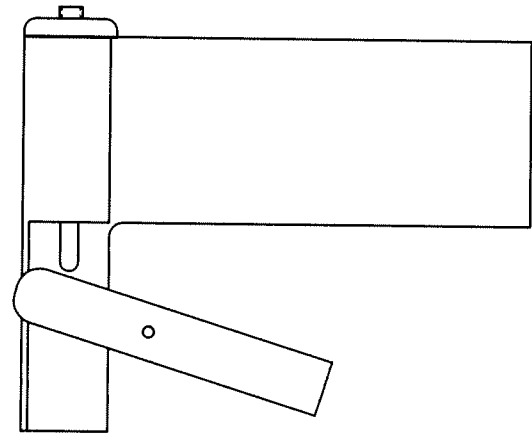
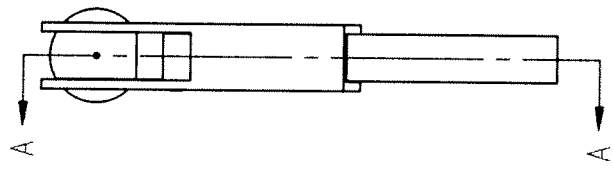


SECTION A-A

SOLID EDGE ACADEMIC COPY

NAME	DATE	<b>SOLID EDGE</b> UGS - The PLM Company
starnick	12/12/07	
DRAWN		TITLE
CHECKED		Valve Open, Safety Off
ENG APPR		SIZE
MGR APPR		C
		FILE NAME
		SCALE
		WEIGHT
		SHEET 1 OF 1

