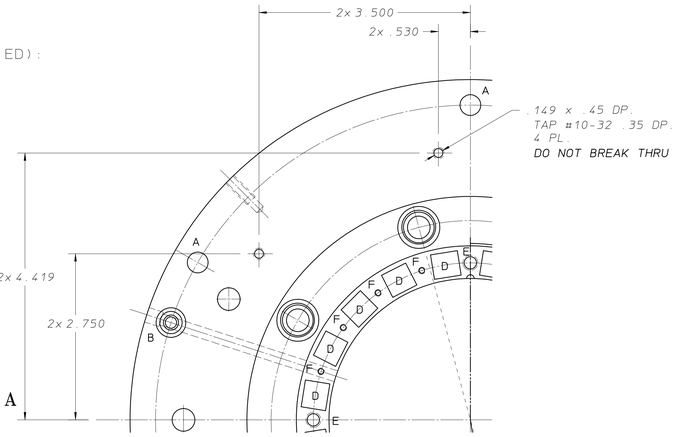
NOTES (UNLESS OTHERWISE SPECIFIED):

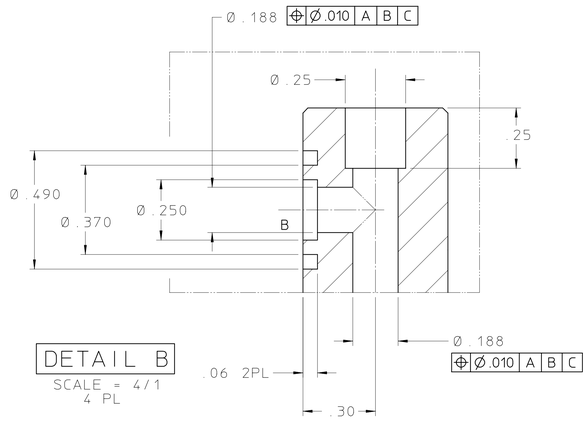
1) DIMENSIONS IN INCHES.

2) MATL: SST, 304L.

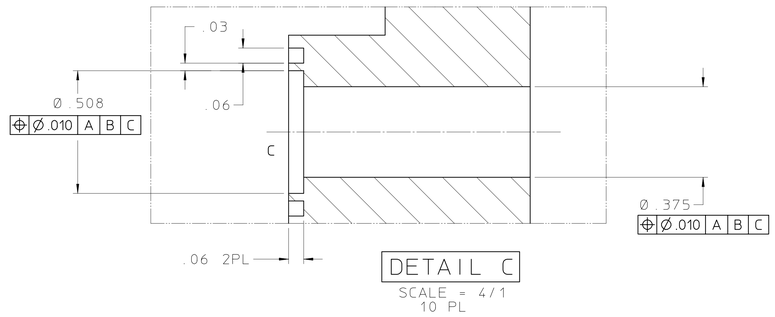


A

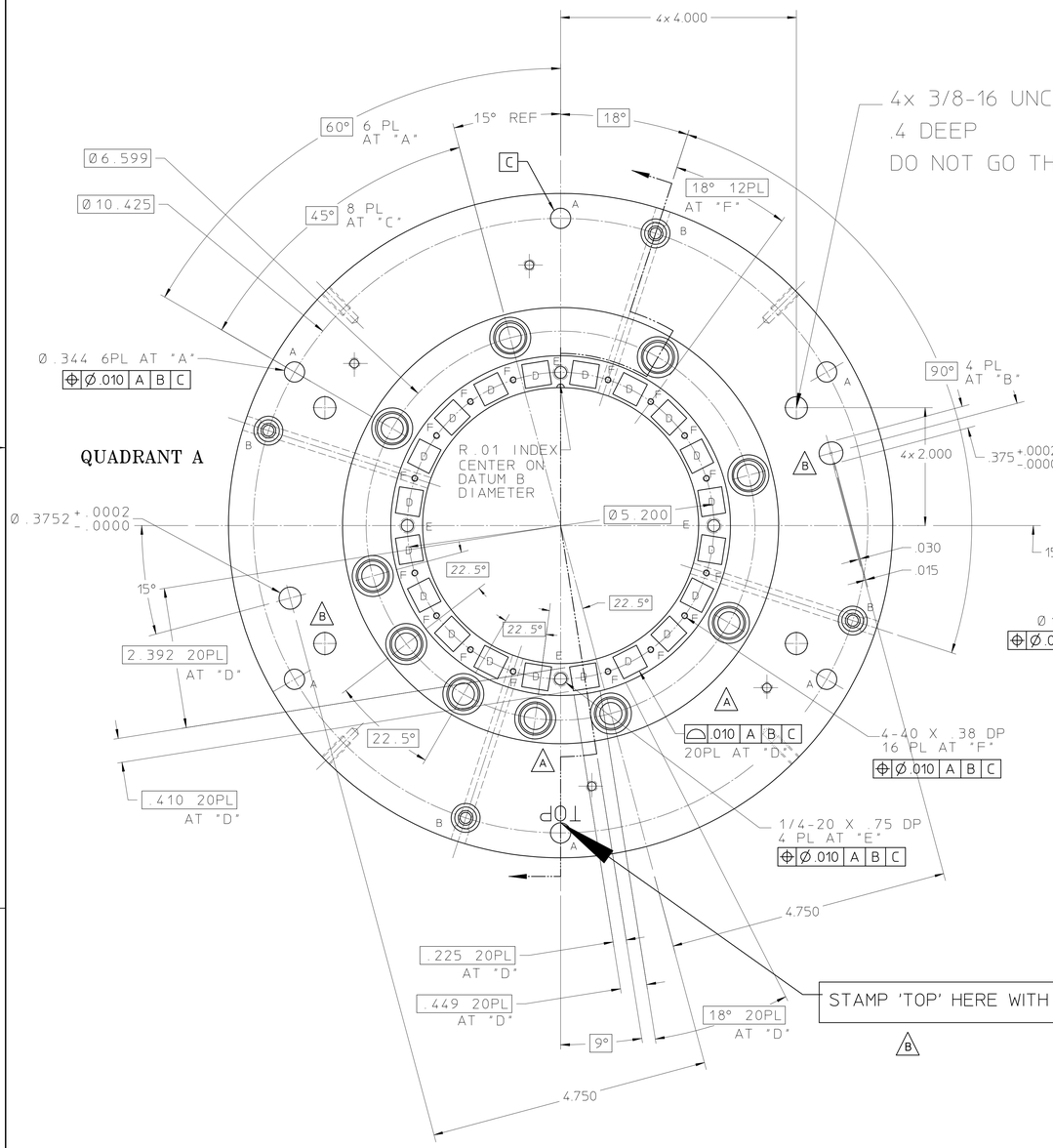
DETAIL OF QUADRANT A

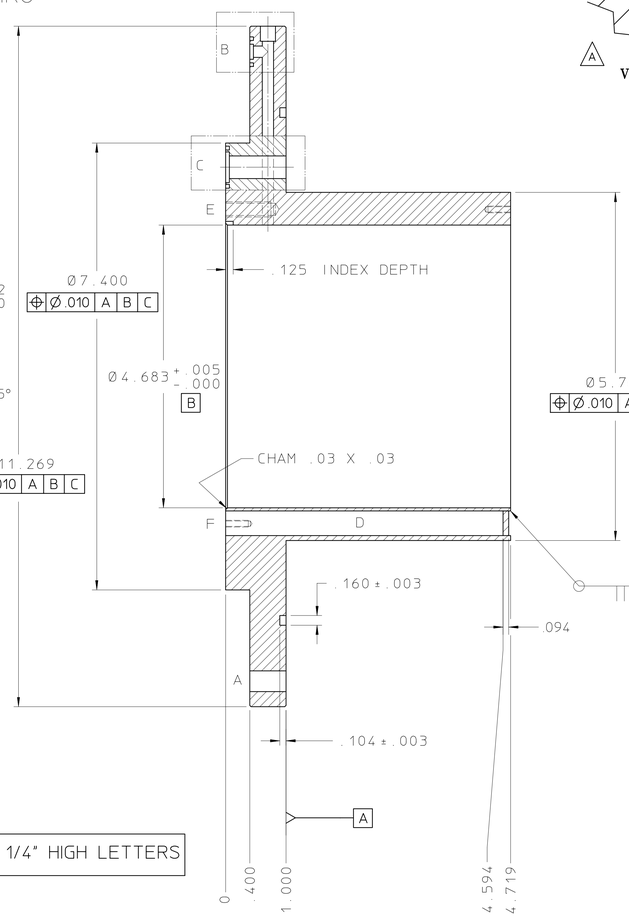


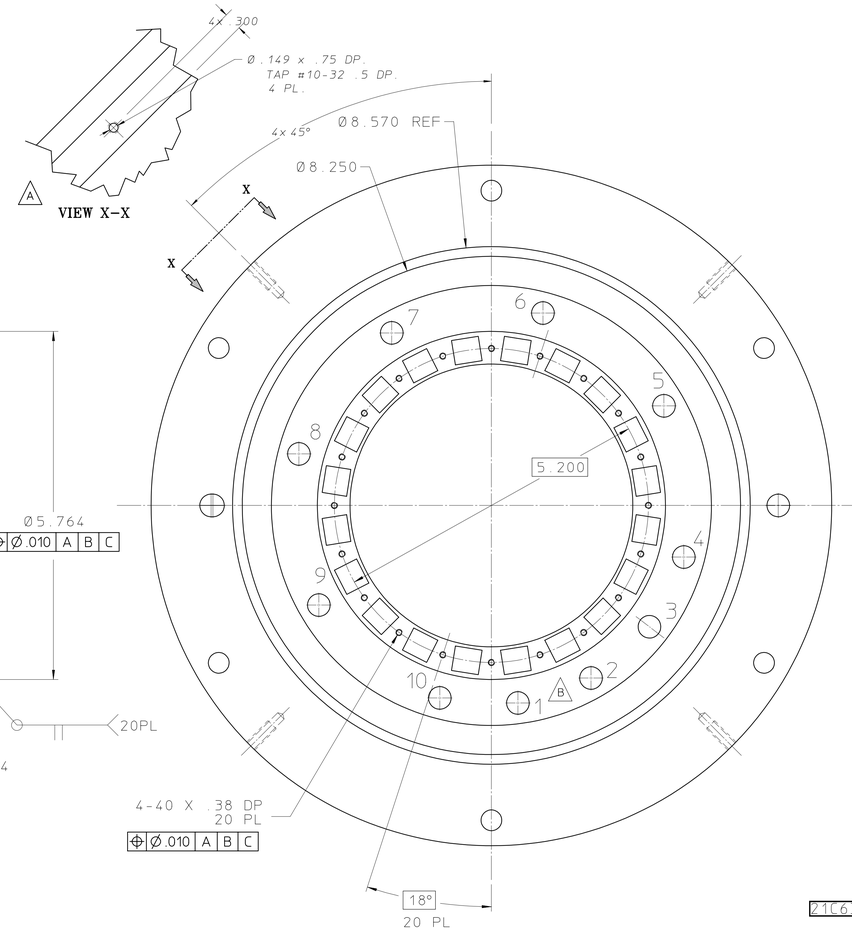
DETAIL B
SCALE = 4/1
4 PL



DETAIL C
SCALE = 4/1
10 PL







21C6396B

REV	DWG	CHK	ZONE	DATE	CHANGES
B	JM			4/3/00	CHANGED NUMBERING
B	JM		B7	4/3/00	ROTATED "TOP" 180°
B	JM		B6.6	4/3/00	ROTATED PIN 8 SLOTTED ALIGNEMENT HOLES
A	DWC		D7	4/3/00	ADDED SECOND VIEW OF QUADRANT A, WITH 10-32 CALLOUTS
A	DWC		C3	4/3/00	ADDED 10-32 HOLE, AND VIEW X-X
A	DWC		B6	4/3/00	REMOVED WELD PREP
A	DWC		B7	4/3/00	ADDED WELD PREP AND RELATED DIM.

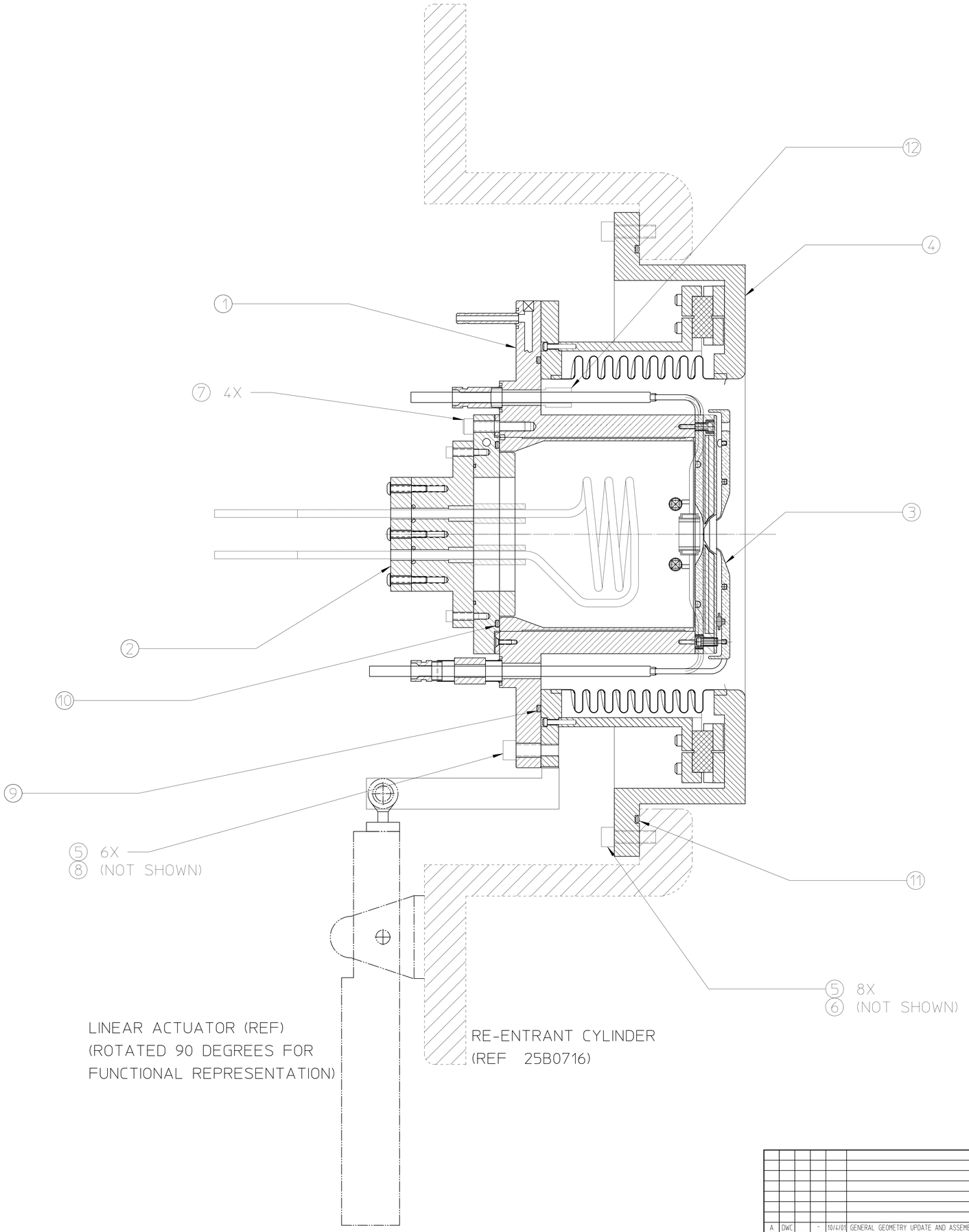
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1; FRAC ±1/64; XX ± .01; ANGLES ± 0.5°; XXX ± .005; FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° OUT 1.5 PITCH THD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG: PAL — DATE: 01-12-99
CHK: SKM — DATE: 11-15-99

ITEM	REQD	PART NO	DESCRIPTION

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
CUSP MAGNET BODY

PATENT CLEAR | DWG. TYPE: DETAIL | SHOWN ON | SCALE: FULL | DO NOT SCALE PRINTS
MICROFILMED | DESIGN ACCT. NO.: 8210-14 | CATEGORY CODE | DWG. NO.: 21C6396 | SIZE: B | REV.



REQD	ITEM	PART NO	DESCRIPTION
10	12	21C9912-1	CERAMIC INSULATOR FOR VACUUM FEEDTHRUS
1	11	#2-280	O-RING, VITON, PARKER, INC., SPLICED TO 13.58" ID
1	10	#2-243	O-RING, VITON, PARKER, INC.
1	9	#2-267	O-RING, VITON, PARKER, INC.
2	8	-	DOWEL PIN, .375" DIA, 1.0" LONG
4	7	-	SHCS, 1/4-20, 1.0" LONG
2	6	-	DOWEL PIN, .250" DIA X 1.0" LONG
14	5	-	SHCS,5/16-18 X 1.0" LONG
1	4	21G7584	TILT MECHANISM ASSEMBLY
1	3	21C8934	OUTLET ELECTRODE ASSEMBLY
1	2	21G7543	BACKFLANGE SUBASSEMBLY
1	1	21G8074	PLASMA CHAMBER MAGNET ASSEMBLY

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		-	10/4/01	GENERAL GEOMETRY UPDATE AND ASSEMBLY CALLOUTS

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .001 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK. REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

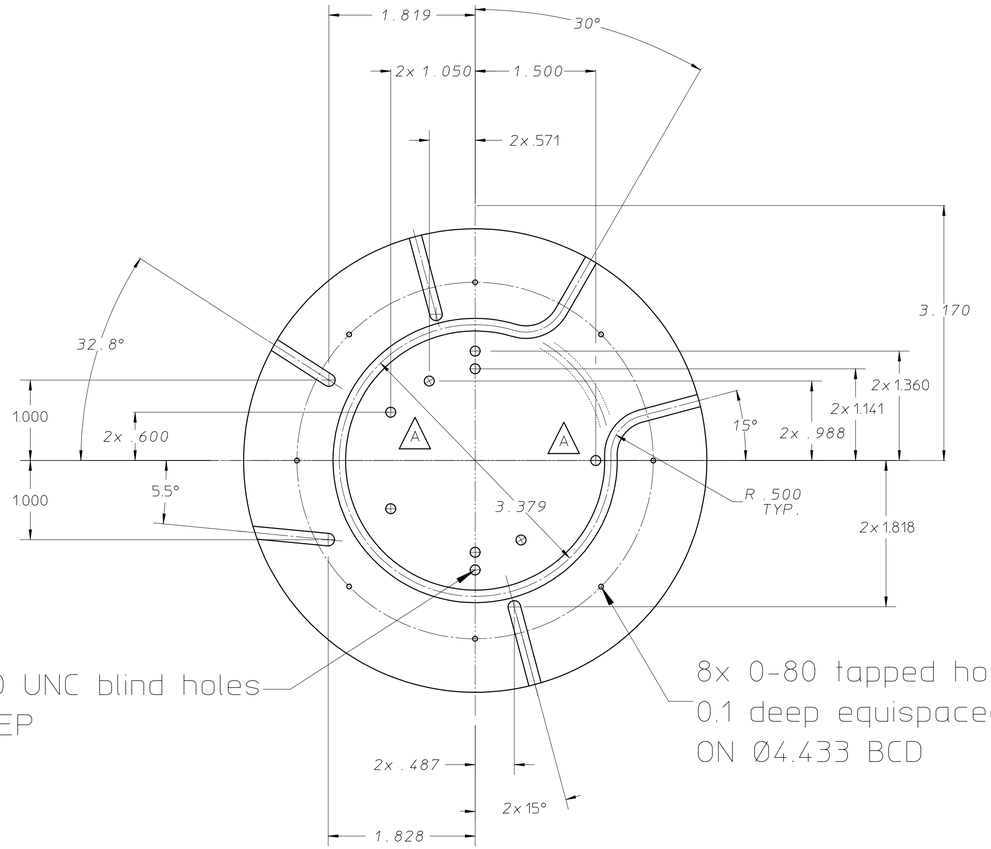
SHOP ORDERS
ACCT NO. | SERIAL NO.
DATE ISSD | DATE REQD | NO REQD
DELIVER TO
SURFACE TREATMENT –
IDENT METH –
DWG BY S. MUKHERJEE DATE 01-04-99
CHK BY M. LEITNER DATE 3-14-99

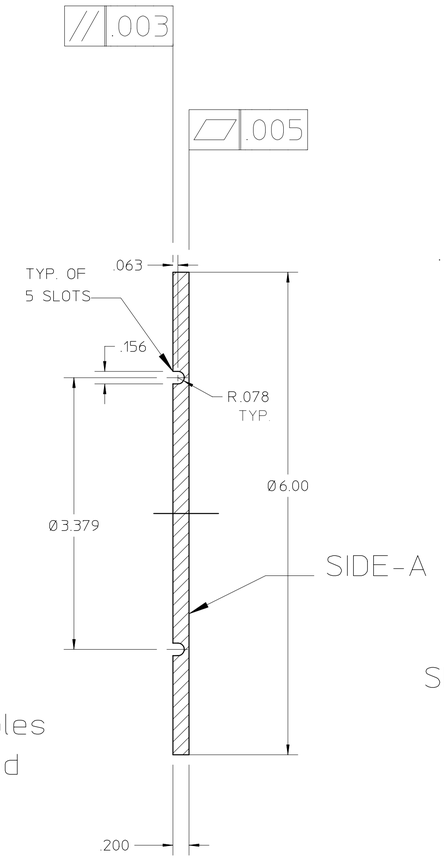
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

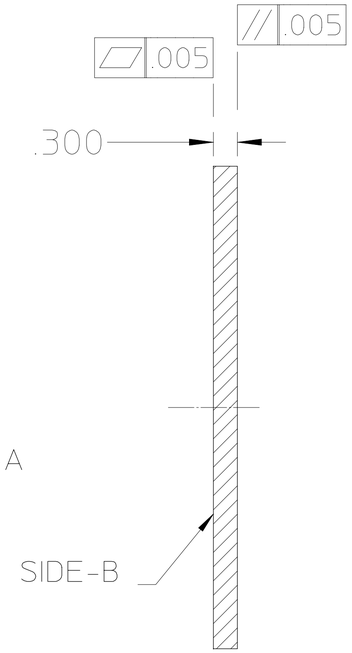
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
GENERAL ARRANGEMENT

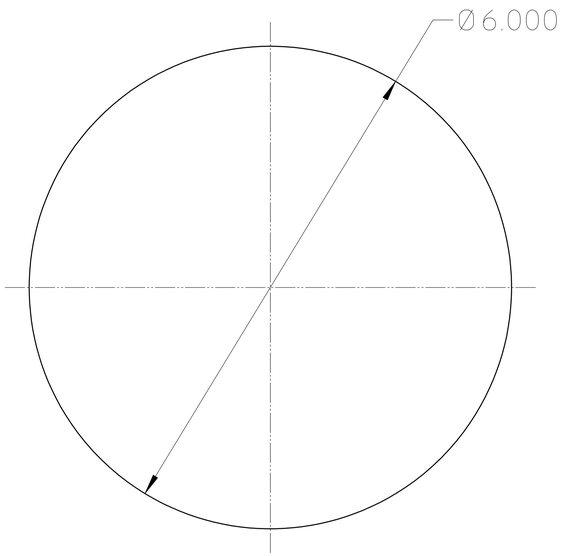
PATENT CLEAR | MICROFILMED
DWG TYPE ASSEMBLY | SHOWN ON | SCALE FULL | DO NOT SCALE PRINTS
DESIGN ACCT NO 8210-14 | CATEGORY CODE FE1100 | DWG NO 21C8406 | SIZE A | REV A

ITEM	REQD	PART NUMBER	DESCRIPTION
1	1	-1	1006 LOW CARBON STEEL PLATE STOCK
2	1	-2	1/4 THK. OFHC PLATE









21C8454A

(1) COPPER PLATE

(2) 1006 LOW CARBON STEEL PLATE

NOTE:
SIDE-A OF COPPER BLANK TO BE BRAZED
WITH SIDE-B OF THE IRON BLANK PART USING
HIGH TEMP. SILVER BRAZING ALLOY
SUCH AS PALCUSIL 15 OR PALCUSIL 25

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		B8	1/15/01	CHANGED DEPTH FROM .10 TO .18
A	DWC		C7,C6	1/15/01	ADDED THREE MORE 5-40 TAPPED HOLES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
.X ± .1 | FRAC. ±1/64
.XX ± .01 | ANGLES ± 0.5°
.XXX ± .005 | FINISH 125

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

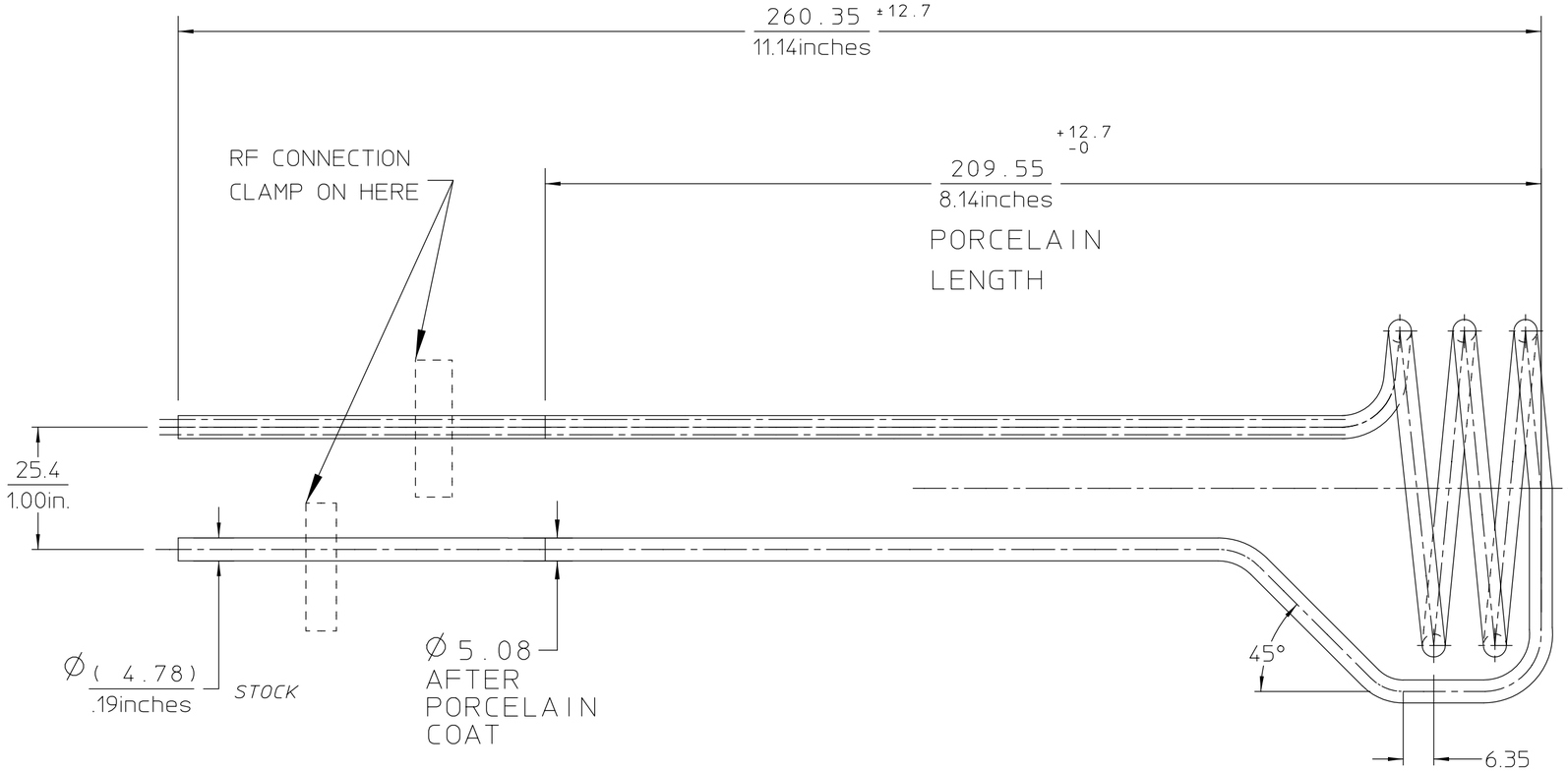
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE | DATE: 04-29-99
CHK. BY: D. CHENG | DATE: 5-05-99

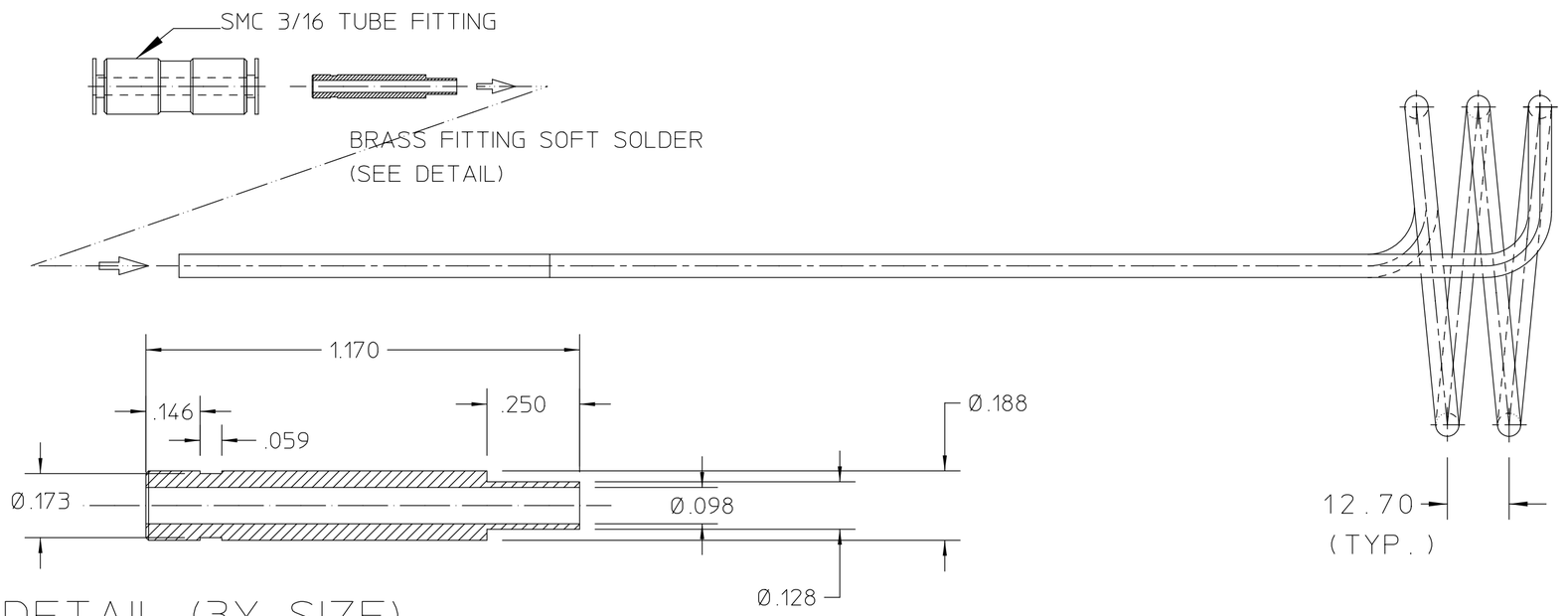
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS- FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
BLANK FOR COPPER/IRON BRAZEMENT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21C8454	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14		21C8414	A

REQ	ITEM	PART NUMBER	DESCRIPTION
			TUBE, 3/16" O.D., COPPER (REFRIGERATION TUBE)

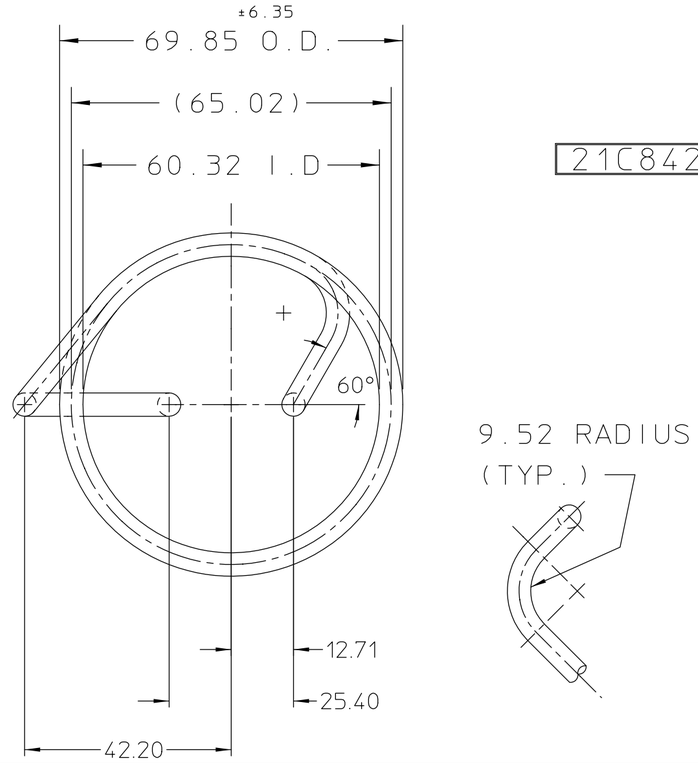




DETAIL (3X SIZE)

NOTES: UNLESS OTHERWISE SPECIFIED,

1. POSITIONAL TOLERANCES AND DATUM FEATURES OF SIZE APPLY REGARDLESS OF FEATURE SIZE.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. PORCELAIN COATING MUST HAVE A RESISTANCE OF GREATER THAN 20 MILLION OHMS WHEN SUBMERGED IN SALT WATER SOLUTION.
4. USE OF SULFUR OR SILICONE BEARING OILS, LUBRICANTS OR COOLANTS ARE STRICTLY PROHIBITED.
5. USE OF RESIN OR RUBBER BONDED ABRASIVES UNDER POWER IS STRICTLY PROHIBITED. USE VITREOUS BONDED ABRASIVES ONLY.
6. PROTECT FINISHED PART BY BAGGING OR SIMILAR METHOD TO PROTECT AND MAINTAIN CLEANLINESS DURING SHIPMENT AND STORAGE.



