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## Solid Explosive Plane-Wave Lenses Pressed-to-Shape with Dies

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Solid Explosive Plane-Wave  
Lenses Pressed-to-Shape with Dies

B. Olinger



# SOLID EXPLOSIVE PLANE-WAVE LENSES PRESSED-TO-SHAPE WITH DIES

by  
Bart Olinger

## ABSTRACT

Solid-explosive plane-wave lenses 1", 2" and 4¼" in diameter have been mass-produced from components pressed-to-shape with aluminum dies. The method used to calculate the contour between the solid plane-wave lens components pressed-to-shape with the dies is explained. The steps taken to press, machine, and assemble the lenses are described. The method of testing the lenses, the results of those tests, and the corrections to the dies are reviewed. The work on the ½", 8", and 12" diameter lenses is also discussed.

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## INTRODUCTION

Most shock and detonation waves used in physics and engineering experiments are unidirectional and planar in order to avoid divergent effects. This is achieved by planar initiation of the explosive that generates the detonation wave. The most practical planar initiators are solid explosive plane-wave lenses because of the quality of their planar simultaneity, and that they can be manufactured in mass and stored for long periods.

## CALCULATING THE INTERFACE SURFACES

If an explosive is initiated at a point, the explosive reaction, or detonation, propagates spherically from that point. If a cone of slower detonating explosive is overlaid with a coating of faster detonating explosive so that the detonation down the surface of the cone reaches its base at the same time as the detonation down the axis of the cone, then a planar detonation wave will propagate along that axis. The length of the sides of the cone are proportional to the detonation velocity of the fast-detonating explosive,  $V_f$ , and the height of the cone is proportional to the detonation velocity of the slow-detonating explosive,  $V_s$ . This is the basic concept of the solid explosive plane-wave lens.

In Figure 1, the initiation occurs at the apex. Using cylindrical coordinates, the planar detonation front reaches a depth of  $Z_d$  for all values of the radius at the same time,  $t_d$ . The coordinates of the interface between the fast detonating explosive and the slow are  $Z_c(r)$  and  $r$ . Therefore,

$$t_d = \frac{\left[ Z_c(r)^2 + r^2 \right]^{1/2}}{V_f} + \frac{\left[ Z_d - Z_c(r) \right]}{V_s}. \quad (1)$$

Solving for  $Z_c(r)$ ,

$$Z_c(r) = Z_d - \left( \frac{V_s}{V_f^2 - V_s^2} \right) \times \left( V_f^2 \times t_d - V_s \times Z_d - \left[ V_f^2 \times \left\{ Z_d^2 - 2V_s \times Z_d \times t_d + V_s^2 \times t_d^2 \right\} + r^2 \times \left\{ V_f^2 - V_s^2 \right\} \right]^{1/2} \right). \quad (2)$$

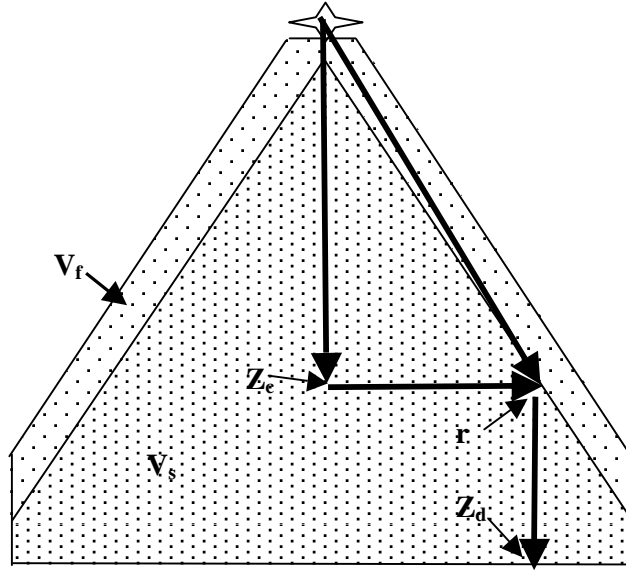


Figure 1. The initiation of the plane-wave lens is in the detonator above the explosive. The detonation front reaches  $Z_d$  by traveling through a fast detonating explosive a distance of  $(Z_c^2 + r^2)^{1/2}$  at velocity  $V_f$  and then by traveling through the slow detonating explosive a distance of  $(Z_d - Z_c)$  at velocity  $V_s$ . The total times required to reach  $Z_d$  for all values of  $r$  are the same,  $t_d$ .

The depth of the interface,  $Z_c(r)$ , is found for all values of  $r$  to the maximum  $r$  of interest. The depth or thickness of fast-detonating explosive above the slow at the apex is determined by the choices of  $Z_d$  and  $t_d$  along the axis. The aspect ratio of lens is determined by  $V_f$  and  $V_s$ .

PBX 9501 and TNT are the fast and slow detonating explosives currently used for the manufacture of plane-wave lenses. Because TNT is a single component explosive and the quality control for the production of PBX 9501 is tightly controlled, their detonation velocities depend only on their compacted densities.

$$V_{f(PBX9501)} = 1.88 + 3.76\rho \text{ mm}/\mu\text{s}, \quad (3)$$

$$V_{s(TNT)} = 1.88 + 3.76\rho \text{ mm}/\mu\text{s}. \quad (4)$$

The standard densities for pressed PBX 9501 and TNT are  $1.83 \text{ g}/\text{cm}^3$  ( $8.76 \text{ mm}/\mu\text{s}$ ) and  $1.64 \text{ g}/\text{cm}^3$  ( $6.94 \text{ mm}/\mu\text{s}$ ), respectively. The detonator currently used for plane-wave lens production is the SE-1, or the commercially available RP-1. This detonator has an apparent center-of-initiation 7.2 mm above its face when the detonation wave is measured at some depth

in PBX 9501. Because the face of the detonator is usually set 10 mm above the slow detonating component apex on the fast in order to smooth out detonation wave irregularities caused by the detonator, the value of  $Z_c (r = 0)$  becomes 17.2 mm.

## **PRESSING, MACHINING, AND ASSEMBLY**

The steel-die press cylindrical diameters available are 1", 1<sup>5</sup>/<sub>8</sub>", 2", 2<sup>1</sup>/<sub>2</sub>", and 3" (Savage press), and 4<sup>1</sup>/<sub>4</sub>", 6", 8", 10", and 12" (Accudyne press). We selected the 4<sup>1</sup>/<sub>4</sub>" diameter for the initial lens. Dies were machined based on the contours calculated using equation 2 above, the components pressed and assembled, and the lens was tested for simultaneity. (PowerPoint presentation, about Sept. 2005, titled Planarity Measurements of Pressed, High-Explosive Lenses, by Russ Olson, et al.) Based on those results the 4<sup>1</sup>/<sub>4</sub>" diameter lens dies were corrected and 1", 2", and 4<sup>1</sup>/<sub>4</sub>" diameter lens dies were machined based on that correction. The tests of the lenses made with these dies and their corrections are now discussed.

The dies consist of convex and concave mandrels machined from 7075 aluminum. The explosive TNT components are pressed using flaked TNT, heated to 65°C, and compacted at 5,000 psi for 5 min., using the concave mandrel. The concave surface is the contour between the faster and slower detonating explosives first calculated and then corrected. The PBX 9501 components were pressed from the stock of PBX 9501 maintained at the Laboratory, heated to 90°C, and compacted twice at 20,000 psi for 5 min. with a brief rest between using the convex mandrel. The concave and convex surfaces have the same contour, line-to-line. Those contours used for the 1", 2" and 4<sup>1</sup>/<sub>4</sub>" lenses are listed in the "Old" column in the table at the end of this report. The outer conical surface of the PBX 9501 is formed at the same time with a second concave mandrel used with the convex mandrel.

Next, the pressed TNT components' faces are machined flat and perpendicular to their axes using pot chucks machined to match the TNT components contoured surfaces. The components are also machined to specified heights. Those heights are measured and recorded.

The next step is to bond the PBX 9501 and TNT components together. The contour surfaces are first cleaned with isopropyl alcohol. The PBX 9501 components are then inverted and set in cardboard tube pedestals. Their concave contoured surfaces are thinly painted with Aralhex adhesive. The TNT components' convex contoured surfaces are inserted into the PBX 9501 components. Padded weights are placed on the TNT faces until the adhesive sets, after 12 hours. The weights used are 250 g, 1 kg, and 4 kg Cu cylinders for the 1", 2", and 4<sup>1</sup>/<sub>4</sub>" diameter lenses.

The final step is to machine a surface flat-and-parallel to the TNT face 1 cm above the apex of the slow component whose height was recorded. This surface is for mounting a detonator locator using Aralhex adhesive. The locator must be precisely centered on the lenses' axes. Diagrams of the three assembled lenses are attached.

## **TESTING AND CORRECTING**

Lenses are tested at Chamber 8, TA-40, DE-9. The 1", 2" and 4<sup>1</sup>/<sub>4</sub>" lenses were bonded to plate glass with 3-mil shim stock sandwiched between. The air gap flashes when the detonation wave arrives at the surface of the lens. A set of slits are placed across the image of the explosive lens face and a Cordin camera sweeps that slit image over the recording film at 12 mm/μs.

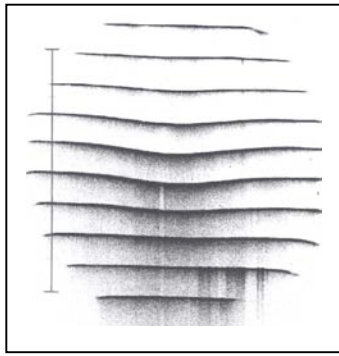


Figure 2. Slit image of a 1" lens. Scale on the left is 12 mm.

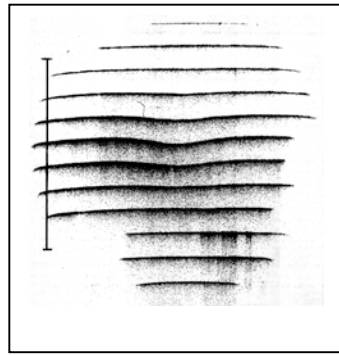


Figure 3. Slit image of a 2" lens. Scale on the left is 12 mm.

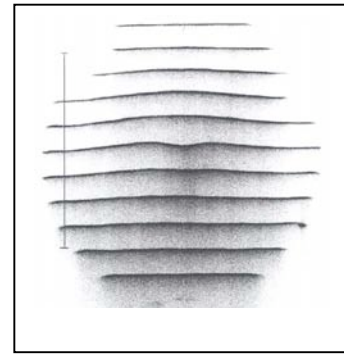


Figure 4. Slit image of a 4 1/4" lens. Scale on the left is 12 mm.

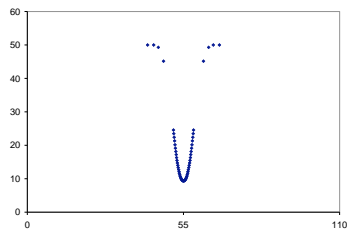


Figure 5. Time of arrival of the detonation wave for the 1" lens. The vertical scale is ns, the horizontal is mm.

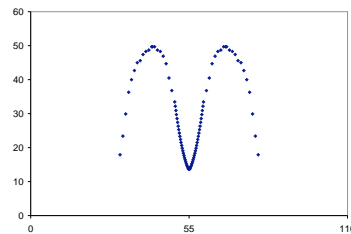


Figure 6. Time of arrival of the detonation wave for the 2" lens. The vertical scale is ns, the horizontal is mm.

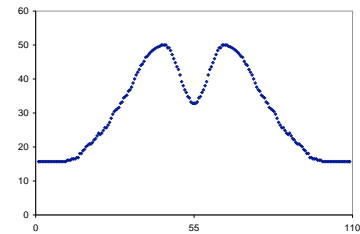


Figure 7. Time of arrival of the detonation wave for the 4 1/4" lens. The vertical scale is ns, the horizontal is mm.

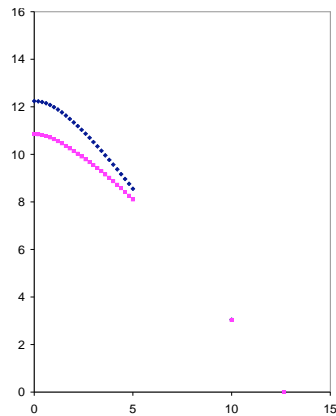


Figure 8. Contour for 1" explosive lens dies. Dark blue is the original contour, pink is the corrected. The vertical axis is the axis of the contour in mm; the horizontal is the contour radius in mm.