REVISION HISTORY		
REV	DESCRIPTION	DATE

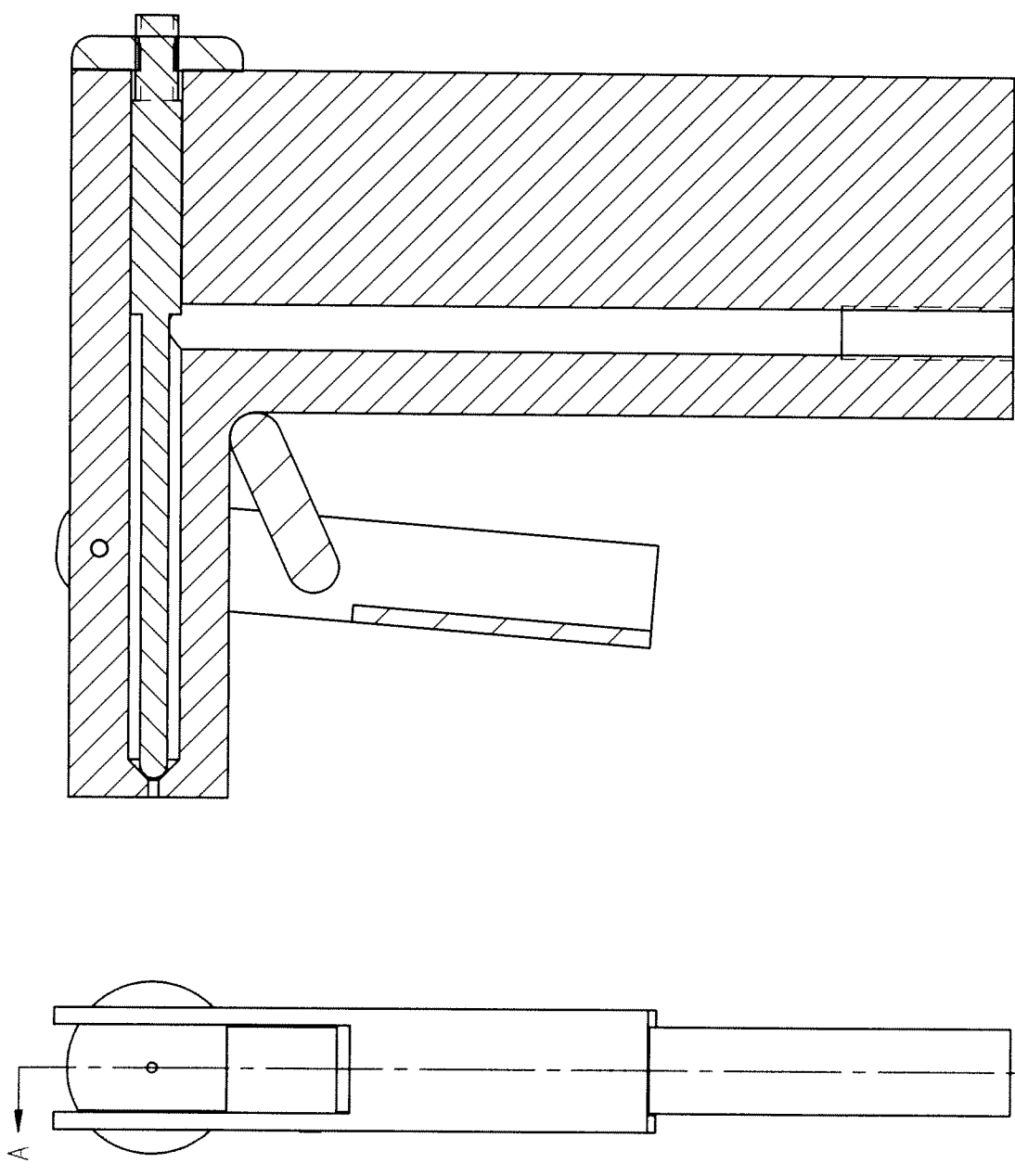


SECTION A-A

DRAWN	NAME	DATE	<b>SOLID EDGE</b> UGS - The PLM Company TITLE: Valve Closed, Safety Off SIZE: DWG NO: C FILE NAME: sprayer.asst.dft SCALE:      WEIGHT:      SHEET: 1 OF 1
CHECKED	3/10/07	12/12/07	
ENG APPR			
MGR APPR			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES XXX° 2 PL #XXX 3 PL #XXXX			

SOLID EDGE ACADEMIC COPY

REVISION HISTORY		
REV	DESCRIPTION	DATE



SECTION A-A

SOLID EDGE ACADEMIC COPY

DRAWN		NAME	DATE
			12/12/07
CHECKED			
ENG APPR			
MGR APPR			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES ±XX°			
2 PL ±XXX.3 PL ±XXXX		SCALE	WEIGHT

**SOLID EDGE**  
UGS - The PLM Company

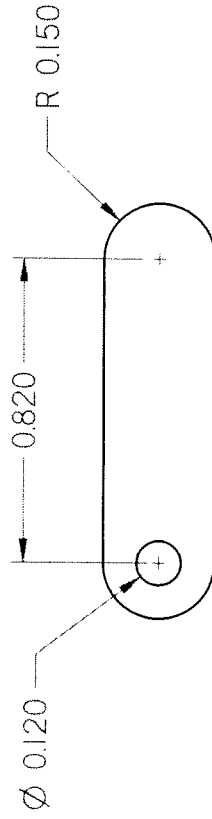
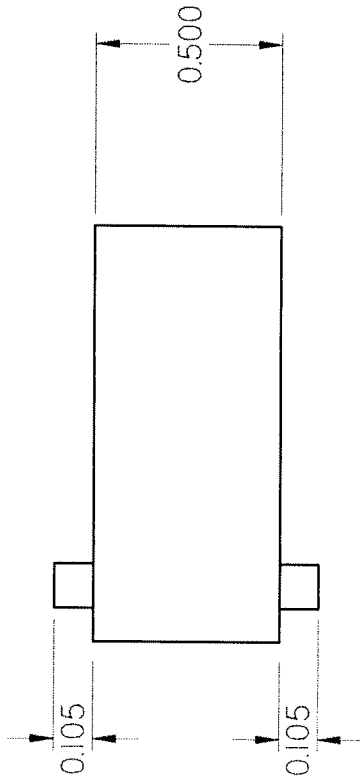
TITLE: Valve Closed - Safety On