21C8423

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: ANGLES ± 1° ; X.XX ± 3.17 ; FINISH 3.2

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.		SERIAL NO.
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG BY	SAM/C.A.MATUK	DATE 01-04-99
CHK. BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

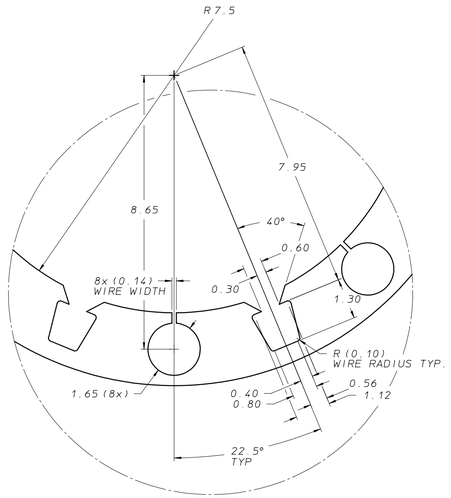
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
RF ANTENNA (2 TURN)

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	CD	21C8406	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C8423	

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

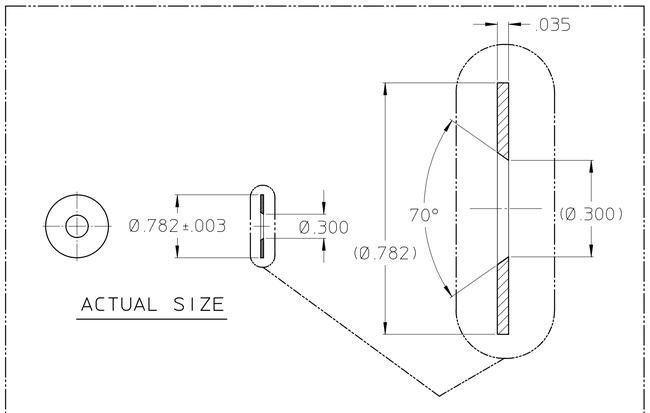
ITEM	REQD	PART NUMBER	DESCRIPTION
1	1	-1	BAR ROUND 304 STAINLESS STEEL
2	1	-2	BAR ROUND 304 STAINLESS STEEL
3	A/R	-3	TUBING Ø.125x.015 WALL STAINLESS STEEL
4	1	-4	SHEET 304 .035 THK STAINLESS STEEL
5	4	-5	SHEET 304 .025 THK STAINLESS STEEL
6	2	-6	BAR ROUND Ø3/8" 304 STAINLESS STEEL
7	A/R	-7	TUBING, Ø.25" X .040 WALL, 304 S.S



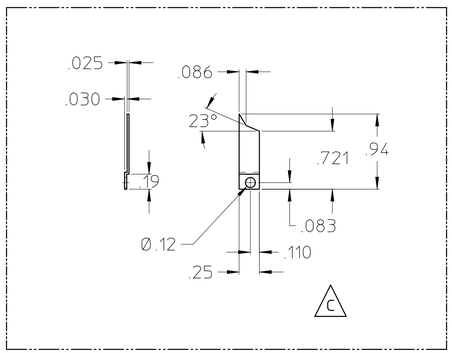
DETAIL A

SCALE 10:1

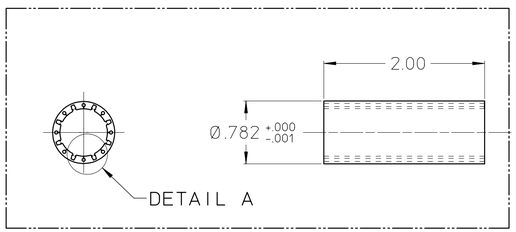
DIMENSIONS IN MILLIMETERS
TOLERANCE = [± 0.05mm]



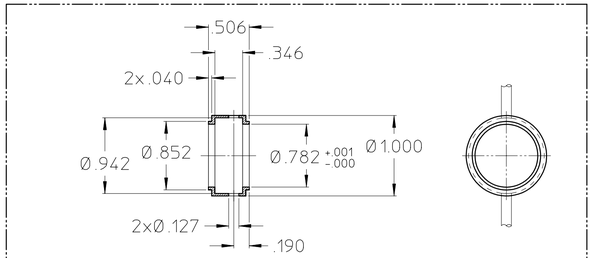
ITEM 4 - CESIUM COLLAR PLATE
SCALE: AS NOTED



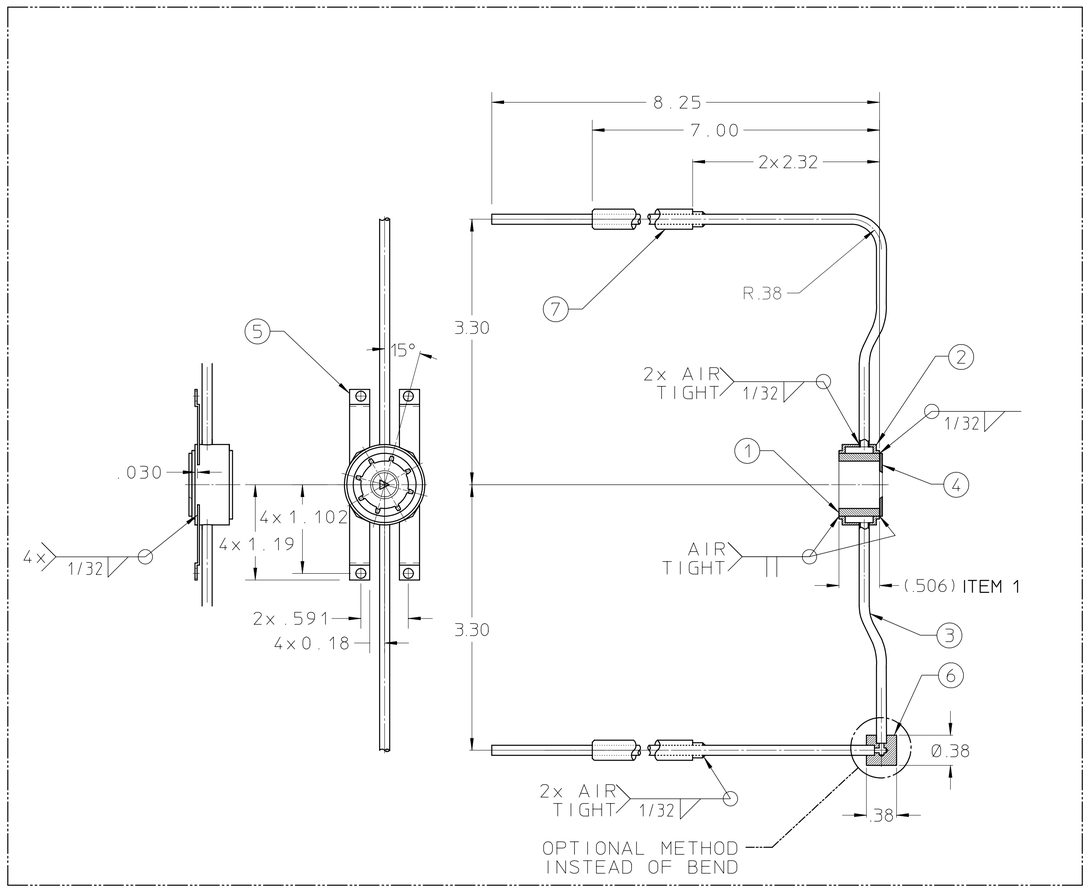
ITEM 5 - MOUNTING TAB
SCALE: FULL
2 REQD AS IS
2 REQD MIRROR IMAGE



ITEM 1 - CESIUM COLLAR STOCK
SCALE: FULL



ITEM 2 - COOLING JACKET
SCALE: FULL



ASSEMBLY WELDMENT

21C8434C

REV	DWG	CHK	ZONE	DATE	CHANGES
C	DWC		B5	10/14/01	MODIFIED MOUNTING TAB DIM
B	DWC			9/13/01	REVISED AND UPDATED
A	RLOW			05/23/00	REVISED AND UPDATED

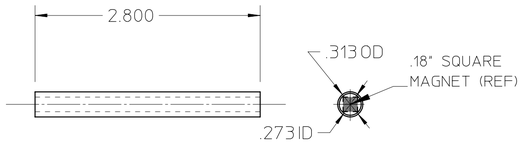
UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ± 0.5° | .XXX ± .003 | FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE/ELECTROPOLISH
IDENT. METH. TAG
DWG. BY s. mukherjee | DATE 01-11-99
CHK BY DAN CHENG | DATE XX-XX-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS -FE ION SOURCE R&D
ION SOURCE DEVELOPMENT
CESIUM COLLAR

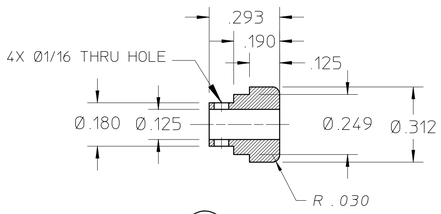
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14		21C8434	C

REQ	ITEM	PART NUMBER	DESCRIPTION
2	1		TUBING ROUND, 5/16"ODx.020 WALL SST
2	2		BAR ROUND, 5/16" DIA SST TYPE 316L
2	3		BAR ROUND, 5/16" DIA SST TYPE 316L
2	4		BAR, SST TYPE 316L
3	5		BAR, SST TYPE 304
2	6		TUBING ROUND, 1/8"ODx.016 WALL SST
1	7		TUBING ROUND, 1/8"ODx.016 WALL SST
2	8	21C8492	FILTER MAGNET SPECIFICATIONS
2	9	21G7711-2	LEGRIS WATER FITTING PREP, LONG, CUT TO 5.5" LONG



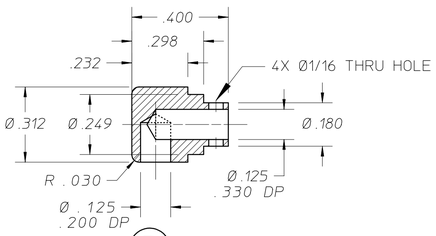
ITEM (1) 2 REQD,
MAT'L; TUBING, 5/16 ODx.020 WALL SST

SCALE;1/1



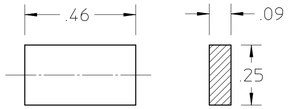
ITEM (2) 2 REQD,
MAT'L; SST TYPE 316L

SCALE; 3/1



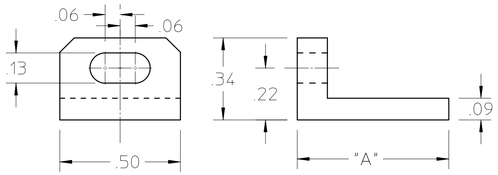
ITEM (3) 2 REQD,
MAT'L; SST TYPE 316L

SCALE; 3/1



ITEM (4) 2 REQD,
MAT'L; SST TYPE 316L

SCALE; 3/1

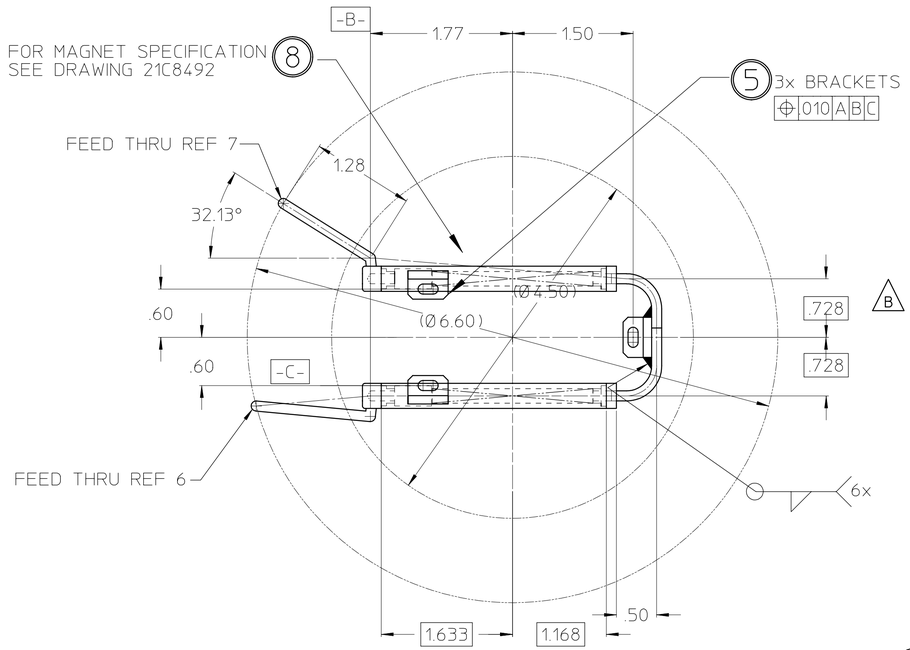


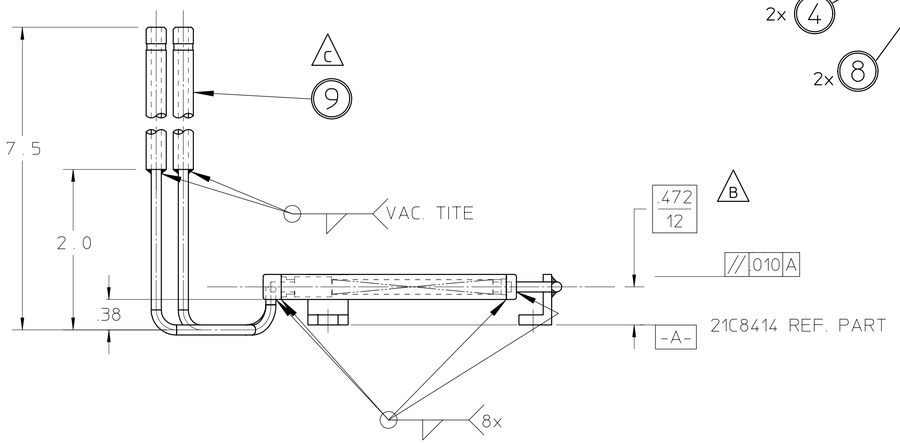
	"A"
LONG	.32
SHORT	.63

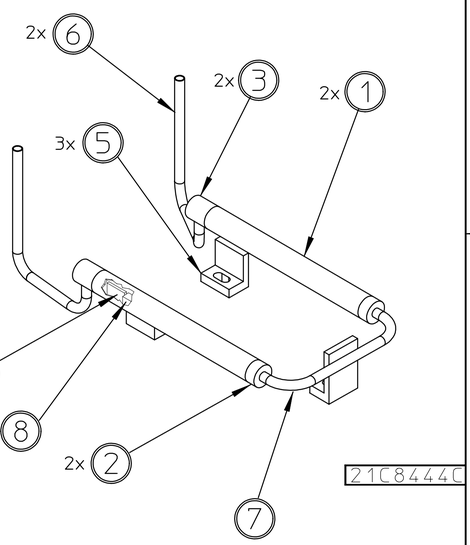
ITEM (5) 2 "SHORT" REQD,
1 "LONG" REQD.
MAT'L; SST TYPE 304

(B)

SCALE; 3/1







21C8444C

REV	DWG	CHK	ZONE	DATE	CHANGES
C	DWC		B4	9/14/01	ADDED ITEM 9 AND DIMENSION
B	DWC		C2	11/15/00	.728 DIMENSION WAS .984
B	DWC		B2	11/15/00	.472 DIMENSION WAS .591
B	DWC		A6	11/15/00	ADDED TABULAR DIMENSION
A	RLOW		-	7/15/00	REVISED, REDRAWN AND UPDATED

UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 FRAC. ± 1/64; .XX ± .01 ANGLES ± 1°; .XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

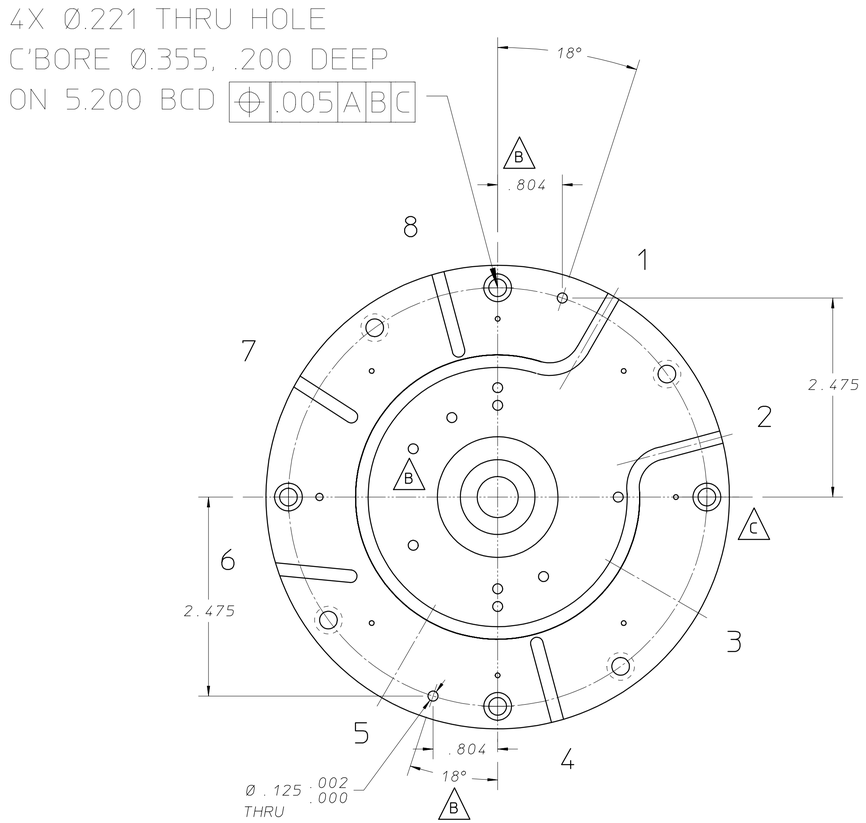
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY S. MUKHERJEE DATE 01-04-99
CHK BY M. LEITNER DATE 03-10-99

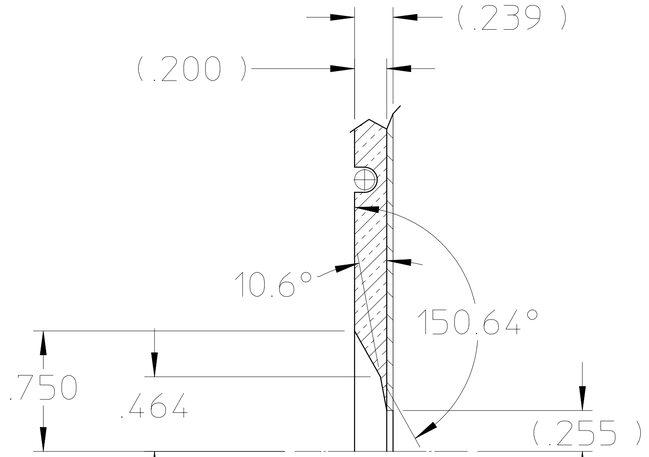
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
FILTER MAGNET ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY	21C8406		
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C8444	C

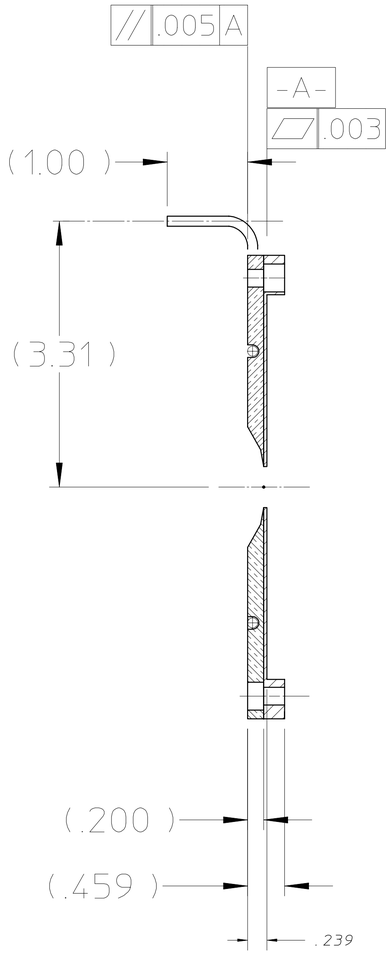
REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21C8414	COPPER & IRON BRAZEMENT BLANK

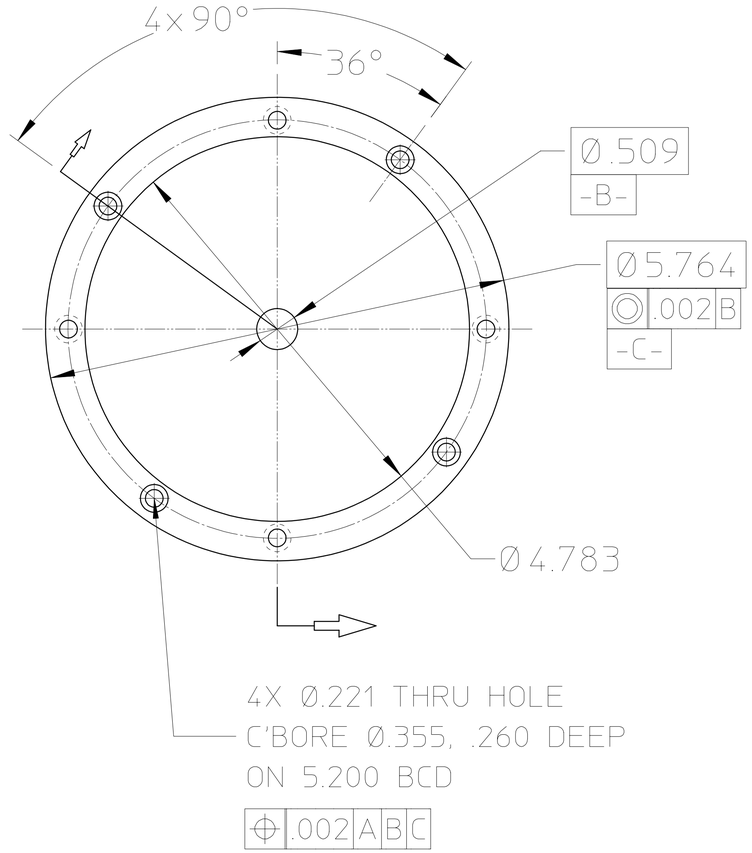




DETAIL

SCALE: 2X





21C8454C

REV	DWG	CHK	ZONE	DATE	CHANGES
C	DWC		C6	2/15/01	MOVED C-BORED HOLE BACK TO 90°
B	DWC		C7	1/15/01	ADDED THE TWO Ø.125 DOWEL HOLES
B	DWC		C7	1/15/01	REMOVED THE THREE 5-40 TAPPED HOLES
A	DWC		C6	4/3/00	ROTATED C-BORED HOLE 22.5° FROM HORIZ.

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ± 1/64 | .XX ± .01 | ANGLES ± 1° | .XXX ± .002 | FINISH 125

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

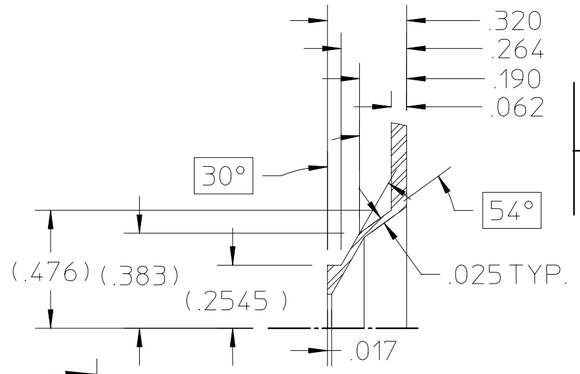
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE | DATE: 04-15-99
CHK. BY: D. CHENG | DATE: 5-15-99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

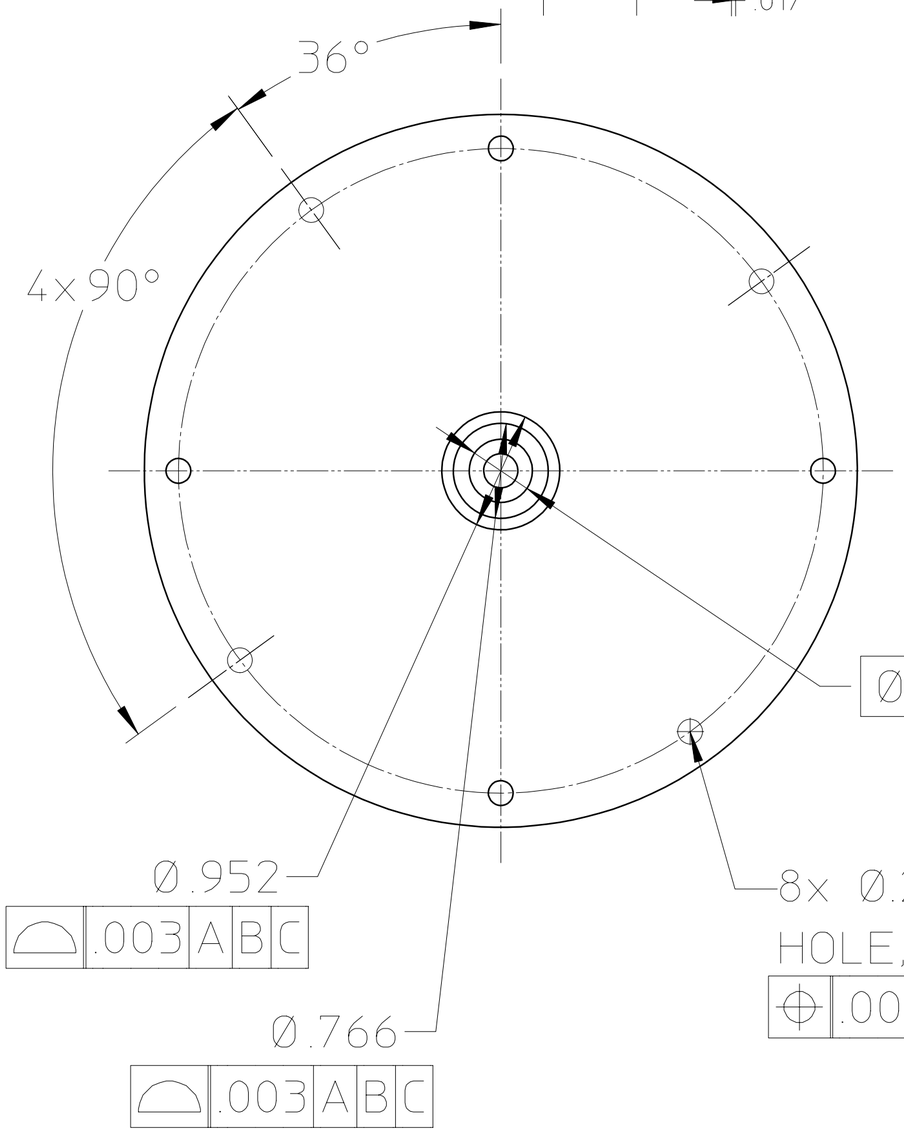
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
OUTLET ELECTRODE IRON PLATE

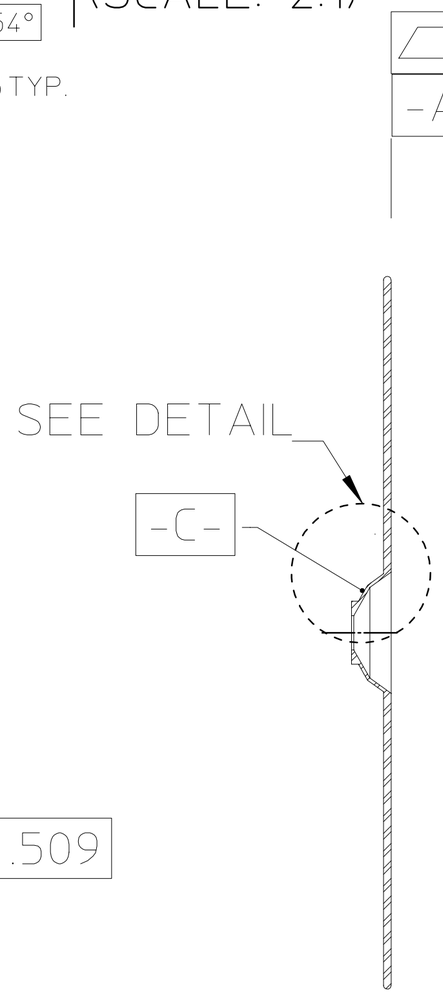
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	PART	21C8934	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C8454	C

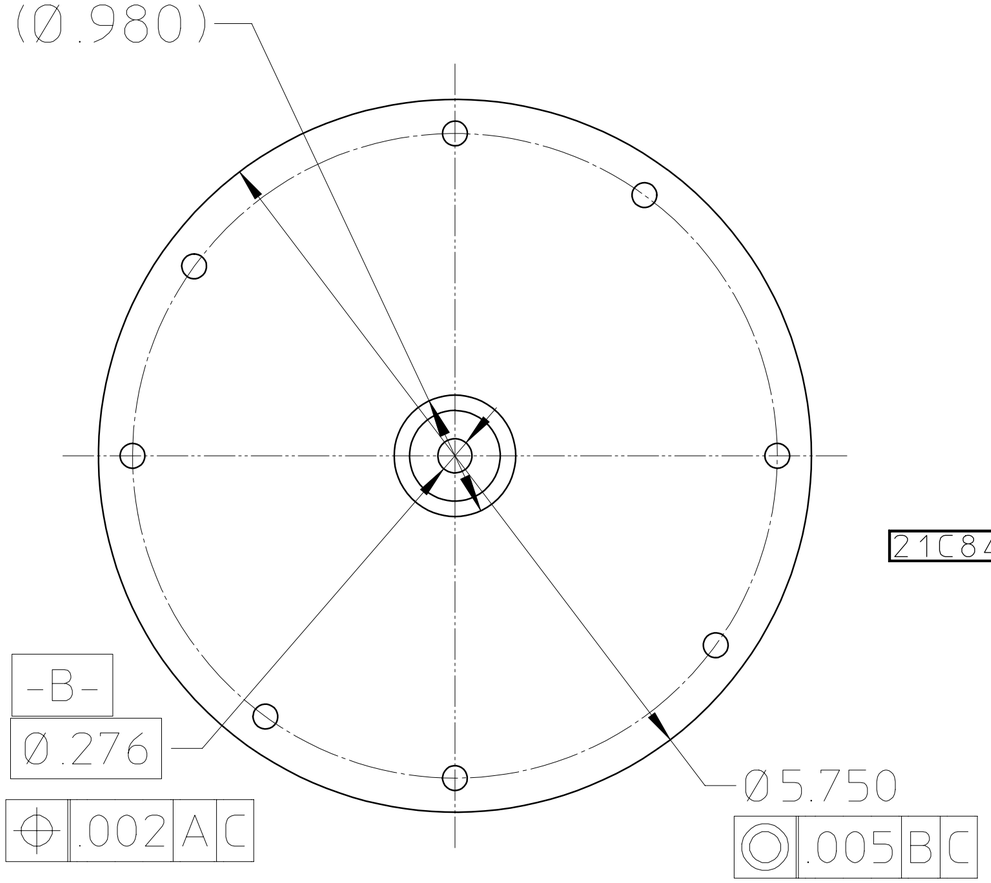
1	ITEM	PART NUMBER	DESCRIPTION
REQ	1	-	304 STAINLESS STEEL PLATE, 3/8 THK.