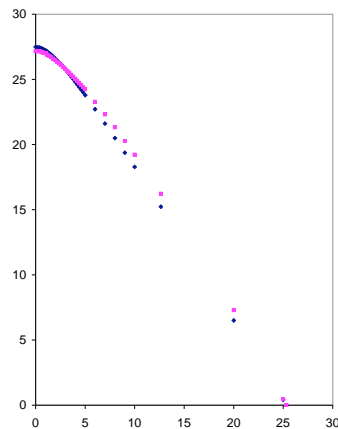


Figure 9. Contour for 2" explosive lens dies. Dark blue is the original contour, pink is the corrected. The vertical axis is the axis of the contour in mm; the horizontal is the contour radius in mm.

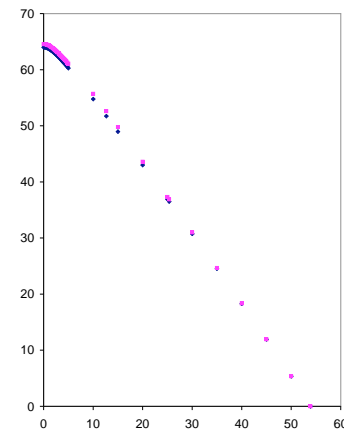


Figure 10. Contour for 4 1/4" explosive lens dies. Dark blue is the original contour, pink is the corrected. The vertical axis is the axis of the contour in mm; the horizontal is the contour radius in mm.



Figures 2, 3, and 4 are the slit images from a 1", 2" and 4¼" lenses. Two lenses of each size were tested and they were reproducible. Group DE-9 normally analyzes the slit images, but at this time they are developing new software and training a new analyzer. While waiting for their analyses, I blew-up the film images with a microfiche printer and read the central lines with an eye-loupe with an internal scale. During the shot setup, no effort was made to place the central slit on the diameter; therefore, the results are not the true maxima.

In Figures 5, 6, and 7 are plotted the times of arrival of the detonation fronts as a function of the diameter position centered at 55 mm. The initial arrivals are plotted at 50 ns. All three lens sizes were based on the same contour, for the 4¼" lens, therefore, the deviations display the same pattern. The first arrival for all three lens sizes occurs at a radius of about ½" or 12.7 mm. The center of the lens lags behind the first arrival by 40 ns (1"), 37 ns (2"), and 17 ns (4¼"). These data are the deviations from simultaneity,  $\Delta t_d$ , as a function of the radius,  $r$ , of the lenses.

Differentiating  $Z_c(r)$  with respect to  $t_d$  in Equation 2, deviations from the interface that will create a simultaneous detonation wave as a function of the radius can be calculated,

$$\Delta Z_c(r) = \Delta t_d(r) \div \left[ \frac{1}{V_f} \times \left\{ \frac{Z_c(r)}{[Z_c(r)^2 + r^2]^{1/2}} \right\} - \frac{1}{V_s} \right]. \quad (5)$$

These deviations are now used to adjust the interface for the final lens design. Figures 8, 9, and 10 show the corrected contours. The corrected contours are listed in the "New" column in the table below.

### **THE ½", 8", AND 12" DIAMETER LENSES**

Dies for a 1" diameter lenses initiated with RP-3 detonators (the P-25B drawings) were also made. The lenses have 2 mm, rather than 10 mm, of PBX 9501 between the detonator platform and the top of the slow component. Lens components made from these dies were pressed and assembled. The detonator locator for the RP-3 was then attached. The lenses were then reduced in height to 0.45" and in diameter to 0.75", producing a ½" diameter lens. This lens is to be test-fired at Chamber 8.

The 8"-diameter dies were used to press PBX 9501 and TNT components. The TNT components cracked parallel to the flat base. The problem appears to be that the pressure used was too high. Before we could press additional components at lower pressure, the HE pressing facility was closed. The new press, the Accudyne, will begin operation in early 2008. Attempts at pressing the 12" components were postponed until successful 8" components were produced.

### **DRAWINGS**

Engineering drawings of the dies, the pot chucks, and the finished lenses, both tested and not yet tested, are appended to this report.

## **ACKNOWLEDGEMENTS**

Tim Cash, PF-TDI, LANL, created the engineering drawings of the dies and pot chucks. Steve Rivera created the engineering drawings of the lenses. John Morris, Larry, Vaughan, and Bob Meir set up and fired the lens tests with the Cordin sweep camera at the enclosed firing chamber of DE-9, LANL. They were mentored by Larry Hill of the same group. This research is funded by the HE Science Project led by Dan Hooks, DE-9, under LANL's NNSA Campaign 2 Dynamic Materials Properties Program, David J. Funk, DE-DO, Program Manager.

**Old and New Contours of the Dies for the 1", 2" and 4¼" Lenses**

1" lens		
Old X	New X	Y
mm	mm	mm
12.245	10.852	0.000
12.234	10.841	0.200
12.203	10.814	0.400
12.151	10.770	0.600
12.079	10.711	0.800
11.991	10.640	1.000
11.886	10.556	1.200
11.767	10.462	1.400
11.635	10.359	1.600
11.492	10.248	1.800
11.344	10.137	2.000
11.194	10.027	2.200
11.035	9.911	2.400
10.870	9.793	2.600
10.698	9.671	2.800
10.520	9.547	3.000
10.338	9.421	3.200
10.152	9.295	3.400
9.961	9.155	3.600
9.768	9.016	3.800
9.571	8.872	4.000
9.372	8.726	4.200
9.170	8.574	4.400
8.966	8.420	4.600
8.761	8.262	4.800
8.553	8.099	5.000
3.043	3.031	10.000
0.000	0.000	12.650

2" Lens		
Old X	New X	Y
mm	mm	mm
27.486	27.163	0.000
27.475	27.163	0.200
27.444	27.146	0.400
27.392	27.110	0.600
27.320	27.056	0.800
27.232	26.988	1.000
27.127	26.905	1.200
27.008	26.809	1.400
26.876	26.703	1.600
26.733	26.587	1.800
26.585	26.468	2.000
26.435	26.348	2.200
26.276	26.220	2.400
26.111	26.088	2.600
25.939	25.950	2.800
25.761	25.807	3.000
25.579	25.662	3.200
25.393	25.513	3.400
25.202	25.360	3.600
25.009	25.207	3.800
24.812	25.050	4.000
24.613	24.892	4.200
24.411	24.732	4.400
24.207	24.571	4.600
24.002	24.410	4.800
23.794	24.246	5.000
22.715	23.288	6.000
21.608	22.306	7.000
20.494	21.325	8.000
19.372	20.273	9.000
18.284	19.230	10.000
15.231	16.226	12.650
6.503	7.288	20.000
0.412	0.476	25.000
0.000	0.000	25.336

4¼" Lens		
Old X	New X	Y
mm	mm	mm
63.985	64.569	0.000
63.974	64.561	0.200
63.943	64.534	0.400
63.891	64.485	0.600
63.819	64.418	0.800
63.731	64.334	1.000
63.626	64.235	1.200
63.507	64.121	1.400
63.375	63.995	1.600
63.232	63.859	1.800
63.084	63.718	2.000
62.934	63.575	2.200
62.775	63.424	2.400
62.610	63.267	2.600
62.438	63.104	2.800
62.260	62.935	3.000
62.078	62.763	3.200
61.892	62.587	3.400
61.701	62.407	3.600
61.508	62.225	3.800
61.311	62.040	4.000
61.112	61.853	4.200
60.910	61.664	4.400
60.706	61.473	4.600
60.501	61.282	4.800
60.293	61.088	5.000
54.783	55.710	10.000
51.730	52.604	12.650
48.976	49.779	15.000
43.002	43.602	20.000
36.911	37.313	25.000
36.499	36.889	25.336
30.747	30.990	30.000
24.540	24.678	35.000
18.287	18.333	40.000
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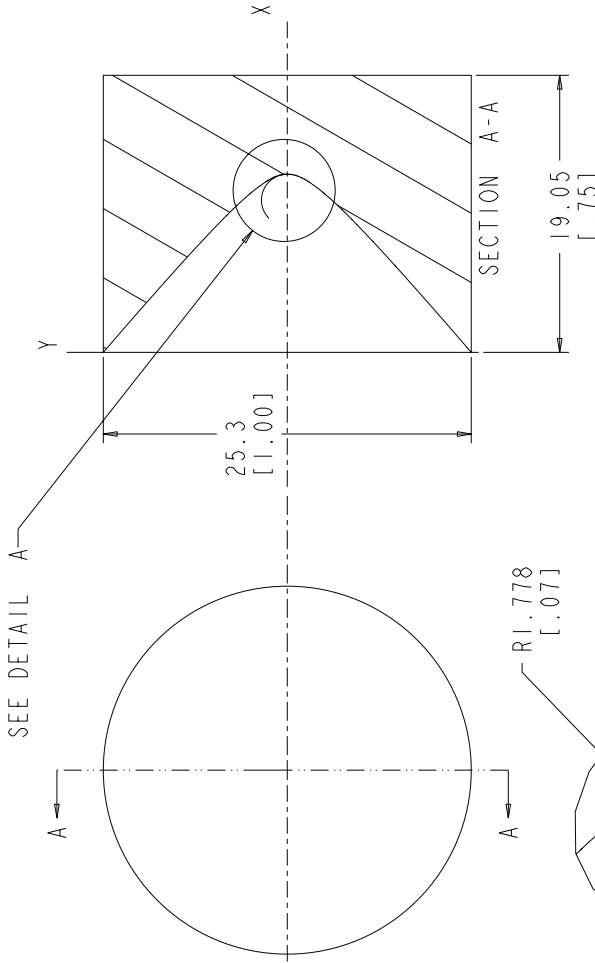
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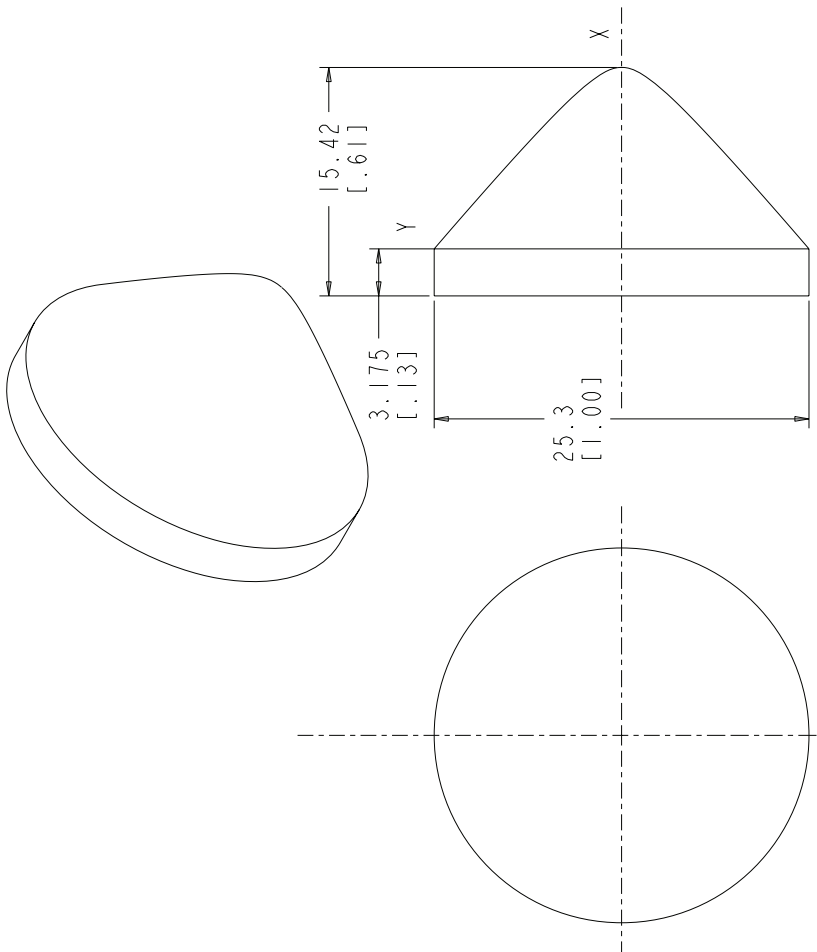
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PART NUMBER		REVISONS	
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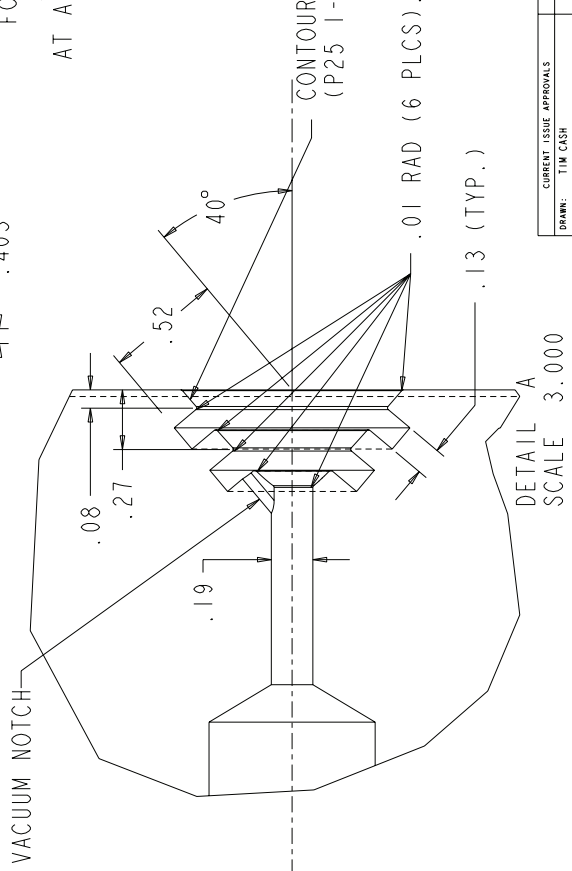
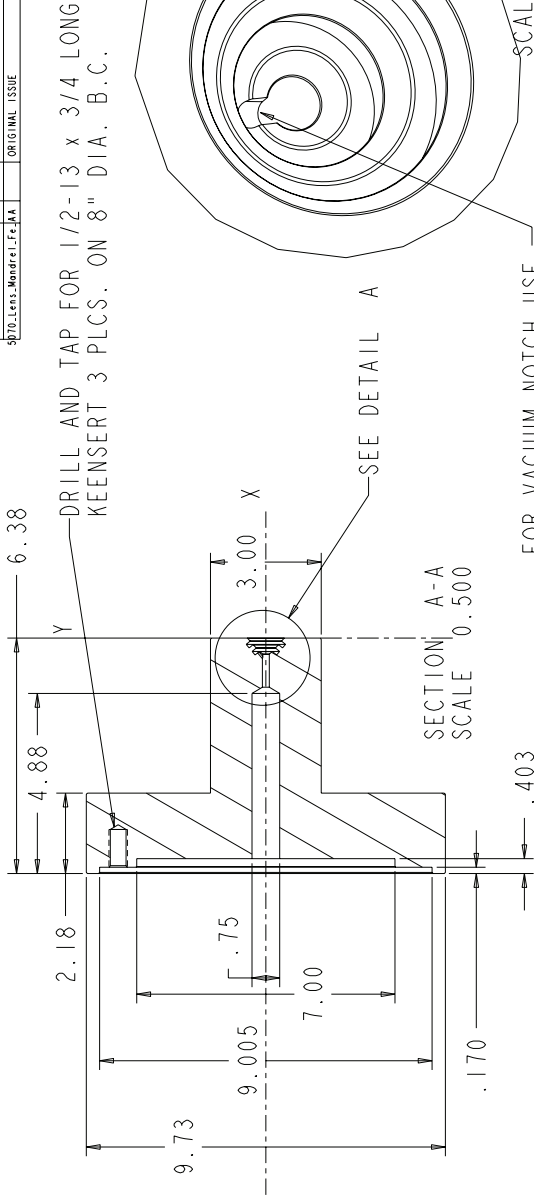
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PROCESS MATERIAL	AS REQUIRED FOR ASSEMBLY
DESCRIPTION/MATERIAL	
TITLE	VACUUM FIXTURE
PART CLASSIFICATION	FOR (P25) 1-INCH LENS MANDREL
UNCLASSIFIED	NC Sketch
DRAWING NUMBER	5122 VACUUM FIXTURE A
SIZE	C
SCALE	1:500
SHEET	1 OF 1
ORIGIN	Wildlife-2
STATUS	LA - CHK - -