SEE DWG NO: C

FILE NAME: 301valve.dwg

SHEET 1 OF 1

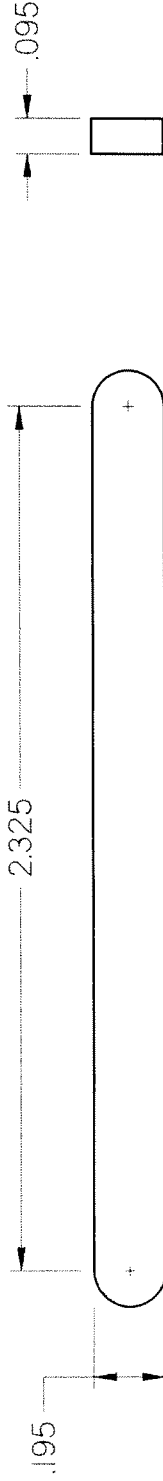
REVISION HISTORY		
REV	DESCRIPTION	DATE



SOLID EDGE ACADEMIC COPY

NAME		DATE
DRAWN	ELI/PL	12/11/07
CHECKED		
ENG APPR		
MGR APPR		
UNLESS OTHERWISE SPECIFIED		
DIMENSIONS ARE IN INCHES		
ANGLES ±XX°		
2 PL ±.003 3 PL ±0.020		
SCALE		WEIGHT
SOLID EDGE		
UGS - The PLM Company		
TITLE		
Safety		
SEE DWG NO		
FILE NAME	safety.dft	
REV		

REVISION HISTORY		
REV	DESCRIPTION	DATE



DRAWN	NAME	DATE	<b>SOLID EDGE</b>
CHECKED	slimber11	12/12/07	JGS - The PLM Company
ENG APPR			Rect Pin
MGR APPR			SIZE: Dwgno
			C
			FILE NAME: RECT.DWG
			SCALE
			WEIGHT
			SHEET 1 OF 1

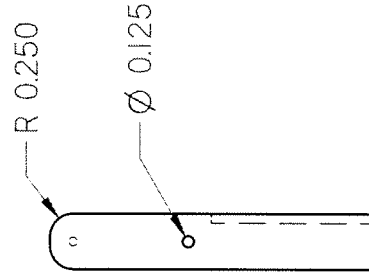
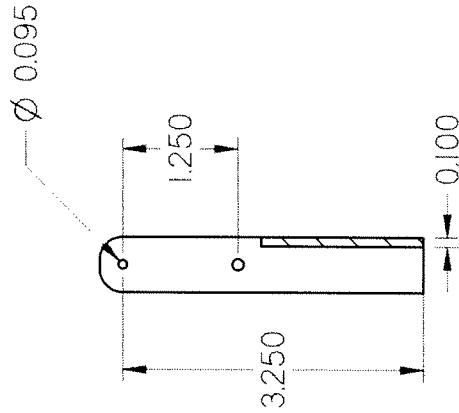
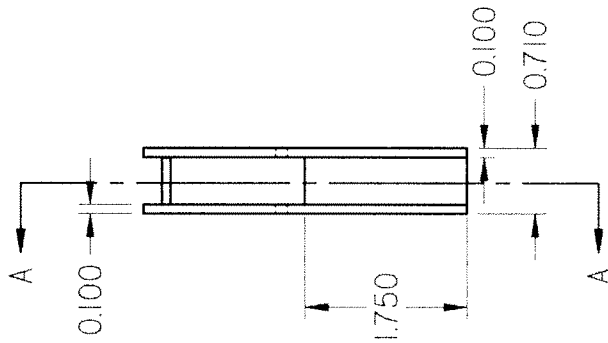
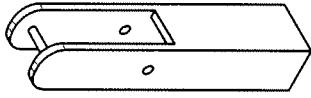
SOLID EDGE ACADEMIC COPY

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
ANGLES °XX'