DETAIL
(SCALE: 2:1)







21C8473A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	JM		D4	8-31	(.2545) DIM. WAS 0.250; DIA IS NOW .509

UNLESS OTHERWISE SPECIFIED

TOLERANCES		
.X ± .1	FRAC. ± 1/64	
.XX ± .01	ANGLES ± .01°	
.XXX ± .005	FINISH 125 √	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENT. METH.	TAG	
DWG. BY	S. MUKHERJEE	DATE 04-20-99
CHK BY	D. CHENG	DATE 4-29-99

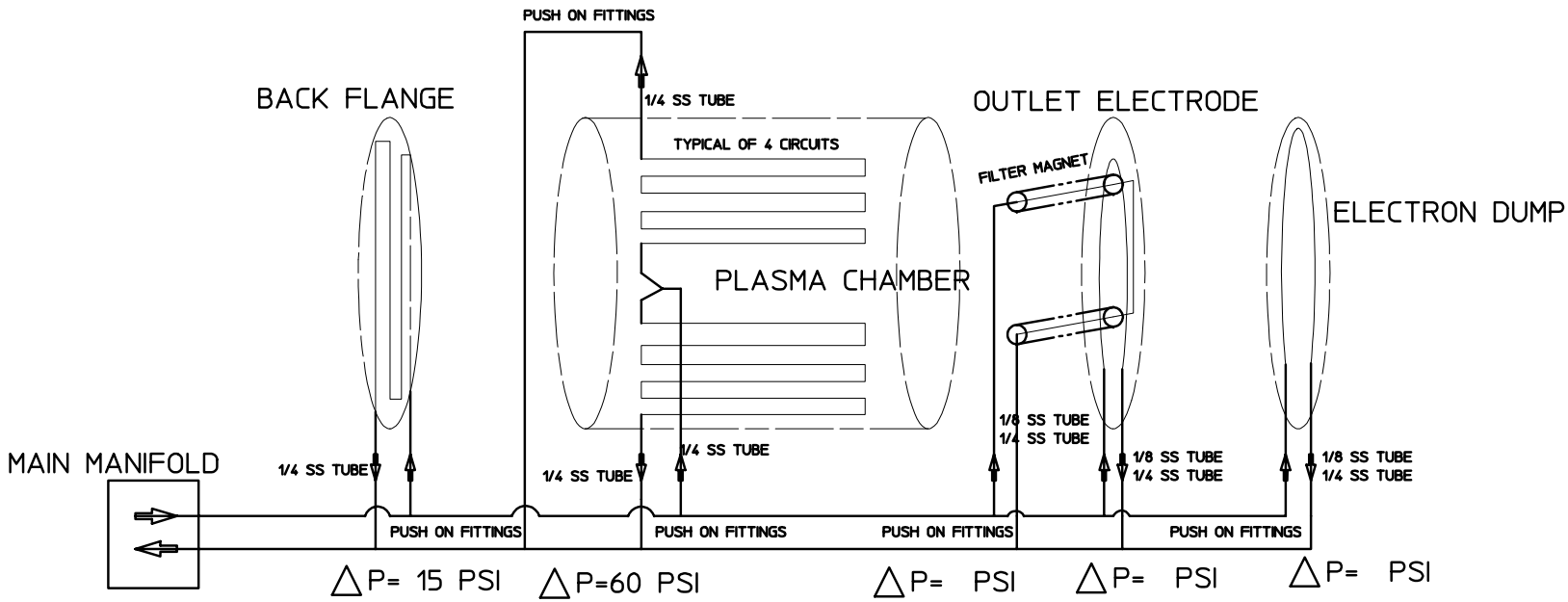
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRON END SYSTEM
ION SOURCE PROTOTYPE DESIGN
APERTURE PLATE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	PART		DWG. NO. 21C8473	SIZE A / REV. A
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE1100		

Dwg. No. 21C8481 Size Rev

SCHEMATIC OF COOLING WATER FLOW

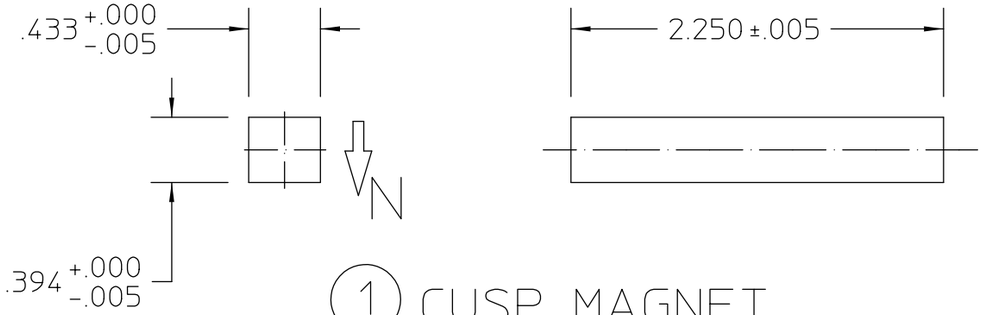


Material –				–	–	–	–
Unless Otherwise Noted				Rev	Dwn	Date	Changes
.X ± .1	.XX ± .025	.XXX ± .010	Angles ± .5°	LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California – Berkeley			
				SNS – FRONT END SYSTEM			
Account Number –	Finish √ 125			ION SOURCE PROTOTYPE DESIGN			
Date Issued –	Date Reqd –			ION SOURCE WATER COOLING SCHEMATIC			
Number Required –	Deliver To –			Shown on Dwg No. 00X0000			
Surface Treatment –	Identific Method Tag			Patent Clear	Category Code FE1100	Do not Scale Prints	
Drawn By S. MUKHERJEE	Date 01-20-99			Micro-Filmed	Drawing Scale Full	Dwg. No. 21C8481	Size Rev –
Check By M. LEITNER	Date 00-00-94			Design Account 8210-14	Drawing Type LAYOUT		

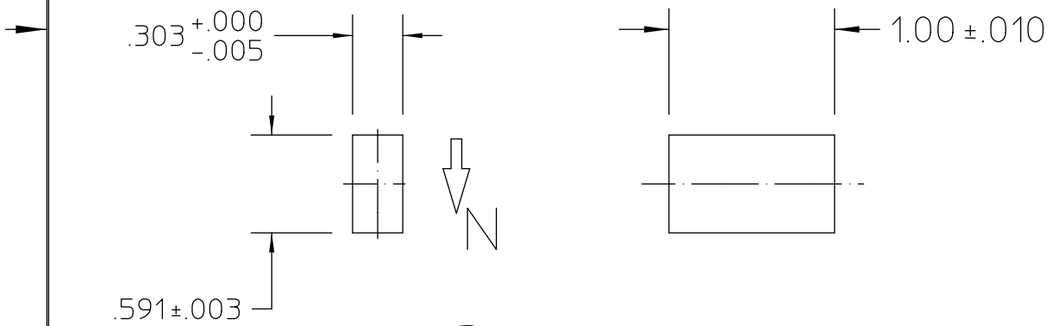
21C8502	REQD	ITEM	PART NUMBER	DESCRIPTION
	40	1	-1	10mmx11mm CUSP MAGNET
	10	2	-2	7.6mmx15mm BACK PLATE MAGNET

NOTES:

1. MATERIAL IS SINTERED NdFeB
   THE ARROW DENOTES MAGNETIZATION DIRECTION
2. ALL DIMENTIONS ARE INCHES
3. MAGNET PROPERTIES
   BR = 13500 Gauss
   Hc = 11700 Oe.
   BHmax = 45 MGOe.



① CUSP MAGNET



② BACK PLATE MAGNET

REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.001

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO	
DATE ISSD	DATE REQD	NO REQD	
DELIVER TO			
SURFACE TREATMENT	-		
IDENTIFIC METHOD	TAG		
DWG BY	S. MUKHERJEE	DATE	03-16-99
CHK BY	M. LEITNER	DATE	00-00-00

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

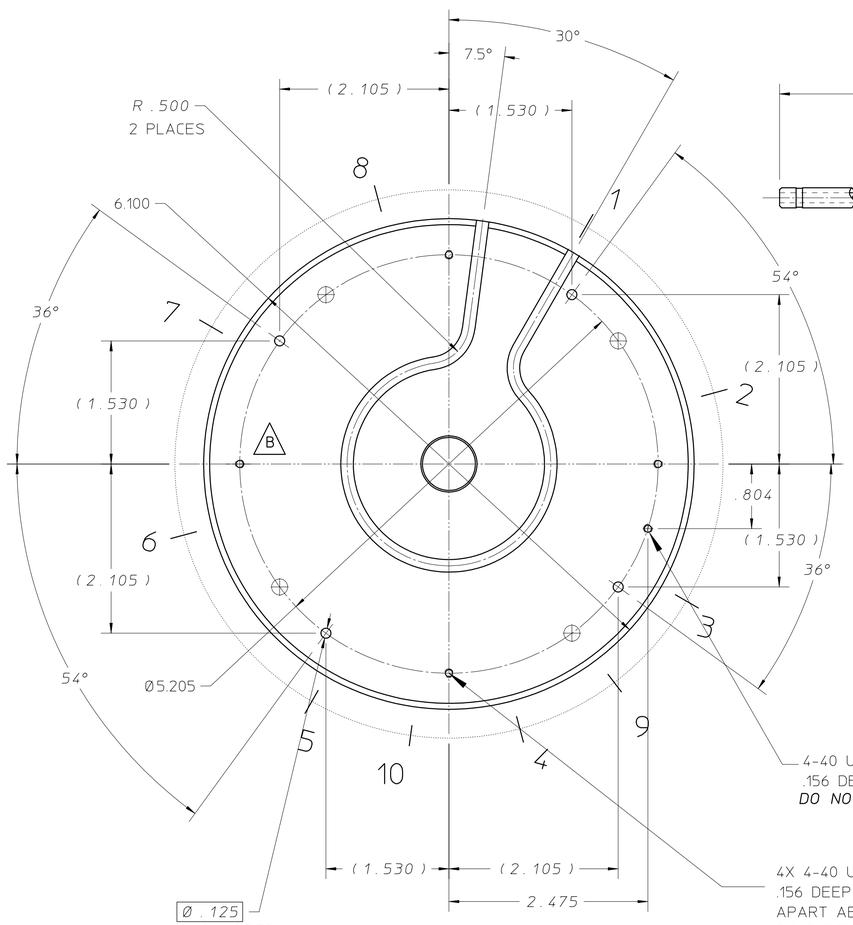
SNS -FRONT END SYSTEM

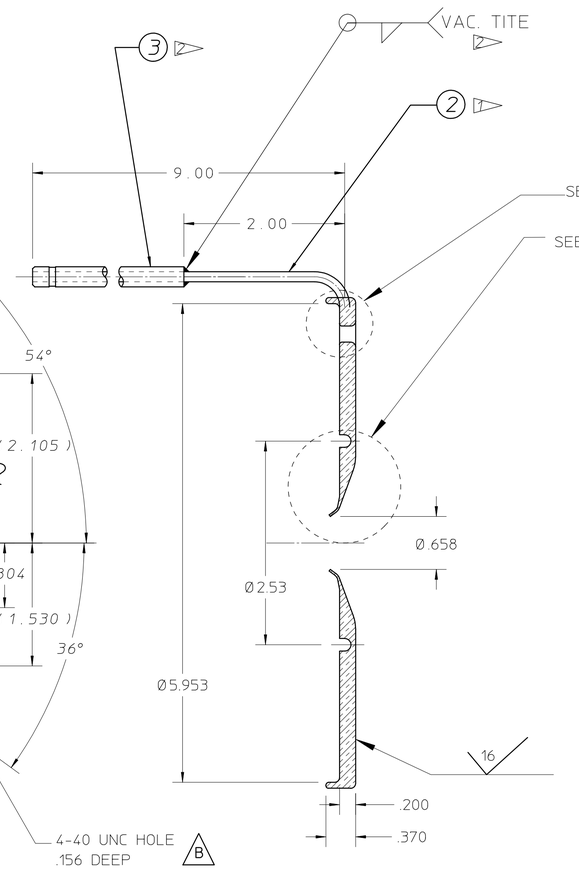
ION SOURCE PROTOTYPE DESIGN

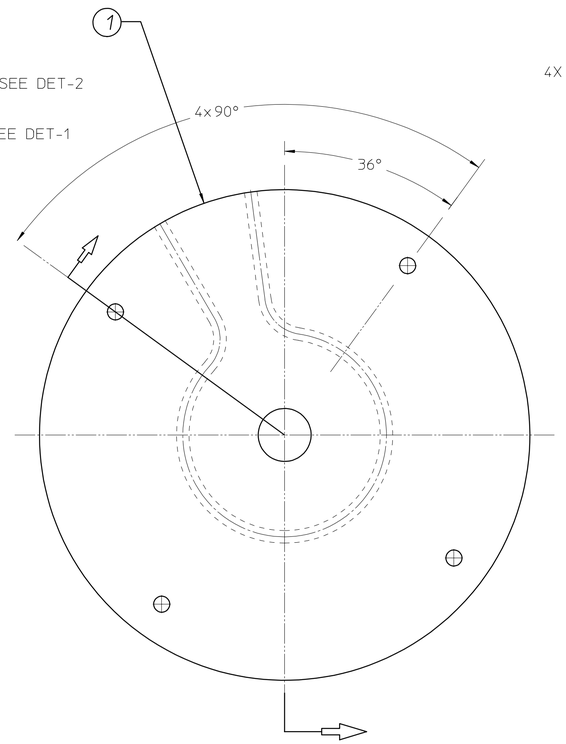
CUSP MAGNET SIZE

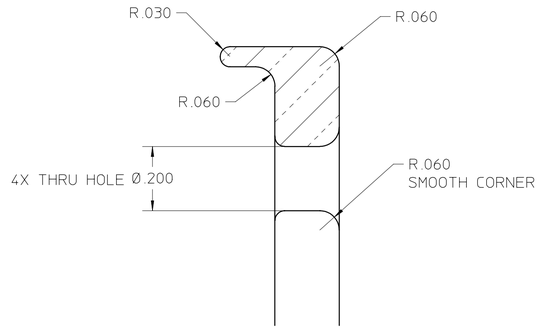
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL		DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE1100	21C8502

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	-	OFHC COPPER
A/R	2	-	TUBING, STAINLESS, Ø.125 X .030 WALL
2	3	21G7711-2	LEGRIS WATER FITTING PREP, LONG, CUT TO 7.0 LONG





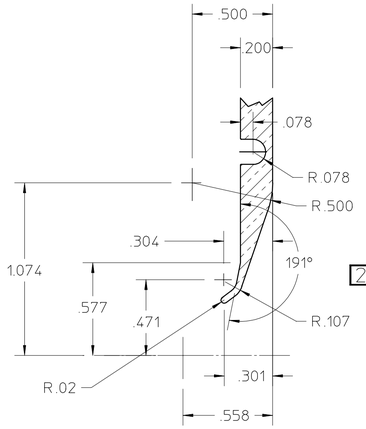




DETAIL-2
(SIZE 2X)

ADDITIONAL NOTES:

1. ITEM 2 SHALL BE SOLDER BRAZED INTO THE SLOT OF ITEM 1 AFTER MACHINING IS COMPLETE.
2. ITEM 3 SHALL BE WELDED TO ITEM 2 AFTER THE SOLDER BRAZE OPERATION.



DETAIL -1
(SIZE 2X)

21C8924C

REV	DWG	CHK	ZONE	DATE	CHANGES
C	DWC			9/01	ADDED ITEMS 2 AND 3 AND RELATED NOTES
B	DWC			8/01	CHANGED MATERIAL FROM GLIDCOP TO OFHC
B	DWC		B6	8/01	ADDED 4-40 HOLE
B	DWC		B8	8/01	ADDED .125 DIAMETER HOLE PATTERN
B	DWC		C8	8/01	ROTATED 4-40 HOLE BACK TO HORIZ.
A	DWC		C8	4/3/00	ROTATED 4-40 HOLE 22.5° FROM HORIZ.

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ± 1/64; .XX ± .01 ANGLES ± 1°; .XXX ± .005 FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE DATE: 04-20-99
CHK. BY: D. CHENG DATE: 5/10/99

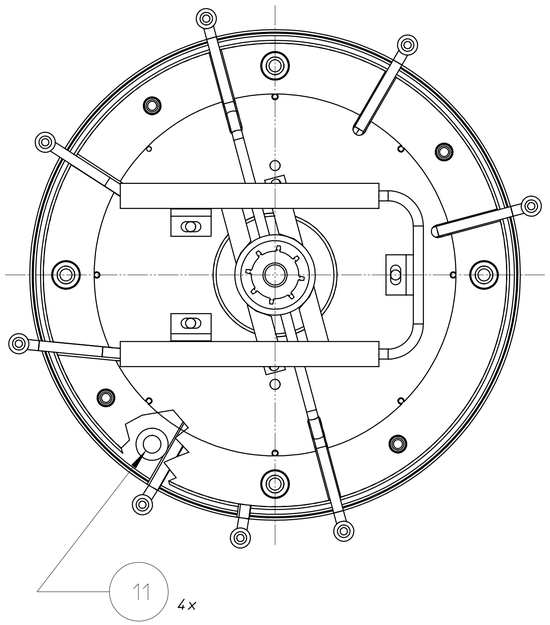
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

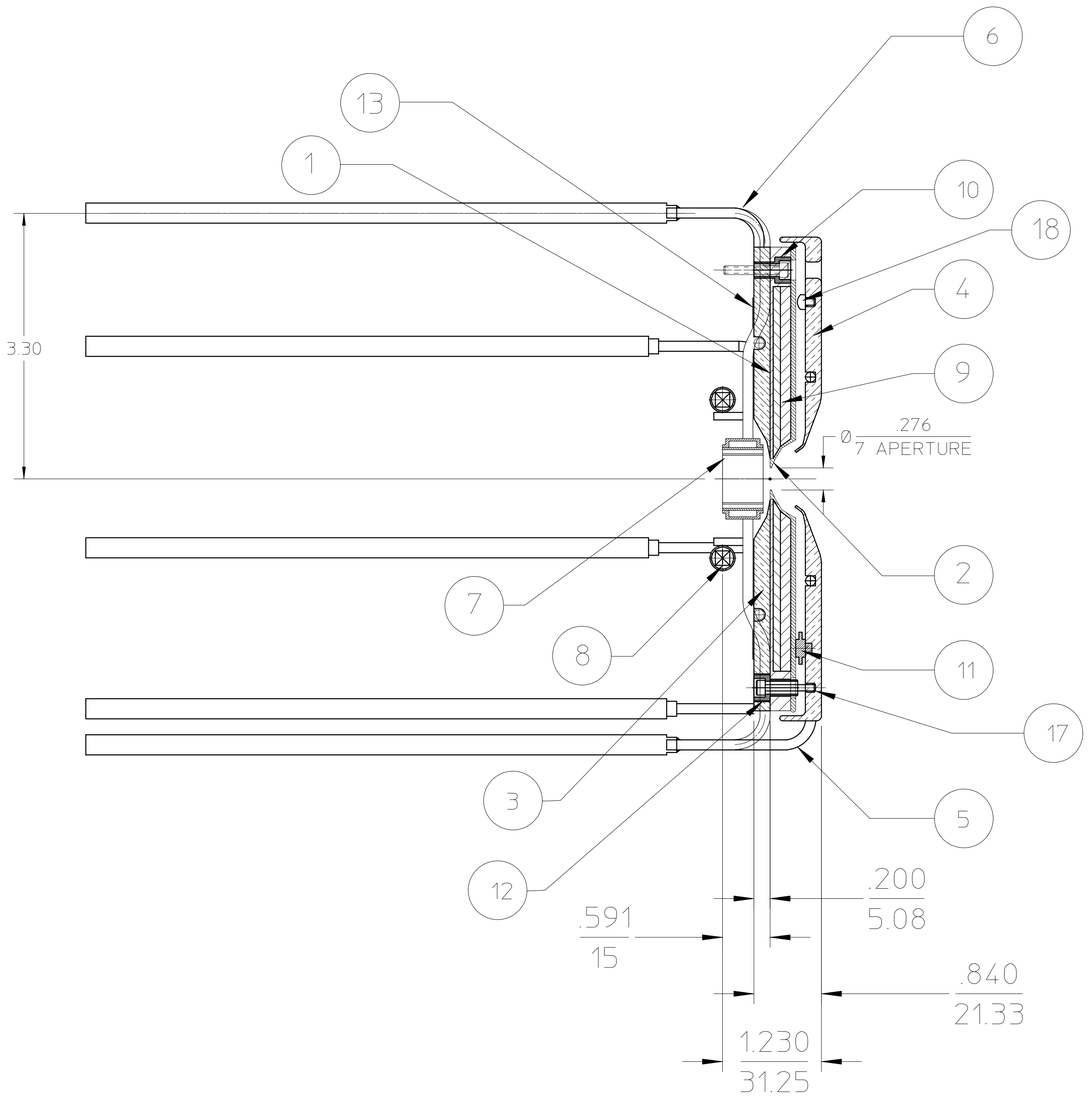
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
ELECTRON DUMP ELECTRODE

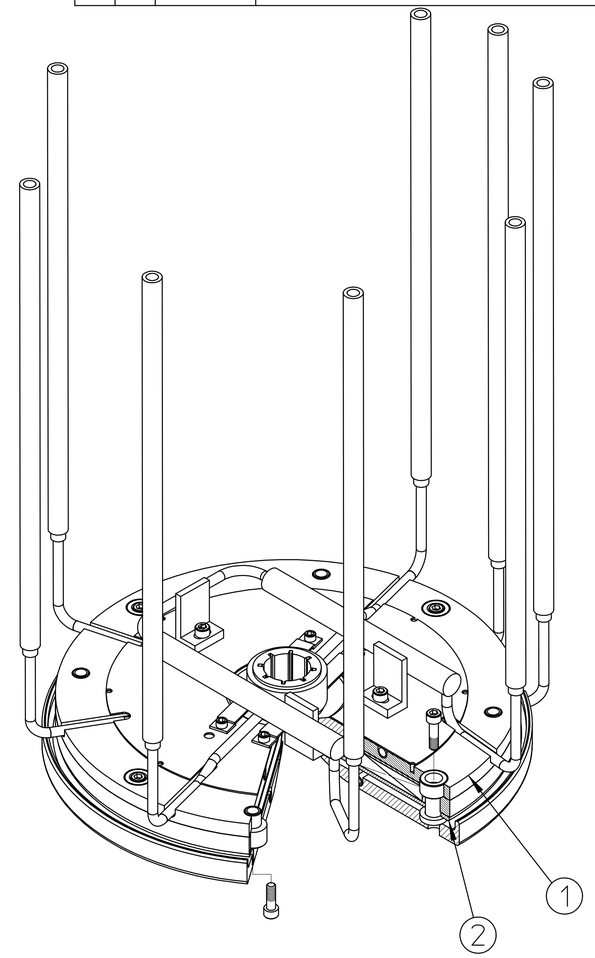
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	PART	21C8934	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C8924	C

OVERALL DIMENSIONS SHOWN
INCH (UPPER)/mm (LOWER)

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21C8454	OUTLET ELECTRODE IRON PLATE
1	2	21C8473	APERTURE PLATE (304 STAINLESS STEEL)
1	3	21C8414	COPPER/ IRON PLATE BRAZEMENT BLANKS
1	4	21C8924	ELECTRON DUMP PLATE (GLIDCOP MATERIAL)
A/R	5	21C8924-1	1/8 SS TUBE ELCTRON DUMP COOLING
A/R	6	21C8414	1/8 SS TUBE OUTLET ELECTRODE COOLING
1	7	21C8434	CESIUM COLLAR ASSEMBLY
1	8	21C8444	FILTER MAGNET ASSEMBLY
1	9	21C9963	SmCo MAGNET ASSEMBLY
4	10	21C9302-2	INSULATING INSERT (SHORT)
4	11	21C9302-3	INSULATING SPACER
4	12	21C9302-1	INSULATING INSERT (LONG)
1	13	21G7593	STAINLESS STEEL SHIELD
4	14		CAPSCR SOC HD VENTED SST, #4-40UNCx3/8"
4	15		CAPSCR SOC HD VENTED SST, #5-40UNCx1/8"
3	16		CAPSCR SOC HD VENTED SST, #5-40UNCx1/4"
1	17	21G7631	MODIFIED #4-40 SCREW, 5/8" LONG
1	18	21G7621	SPARK GAP







21C8934A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	R LOW			8/00	REVISE, REDRAWN AND UPDATED

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ±1°; .XXX ± .001 FINISH 125√

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

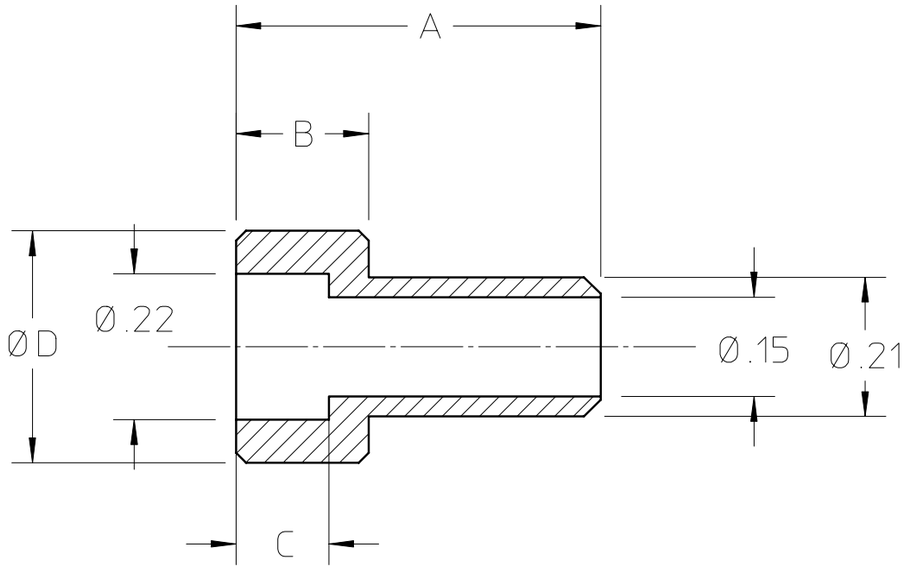
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT -
IDENT. METH. TAG
DWG. BY S. MUKHERJEE DATE 01-29-99
CHK. BY M. LEITNER DATE 00-00-00

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
OUTLET ELECTRODE ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY	21C8406	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C8934	A

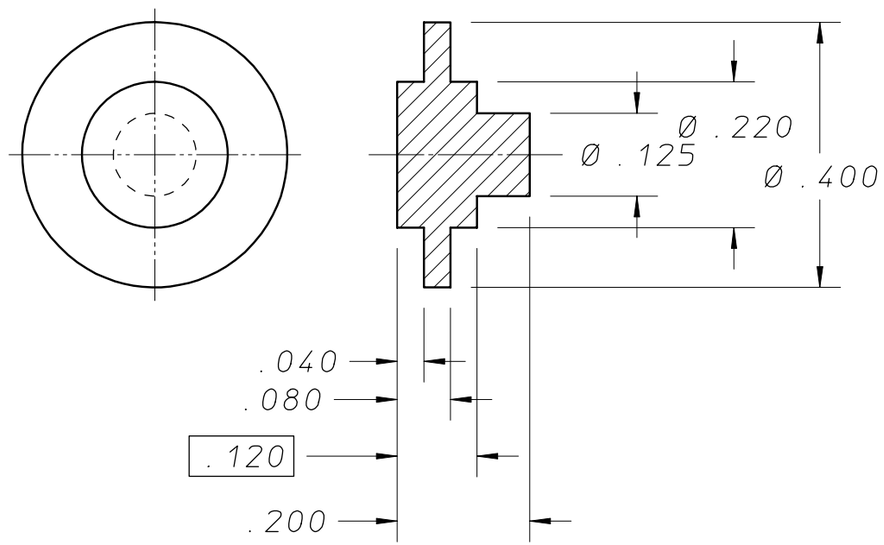
21C9302A	REQD	ITEM	PART NUMBER	DESCRIPTION
	-	1		INSULATING INSERT - LONG (VESPEL)
	-	2		INSULATING INSERT - SHORT (VESPEL)
	-	3		INSULATING SPACER RING (MACOR)