UNCLASSIFIED

UNCLASSIFIED

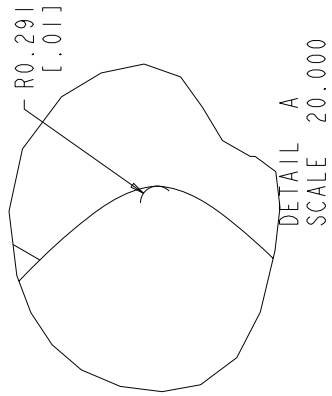
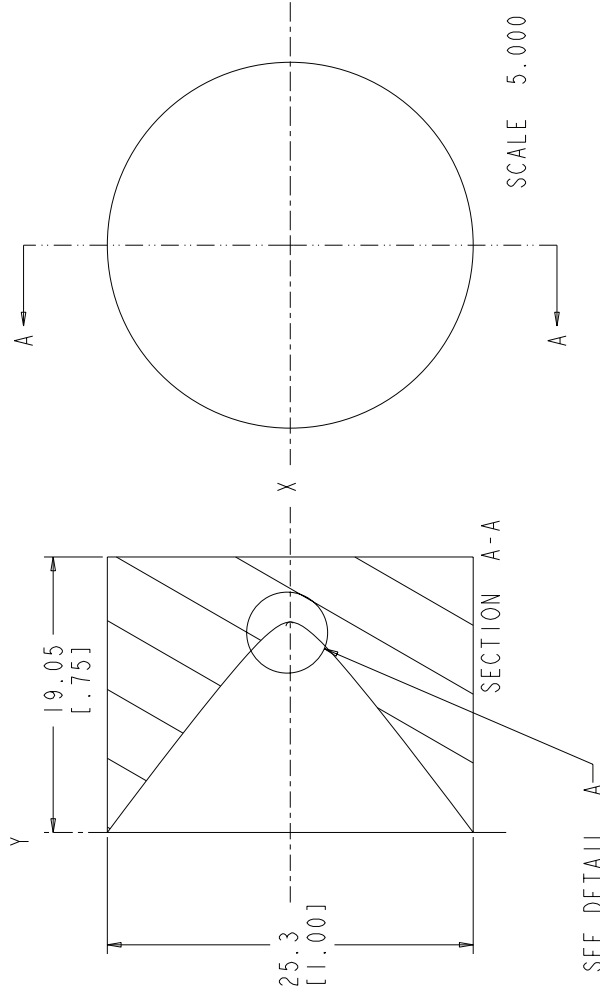
UNCLASSIFIED

COORDINATES OF SPLINE POINTS

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13.16369	2.147949	0
13.0213	2.288489	0
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12.11084	3.12872	0
11.9522	3.268389	0
11.79282	3.408018	0
11.63123	3.547527	0
7.362366	7.022987	0
5.001832	8.859721	0
2.874085	10.48667	0
0	12.65	0

UNCLASSIFIED

PART NUMBER		REVISIONS	
ISS	SHEET	DESCRIPTION	DATE
5070	LA	ORIGINAL ISSUE	



MARKING	GENERAL METHODS	DESCRIPTION/MATERIAL	NOTE	SHEET	ITEM
NA 9919100	GENERAL REQUIREMENTS				
NA 9900000					
PART/CONTROL NO	DESCRIPTION/MATERIAL				
QUANTITY FOR DOCUMENTS: NA : NO QUANTITY FOR ASSEMBLY	DESCRIPTION/MATERIAL				
QUANTITY FOR ASSEMBLY: NA : AS REQUIRED FOR ASSEMBLY	DESCRIPTION/MATERIAL				
QUANTITY FOR PROCESSING: NA : AS REQUIRED FOR PROCESSING	DESCRIPTION/MATERIAL				
QUANTITY FOR TESTING: NA : AS REQUIRED FOR TESTING	DESCRIPTION/MATERIAL				
MODEL: 5075-P25B-FEMALE					
TYPE: P25B					
PART					
Los Alamos					
NOT FOR PRODUCTION					
PART CLASSIFICATION					
UNCLASSIFIED					
DRAWING CLASSIFICATION					
UNCLASSIFIED					
SIZE					
C					
DRAWING NUMBER					
5075 Lens Mandrel					
SCALE					
88516					
SHEET					
1 OF 1					
ORIGIN					
W11d1fir-2					
STATUS					
LA - CHK					

UNCLASSIFIED

UNCLASSIFIED



PTS-P25B-CONVEX-#5074

UNCLASSIFIED

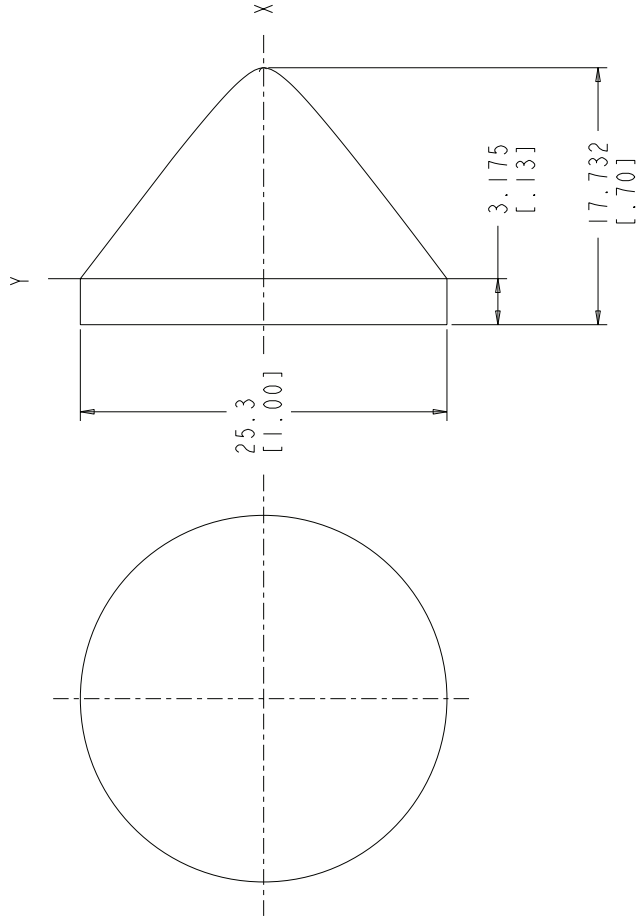
(they may be edited using available editor; changes in X and Y coordinates of the first and the last points will be ignored)

CARTESIAN COORDINATES:

X	Y	Z
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14.54095	0.1473193	0
14.51011	0.2938457	0
14.46377	0.4395397	0
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14.32971	0.7287077	0
14.24421	0.8723007	0
14.14837	1.015339	0
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13.92935	1.299948	0
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13.43812	1.866312	0
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7.362366	7.022987	0
5.001832	8.859721	0
2.874085	10.48667	0
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UNCLASSIFIED