2 PL .003 3 PL .0020



REVISION HISTORY		
REV	DESCRIPTION	DATE

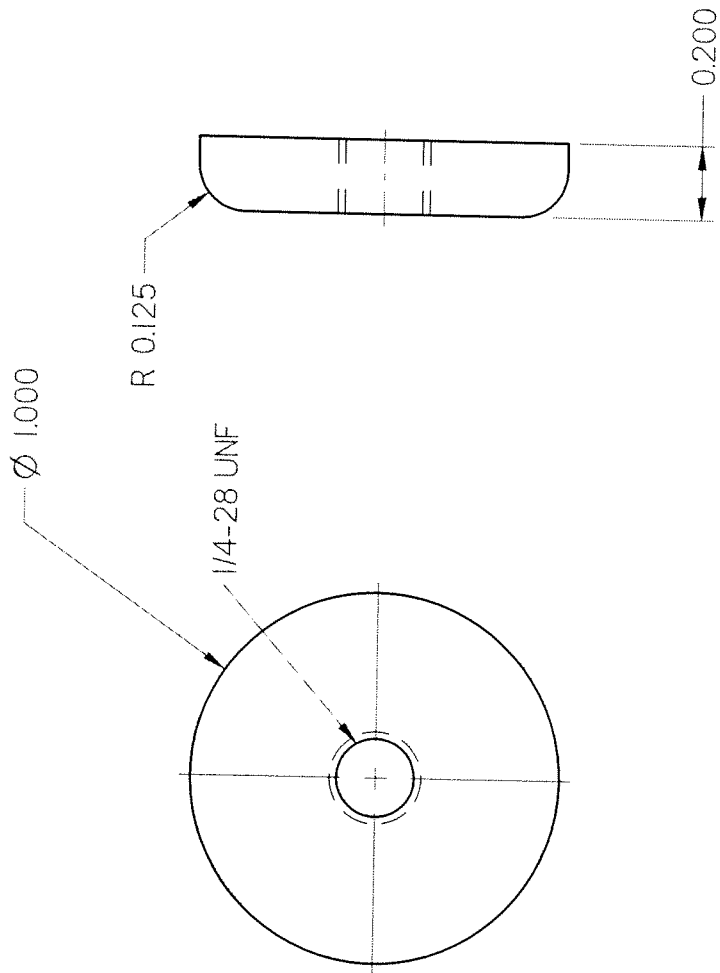


SECTION A-A

NAME	DATE	<b>SOLID EDGE</b> UGS - The PLM Company
DRAWN	3/10/07 12:12:07	
CHECKED		
ENG APPR		
		TITLE
		Trigger
		SIZE DWG NO
		C
		UNLESS OTHERWISE SPECIFIED
		DIMENSIONS ARE IN INCHES
		ANGLES XXX
		FILE NAME: trigger.dft
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		WEIGHT
		SHEET 1 OF 1

SOLID EDGE ACADEMIC COPY

REVISION HISTORY		
REV	DESCRIPTION	DATE

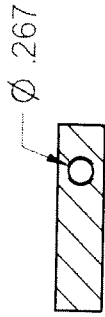


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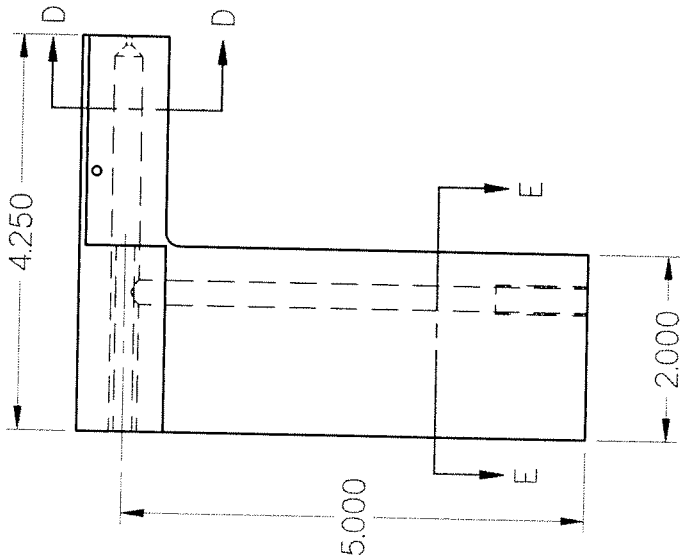
NAME	DATE	<b>SOLID EDGE</b>
stamper	12/11/07	UGS - The PLM Company
CHECKED		
ENG APPR		
MGR APPR		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES °XX'		TITLE
2 PL ±.003 3 PL ±0.020		Endcap
		SIZE DWG NO
		C
		REV
		FILE NAME: endcap.re-081
		SCALE
		WEIGHT
		SHEET 1 OF 1