INSERT	A	B	C	D
TYPE-1	.55	.20	.14	.35
TYPE-2	.46	.26	.19	.35

TYPE-3 SPACER RING

BREAK ALL EDGES TO .01"



REV	DWN	CHK	DATE	DESCRIPTION
A	DWC	-	10/5/00	UPDATED GEOMETRY

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.001

SURFACE FINISH 125

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT: DEGREASE

IDENTIFIC METHOD: TAG

DWG BY: S. MUKHERJEE | DATE: 01-29-99

CHK BY: DAN CHENG | DATE: 5/6/99

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM

ION SOURCE PROTOTYPE DESIGN

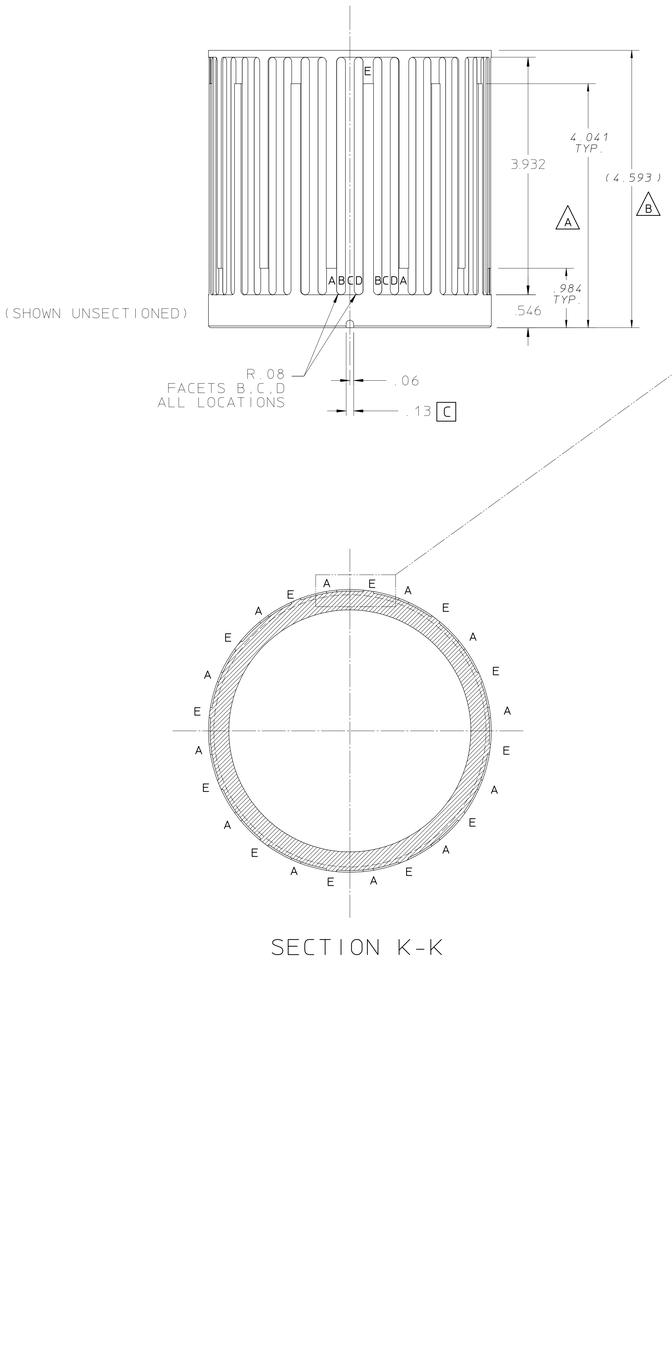
OUTLET ELECTRODE INSULATING INSERTS

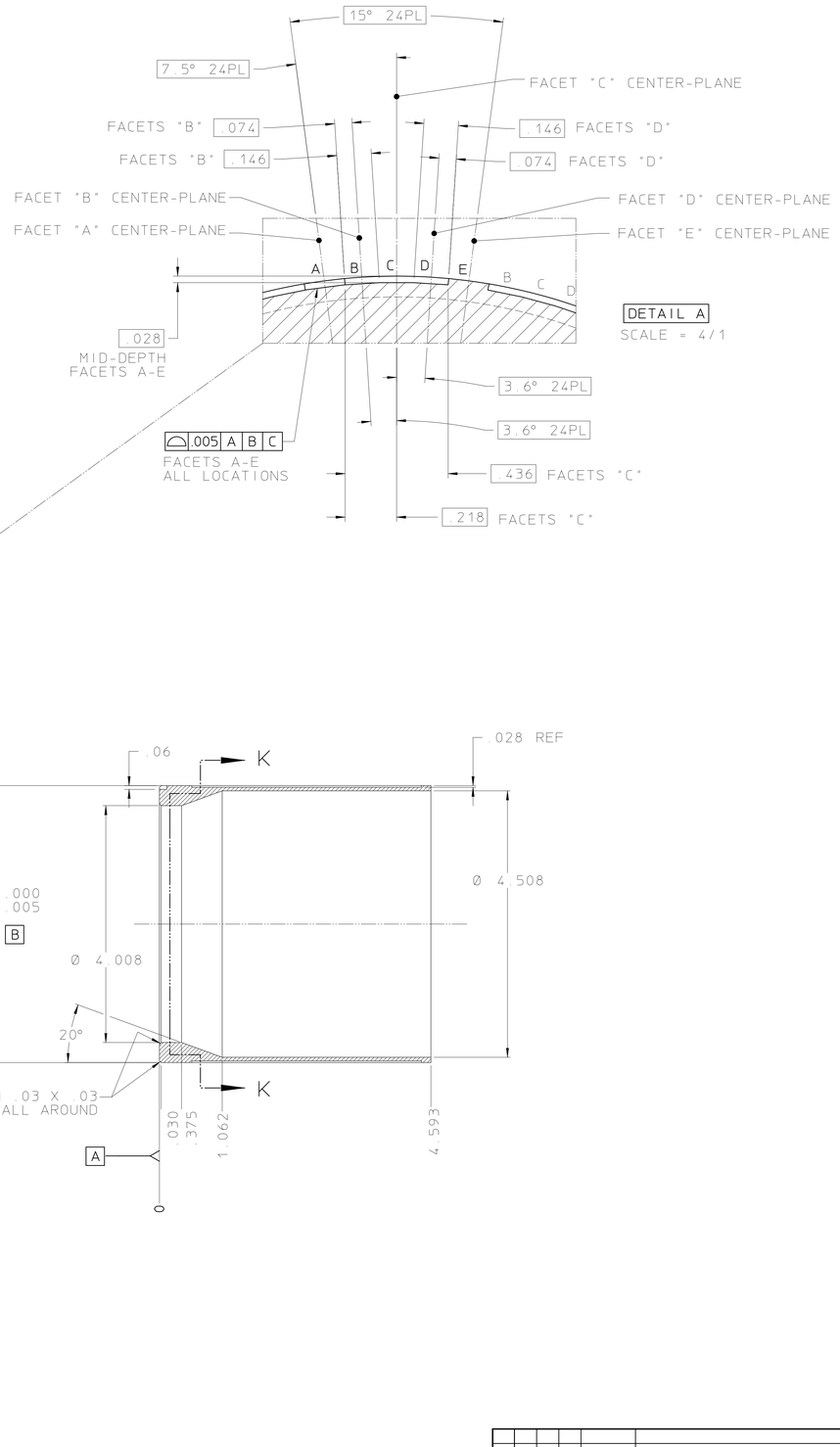
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 4:1
	DETAIL	21C8934	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE1100	21C9302A

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

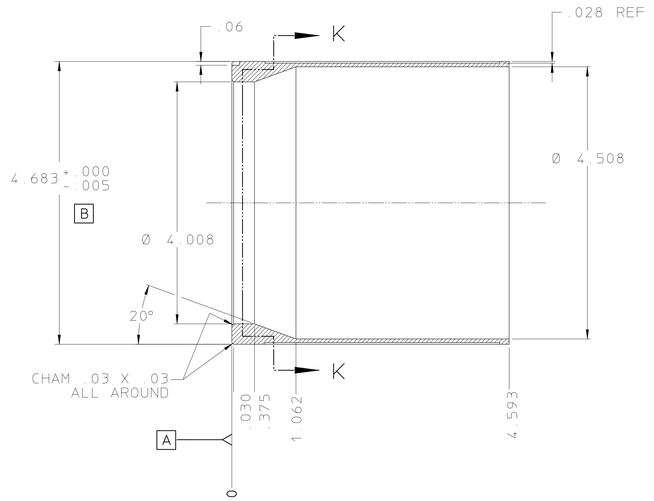
2) SST, 316L.

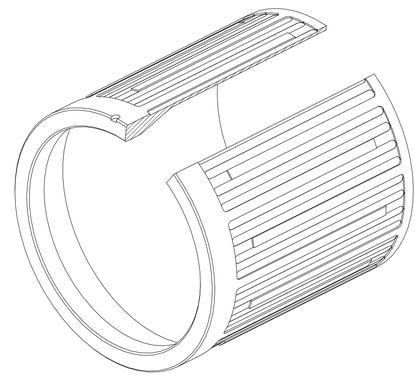




DETAIL A
SCALE = 4/1

SECTION K-K





21C9786B

REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		C6	10/260/01	CHANGED 4.679 DIM TO (4.593) AND RELATED GEOM.
A	DWC		C6	9/20/01	ADDED .984 AND 4.041 DIMENSIONS

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ± 1/64; XX ± .01 ANGLES ± 0.5°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD
DATE REQD
NO REQD
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT METH: TAG
DWG BY: PAL — DATE: 12-17-98
CHK BY: SKM — DATE: 01-08-99

ITEM	REQD	PART NO.	DESCRIPTION

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
PLASMA CHAMBER

PATENT CLEAR | DWG. TYPE: DETAIL | SHOWN ON | SCALE: FULL | DO NOT SCALE PRINTS
MICROFILMED | DESIGN ACCT. NO: 8210-14 | CATEGORY CODE: FE1100 | DWG. NO.: 21C9786 | SIZE | REV: B

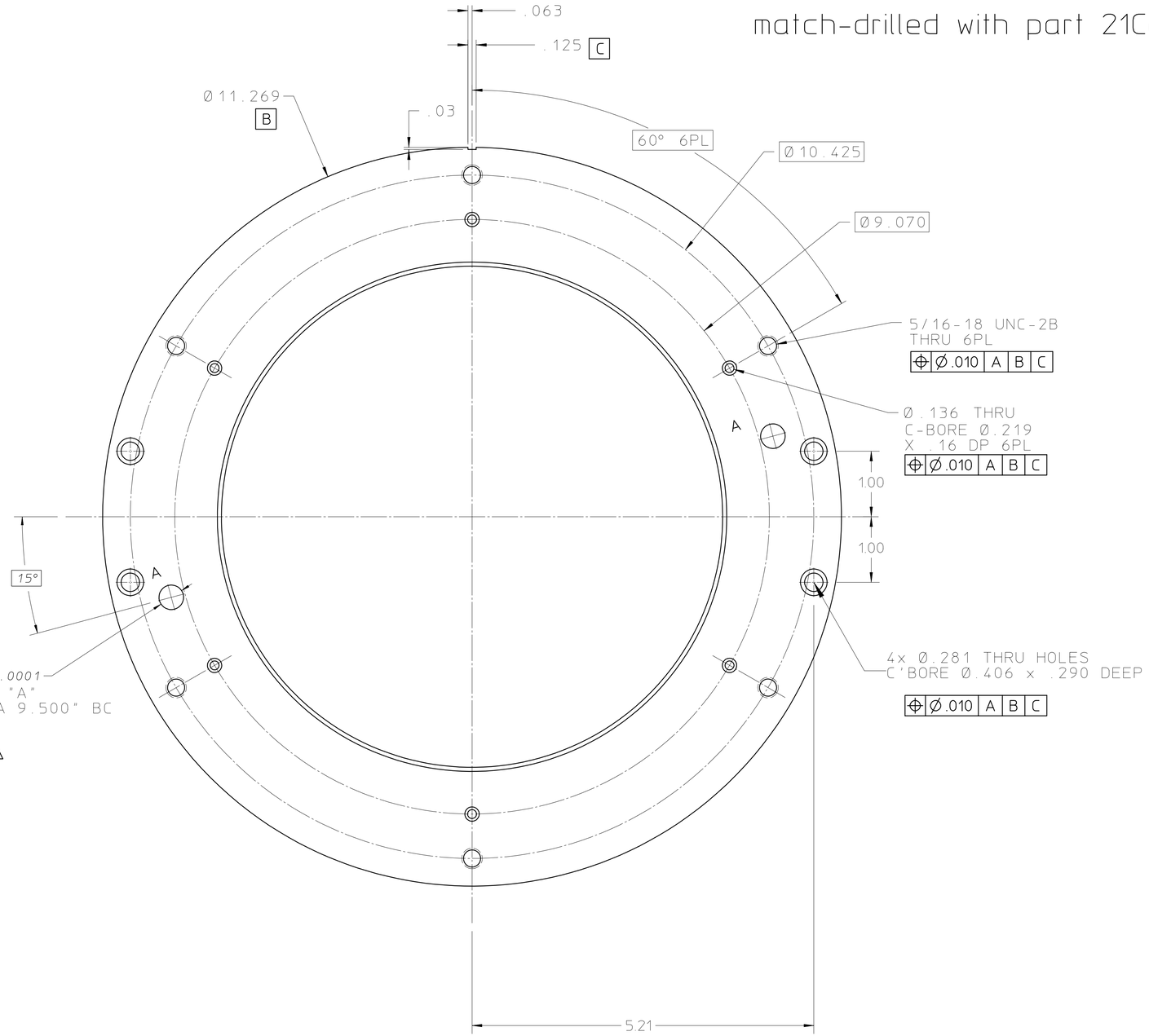
NOTES (UNLESS OTHERWISE SPECIFIED):

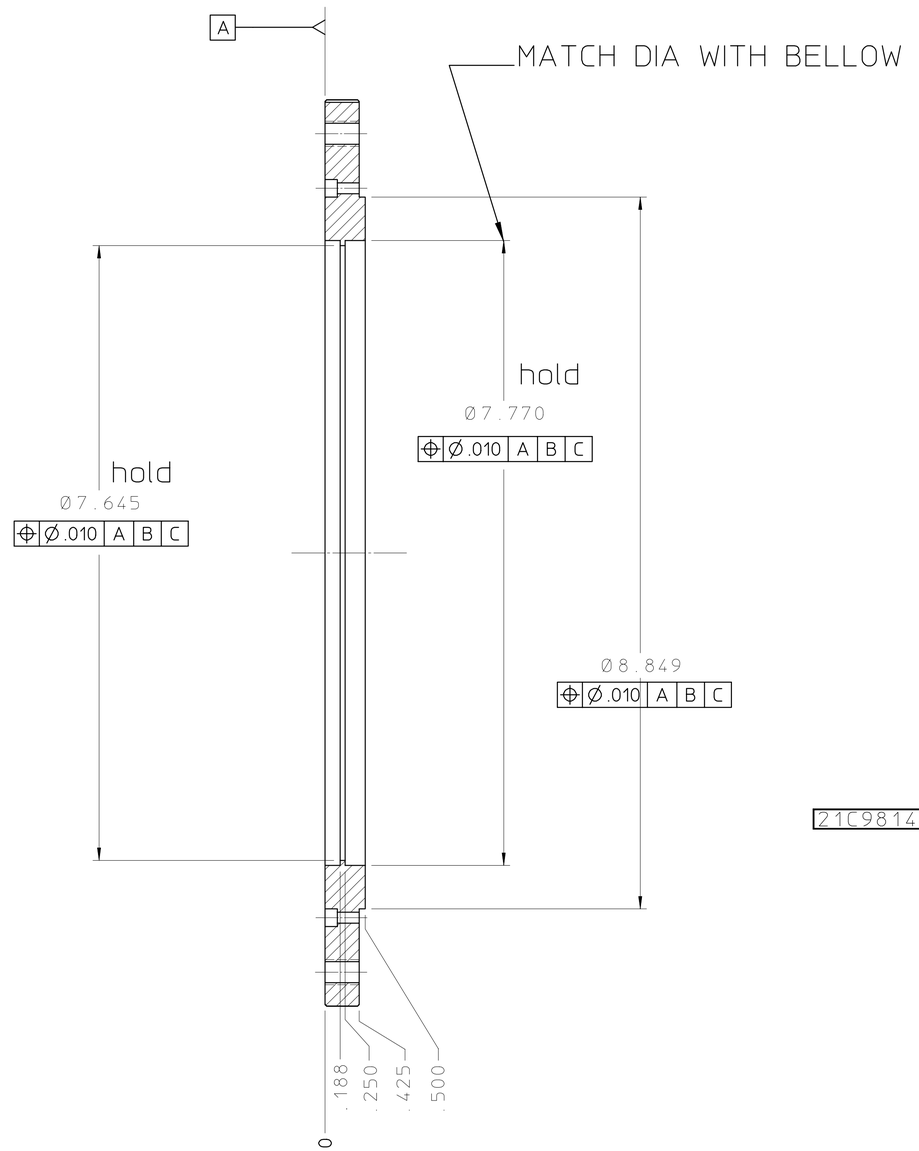
1) DIMENSIONS IN INCHES.

2) MATL: SST, 304.

ITEM	REQD	PART NUMBER	DESCRIPTION

Note
Dowel hole marked 'A' to be
match-drilled with part 21C6396A





21C9814A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		B8	5/04/01	ROTATED DOWEL PIN HOLES 15 DEGREES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ± 0.5° | .XXX ± .005 | FINISH 125

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG. BY: PAL — DATE: 01-12-99
CHK. BY: SKM — DATE: 01-12-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

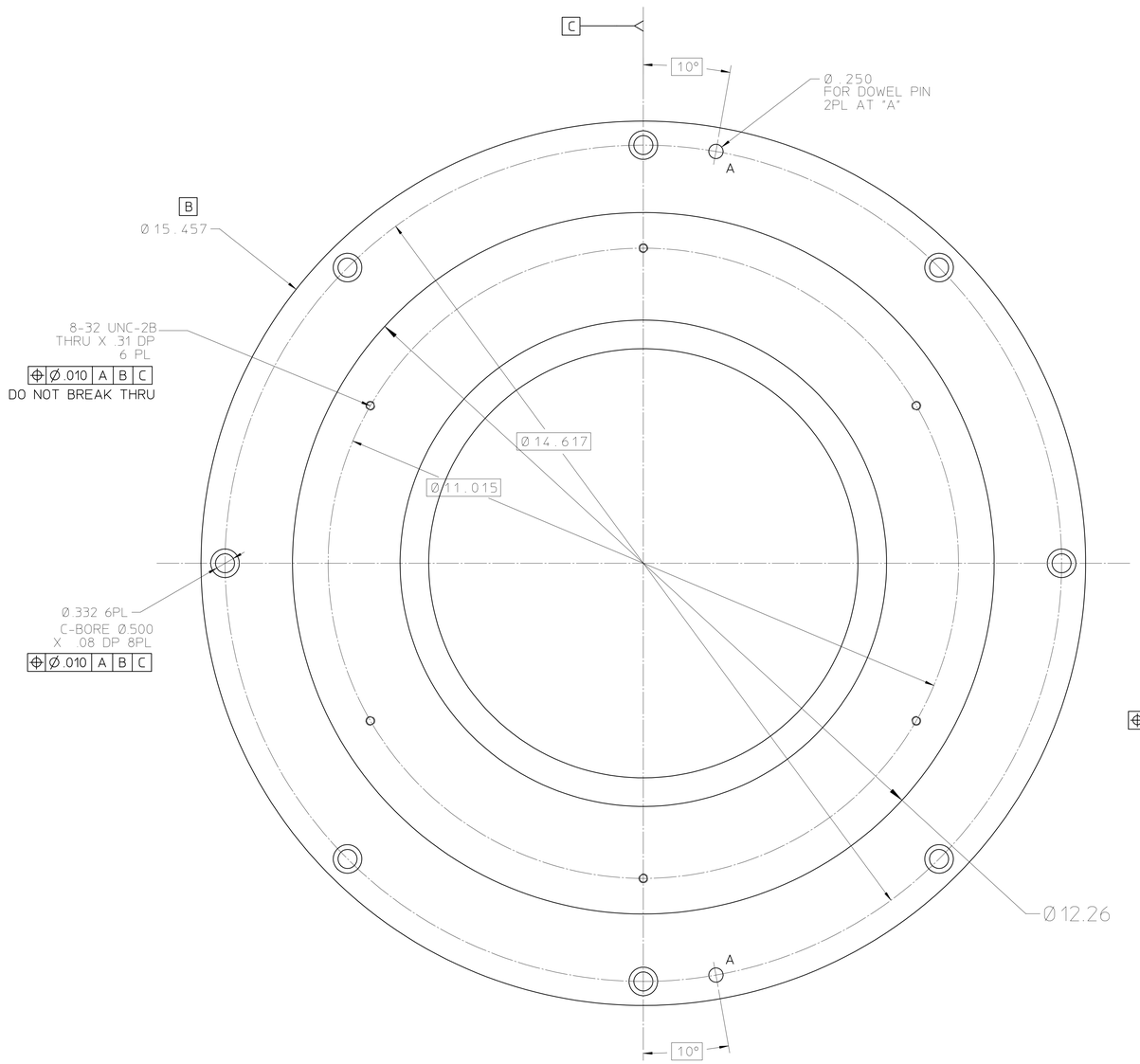
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
FORMED BELLOWS FLANGE

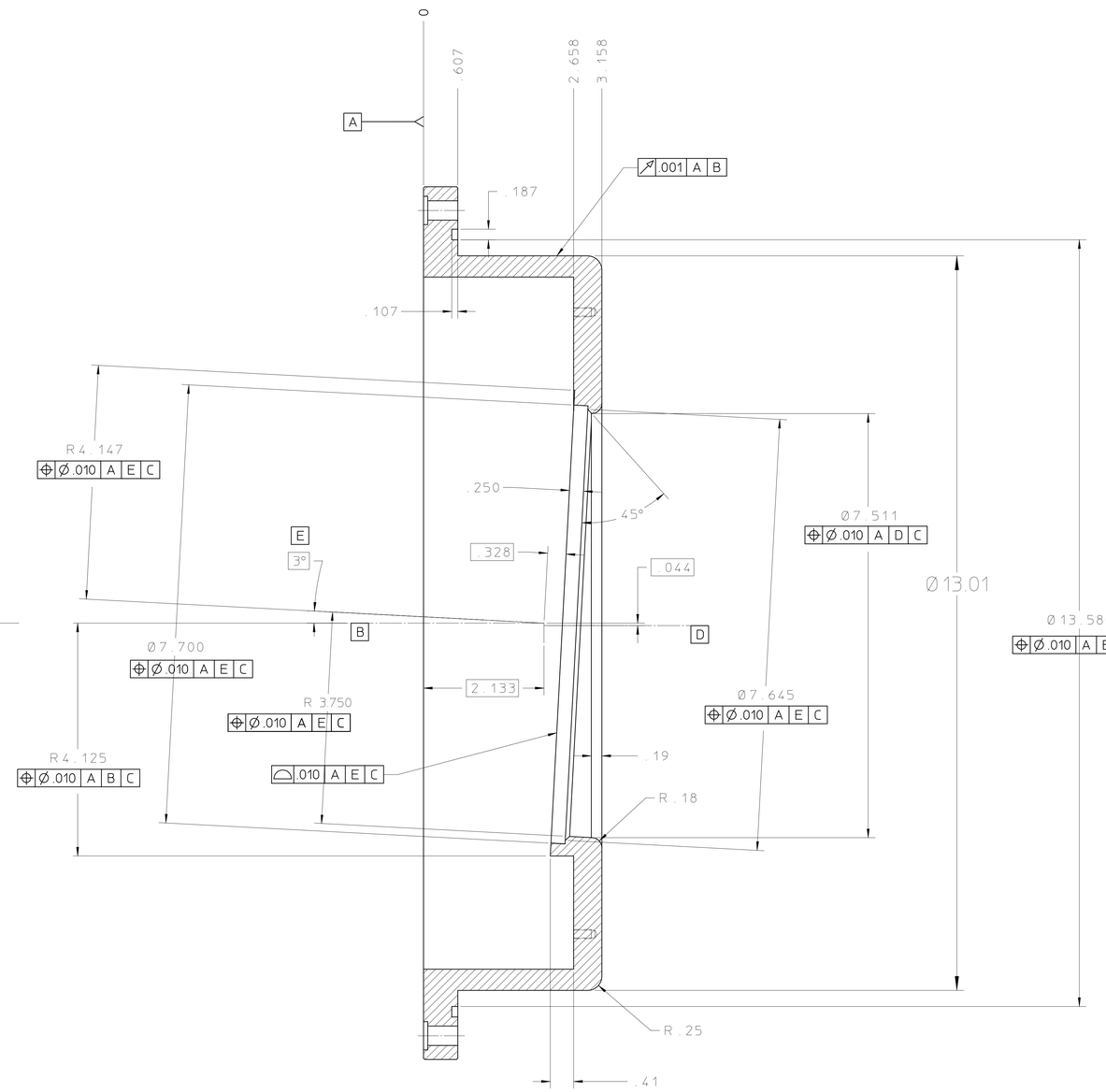
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14		21C9814	A

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

2) MATL: SST. 304.





21C9826

Note:
Dowel hole marked 'A' to be drilled undersize so that it can be match-drilled with part 25B0716 after CMM adjustment.

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ± 0.5°; .XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD.
DELIVER TO:
SURFACE TREATMENT: CLEAN
IDENT METH: TAG
DWG BY: PAL DATE: 01-25-99
CHK BY: SKM DATE: 01-26-99

ITEM	REQD	PART NO.	DESCRIPTION

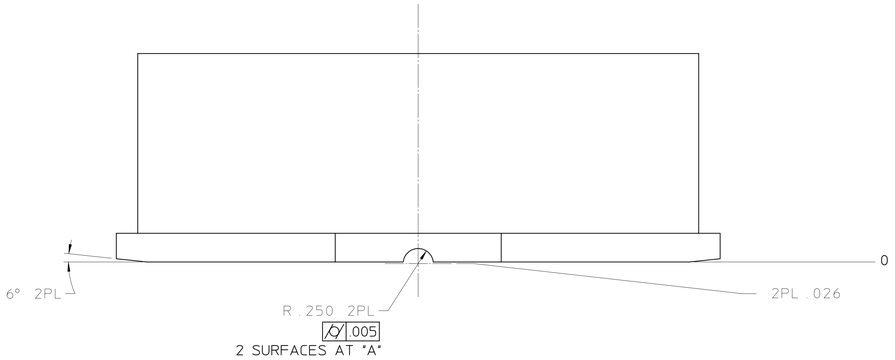
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
FIXED FLANGE

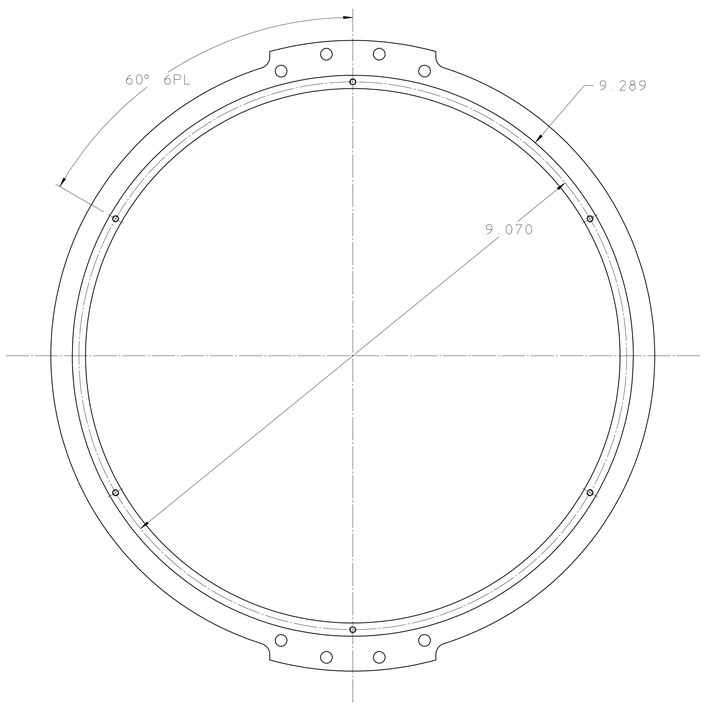
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14		21C9826	0

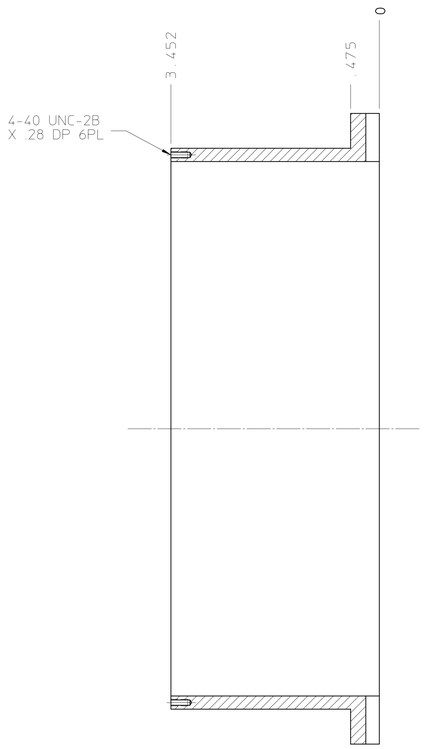
NOTES (UNLESS OTHERWISE SPECIFIED):

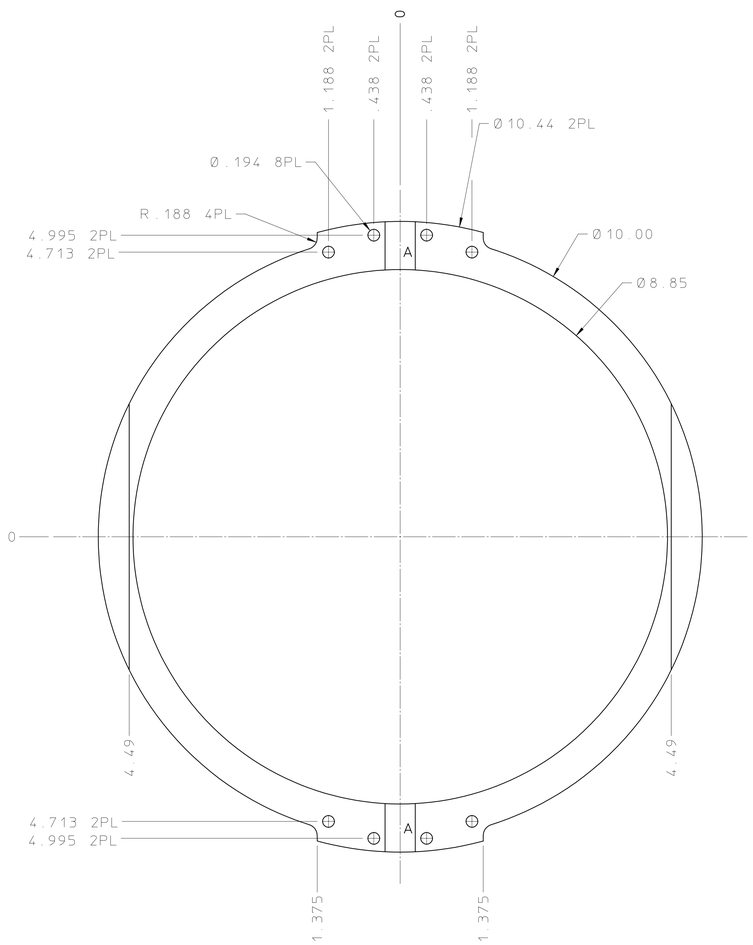
1) DIMENSIONS IN INCHES.