PART NUMBER	ISSUE	SHEET ZONE	DESCRIPTION	DATE
5070.Lens.Mandrel.Fe.MA			ORIGINAL ISSUE	

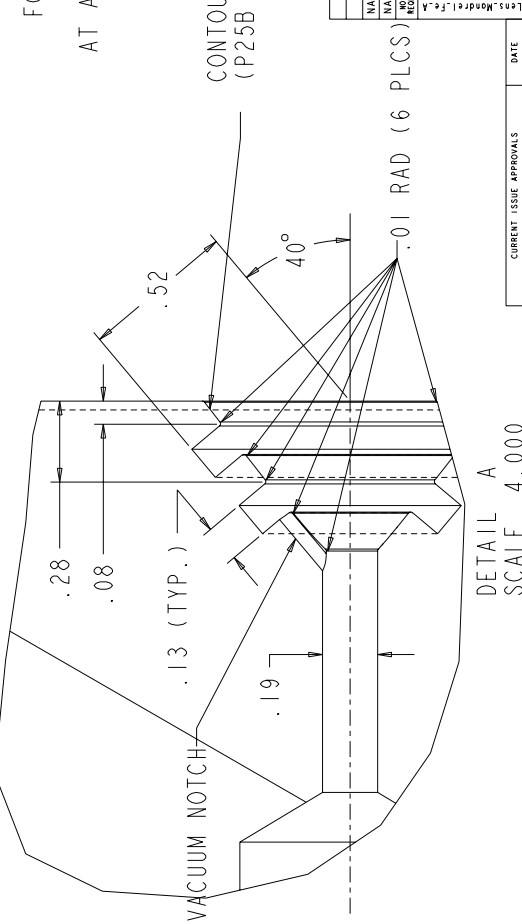
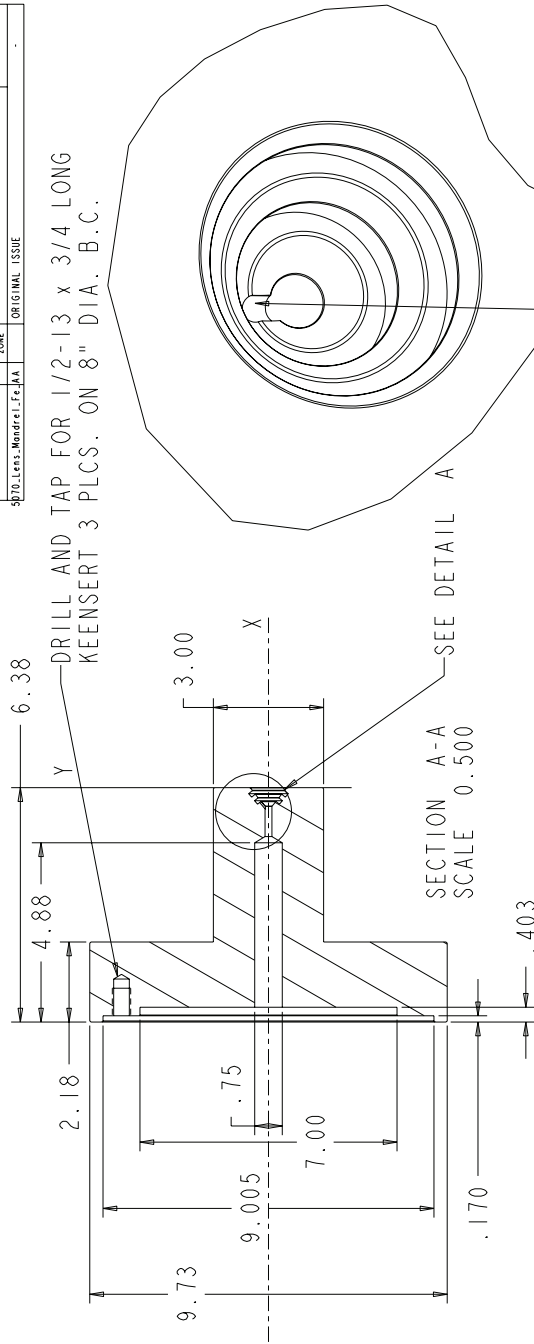


MARKING	GENERAL METHODS	NOTE	SHEET TOTAL
MA 9919100			
MA 9900000			
PART CONTROL NO	DESCRIPTION/MATERIAL		
QUANTITY: MA = NO QUANTITY FOR DOCUMENTS ALTERNATE: ALI = ALTERNATE	PM = PROCESS MATERIAL AB = AS REQUIRED EM = EXPENSE MATERIAL ARS = AS REQUIRED FOR ASSEMBLY		
ASSOCIATIONS: ALI = ALTERNATE			
MODEL: 5074.P25B.MALE			
TYPE: PART			
Los Alamos National Laboratory	UNCLASSIFIED	MALE	
METRIC	UNCLASSIFIED	NC Sketch	
PART CLASSIFICATION	DRIVING NUMBER	P25B LENS (1 INCH)	
DRIVING CLASSIFICATION	SIZE	C	
5070.Lens.Mandrel.Fe.A	5074 Lens Mandrel	A	
PART NUMBER	SCALE	15:000	SHEET 1 OF 1
5070	LA - CHK		
DESIGNED: Bart Olinger	Wildfire-2		
CHECKED: TIM CASH			
APPROVED:			

UNCLASSIFIED

UNCLASSIFIED

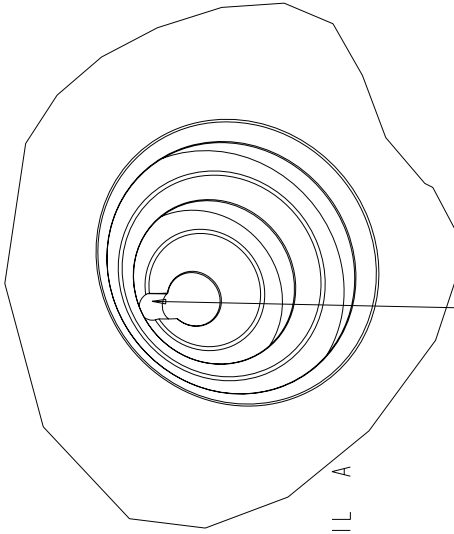
UNCLASSIFIED



UNCLASSIFIED

PART NUMBER		REVISIONS	
USE	SHEET	DESCRIPTION	DATE
ZONE	NO.		
9070	1	ORIGINAL ISSUE	

DRILL AND TAP FOR 1/2-13 x 3/4 LONG KEENSERT 3 PLCS. ON 8" DIA. B.C.



FOR VACUUM NOTCH USE 3/32 BALL END MILL AT APPROX 40° x 3/64 DEEP

SCALE 4.000

CONTOUR TO MATCH DRW # 5075 (P25B 1 INCH LENS MANDREL)

MARKING - GENERAL METHODS	DESCRIPTION/MATERIAL	NOTE	SHEET	ITEM
GENERAL REQUIREMENTS			NO.	
INA 9919100	PARTICULAR NO.			
INA 9900000	QUANTITY: WA = NO QUANTITY FOR DOCUMENTS PM = PROCESS MATERIAL AB = AS REQUIRED FOR ASSEMBLY EPC = EXPRESS MATERIAL			
9070	MODEL: 5123 P25B VAC FIXTURE			
	TYPE: PART			
	TITLE: VACUUM FIXTURE			
	PART CLASSIFICATION: UNCLASSIFIED			
	FOR 1-INCH (P25B) LENS			
	DRAWING NUMBER: NC Sketch			
	SIZE: C			
	5123 VACUUM FIXTURE A			
	SCALE: 1.500			
	SHEET 1 OF 1			
	UNION: Wildfire-2			
	STATUS: LA - CHK - -			

CURRENT ISSUE APPROVALS	DATE
DRAWN: TIM CASH	
CHECKED: -	
DESIGNED: Brri Olinger	
APPROVED: -	

DETAIL A SCALE 4.000

UNCLASSIFIED

UNCLASSIFIED

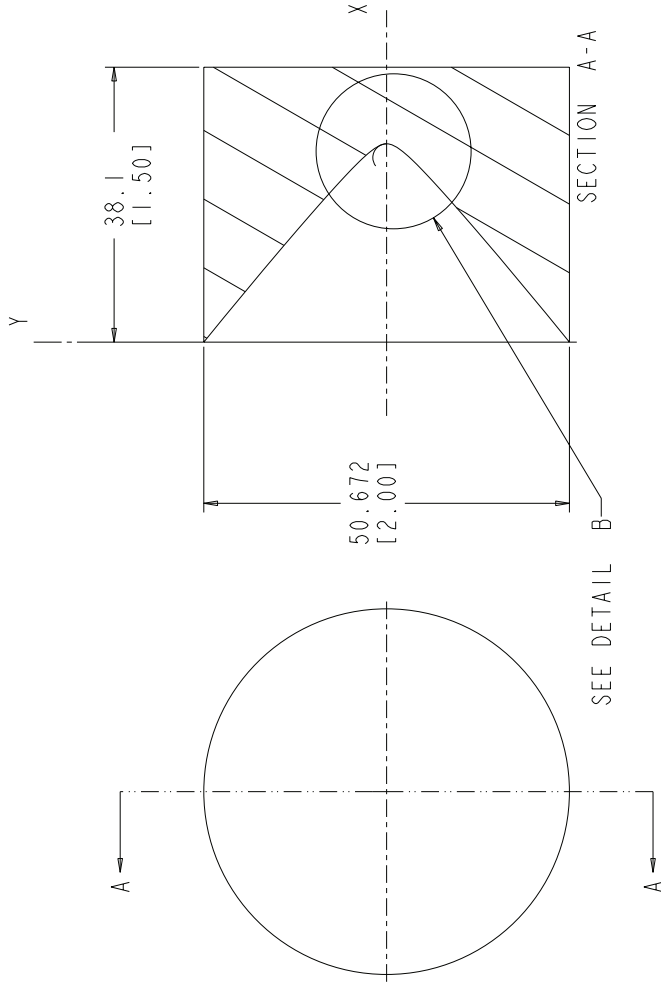
UNCLASSIFIED

Coordinates of spline points:

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27.32	0.8	0
27.232	1	0
27.127	1.2	0
27.008	1.4	0
26.876	1.6	0
26.733	1.8	0
26.585	2	0
26.435	2.2	0
26.276	2.4	0
26.111	2.6	0
25.939	2.8	0
25.761	3	0
25.579	3.2	0
25.393	3.4	0
25.202	3.6	0
25.009	3.8	0
24.812	4	0
24.613	4.2	0
24.411	4.4	0
24.207	4.6	0
24.002	4.8	0
23.794	5	0
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15.231	12.65	0
12.477	15	0
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0.412	25	0
0	25.336	0

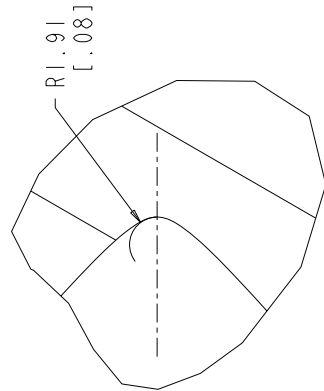
UNCLASSIFIED

PART NUMBER	ISS	SHEET ZONE	DESCRIPTION	DATE
5070.Lens.Mandrel.FE.A			ORIGINAL ISSUE	



SECTION A-A

SEE DETAIL B



DETAIL B  
UNCLASSIFIED .000

NO	REV	DESCRIPTION	DATE
NA	9919100	MARKING - GENERAL METHODS	
NA	9900000	GENERAL REQUIREMENTS	
NO	RECD	PARTICULAR NO	
<small>           PARTICIPATING IN: ALL ACQUIREMENTS FOR DOCUMENTS            PART CLASSIFICATION: NC SKETCH            DESCRIPTION/MATERIAL: P50 (2 INCH) LENS            GENERAL REQUIREMENTS: ABS AS REQUIRED FOR ASSEMBLY            DRAWING: 5072.P50.FEMALE            MODEL: 5072.P50.FEMALE            TYPE: FEMALE            TITLE: P50 (2 INCH) LENS FEMALE NC Sketch            PART CLASSIFICATION: UNCLASSIFIED            DRAWING CLASSIFICATION: UNCLASSIFIED            SIZE: DRAWING NUMBER: 5072.Lens.Mandrel.FE.A            CHECK: 88516 SCALE: 2.500 SHEET: 1 OF 1            ORIGIN: Wildfire-2 STATUS: LA - CHK - -            ISSUE: UNCLASSIFIED            THIRD ANGLE PROJECTION         </small>			
NO	RECD	CURRENT ISSUE APPROVALS	DATE
<small>           DRAWN: TIM CASH            CHECKED: Bob Olinger            APPROVED:         </small>			