REVISION HISTORY		
REV	DESCRIPTION	DATE

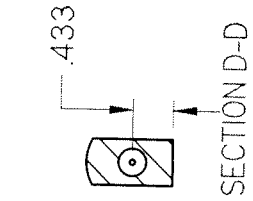
REV	DESCRIPTION	DATE	APPROVED



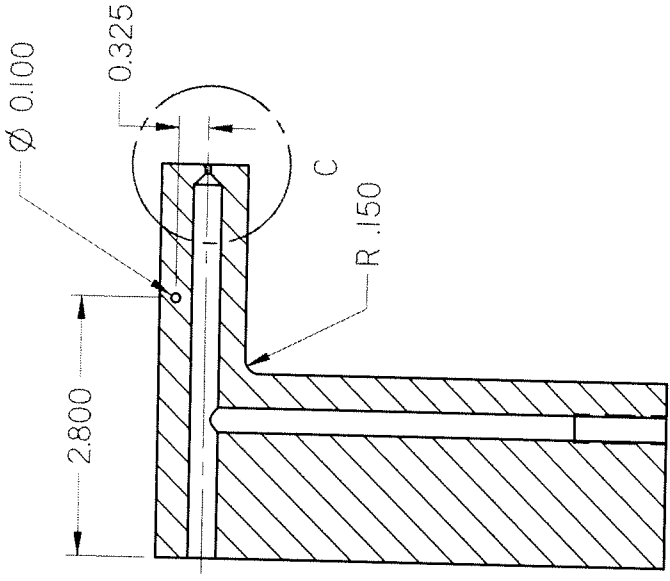
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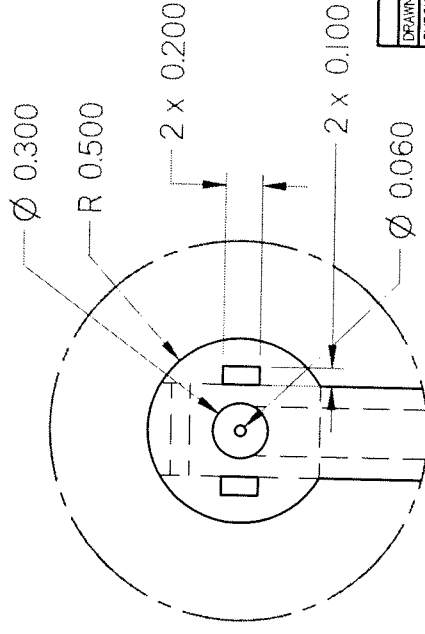
SECTION E-E



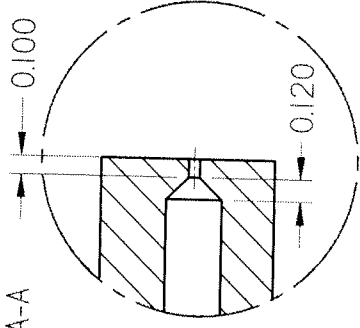
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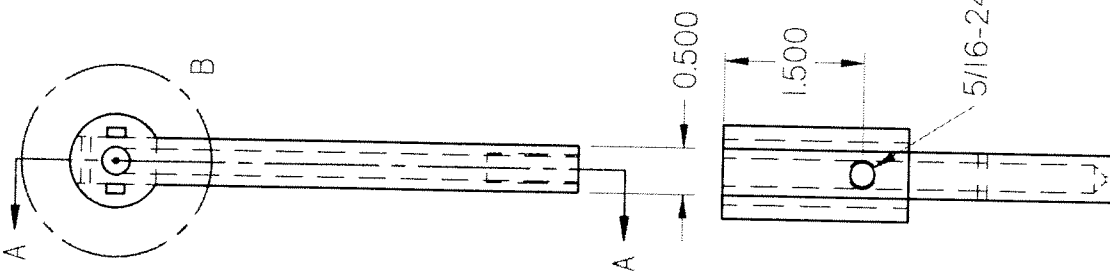
SECTION A-A



DETAIL B



DETAIL C



DETAIL B

DESIGN	NAME	DATE
	stomper	12/12/87
CHECKED		
ENG APPR		
MGR APPR		

TITLE	SIZE	SCALE
SOLID EDGE	Handle	1:1
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES XXX°		
2 PL 4XXX 3 PL 40020		

FILE NAME	WEIGHT	SHEET 1 OF 1

SOLID EDGE ACADEMIC COPY

5/16-24 UNF T 1.000