2) MATL: SST, 304.









21C9836

ITEM	REQD	PART NO.	DESCRIPTION

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED (TOLERANCES)
.X ± .1 — FRAC ± 1/64
.XX ± .01 — ANGLES ± 0.5°
.XXX ± .005 — FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD
DATE RECD
NO RECD
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT METH: TAG
DWG BY: PAL — DATE: 01-20-99
CHK BY: SKM — DATE: 01-21-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM

ION SOURCE PROTOTYPE DESIGN

SUPPORT CYLINDER

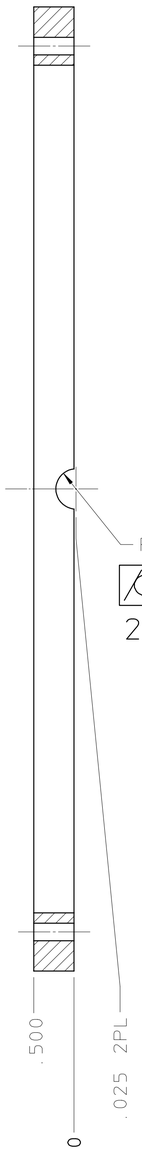
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21C8406	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV
	8210-14	FE1100	21C9836	0

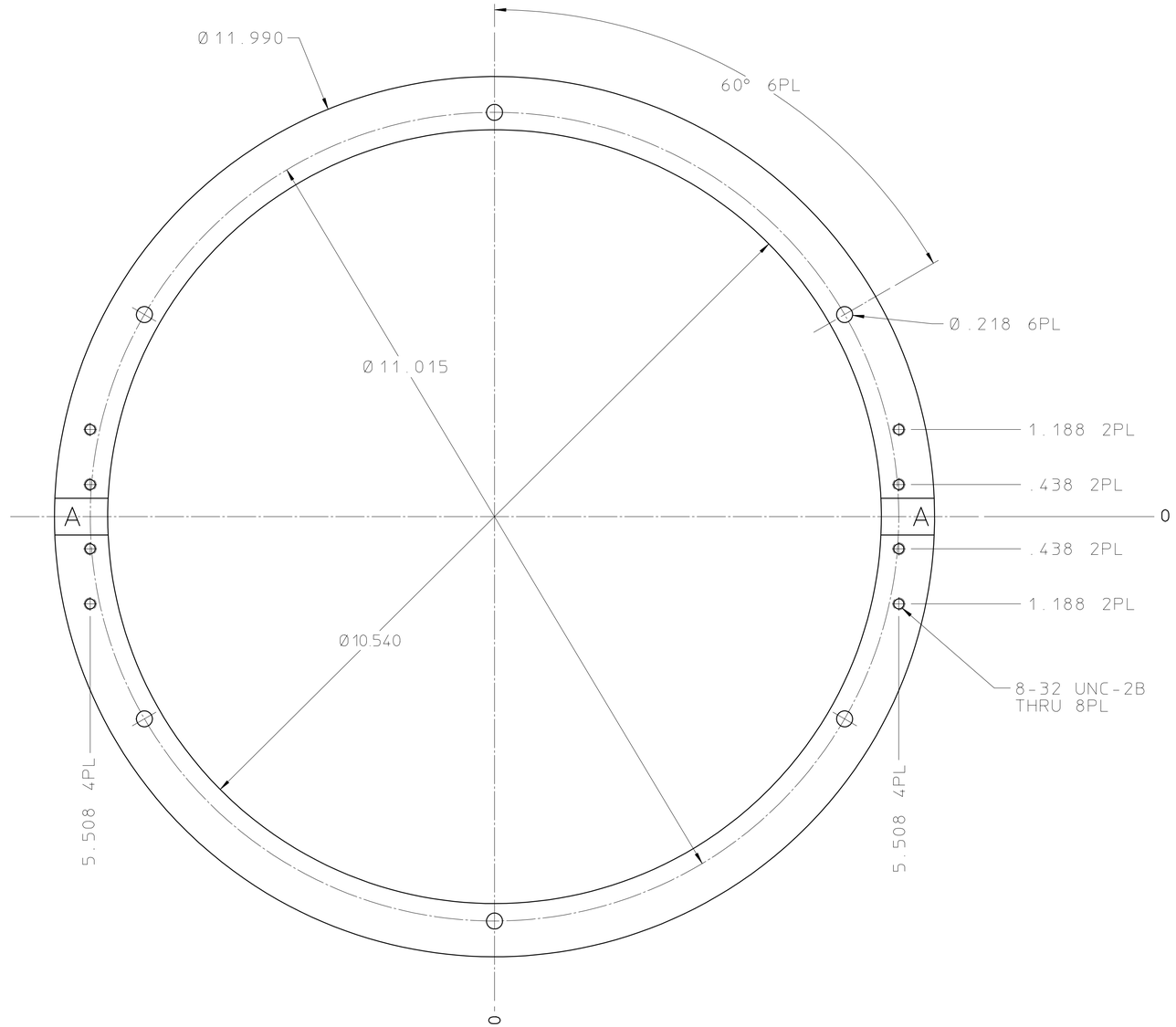
NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

2) MATL: SST, 304.

ITEM	REQD	PART NUMBER	DESCRIPTION





21C9844

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1; FRAC. ±1/64; .XX ± .01; ANGLES ± 0.5°; .XXX ± .005; FINISH 125

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG. BY: PAL — DATE: 01-20-99
CHK. BY: SKM — DATE: 01-21-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
PIN RETAINING RING

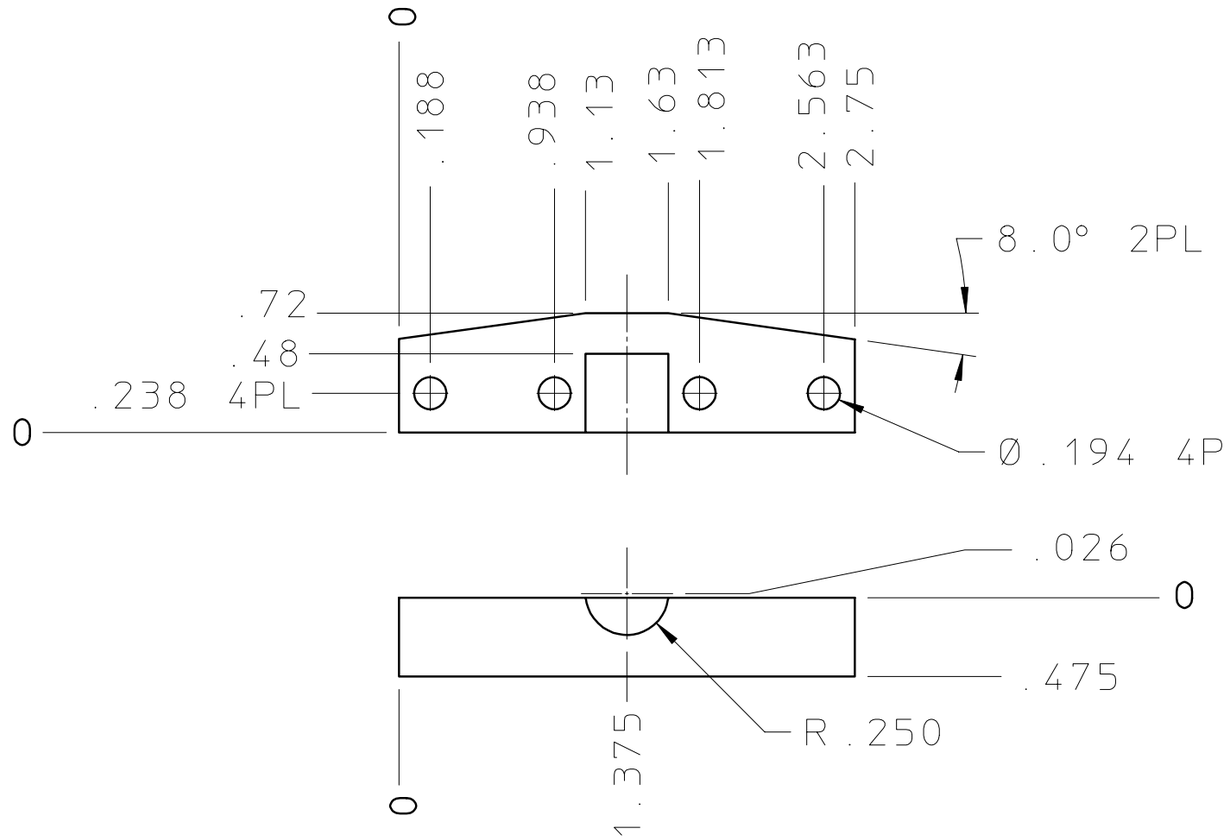
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE: FULL	DO NOT SCALE PRINTS
	DETAIL			
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE	DWG. NO. 21C9844	SIZE / REV. 0

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

2) MATL: SST, 304.

21C9852	ITEM	REQD	PART NUMBER	DESCRIPTION
	1	2		



REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

ANGLES: ± 0.5° SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	CLEAN	
IDENTIFIC METHOD	TAG	
DWG BY PAL		DATE 01-20-99
CHK BY SKM		DATE 01-21-99

LAWRENCE BERKELEY NATIONAL LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM

ION SOURCE PROTOTYPE DESIGN

PILLOW BLOCK OUTER

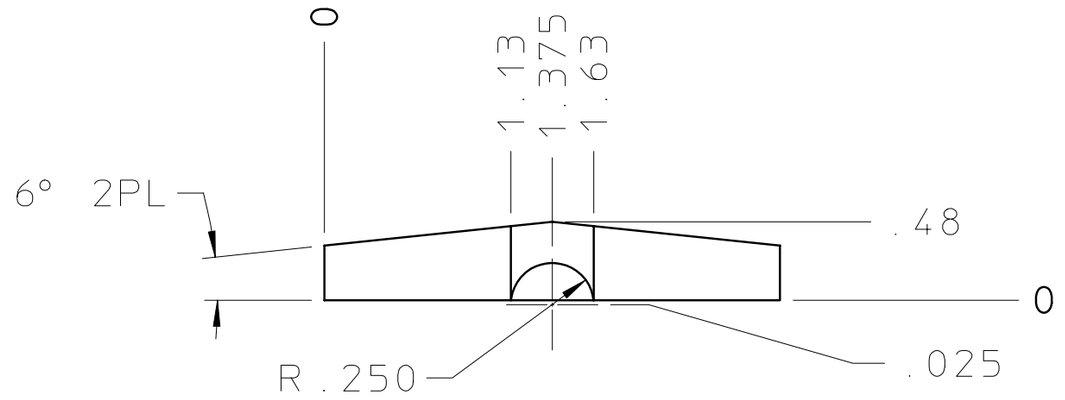
PAT CLEAR	DWG TYPE DETAIL	SHOWN ON	SCALE: FULL (DO NOT SCALE PRINTS)
MICROFILMED	DESIGN ACCT NO 8210-14	CATEGORY CODE	DWG NO 21C9852 REV 0

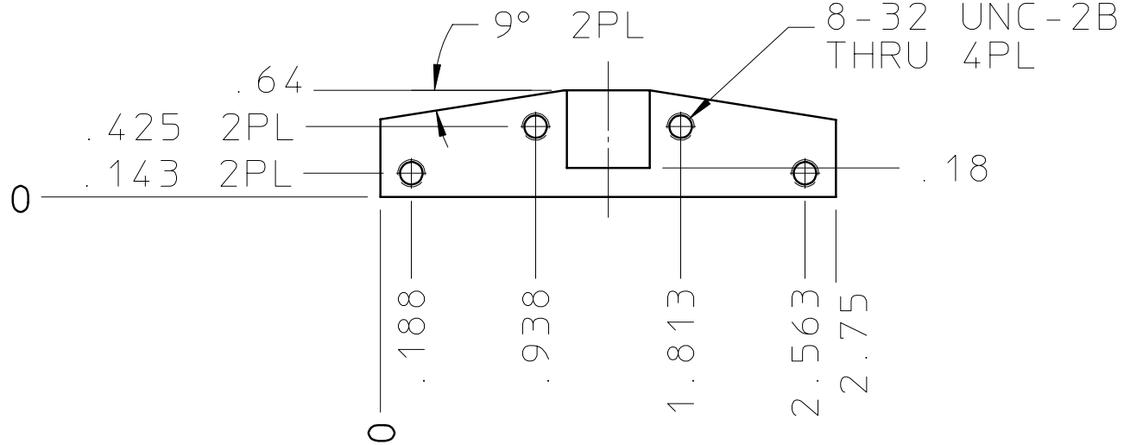
NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

2) MATL: SST, 304.

21C9862	ITEM	REQD	PART NUMBER	DESCRIPTION
	1	2		304 STAINLESS STEEL BAR STOCK





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

ANGLES: ± 0.5° SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	CLEAN	
IDENTIFIC METHOD	TAG	
DWG BY PAL		DATE 01-20-99
CHK BY SKM		DATE 01-21-99

LAWRENCE BERKELEY NATIONAL LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM

ION SOURCE PROTOTYPE DESIGN

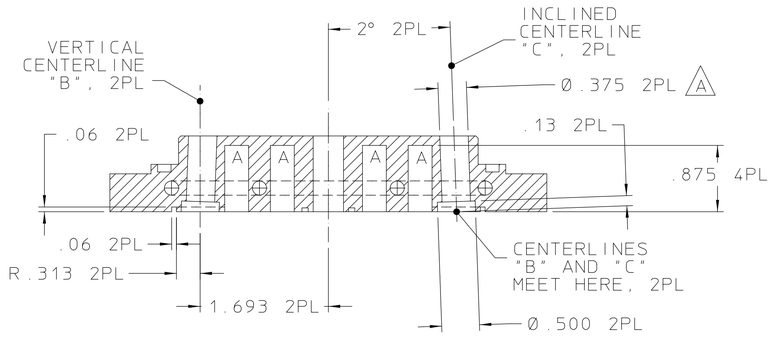
PILLOW BLOCK INNER

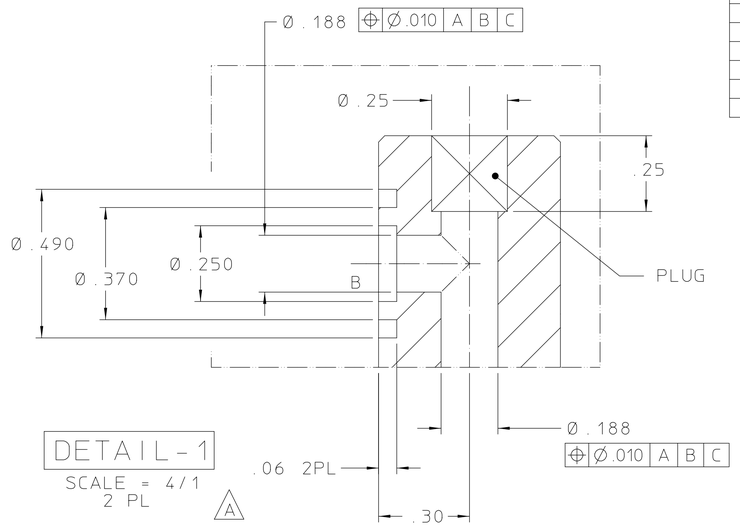
PAT CLEAR	DWG TYPE DETAIL	SHOWN ON	SCALE: FULL (DO NOT SCALE PRINTS)	
MICROFILMED	DESIGN ACCT NO 8210-14	CATEGORY CODE	DWG NO 21C9862	REV 0

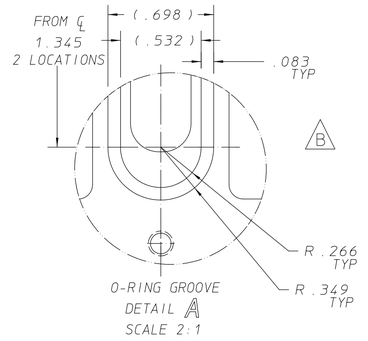
NOTES (UNLESS OTHERWISE SPECIFIED):

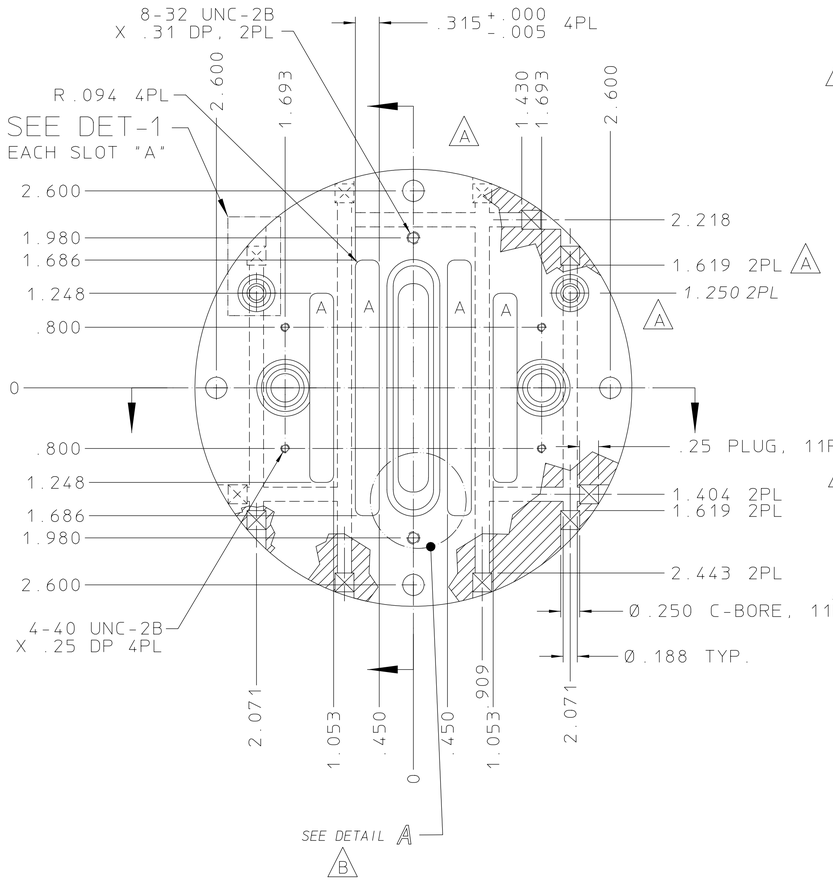
1) DIMENSIONS IN INCHES.

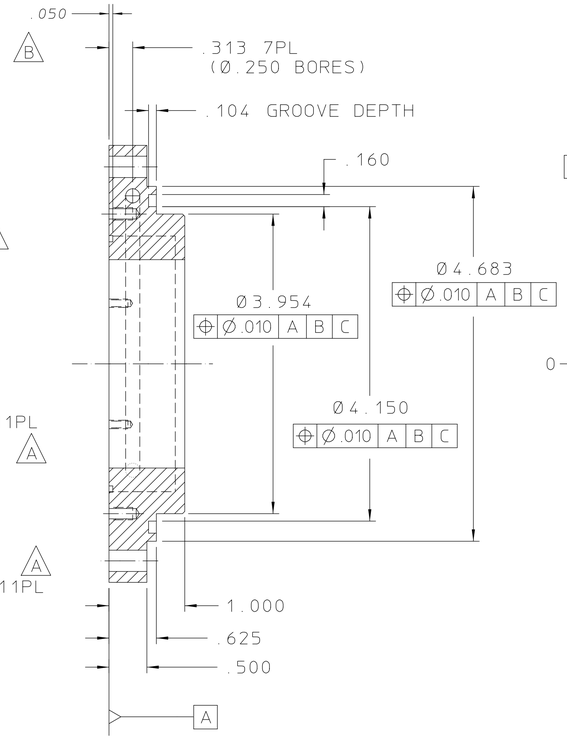
ITEM	REQD	PART NUMBER	DESCRIPTION
	A/R		STAINLESS STEEL, TYPE 304

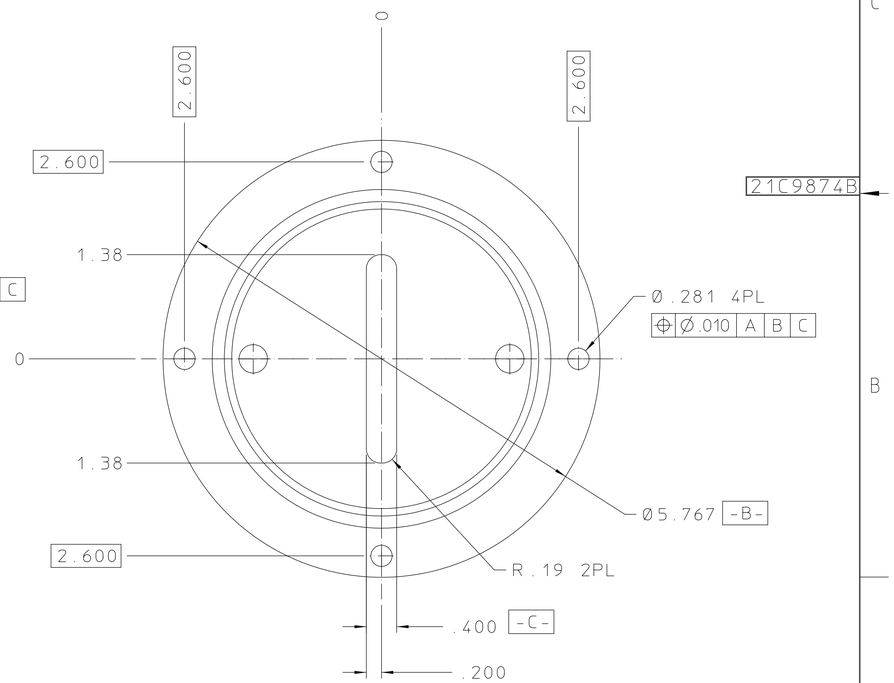












REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		D1	7/25/01	ADDED DETAIL "A"
B	DWC		A7,C5	7/25/01	ADDED O-RING DETAIL AND .050" DEPTH
A	DWC		D5	3/30/00	.375 DIMENSION WAS .370
A	DWC		B5	3/30/00	CHANGED '9PL' CALLOUTS TO '11PL'
A	DWC		B5	3/30/00	1.7xx DIMENSION IS NOW 1.619
A	DWC		B6	3/30/00	ADDED DIMENSTIONS FOR DETAIL-1
A	DWC		C6	3/30/00	ADDED THRU-HOLES AND PLUGS
A	DWC		C4	3/30/00	ADDED DETAIL-1

UNLESS OTHERWISE SPECIFIED

TOLERANCES: X ± .1; XX ± .01; XXX ± .005; FRAC. ±1/64; ANGLES ± 0.5°; FINISH 125

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

ACCT. NO.
SERIAL NO.
DATE ISSD
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG BY: PAL — DATE: 01-12-99
CHK BY: SKM — DATE: 11-16-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

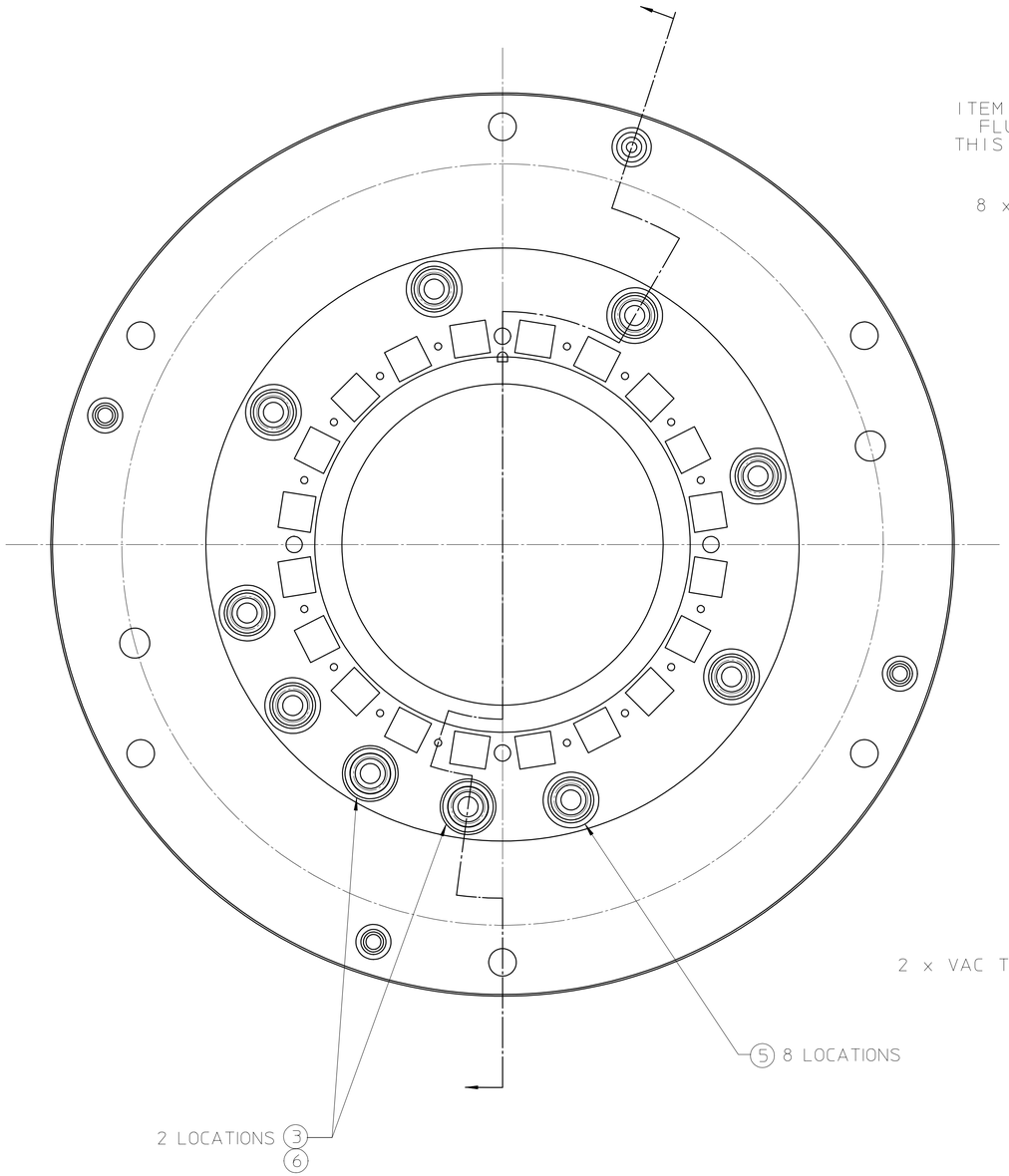
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
BACK FLANGE

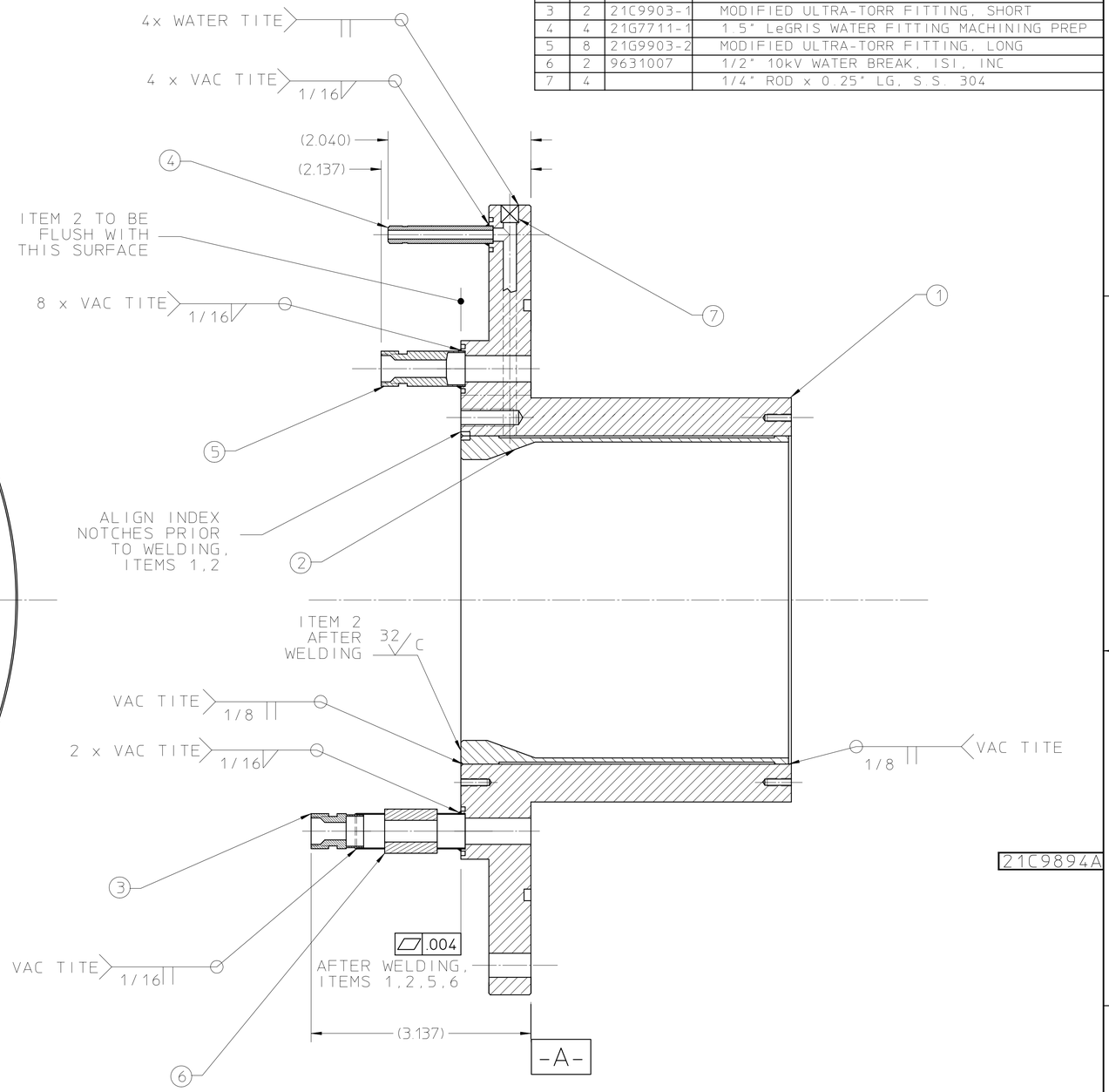
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7723	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C9874	B

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

ITEM	REQD	PART NUMBER	DESCRIPTION
1	1	21C6396	CUSP MAGNET BODY
2	1	21C9786	PLASMA CHAMBER
3	2	21C9903-1	MODIFIED ULTRA-TORR FITTING, SHORT
4	4	21G7711-1	1.5" LeGRIS WATER FITTING MACHINING PREP
5	8	21G9903-2	MODIFIED ULTRA-TORR FITTING, LONG
6	2	9631007	1/2" 10kV WATER BREAK, ISI, INC
7	4		1/4" ROD x 0.25" LG, S.S. 304





21C9894A

SEE 21C6396 FOR FINISHED DIMENSION AFTER WELDING

REV	DWG	CHK	ZONE	DATE	CHANGES
A	JM	DWC	ALL	9/18/01	ADDED WELDMENTS OF ITEMS 3 THRU 7

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ± 0.5°; .XXX ± .005 FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

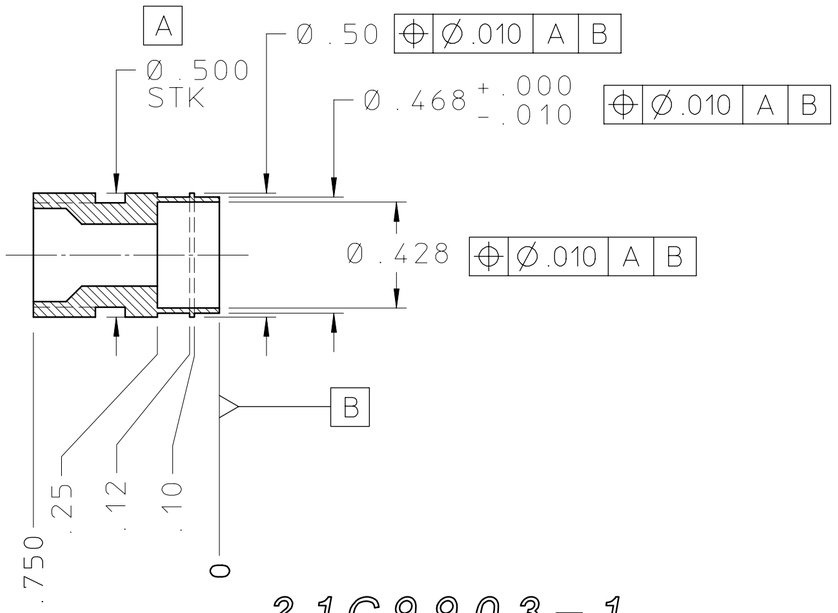
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT CLEAN
IDENT. METH. TAG
DWG. BY PAL | DATE 02-01-99
CHK BY SKM | DATE 02-02-99

LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
PLASMA CHAMBER WELDMENT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
MICROFILMED	DETAIL		DWG. NO. 21C9894	SIZE A / REV. A
	DESIGN ACCT. NO. 8210-14	CATEGORY CODE		

REQ	ITEM	PART NUMBER	DESCRIPTION



21C9903-1

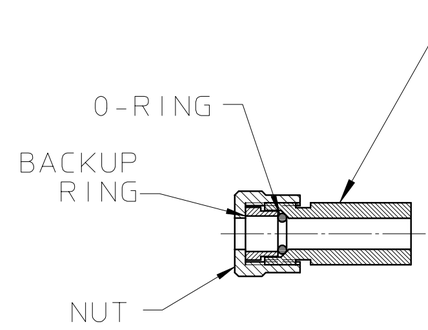
"SHORT" MODIFICATION

NOTES (UNLESS OTHERWISE SPECIFIED):

1) DIMENSIONS IN INCHES.