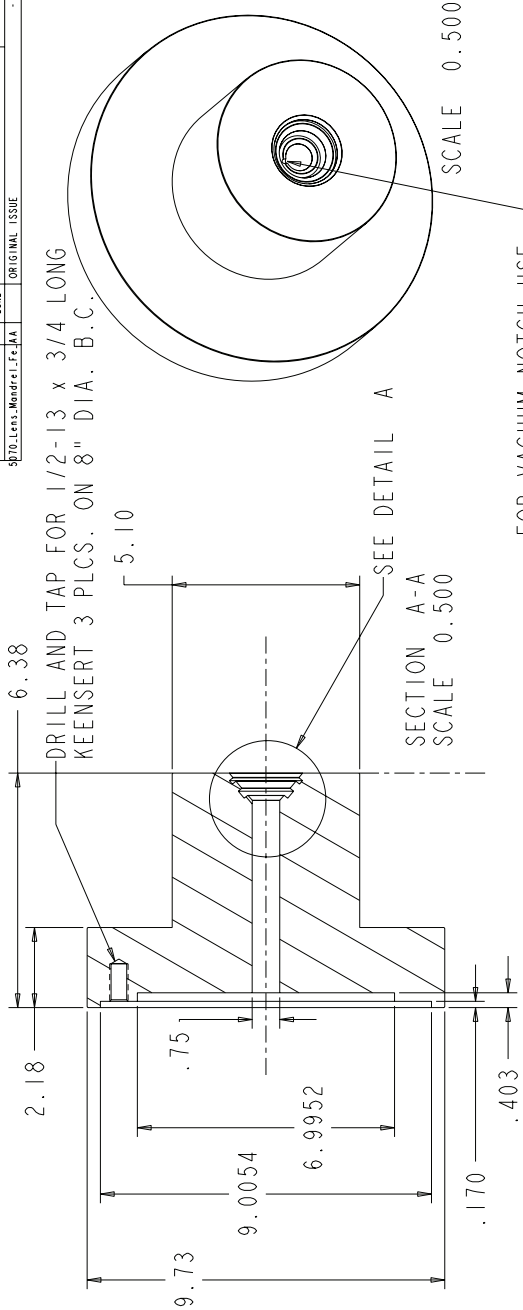
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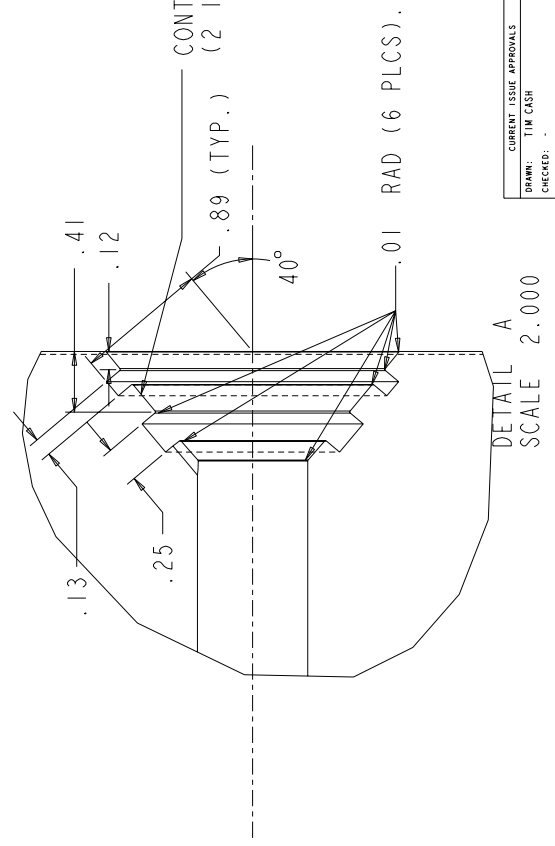
UNCLASSIFIED

UNCLASSIFIED

PART NUMBER	REVISIONS		DATE
	ISS	DESCRIPTION	
5070 Lens Mandrel Fe-M-A	ORIG	INITIAL ISSUE	



FOR VACUUM NOTCH USE  
1/8 BALL END MILL  
AT APPROX 40° x 1/16 DEEP



CURRENT ISSUE APPROVALS	DATE
DRAWN: TIM CASP	
CHECKED: Bert Olinger	
APPROVED: .....	

NA 9919100	MARKING - GENERAL METHODS		
NA 9900000	GENERAL REQUIREMENTS		
REVISION	DESCRIPTION	DATE	BY
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UNCLASSIFIED

UNCLASSIFIED

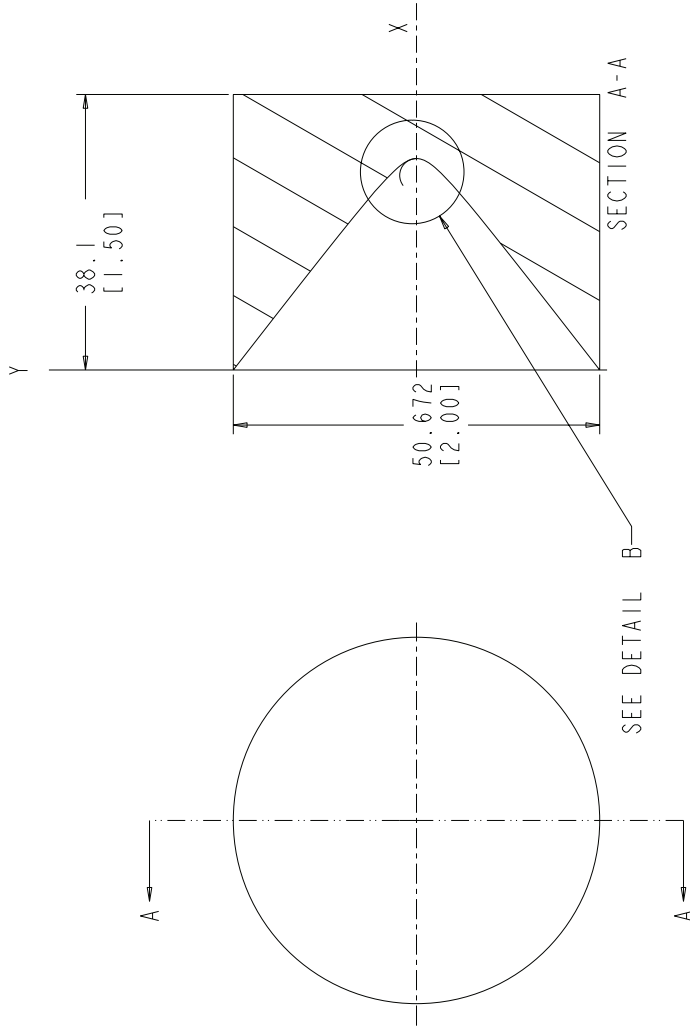
UNCLASSIFIED

Coordinates of spline points:

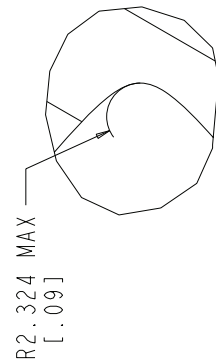
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29.204	0.4	0
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29.1	0.8	0
29.024	1	0
28.933	1.2	0
28.829	1.4	0
28.711	1.6	0
28.581	1.8	0
28.44	2	0
28.289	2.2	0
28.129	2.4	0
27.961	2.6	0
27.786	2.8	0
27.604	3	0
27.416	3.2	0
27.222	3.4	0
27.023	3.6	0
26.82	3.8	0
26.613	4	0
26.403	4.2	0
26.189	4.4	0
25.972	4.6	0
25.752	4.8	0
25.53	5	0
19.539	10	0
13.24	15	0
6.854	20	0
0.432	25	0
0	25.336	0

UNCLASSIFIED

PART NUMBER	ISSUE	SHEET ZONE	DESCRIPTION	DATE
5070_Lens_Mandrel_1.Fc_AA	1		ORIGINAL ISSUE	



SEE DETAIL B



DETAIL B  
SCALE 5.000

UNCLASSIFIED

MARKING - GENERAL METHODS	DESCRIPTION/MATERIAL	NOTE	ITEM
NA 9919100	MARKING - GENERAL METHODS		
NA 9900000	GENERAL REQUIREMENTS		
REVISION	PART CONTROL NO	DESCRIPTION/MATERIAL	NOTE
QUANTITY: 1000	NA - NO QUANTITY FOR DOCUMENTS	PN - PROCESS MATERIAL	AB - AS REQUIRED FOR ASSEMBLY
DRIVING: 5105_P50B_FEMALE	DRIVING: 5105_P50B_FEMALE	DRIVING: 5105_P50B_FEMALE	DRIVING: 5105_P50B_FEMALE
MODEL: 5105_P50B_FEMALE	MODEL: 5105_P50B_FEMALE	MODEL: 5105_P50B_FEMALE	MODEL: 5105_P50B_FEMALE
TYPE: PART	TYPE: PART	TYPE: PART	TYPE: PART
Los Alamos	Los Alamos	Los Alamos	Los Alamos
NATIONAL LABORATORY	NATIONAL LABORATORY	NATIONAL LABORATORY	NATIONAL LABORATORY
METRIC	METRIC	METRIC	METRIC
5070_Lens_Mandrel_1.Fc	5070_Lens_Mandrel_1.Fc	5070_Lens_Mandrel_1.Fc	5070_Lens_Mandrel_1.Fc
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
DRIVING CLASSIFICATION	DRIVING CLASSIFICATION	DRIVING CLASSIFICATION	DRIVING CLASSIFICATION
C 5105_Lens_Mandrel_FEMALE A	C 5105_Lens_Mandrel_FEMALE A	C 5105_Lens_Mandrel_FEMALE A	C 5105_Lens_Mandrel_FEMALE A
SCALE 2.500	SCALE 2.500	SCALE 2.500	SCALE 2.500
SHEET 1 OF 1	SHEET 1 OF 1	SHEET 1 OF 1	SHEET 1 OF 1
ORIGIN	ORIGIN	ORIGIN	ORIGIN
Will Fire-2	Will Fire-2	Will Fire-2	Will Fire-2
STATUS LA - CHK - -	STATUS LA - CHK - -	STATUS LA - CHK - -	STATUS LA - CHK - -
CURRENT ISSUE APPROVALS	CURRENT ISSUE APPROVALS	CURRENT ISSUE APPROVALS	CURRENT ISSUE APPROVALS
DRAWN: TIM CASH	DRAWN: TIM CASH	DRAWN: TIM CASH	DRAWN: TIM CASH
CHECKED: -	CHECKED: -	CHECKED: -	CHECKED: -
DESIGNED: Bar1 Olinger	DESIGNED: Bar1 Olinger	DESIGNED: Bar1 Olinger	DESIGNED: Bar1 Olinger
APPROVED: -	APPROVED: -	APPROVED: -	APPROVED: -

UNCLASSIFIED

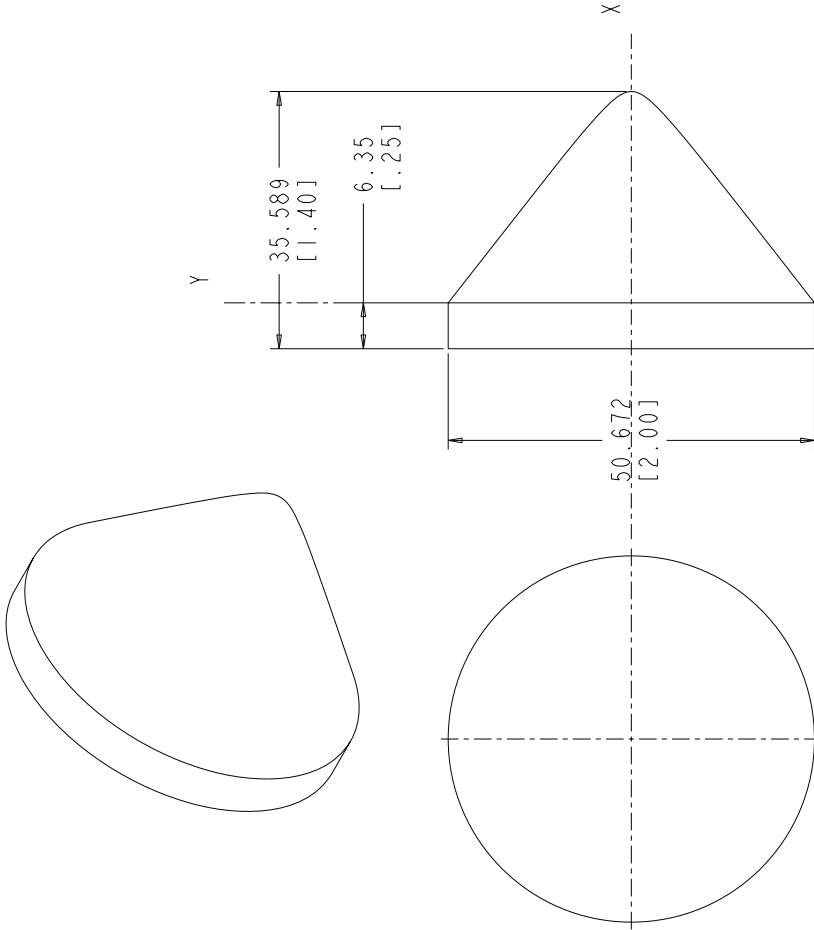
UNCLASSIFIED

Coordinates of spline points:

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29.16	0.6	0
29.1	0.8	0
29.024	1	0
28.933	1.2	0
28.829	1.4	0
28.711	1.6	0
28.581	1.8	0
28.44	2	0
28.289	2.2	0
28.129	2.4	0
27.961	2.6	0
27.786	2.8	0
27.604	3	0
27.416	3.2	0
27.222	3.4	0
27.023	3.6	0
26.82	3.8	0
26.613	4	0
26.403	4.2	0
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25.972	4.6	0
25.752	4.8	0
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19.539	10	0
13.24	15	0
6.854	20	0
0.432	25	0
0	25.336	0

UNCLASSIFIED

PART NUMBER	ISS SHEET ZONE	REVISIONS DESCRIPTION	DATE
5070_Lens_Mandrel_1_Fe_M_A		ORIGINAL ISSUE	



NA 9919100	MARKING - GENERAL METHODS		
NA 9900000	GENERAL REQUIREMENTS		
NA 9900000	DESCRIPTION/MATERIAL		
REVISIONS	REVISIONS		
1	ISSUE FOR DOCUMENTS	AS REQUIRED FOR ASSEMBLY	
2	ISSUE FOR MATERIAL	AS REQUIRED FOR ASSEMBLY	
3	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
4	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
5	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
6	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
7	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
8	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
9	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
10	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
11	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
12	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
13	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
14	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
15	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
16	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
17	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
18	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
19	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
20	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
21	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
22	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
23	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
24	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
25	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
26	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
27	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
28	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
29	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
30	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
31	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
32	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
33	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
34	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
35	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
36	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
37	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
38	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
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43	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
44	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
45	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
46	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
47	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
48	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
49	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
50	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
51	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
52	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
53	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
54	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
55	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
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61	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
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81	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
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84	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
85	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
86	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
87	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
88	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
89	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
90	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
91	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
92	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
93	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
94	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
95	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
96	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	
97	ISSUE FOR DIMENSIONS	AS REQUIRED FOR ASSEMBLY	
98	ISSUE FOR WEIGHT	AS REQUIRED FOR ASSEMBLY	
99	ISSUE FOR FINISH	AS REQUIRED FOR ASSEMBLY	
100	ISSUE FOR TOLERANCES	AS REQUIRED FOR ASSEMBLY	

DRAWN: TIM CASH	DATE
CHECKED: BORIS OLLIGER	
APPROVED: .	