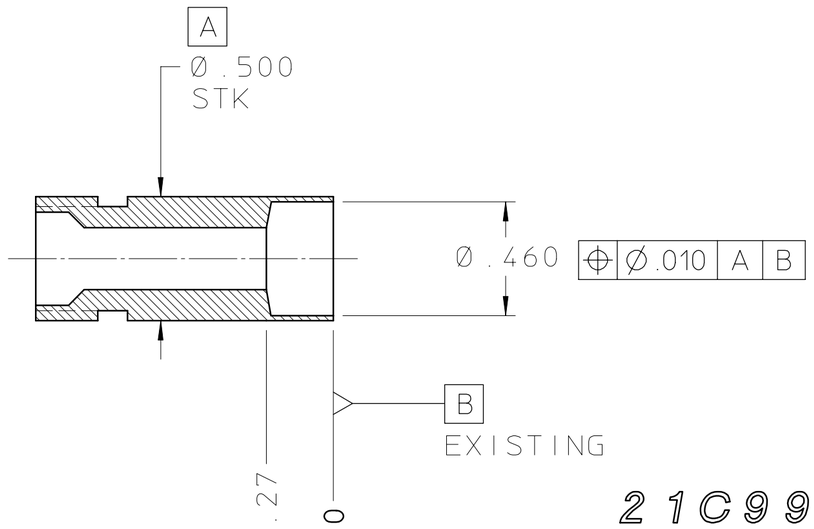
2) MAKE FROM FITTING, 1/4" TUBING, SWAGELOK/CAJON ULTRA-TORR NO. SS-4-UT-A-8BT (BORED THROUGH).

3) DISTRIBUTOR: OAKLAND VALVE & FITTING CO., CONCORD, CA, (510) 676-4100.



COMPLETE FITTING
SCALE = 1/1

21C9903A



21C9903-2

"LONG" MODIFICATION

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		ALL	6/13/00	GENERAL GEOM. UPDATE; ADDED TABULATED PART

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1; FRAC. ±1/64; .XX ± .01; ANGLES ±.01°; .XXX ± .002; FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

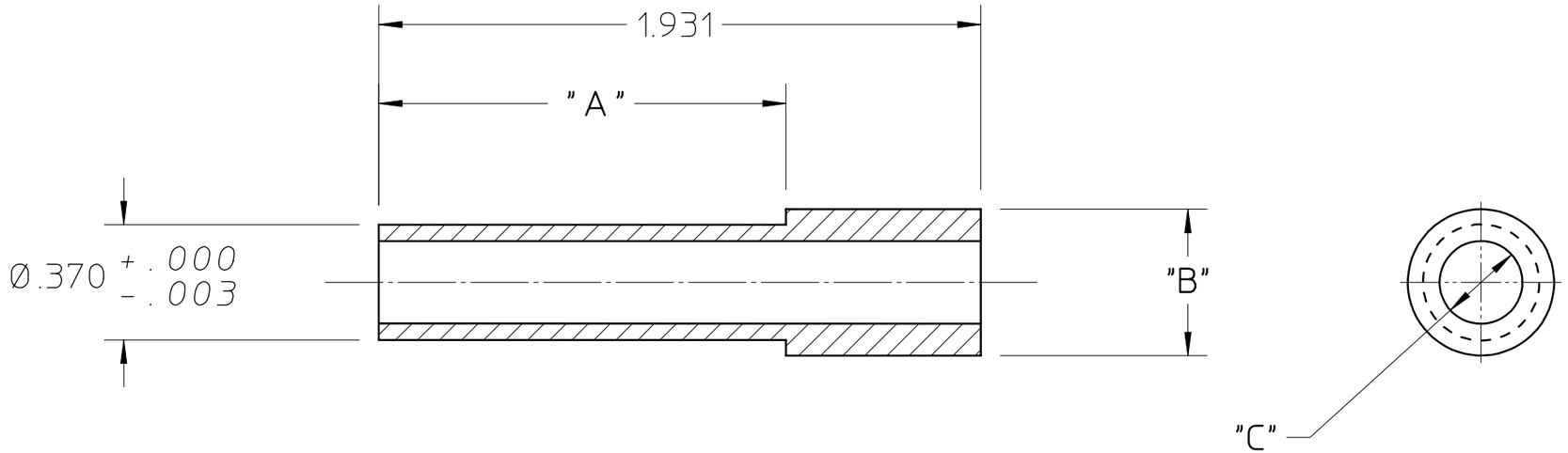
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: SKM | DATE 4/15/99
CHK. BY: D. CHENG | DATE 4/30/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
MODIFIED ULTRA-TORR FITTING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21C9894	1:2	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21C9903	A

21C9912A	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R			ALUMINA, AL203, 99% PURE



PART NUMBER	DIMENSION		
	"A"	"B"	"C"
21C9912-1	1.306	Ø.470	Ø.266
21C9912-2	.681	Ø.390	Ø.220
21C9912-3	1.610	Ø.390	Ø.220

REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		8/7/01	CREATED TABULATED DIMESIONS TABLE

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	S. MUKHERJEE	DATE 02-05-99
CHK BY	D. CHENG	DATE 2/15/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

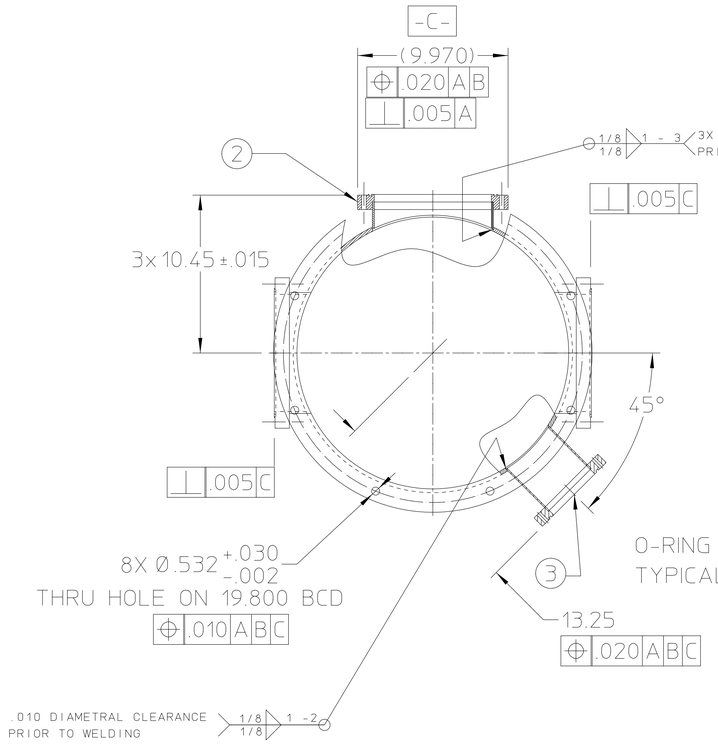
SNS- FRONT END SYSTEM

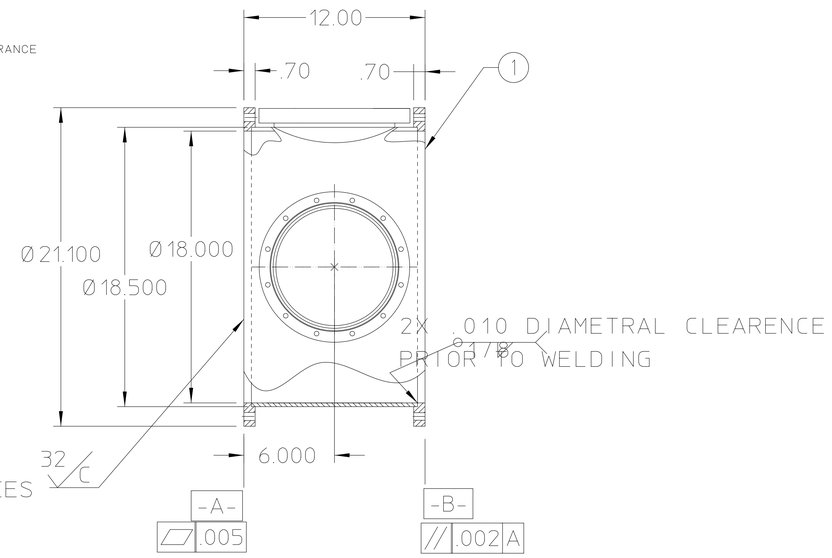
ION SOURCE PROTOTYPE DESIGN

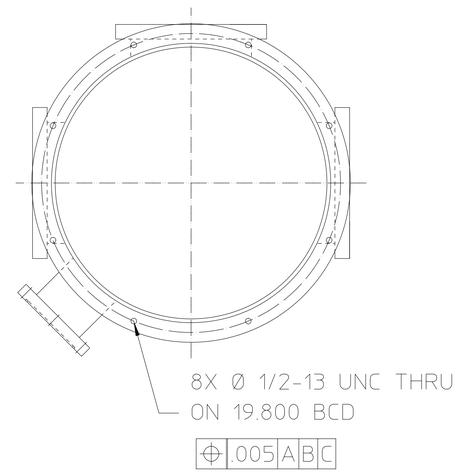
CERAMIC INSULATOR FOR VACUUM FEED THRU

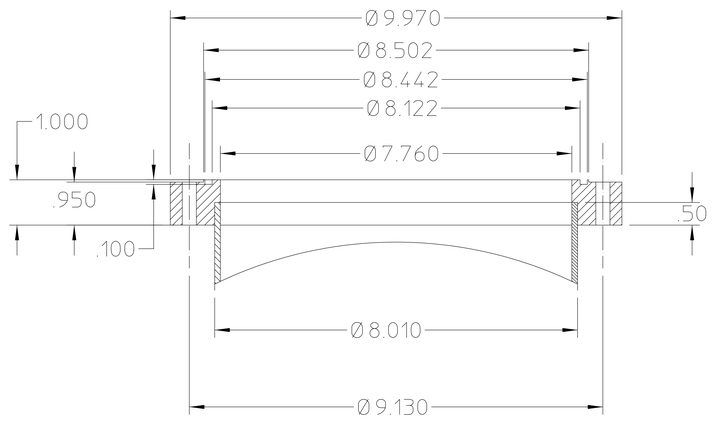
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21C8406	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO / REV
	8210-14	FE1100	21C9912A

NOTES:
1. THIS IS A VACUUM VESSEL
2. ALL JOINTS TO BE LEAK TESTED
   ALLOWABLE LEAK RATE IS 1X 10-7 T-L/SECOND
3. BREAK ALL SHARP CORNERS
4. MATERIAL IS 6061-T4 ALUMINUM



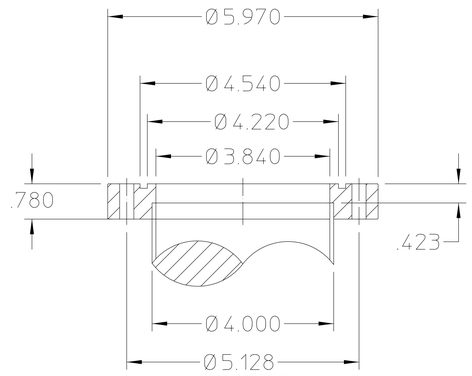






12X 5/16-18 THRU HOLES

DETAIL OF ITEM 2
(SIZE 3X)



8X 5/16-18 UNC THRU HOLES

DETAIL OF ITEM-3
(SIZE 3X)

21C9926

REQD	ITEM	PART NO.	DESCRIPTION
1	3	-3	HALF NIPPLE WITH SPECIAL 6.00 OD FLANGE
3	2	-2	SPECIAL FLANGE, 10.00 OD, 6061-T4 ALUMINUM
1	1	-1	TUBE, 18.50 OD, 6061-T4 ALUMINUM

REV	DWG	CHK	ZONE	DATE	CHANGES

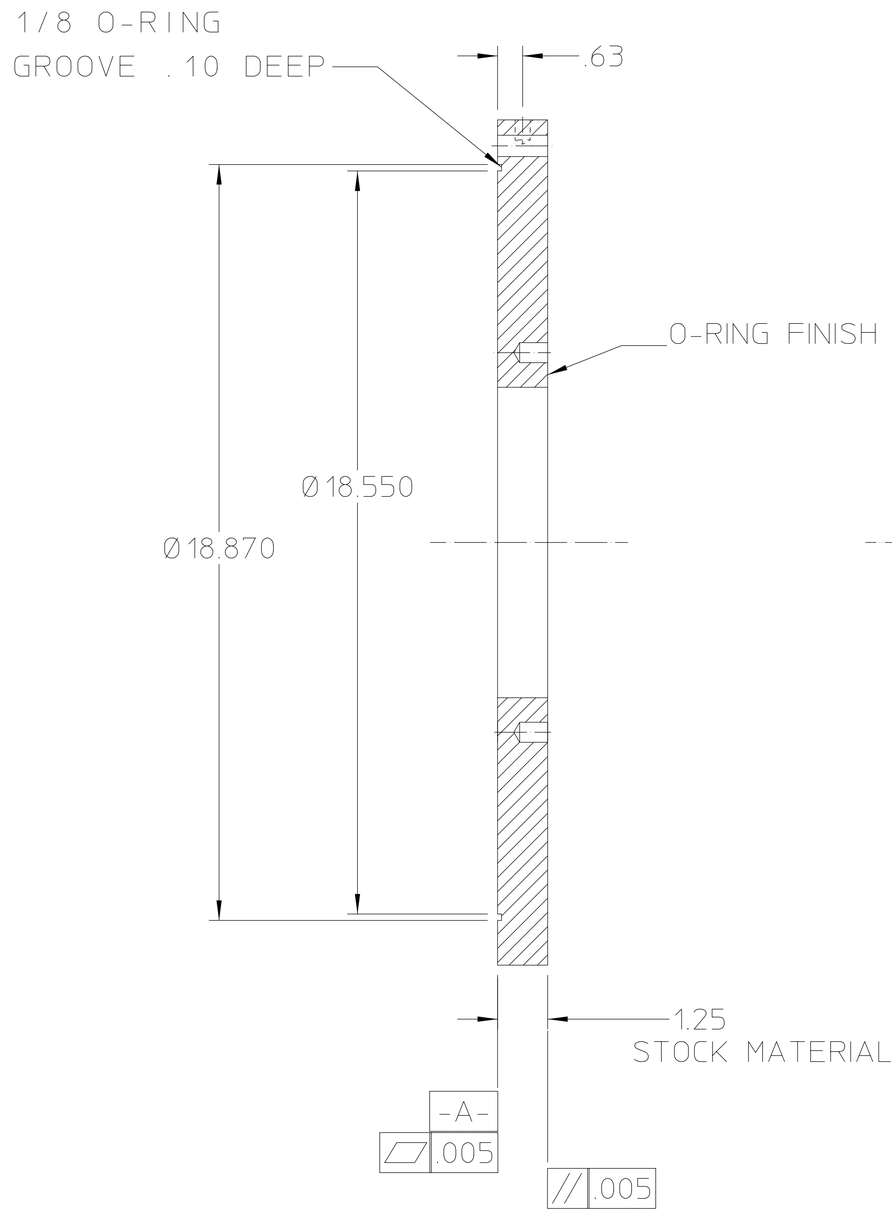
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .05 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

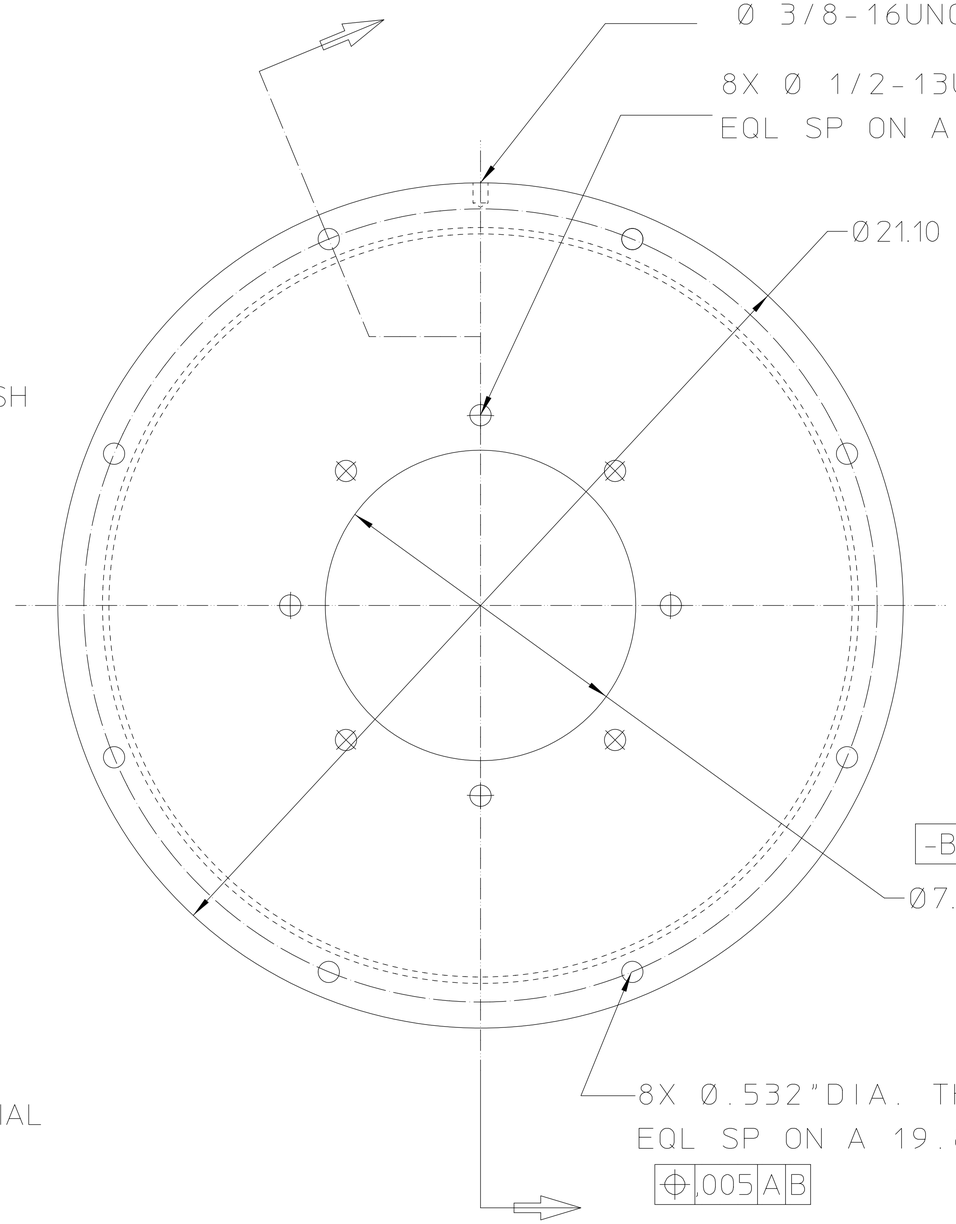
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT METH TAG
DWG BY S. MUKHERJEE DATE 03-25-99
CHK. BY
DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
NEW DIAGNOSTIC SPOOL

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	PART	00X0000	1 : 4	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE REV.
	8210-14	FE1100	21C9926	

REQ	ITEM	PART NUMBER	DESCRIPTION
1			6061-T4 ALUMINUM PLATE (1.25 STOCK OK)





NOTES:
BREAK ALL SHARP CORNERS
MATERIAL IS 6061-T4 AL.

21C9934

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
- .X ± .1 — FRAC. ± 1/64
- .XX ± .05 — ANGLES ± 1°
- .XXX ± .005 — FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

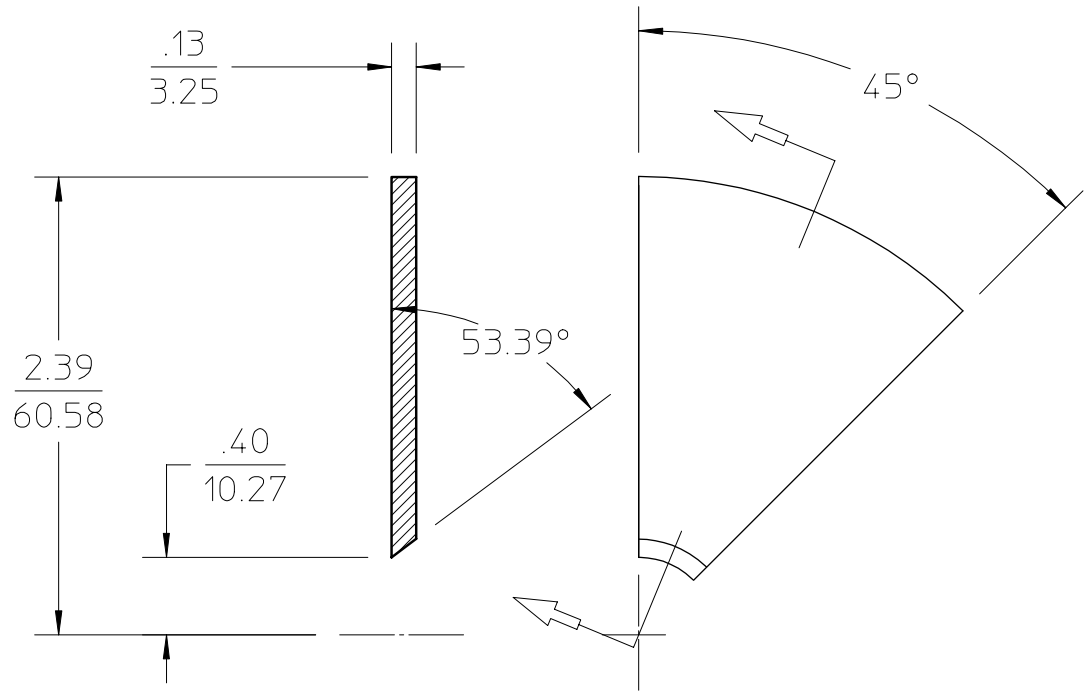
ACCT. NO.		SERIAL NO.	
DATE ISSD.	DATE REQD.	NO. REQD.	
DELIVER TO			
SURFACE TREATMENT	DEGREASE		
IDENT. METH.	TAG		
DWG. BY	S. MUKHERJEE	DATE	3-25-99
CHK. BY	USUALLY NO ONE	DATE	4/10/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
DIAGNOSTIC SPOOL END COVER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 1:2	DO NOT SCALE PRINTS
	DETAIL		DWG. NO. 21C9934	SIZE REV.
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE1100		

Dwg. No. 21C9941 Size Rev

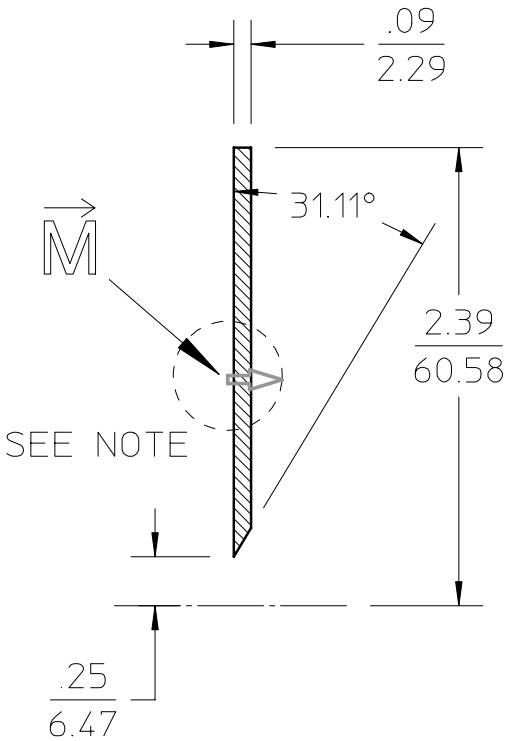


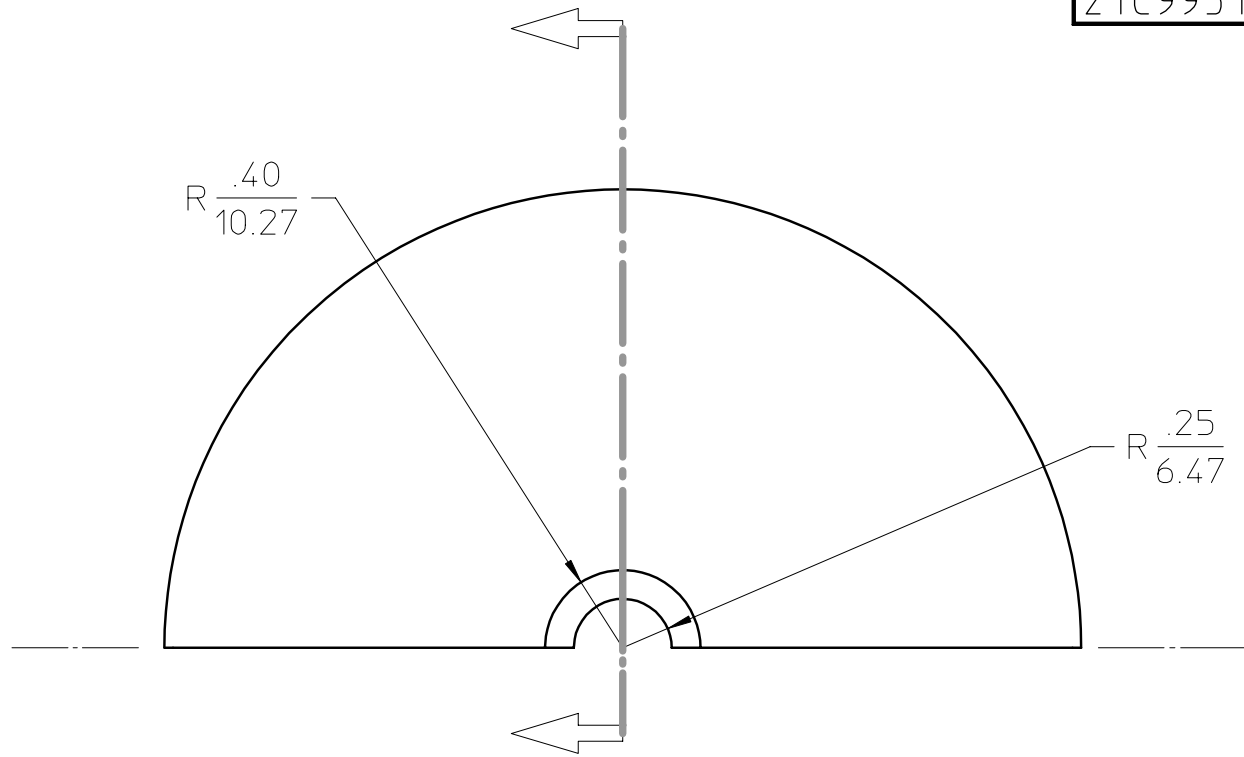
8 PIECES
FOR MAGNETIZATION ORIENTATION
SEE ASSEMBLY DRAWING 21C9963

DIMENSION IN INCH/MM
MATERIAL: S3069
SmCo, GRADE 30

Material –				–	–	–	–
Unless Otherwise Noted				Rev	Dwn	Date	Changes
.X ± .1	.XX ± .025	.XXX ± .010	Angles ± .5°	LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California – Berkeley			
				SNS – FRONT END SYSTEM			
Account Number –		Finish √ 125		ION SOURCE PROTOTYPE DESIGN			
Date Issued –		Date Reqd –		OUTLET ELECTRODE MAGNET 'MAIN #1 TO #8'			
Number Required –		Deliver To –		Shown on Dwg No. 21C9963			
Surface Treatment no coating		Identific Method –		Patent Clear	Category Code FE1100	Do not Scale Prints	
Drawn By M. Leitner		Date 03-04-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21C9941	Size Rev –
Check By D. CHENG		Date 3/10/99		Design Account 8210-14	Drawing Type Detail		

Dwg. No. 21C9951A Size Rev





DIMENSION IN INCH/MM

MATERIAL: S3069

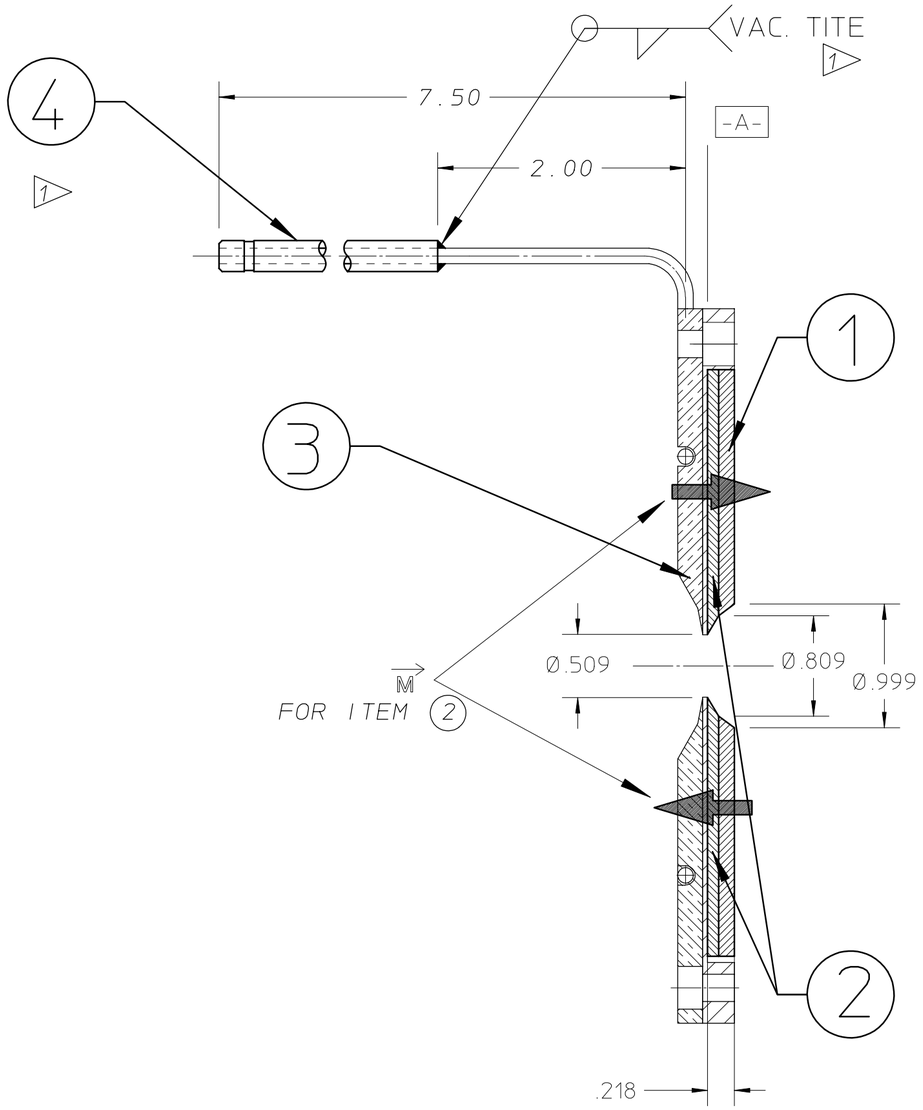
SmCo, GRADE 30

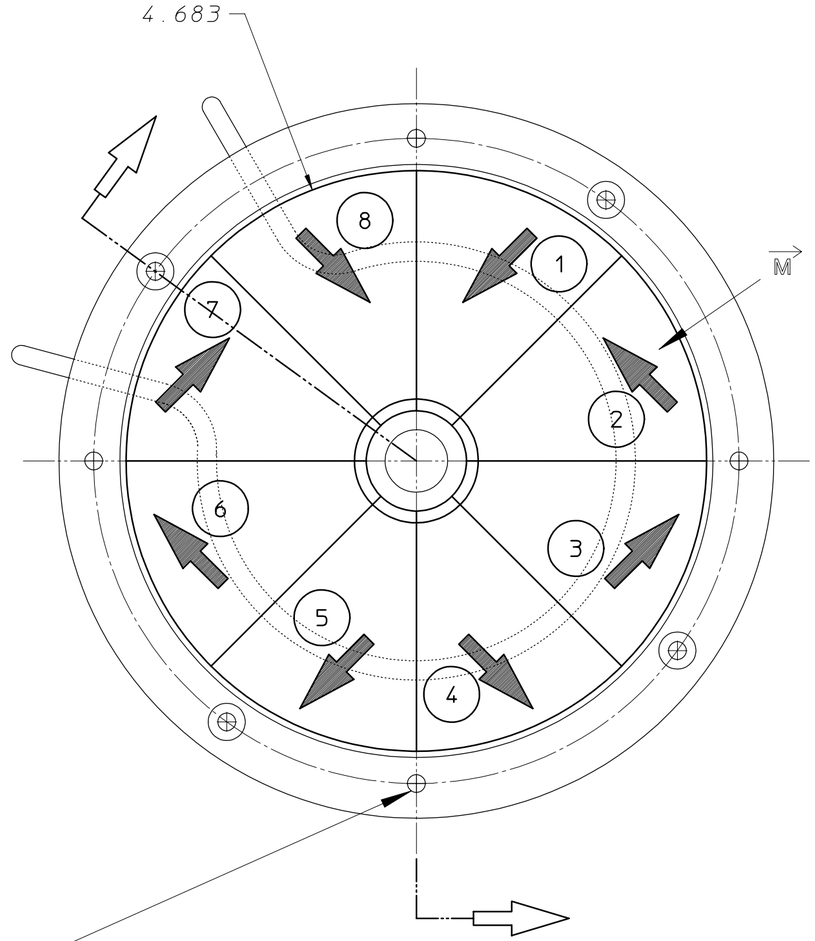
NOTE:

1. ONE HALF AS SHOWN
SECOND HALF MAGNETIZATION REVERSED
2. ARROW INDICATES THE "NORTH" SIDE
OF THE MAGNET (THE NEEDLE OF A
COMPASS WILL POINT OPPOSITE DIRECTION)

Material – SINTERED SAMARIUM-COBALT, GRADE			SMC DNC	9/20/01	ADDED NOTE NUMBER 2	
Unless Otherwise Noted			Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .010 | Angles ± .5°			LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1			University of California – Berkeley			
			SNS - FRONT END SYSTEM			
Account Number –	Finish √ 125		ION SOURCE PROTOTYPE DESIGN			
Date Issued –	Date Reqd –		OUTLET ELECTRODE MAGNET "BLOCKER #1"			
Number Required –	Deliver To –		Shown on Dwg No. 21C9963			
Surface Treatment no coating	Identific Method –		Patent Clear	Category Code FE1100	Do not Scale Prints	
Drawn By SKM	Date 03-04-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21C9951	Size A Rev
Check By M. LEITNER	Date 4/15/99		Design Account 8210-14	Drawing Type Detail		

REQ	ITEM	PART NUMBER	DESCRIPTION
8	1	21C9942	MAIN MAGNET
2	2	21C9952	BLOCKER MAGNET
1	3	21C8454	OUTLET ELECTRODE IRON PLATE W/ COOLING TUBE
2	4	21G7711-2	LEGRIS WATER FITTING PREP, LONG, CUT TO LENGTH





21C8454B

ADDITIONAL NOTES:

1 ITEM 4 SHALL BE WELDED AFTER MAGNETS HAVE BEEN INSTALLED.

NOTE:
INDEX MAGNETS BASED ON THIS VERTICAL AXIS THRU THIS HOLE (NOTE THE COOLING TUBE ORIENTATION ON LEFT OF AXIS)
⌖ .002 A B C

A DIRECTION OF ARROWS FOR MAGNETIZATION INDICATE THE "NORTH" SIDE OF THE MAGNET (I.E. A COMPASS NEEDLE POINTS OPPOSITE DIRECTION)

1	225°
2	135°
3	45°
4	315°
5	225°
6	135°
7	45°
8	315°

REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		-	9/16/01	ADDED ITEM 4 AND RELATED NOTE
A	DWC		B1	9/15/01	ADDED MAGNETIZATION NOTE

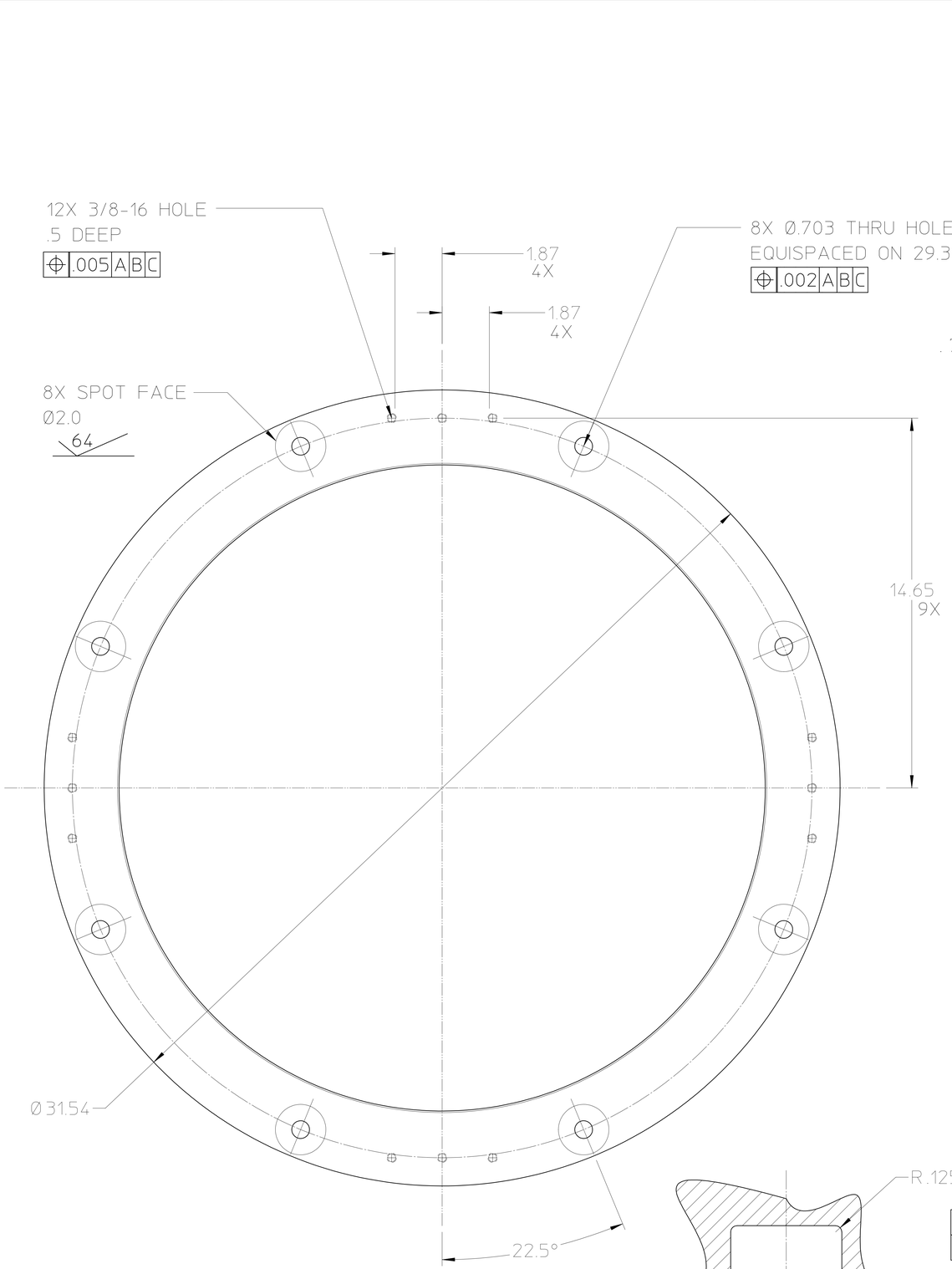
UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 FRAC. ± 1/64; .XX ± .01 ANGLES ± .01°; .XXX ± .001 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

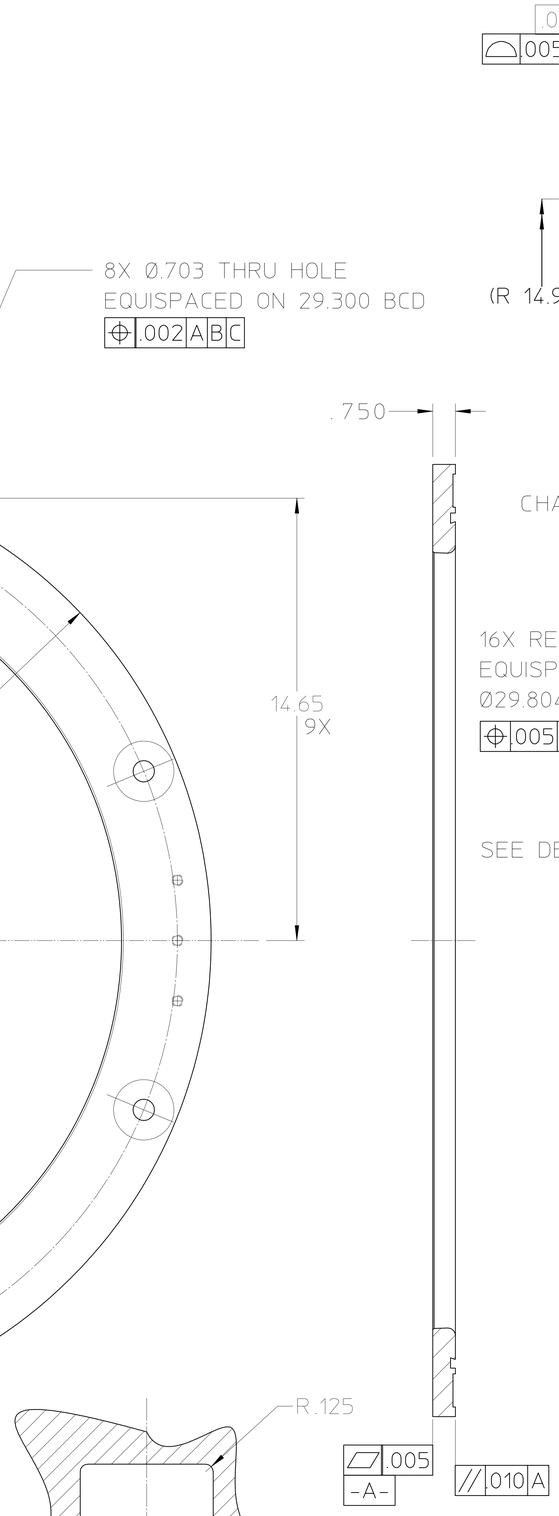
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE DATE: 04-06-99
CHK BY: M. LEITNER DATE: 04-30-99

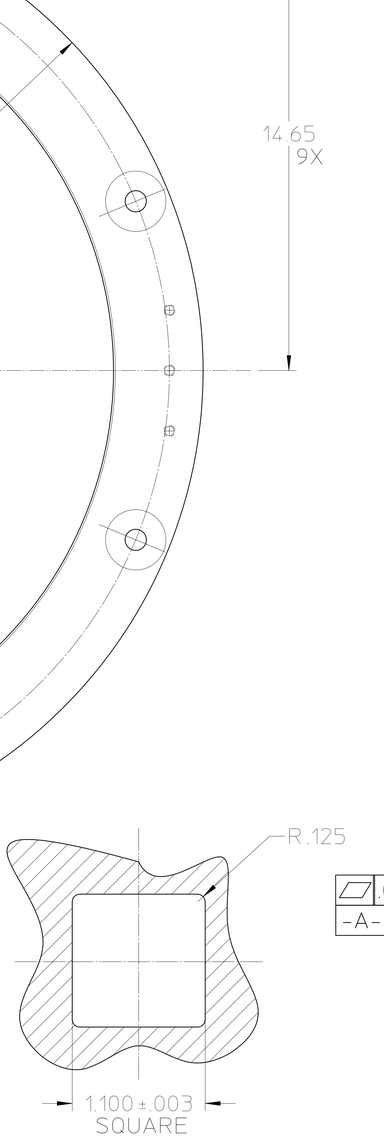
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
OUTLET ELETRODE MAGNET SPECIFICATION

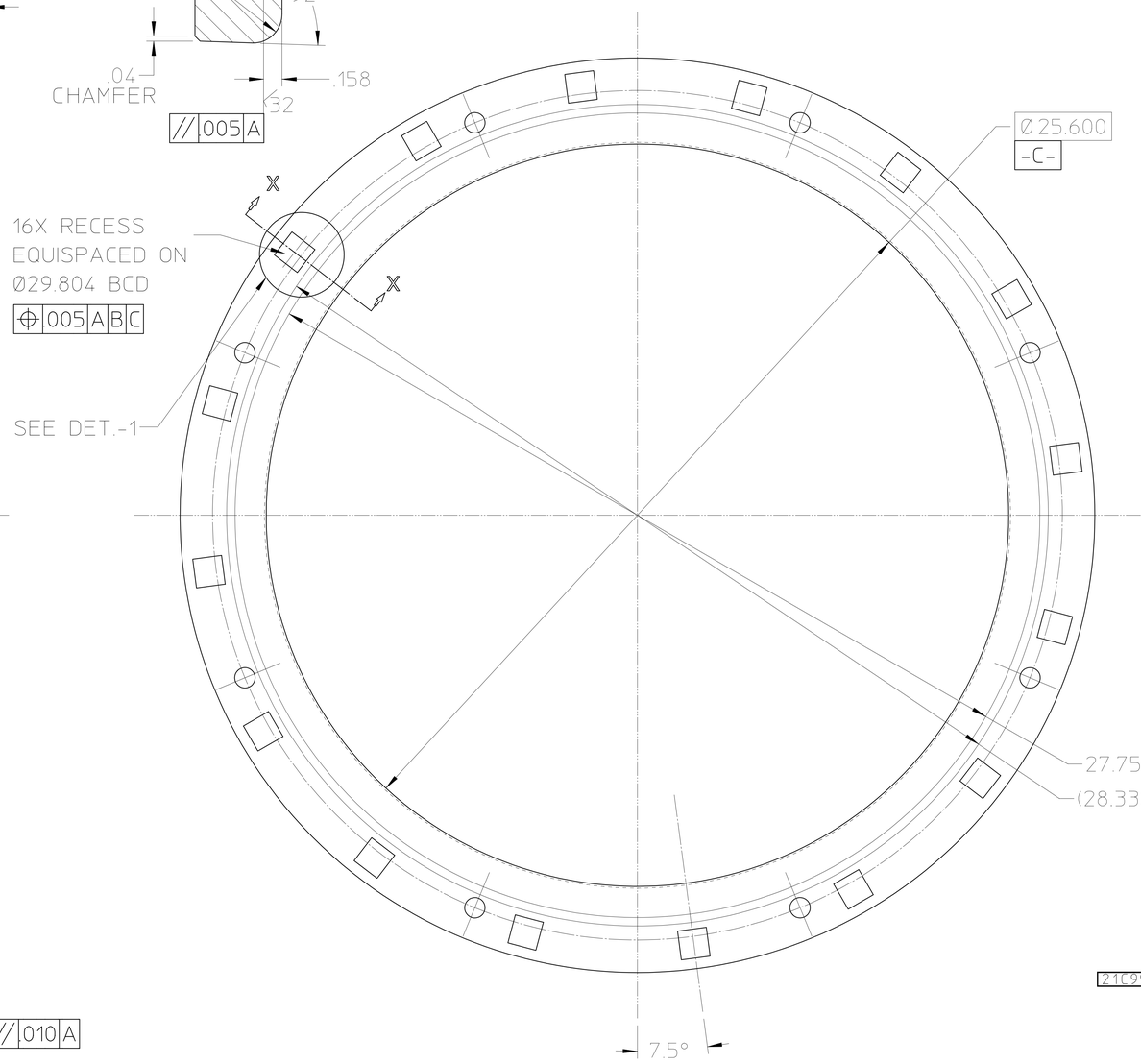
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY	21C8934	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C9963	B







DETAIL-1
(SCALE 4X)



SECTION
X – X
SCALE 4 : 1

NOTES:
1. ANNEAL STOCK MATERIAL AFTER ROUGH MACHINING TO MAINTAIN FLATNESS TOLERANCE.

2. REMOVE ALL SHARP CORNERS.

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		-	10/25/01	GENERAL GEOMETRY UPDATE

REQD	ITEM	PART NO	DESCRIPTION
1	1		.75 INCH THICK 304 STAINLESS STEEL PLATE STOCK

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC ± 1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

SHOP ORDERS
ACCT NO. | SERIAL NO.
DATE ISSD | DATE REQD | NO REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT METH: TAG
DWG BY: S. MUKHERJEE — DATE: 05-18-99
CHK BY: D. CHENG — DATE: 11-11-99

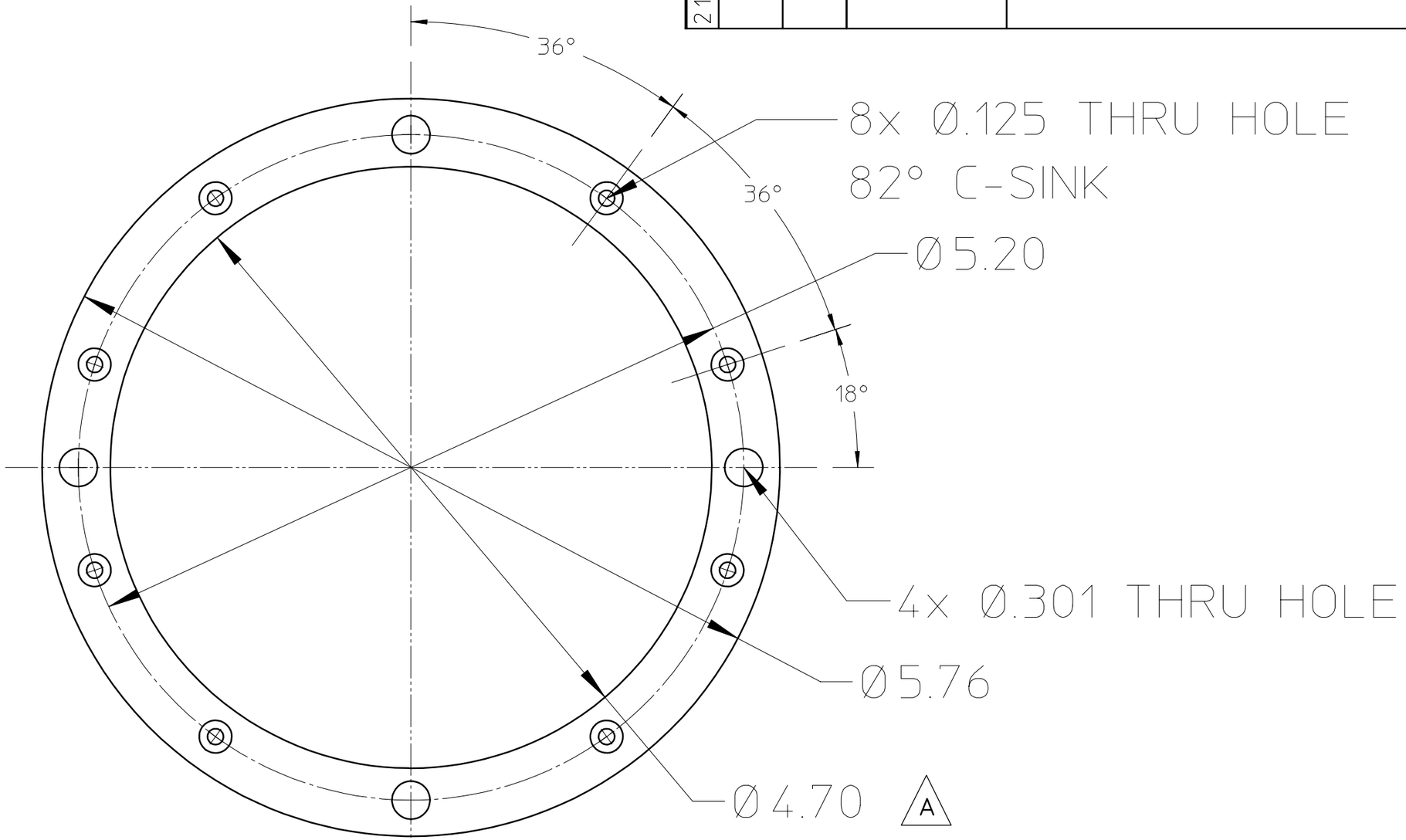
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
LEBT INSULATOR FLANGE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 1:2	DO NOT SCALE PRINTS
	DETAIL	21G8964		
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21C9976	A

21C9976A

21C9982A	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1		1/16 ALUMINUM, 6061 STOCK



REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		6/1/00	Ø 4.70 DIMENSION WAS Ø4.68

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	S. MUKHERJEE	DATE 05-25-99
CHK BY	M. LEITNER	DATE 6/1/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

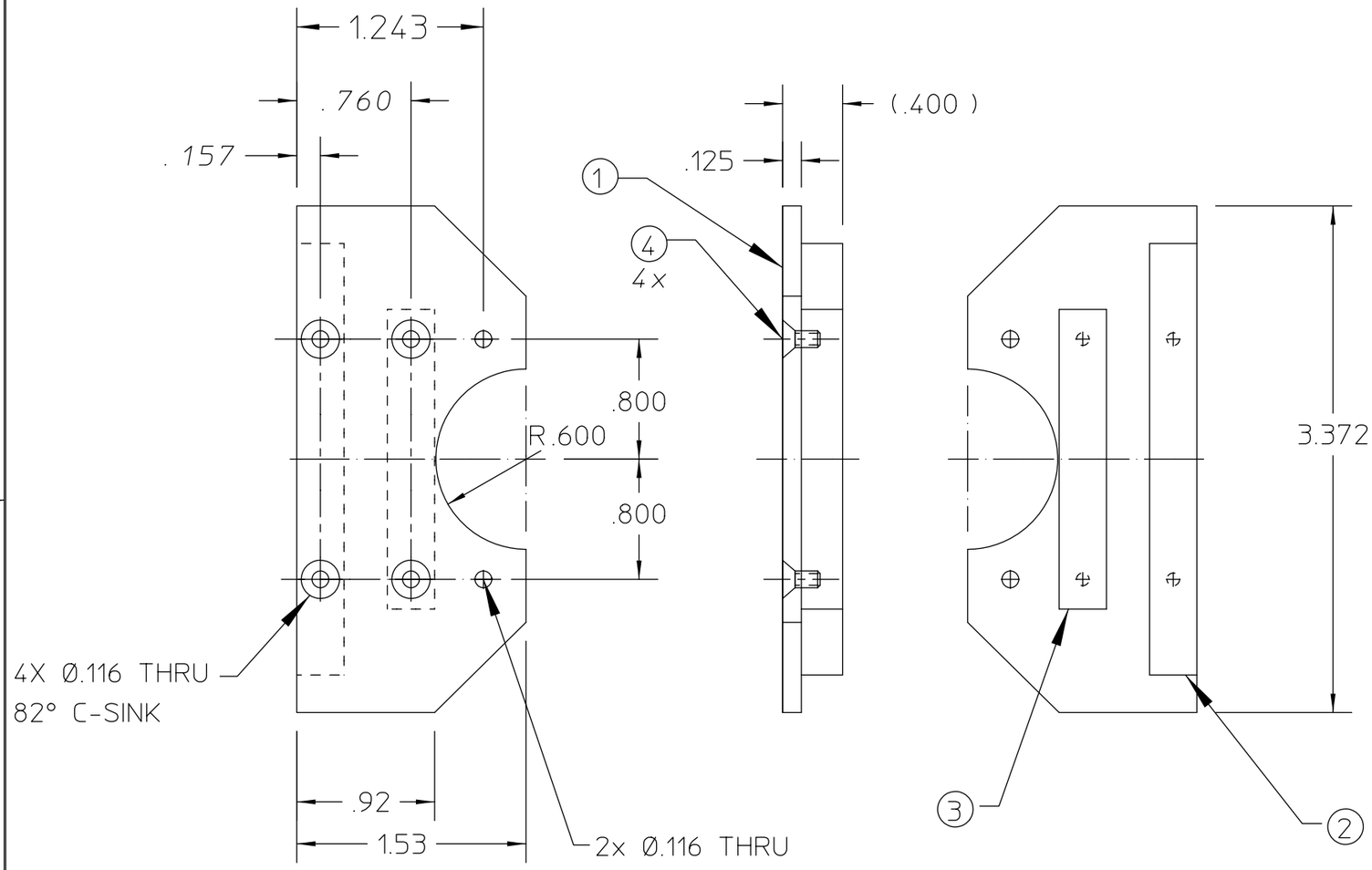
SNS - FRONT END SYSTEM

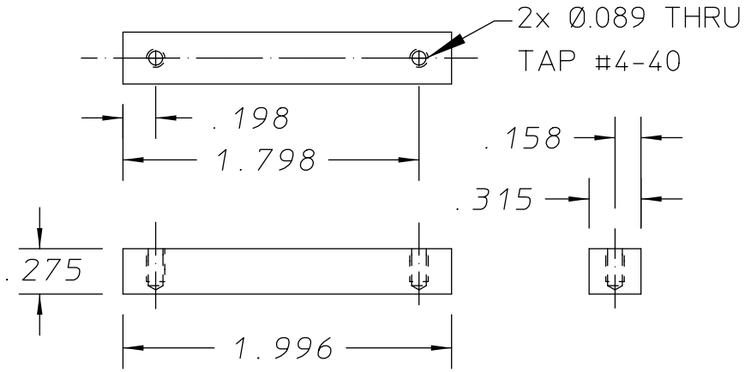
ION SOURCE PROTOTYPE DESIGN

CUSP MAGNET COVER PLATE

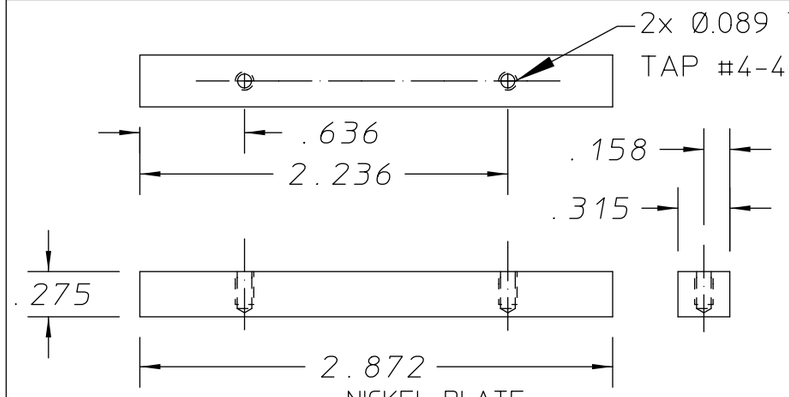
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	00X0000	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE1100	21C9982

21C9992A	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1		1/8 THICK STAINLESS STEEL STOCK
	A/R	2		3/8 SQ. LOW CARBON STEEL STOCK
	A/R	3		3/8 SQ. LOW CARBON STEEL STOCK
	4	4		FLATHEAD SCREW, SS, #4-40 X .25" LG.