5070_Lens_Mandrel_1_Fe_M_A	DESCRIPTION/MATERIAL	P50B (2 INCH) LENS
5070_Lens_Mandrel_1_Fe_M_A	PART	MALE
5070_Lens_Mandrel_1_Fe_M_A	DRIVING CLASIFICATION	UNCLASSIFIED
5070_Lens_Mandrel_1_Fe_M_A	SIZE	NC Sketch
5070_Lens_Mandrel_1_Fe_M_A	CAGEC	88516 SCALE 2.500
5070_Lens_Mandrel_1_Fe_M_A	ORIGIN	Wildfire-2
5070_Lens_Mandrel_1_Fe_M_A	STATUS	LA - CHK - -

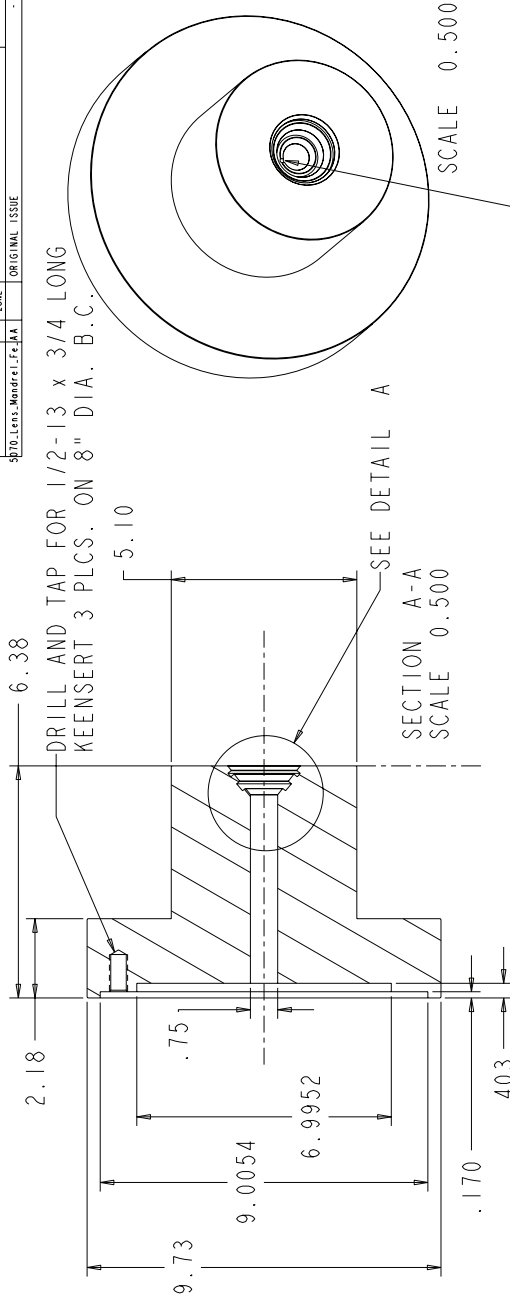
UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

PART NUMBER	REVISIONS	
	SHEET	DATE
5070 LENS MANDREL F.P. #A	ORIGINAL	ISSUE

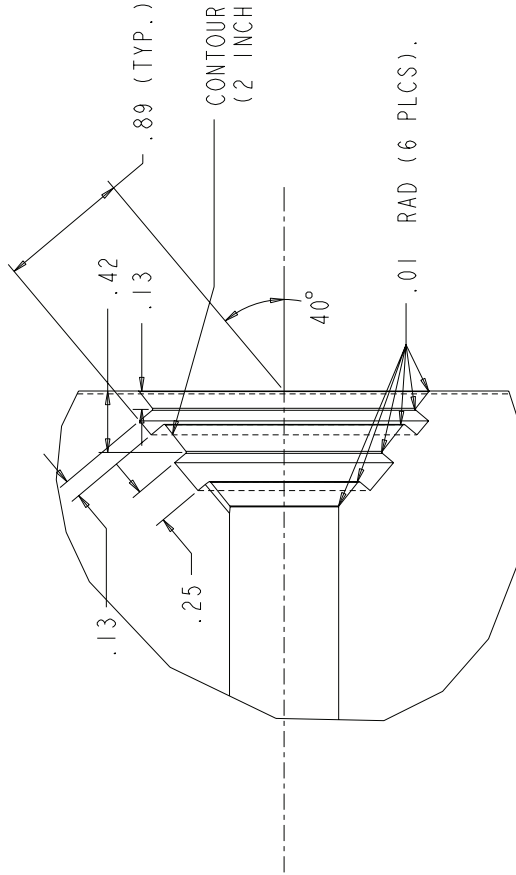


FOR VACUUM NOTCH USE  
1/8 BALL END MILL  
AT APPROX 40° x 1/16 DEEP

SECTION A-A  
SCALE 0.500

SCALE 0.500

SEE DETAIL A



DETAIL A  
SCALE 2.000

CURRENT ISSUE APPROVALS	DATE
DRAWN: TIM CASH	
CHECKED: Berl Olinger	
DESIGNED: Berl Olinger	
APPROVED: . . .	

UNCLASSIFIED

UNCLASSIFIED

NA 9919100	MARKING, GENERAL METHODS		
NA 9900000	GENERAL REQUIREMENTS		
REVISION	DESCRIPTION/MATERIAL	NOTE	SHEET
1			1 OF 1
2			2 OF 1
3			3 OF 1
4			4 OF 1
5			5 OF 1
6			6 OF 1
7			7 OF 1
8			8 OF 1
9			9 OF 1
10			10 OF 1
11			11 OF 1
12			12 OF 1
13			13 OF 1
14			14 OF 1
15			15 OF 1
16			16 OF 1
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18			18 OF 1
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99			99 OF 1
100			100 OF 1



UNCLASSIFIED

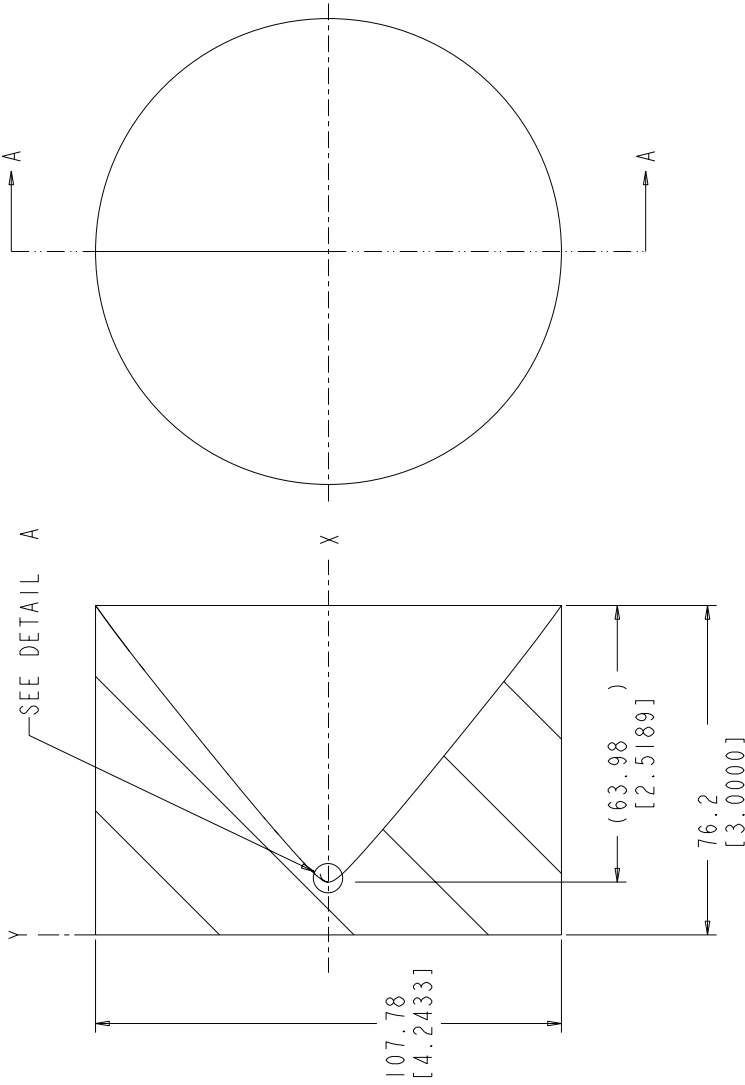
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12.57	1.2	0
12.69	1.4	0
12.83	1.6	0
12.97	1.8	0
13.12	2	0
13.27	2.2	0
13.43	2.4	0
13.59	2.6	0
13.76	2.8	0
13.94	3	0
14.12	3.2	0
14.31	3.4	0
14.5	3.6	0
14.69	3.8	0
14.89	4	0
15.09	4.2	0
15.29	4.4	0
15.49	4.6	0
15.7	4.8	0
15.91	5	0
21.42	10	0
27.22	15	0
33.2	20	0
39.29	25	0
45.45	30	0
51.66	35	0
57.91	40	0
64.26	45	0
70.84	50	0
76.2	53.89	0

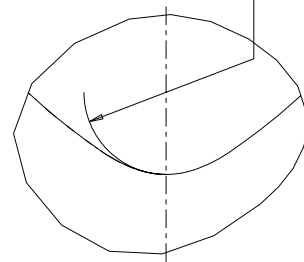
CARTESIAN COORDINATES:

UNCLASSIFIED

PART NUMBER	SHEET ZONE	REVISIONS	DATE
5070.Lens.Mandrel.Fe.AA		DESCRIPTION	
		ORIGINAL ISSUE	



SECTION A-A



DETAIL A  
SCALE 15.000

MARKING - GENERAL METHODS	REVISIONS	DATE
GENERAL REQUIREMENTS		
PART CONTROL NO	DESCRIPTION/MATERIAL	NOTE
9919100		
9900000		
QUANTITY: 100	MA: NO QUANTITY FOR DOCUMENTS	PM: AS REQUIRED FOR ASSEMBLY
DRWING: 5070.LENS.MANDREL.FE.A	MP: EXPRESS MATERIAL	MP: AS REQUIRED FOR ASSEMBLY
TYPE: PART	TITLE	
	4.25 inch Lens Mandrel	
	Female A	
	NC Sketch	
	SIZE DRAWING NUMBER	ISSUE
	UNCLASSIFIED	C
	UNCLASSIFIED	C
	5070 Lens Mandrel Fe A	A
	SCALE: 1:500	SHEET 1 OF 1
	SCALE: 1:500	SHEET 1 OF 1
	ORIGIN: Wildfire-2	STATUS: LA - CHK --

UNCLASSIFIED

UNCLASSIFIED

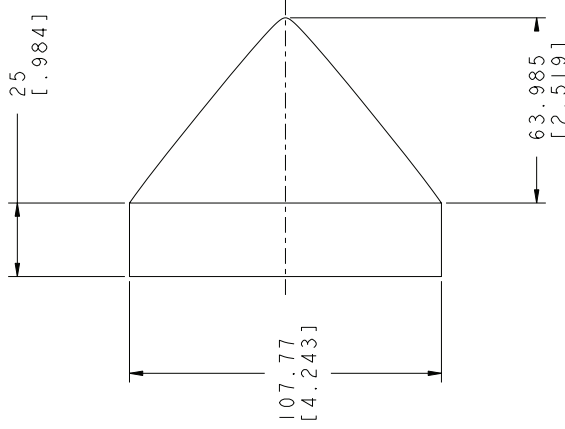
UNCLASSIFIED

X Y Z

63.9850	0.0000	0.0000
63.9740	0.2000	0.0000
63.9430	0.4000	0.0000
63.8910	0.6000	0.0000
63.8190	0.8000	0.0000
63.7310	1.0000	0.0000
63.6260	1.2000	0.0000
63.5070	1.4000	0.0000
63.3750	1.6000	0.0000
63.2320	1.8000	0.0000
63.0840	2.0000	0.0000
62.9340	2.2000	0.0000
62.7750	2.4000	0.0000
62.6100	2.6000	0.0000
62.4380	2.8000	0.0000
62.2600	3.0000	0.0000
62.0780	3.2000	0.0000
61.8920	3.4000	0.0000
61.7010	3.6000	0.0000
61.5080	3.8000	0.0000
61.3110	4.0000	0.0000
61.1120	4.2000	0.0000
60.9100	4.4000	0.0000
60.7060	4.6000	0.0000
60.5010	4.8000	0.0000
60.2930	5.0000	0.0000
54.7830	10.0000	0.0000
51.7300	12.6500	0.0000
48.9760	15.0000	0.0000
43.0020	20.0000	0.0000
36.9110	25.0000	0.0000
36.4990	25.3360	0.0000
30.7470	30.0000	0.0000
24.5400	35.0000	0.0000
18.2870	40.0000	0.0000
11.9360	45.0000	0.0000
5.3610	50.0000	0.0000
0.0000	53.8850	0.0000

UNCLASSIFIED

PART NUMBER	SHEET ZONE	DESCRIPTION	DATE
A		Rev block description goes here	04-26-2005



INA 9919100	MARKING, GENERAL METHODS	
INA 9900000	GENERAL REQUIREMENTS	
	DESCRIPTION/MATERIAL	
	QUANTITY (ORG, MA, NO QUANTITY FOR DOCUMENTS, PM, PROCESS MATERIAL, AR, AS REQUIRED FOR ASSEMBLY)	
	CLASSIFIER (ORG, ALT, ALTERNATE)	
	MODEL (ASST)	
	TYPE (PART)	
	PART/CONTROL NO	
	MARKING	
	DESCRIPTION	
	SIZE	4.25 INCH LENS MANDREL
	PART CLASSIFICATION	MALE
	DRAWING NUMBER	NC SKETCH
	DRAWING CLASSIFICATION	C 15071 LENS MANDREL A
	ORIGIN	PRO/E-WILDFIRE
	STATUS	ISSUE
		SCALE 1:1   SHEET 1 OF 1
		04-26-2005

CONFIRMED TO BE UNCLASSIFIED	ORG: -
CLASSIFIER: -	
TITLE: -	
DATE: 04-26-2005	
CURRENT ISSUE APPROVALS	
DRAWN: RMONTOYA	
CHECKED: -	
DESIGNED: -	
APPROVED: -	
FINAL ASSY:	
DRAWING LEVEL:	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	
DECIMALS	ANGULAR = ± 0.5°
.XX = ± 0.76	MACHINED = 32
.XX = ± 0.254	FINISH

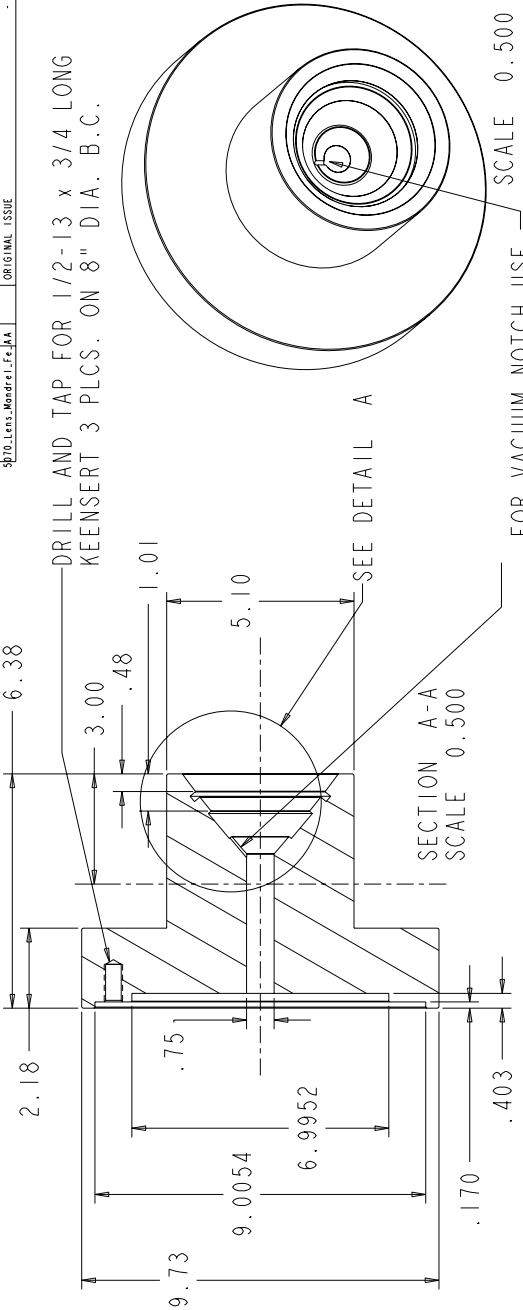
UNCLASSIFIED

PROJ: -	REVISION: -	VERSION: -	RELEASE: -
DRAWING: -			

UNCLASSIFIED

UNCLASSIFIED

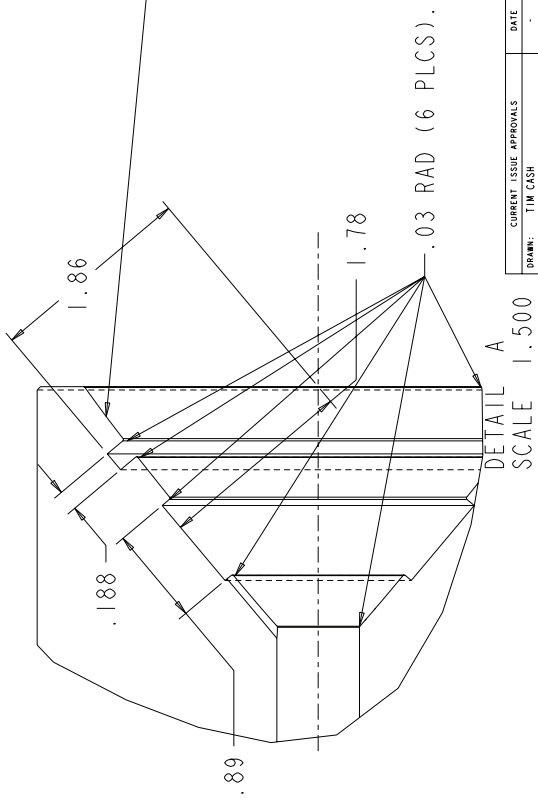
PART NUMBER		REVISIONS	
ISS	SHEET	DESCRIPTION	DATE
570	LA	ORIGINAL ISSUE	



FOR VACUUM NOTCH USE  
1/8 BALL END MILL  
AT APPROX 40° x 1/16 DEEP

SCALE 0.500

CONTOUR TO MATCH DRW. #5070  
(4.25 inch Lens Mandrel)



CURRENT ISSUE APPROVALS	DATE
DRAWN: TIM CASH	
CHECKED: Borl Olinger	
APPROVED: . . .	

NA 9919100	MARKING - GENERAL METHODS		
NA 9900000	GENERAL REQUIREMENTS		
REVISION	DESCRIPTION/MATERIAL	NOTE	ITEM
QUANTITY: NA = NO QUANTITY FOR DOCUMENTS PART NUMBER: NA = NO PART NUMBER FOR DOCUMENTS DRAWING: 519 FOR VAC FIXTURE	DESCRIPTION/MATERIAL	AS REQUIRED FOR ASSEMBLY	
MODEL: 519 FOR VAC FIXTURE	TITLE		
TYPE: PART			
Los Alamos	VACUUM FIXTURE		
NATIONAL LABORATORY	FOR 4.25" (P108) LENS		
INCHES	NC Sketch		
PROJ. NO. 519	SIZE	DRAWING NUMBER	ISSUE
PROJECTION	C	519 VACUUM FIXTURE	A
	ORIGIN	SCALE 1.500	SHEET 1 OF 1
	WITNESSED BY	STATUS	LA - CHK - -

UNCLASSIFIED

UNCLASSIFIED

**UNCLASSIFIED**

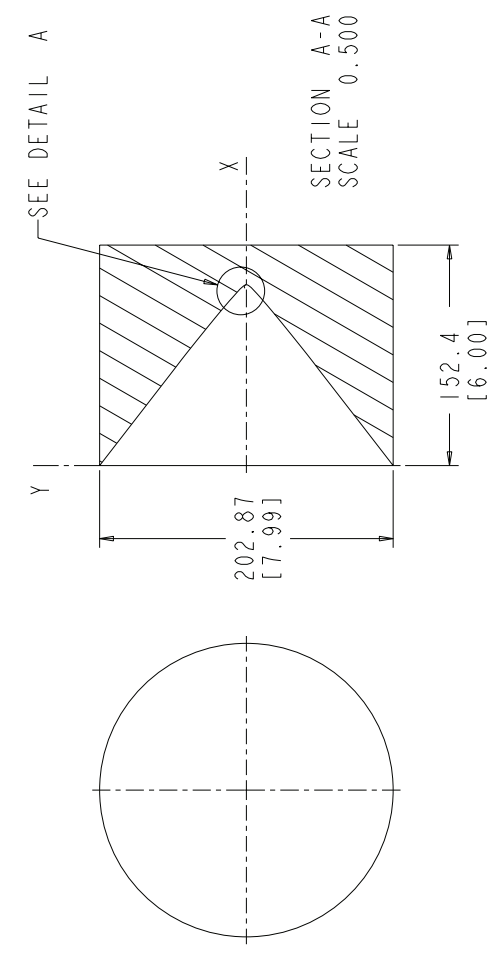
Coordinates of spline points:

CARTESIAN COORDINATES:

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125.016	0.2	0
124.985	0.4	0
124.933	0.6	0
124.861	0.8	0
124.773	1	0
124.668	1.2	0
124.549	1.4	0
124.417	1.6	0
124.274	1.8	0
124.126	2	0
123.976	2.2	0
123.817	2.4	0
123.652	2.6	0
123.48	2.8	0
123.302	3	0
123.12	3.2	0
122.934	3.4	0
122.743	3.6	0
122.55	3.8	0
122.353	4	0
122.154	4.2	0
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121.748	4.6	0
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121.335	5	0
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104.044	20	0
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91.789	30	0
85.582	35	0
79.329	40	0
72.978	45	0
66.403	50	0
59.966	55	0
53.523	60	0
47.074	65	0
40.622	70	0
34.166	75	0
27.708	80	0
21.247	85	0
14.785	90	0
8.321	95	0
1.856	100	0
0	101.435	0

**UNCLASSIFIED**

PART NUMBER	ISSUE	SHEET	ZONE	DESCRIPTION	DATE
9070_Lens_Mandrel.Fe.1A				ORIGINAL ISSUE	



R1.444 MAX  
[.06]

TOOL NOSE RAD

DETAIL A  
SCALE 3.000

NA 9919100	MARKING - GENERAL METHODS				
NA 9900000	GENERAL REQUIREMENTS				
NA 9900000	DESCRIPTION/MATERIAL				
NA 9900000	QUANTITY: NA: NO QUANTITY FOR DOCUMENTS PB: PROCESS MATERIAL EB: EXPLODE MATERIAL				
NA 9900000	MARKING: 5076.P200.FEMALE				
NA 9900000	MODEL: 5076.P200.FEMALE				
NA 9900000	TYPE: PART				
NA 9900000	Los Alamos				
NA 9900000	NATIONAL LABORATORY				
NA 9900000	METRIC				
NA 9900000	PRODUCTION				
5070_Lens_Mandrel.Fe.1A	PART CLASSIFICATION	UNCLASSIFIED	SIZE	P200 LENS (8 INCH)	ISSUE
5070_Lens_Mandrel.Fe.1A	DRAWING CLASSIFICATION	UNCLASSIFIED	C	NC Sketch	A
5070_Lens_Mandrel.Fe.1A	DATE	88518	SCALE	1:1	SHEET 1 OF 1
5070_Lens_Mandrel.Fe.1A	UNIT	Width	Zone	2	STATUS LA - CHK - -

**UNCLASSIFIED**

**UNCLASSIFIED**

CURRENT ISSUE APPROVALS	DATE
DRAWN: TIM CASH	
CHECKED: -	
DESIGNED: Barl Olinger	
APPROVED: -	

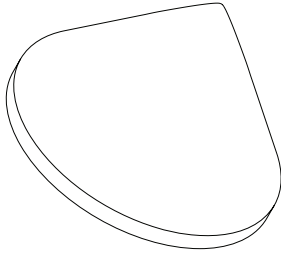
UNCLASSIFIED

Coordinates of spline points:

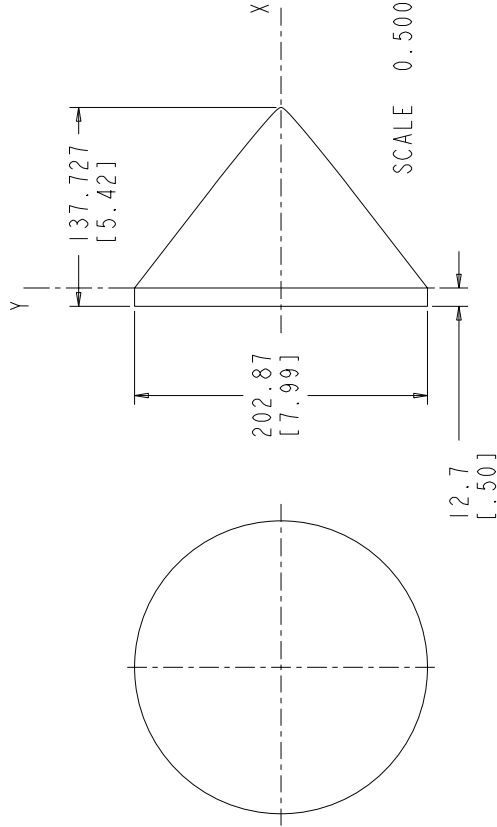
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124.861	0.8	0
124.773	1	0
124.668	1.2	0
124.549	1.4	0
124.417	1.6	0
124.274	1.8	0
124.126	2	0
123.976	2.2	0
123.817	2.4	0
123.652	2.6	0
123.48	2.8	0
123.302	3	0
123.12	3.2	0
122.934	3.4	0
122.743	3.6	0
122.55	3.8	0
122.353	4	0
122.154	4.2	0
121.952	4.4	0
121.748	4.6	0
121.543	4.8	0
121.335	5	0
115.825	10	0
110.018	15	0
104.044	20	0
97.953	25	0
91.789	30	0
85.582	35	0
79.329	40	0
72.978	45	0
66.403	50	0
59.966	55	0
53.523	60	0
47.074	65	0
40.622	70	0
34.166	75	0
27.708	80	0
21.247	85	0
14.785	90	0
8.321	95	0
1.856	100	0
0	101.435	0

UNCLASSIFIED

PART NUMBER	SHEET ZONE	REVISIONS	DATE
5070.Lens.Mandrel.Fx.A		DESCRIPTION	
		ORIGINAL ISSUE	



SCALE 0.500



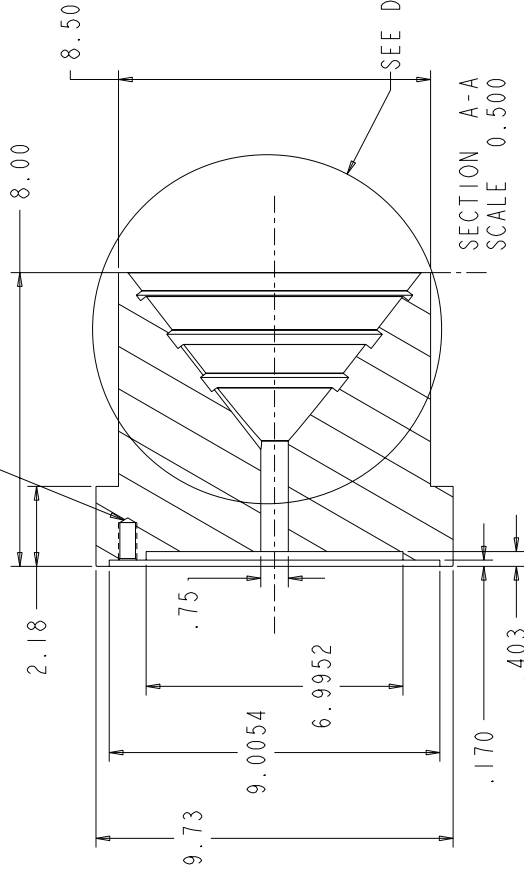
MARKING, GENERAL METHODS			
GENERAL REQUIREMENTS			
DESCRIPTION/MATERIAL			
NOTE			
ITEM			
PART/CONTROL NO			
QUANTITY			
UNIT			
MARKING			
MODEL			
TYPE			
PART CLASSIFICATION			
SIZE			
DRAWING NUMBER			
ISSUE			
SCALE			
SHEET			
OF			
1			
ORIGIN			
STATUS			
LA - CHK			

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

DRILL AND TAP FOR 1/2-13 x 3/4 LONG KEENSERT 3 PLCS. ON 8" DIA. B.C.



SECTION A-A  
SCALE 0.500

.49 (TYP. 2 PLCS.)

3.35 (TYP.)

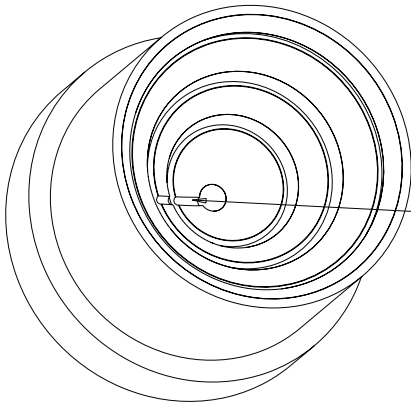
CONTOUR TO MATCH DRW. #5076  
(8 INCH P200 LENS MANDREL)

.01 RAD (6 PLCS.)

DETAIL A  
SCALE 0.500

UNCLASSIFIED

PART NUMBER		REVISIONS	
ISS	SHEET	DESCRIPTION	DATE
970	LA	ORIGINAL ISSUE	



SCALE 0.500

FOR VACUUM NOTCH USE  
1/4 BALL END MILL  
AT APPROX 38° x 1/16 DEEP

NA 9919100	MARKING - GENERAL METHODS			
NA 9900000	GENERAL REQUIREMENTS			
	PARTICULARS NO			
	QUANTITY (REQ.)	NA = NO QUANTITY FOR DOCUMENTS	PM = PROCESS MATERIAL	AB = AS REQUIRED FOR ASSEMBLY
	MARKING	5126, P200, VAC-FIXTURE	5126, P200, VAC-FIXTURE	
	MODEL	5126, P200, VAC-FIXTURE		
	TYPE	PART		
	PART	Los Alamos		
	NATIONAL COMPANY			
	INCHES			
	PROJ ANGLE			
	PROJECTION			
	ORDER	Wildfire-2		
	STATUS	LA - CHK - -		
	MARKING - GENERAL METHODS			
	GENERAL REQUIREMENTS			
	DESCRIPTION/MATERIAL			
	PM = PROCESS MATERIAL			
	AB = AS REQUIRED FOR ASSEMBLY			
	TITLE	VACUUM FIXTURE		
	PART CLASSIFICATION	UNCLASSIFIED		
	DRAWING NUMBER	NC Sketch		
	SIZE	FOR 8" (P200) LENS		
	CLASSIFICATION	UNCLASSIFIED		
	SCALE	1/500		
	SHEET	1 OF 1		

UNCLASSIFIED

UNCLASSIFIED



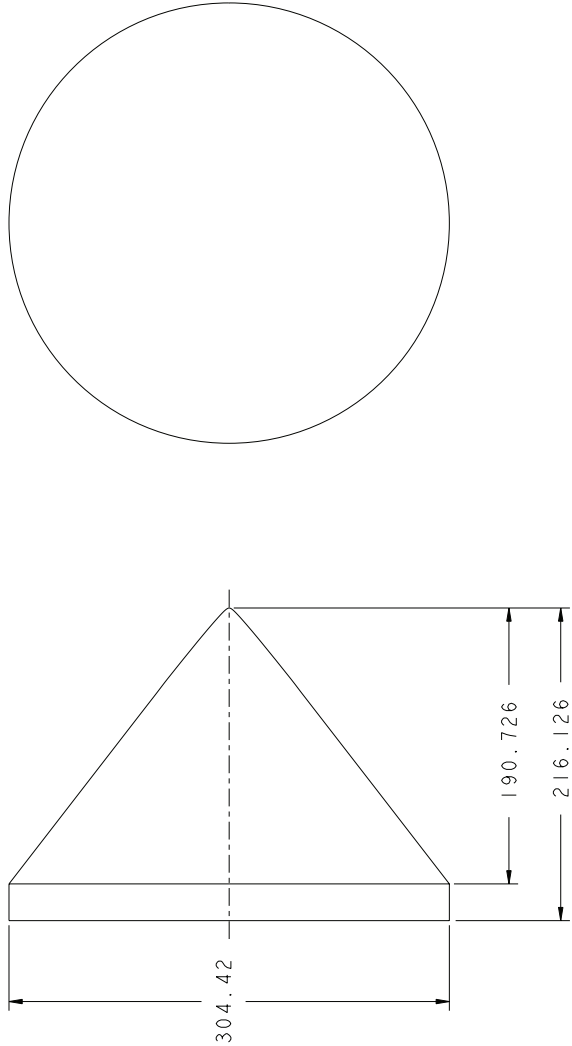
UNCLASSIFIED

X	Y	Z
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190.5600	0.8000	0.0000
190.4720	1.0000	0.0000
190.3670	1.2000	0.0000
190.2480	1.4000	0.0000
190.1160	1.6000	0.0000
189.9730	1.8000	0.0000
189.8250	2.0000	0.0000
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189.5160	2.4000	0.0000
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189.1790	2.8000	0.0000
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188.4420	3.6000	0.0000
188.2490	3.8000	0.0000
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187.6510	4.4000	0.0000
187.4470	4.6000	0.0000
187.2420	4.8000	0.0000
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151.2810	35.0000	0.0000
145.0280	40.0000	0.0000
138.6970	45.0000	0.0000
132.1020	50.0000	0.0000
125.6650	55.0000	0.0000
119.2520	60.0000	0.0000
112.7730	65.0000	0.0000
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99.8650	75.0000	0.0000
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86.9460	85.0000	0.0000
80.4840	90.0000	0.0000
74.0200	95.0000	0.0000
67.5550	100.0000	0.0000
61.0890	105.0000	0.0000
54.6210	110.0000	0.0000
48.1530	115.0000	0.0000
41.6850	120.0000	0.0000
35.2150	125.0000	0.0000
28.7450	130.0000	0.0000
22.2750	135.0000	0.0000
15.8040	140.0000	0.0000
9.3320	145.0000	0.0000
2.8600	150.0000	0.0000
0.0000	152.2100	0.0000
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-10.0840	160.0000	0.0000

PTS-P300-CONVEX-#5079

UNCLASSIFIED

PART NUMBER	ISSUE	SHEET ZONE	DESCRIPTION	DATE
	B		ORIGINAL ISSUE	05-13-2005



NA 9919100	MARKING - GENERAL METHODS			
NA 9900000	GENERAL REQUIREMENTS			
QUANTITY: NA : NO QUANTITY FOR DOCUMENTS	DESCRIPTION/MATERIAL			
ORG: ACT : ALENW	PH : PROCESS/MATERIAL			
DRWG: A5079	EA : EXP/REV			
MODEL: A5079	ITEM			
TYPE: PART	TITLE			
	12 INCH MALE LENS			
	PROG A5079			
	NC SKETCH			
	UNCLASSIFIED			
	UNCLASSIFIED			
	SI METRIC			
	PROJ: WILDFIRE			
	STATUS: LA - CHK - 05-13-2005			

CONFIRMED TO BE UNCLASSIFIED	CLASSIFIER: -	ORG: -
FINAL ASSY:	DRAWING LEVEL:	DATE:
PROJECT NAME:	05-13-2005	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	DECIMALS	ANGULAR
.XX : ± 0.76	MACHINED	± 0.5°
.XXX : ± 0.254	FINISH	± 0.32
CURRENT ISSUE APPROVALS	DRWN: RMONTOYA	CHECKED:
	DESIGNED:	APPROVED:

UNCLASSIFIED

PROJ	REVISION	VERSION	RELEASE
B	3		CONCEPT

UNCLASSIFIED



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