③ NICKEL PLATE
AFTER MACHINING



② NICKEL PLATE
AFTER MACHINING

REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		8/9/00	DIMENSIONED FE BLOCKS

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	S. MUKHERJEE	DATE 05-25-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

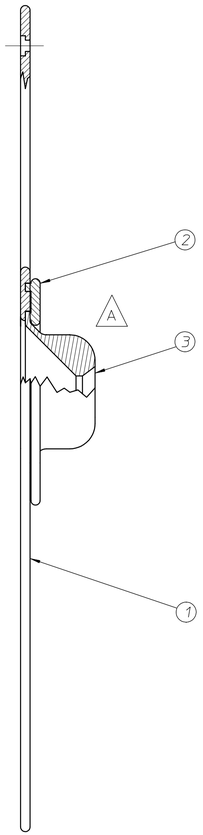
SNS - FRONT END SYSTEM

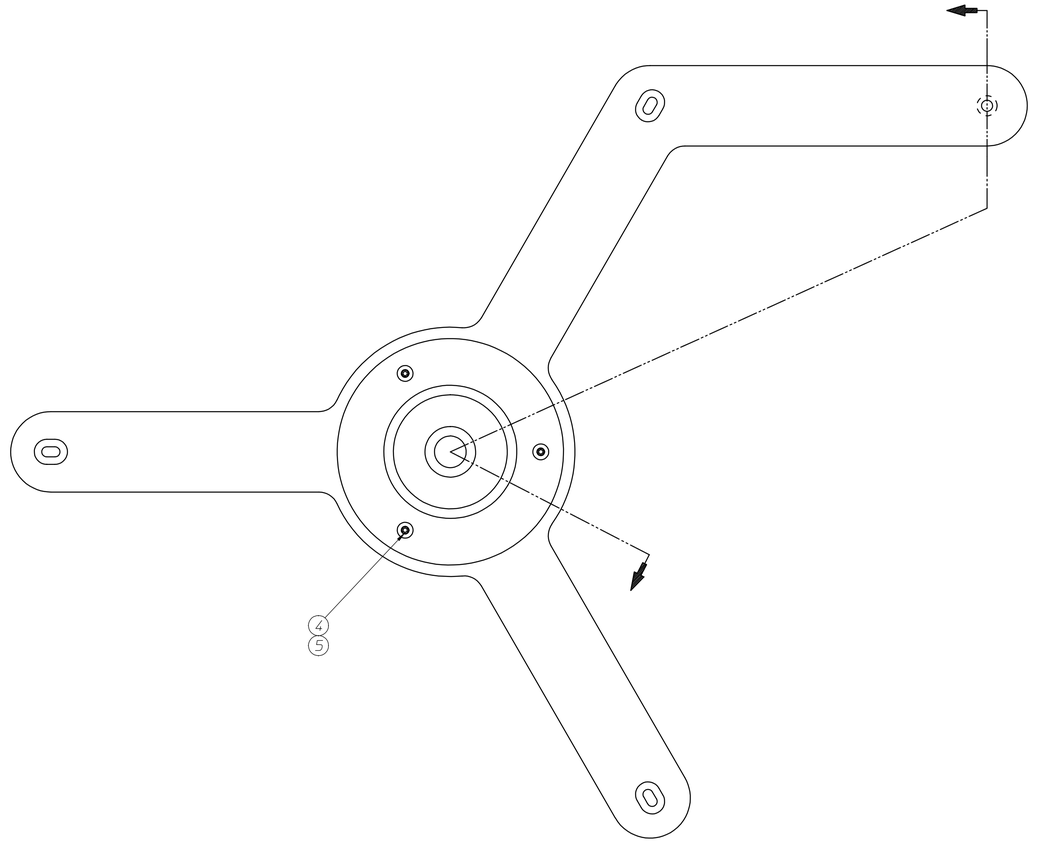
ION SOURCE PROTOTYPE DESIGN

BACK FLANGE MAGNET COVER PLATE

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	21G7543	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE1100	21C9992A

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7014	EXTRACTOR ELECTRODE BODY
1	2	21G7024	EXTRACTOR ELECTRODE CLAMP RING
1	3	21G7403	65 mA EXTRACTOR APERTURE INSERT
3	4	-	SHCS, #0-80, .175" LG
3	5	-	WASHER, #0, STAINLESS STEEL





21G7004A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		D3	3/31/00	ITEM #3 WAS '21G7034', NOW '21G7403'
A	DWC		C6	3/31/00	REFLECTED GEOMETRY CHANGES IN PIECE PARTS

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ±1°; .XXX ± .001 FINISH 64 √

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO.
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG DATE 4-30-99
CHK. BY DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

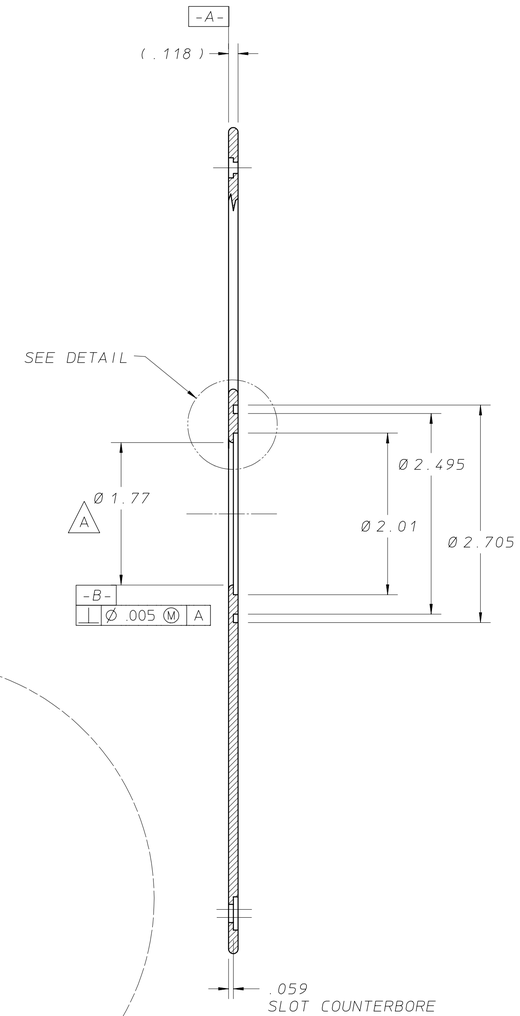
SNS-FES ION SOURCE AND LEBT

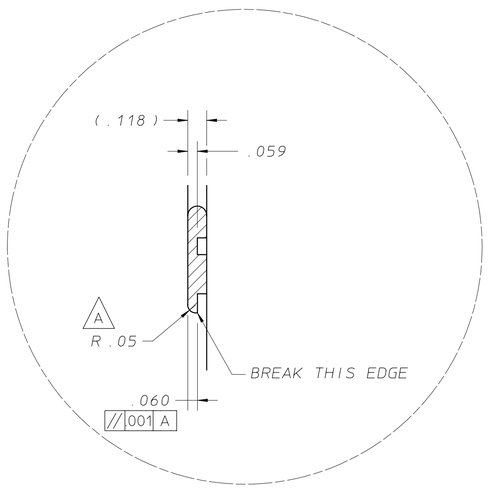
MECHANICAL SYSTEMS

EXTRACTOR ELECTRODE ASSEMBLY

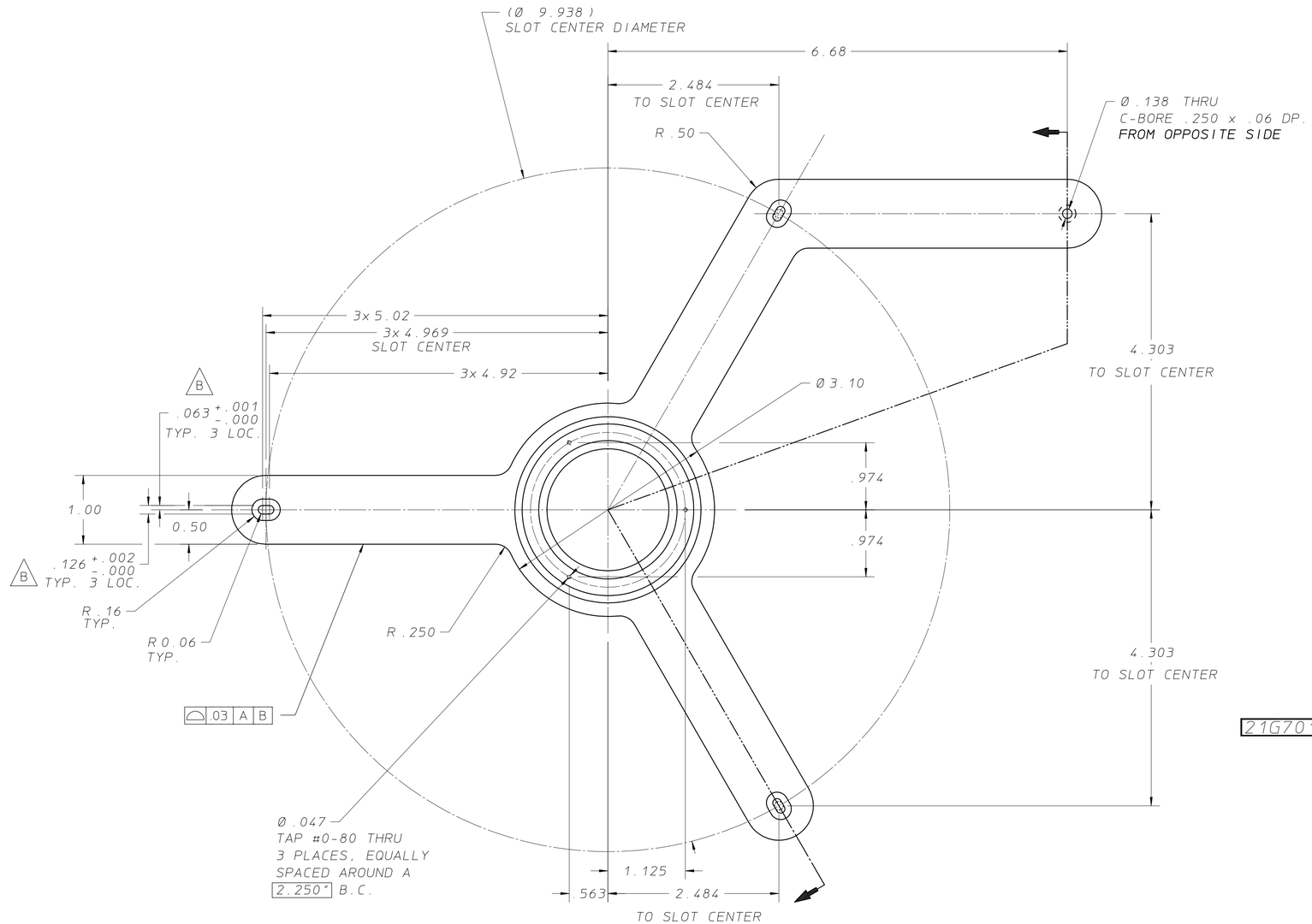
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY	21G7356		
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7004	A

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL SHEET, .125" THICK, TYPE 304





SCALE 2x



21G7014B

REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		B5	7/20/00	ADDED .126 DIMENSION
B	DWC		C5	7/20/00	ADDED .063 DIMENSION
A	DWC		A8	3/31/00	DIMENSION 'R.05' WAS 'R.03'
A	DWC		C7	3/31/00	DIMENSION 'Ø1.77' WAS 'Ø1.35'

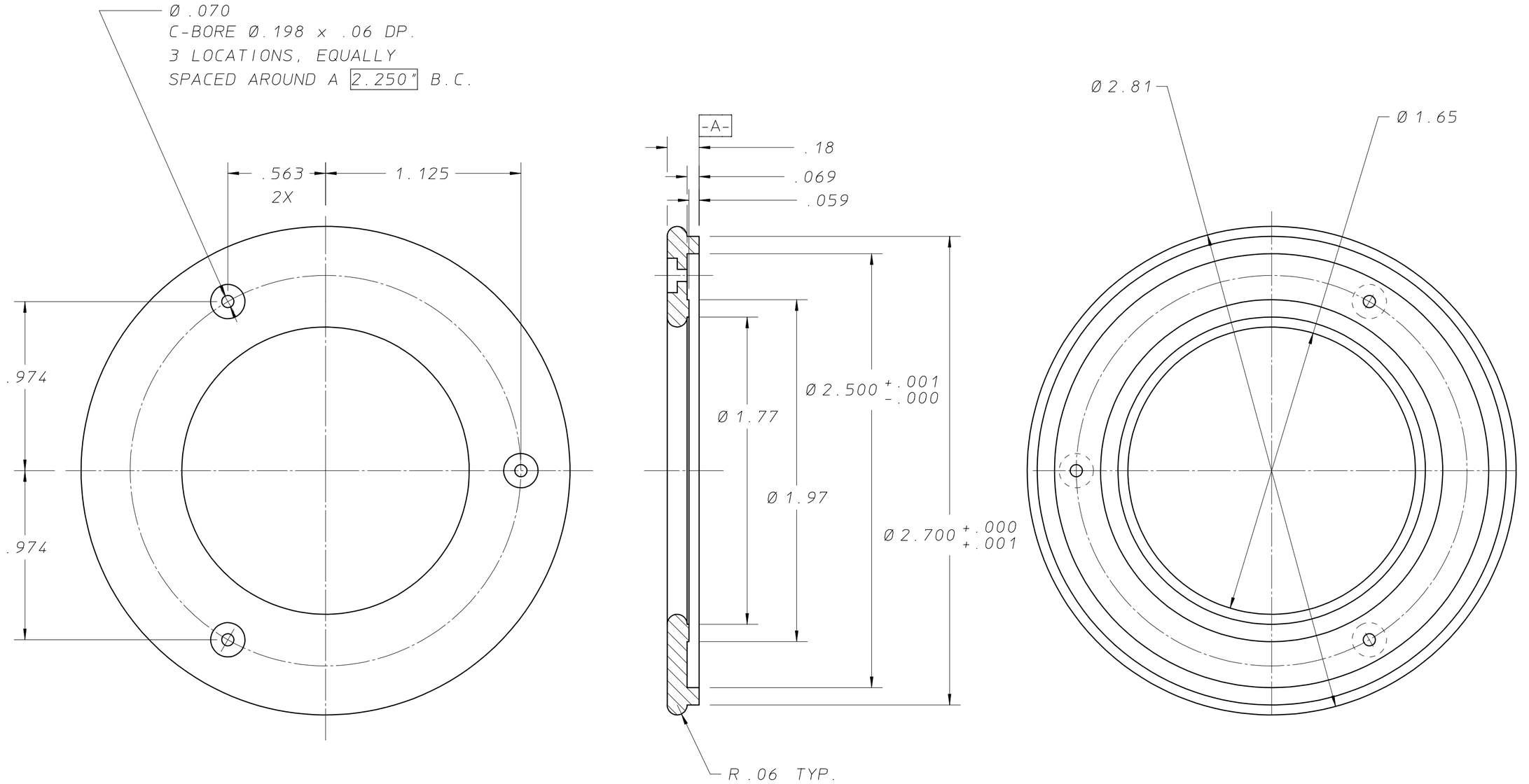
UNLESS OTHERWISE SPECIFIED
TOLERANCES
.X ± .1 FRAC. ±1/64
.XX ± .01 ANGLES ± 1°
.XXX ± .001 FINISH 64 √
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT ELECTROPOLISH
IDENT. METH. TAG
DWG. BY D. CHENG DATE 4-26-99
CHK. BY DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
EXTRACTOR ELECTRODE BODY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7004	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7014	B

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	-	-	LOW CARBON STEEL PLATE, 1006



21G7023

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES		
.X ± .1	FRAC. ±1/64	
.XX ± .01	ANGLES ±.01°	
.XXX ± .001	FINISH 32 √	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

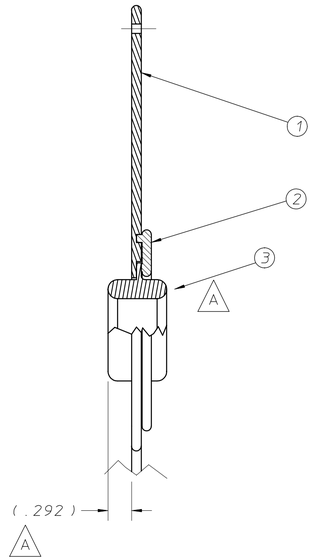
ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 4-26-99
CHK. BY		DATE 00-00-00

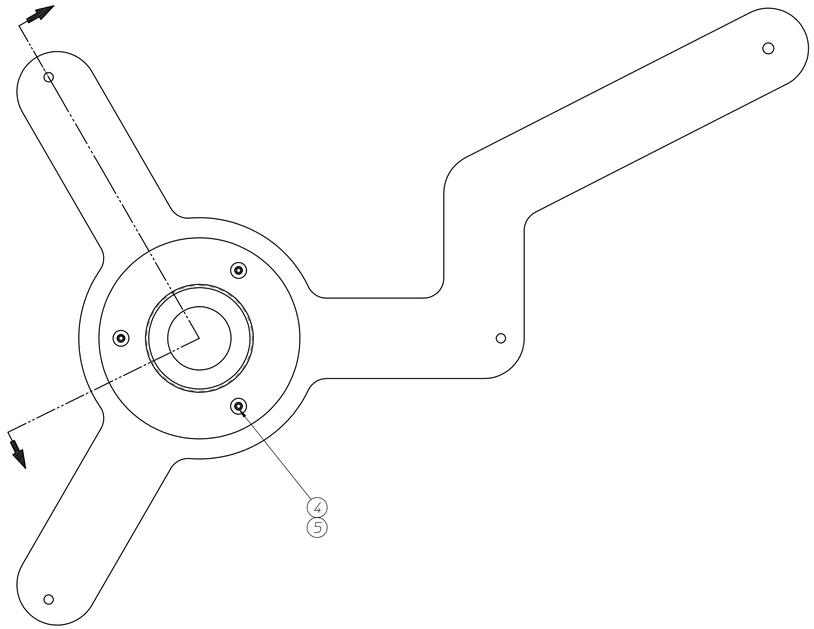
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
EXTRACTOR ELECTRODE CLAMP RING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 2:1	DO NOT SCALE PRINTS
	DETAIL	21G7004	DWG. NO. 21G7023	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE3111		

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7054	G3 ELECTRODE BODY
1	2	21G7063	G3 ELECTRODE CLAMP RING
1	3	21G7413	65 mA G3 ELECTRODE APERTURE INSERT
3	4	-	SHCS, #0-80, .175" LG
3	5	-	WASHER, #0, STAINLESS STEEL





21G7044A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		B7	3/31/00	ADDED .292 DIMENSION FOR REFERENCE
A	DWC		C6	3/31/00	CHANGED GEOMETRY TO REFLECT CHANGE IN ITEM #3
A	DWC		D3	3/31/00	ITEM #3 IS '21G7413'; WAS '21G7073'

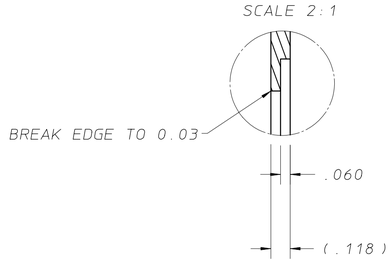
UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ±1°; .XXX ± .001 FINISH 64 √
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

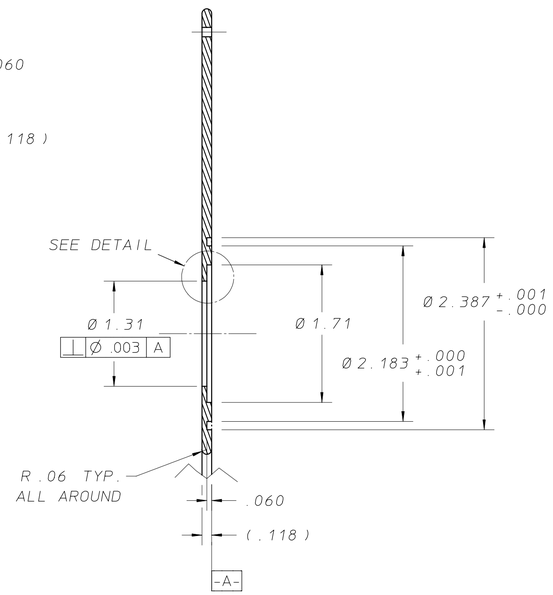
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 4-30-99
CHK. BY | DATE

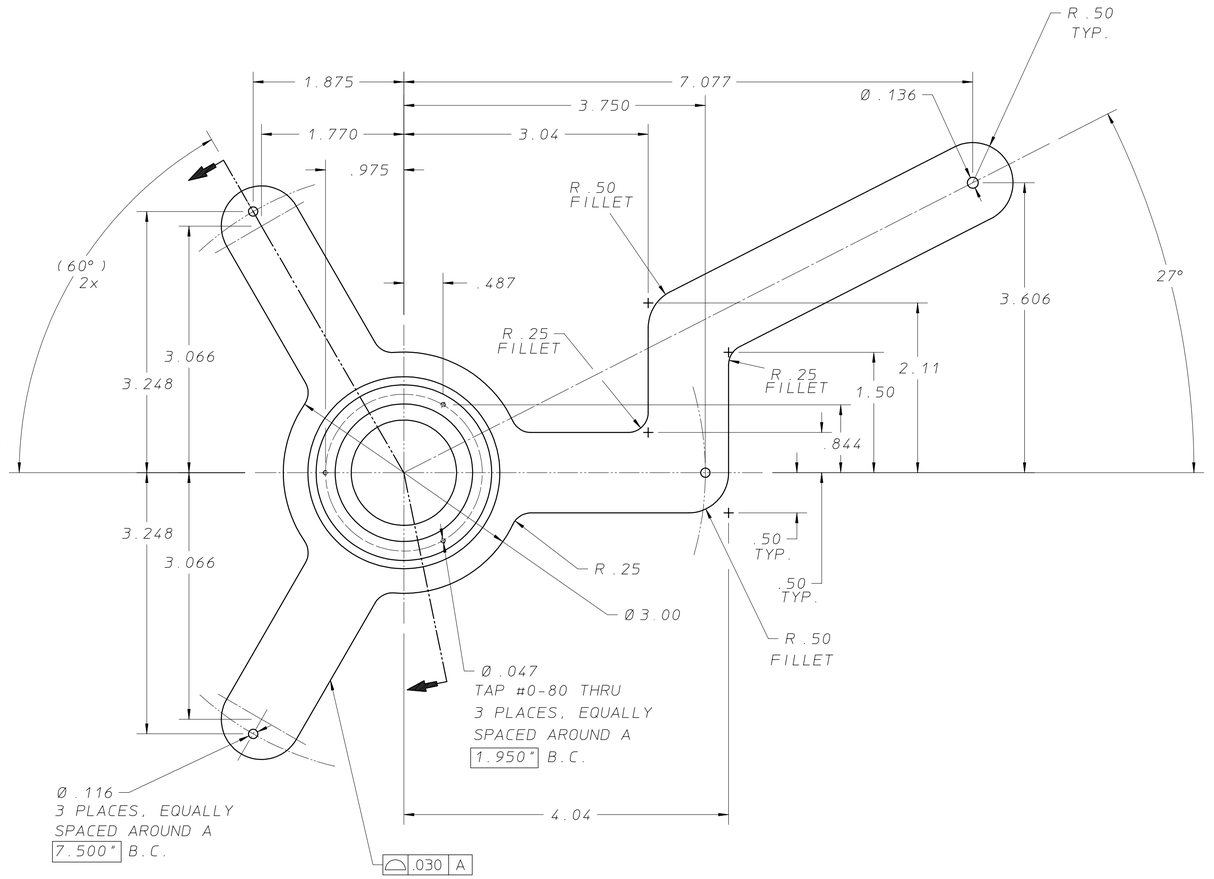
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
G3 ELECTRODE ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY	21G7356	DWG. NO. 21G7044	SIZE A / REV. A
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE3111		

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL SHEET, TYPE 304, .118" STOCK







21G7054

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
.X ± .1 | FRAC. ±1/64
.XX ± .01 | ANGLES ± 1°
.XXX ± .001 | FINISH 32√

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

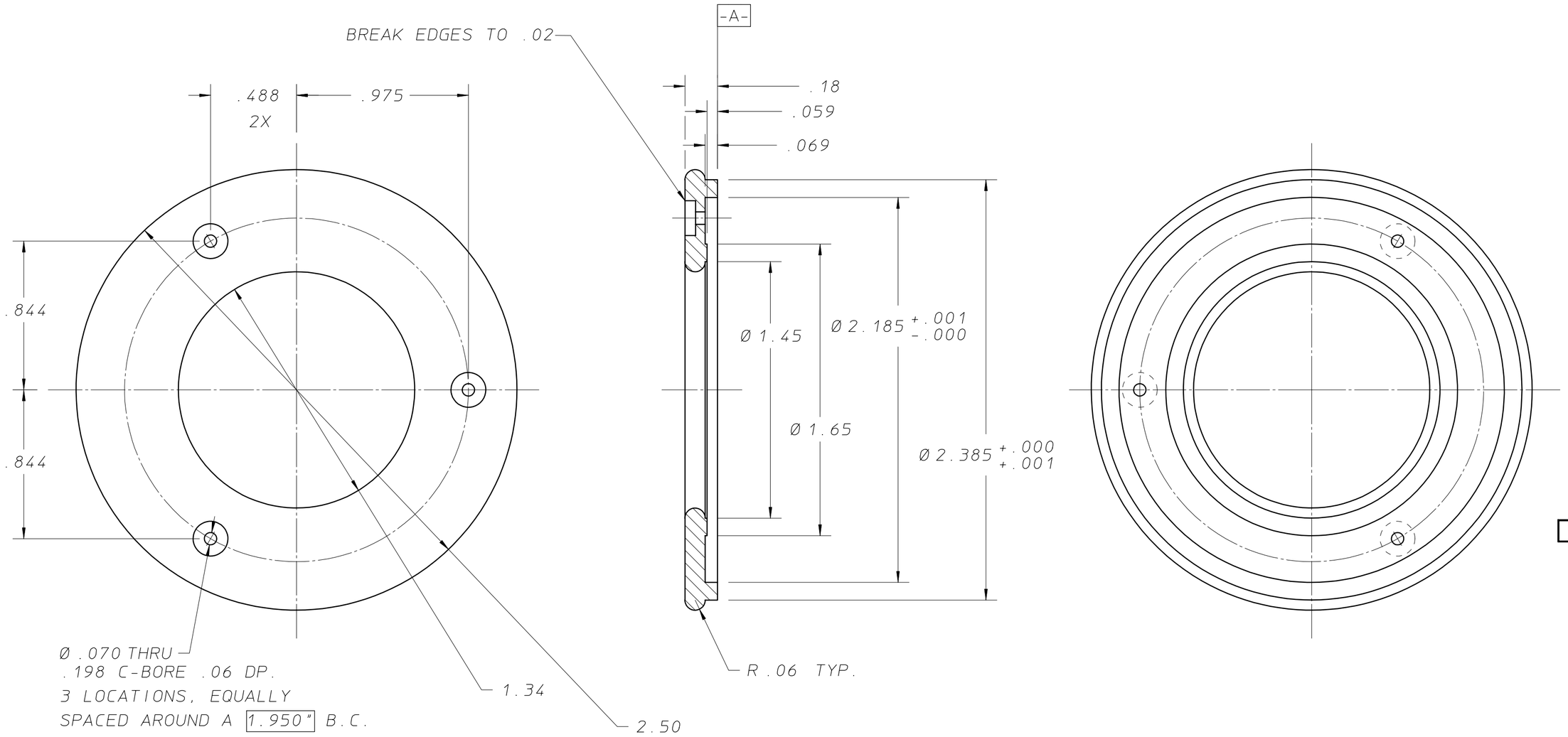
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: D. CHENG — DATE: 4-29-99
CHK. BY: — DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
G3 ELECTRODE BODY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DEATIL	21G7044	DWG. NO. 21G7054	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE3111		

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304, 3/16" STOCK



21G7063

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±.01° | .XXX ± .001 | FINISH 32 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

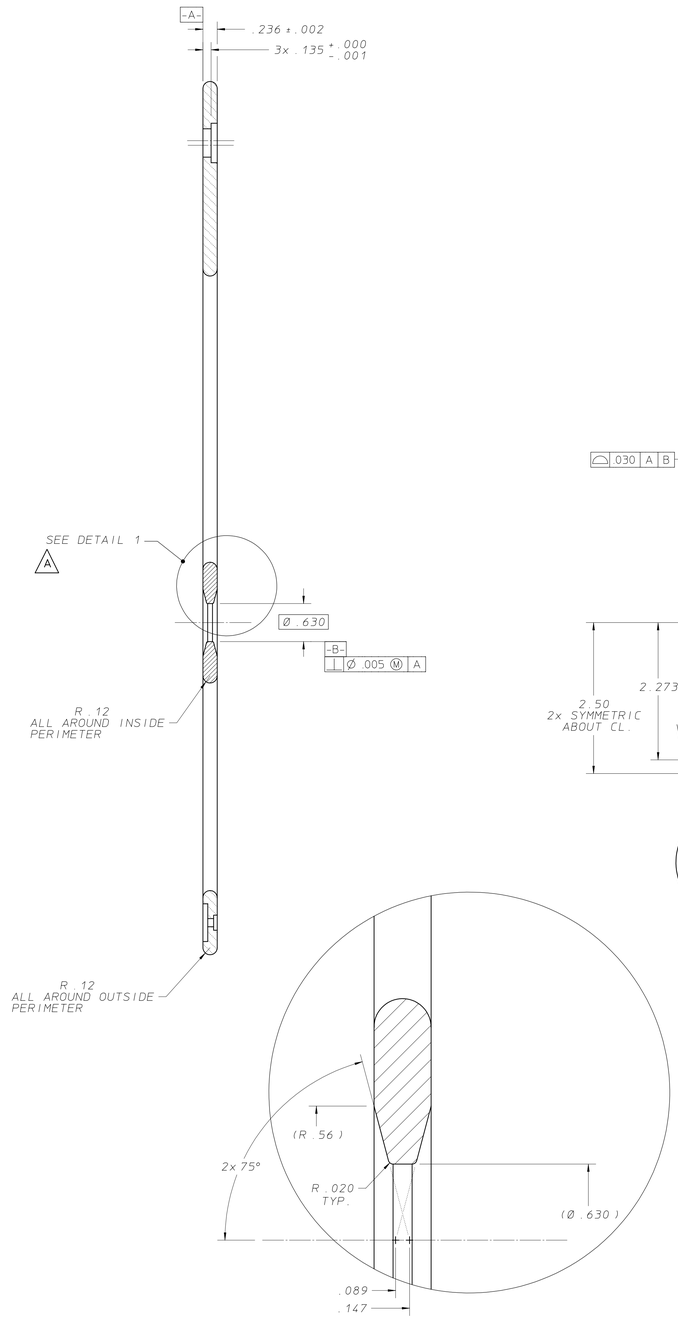
SHOP ORDERS

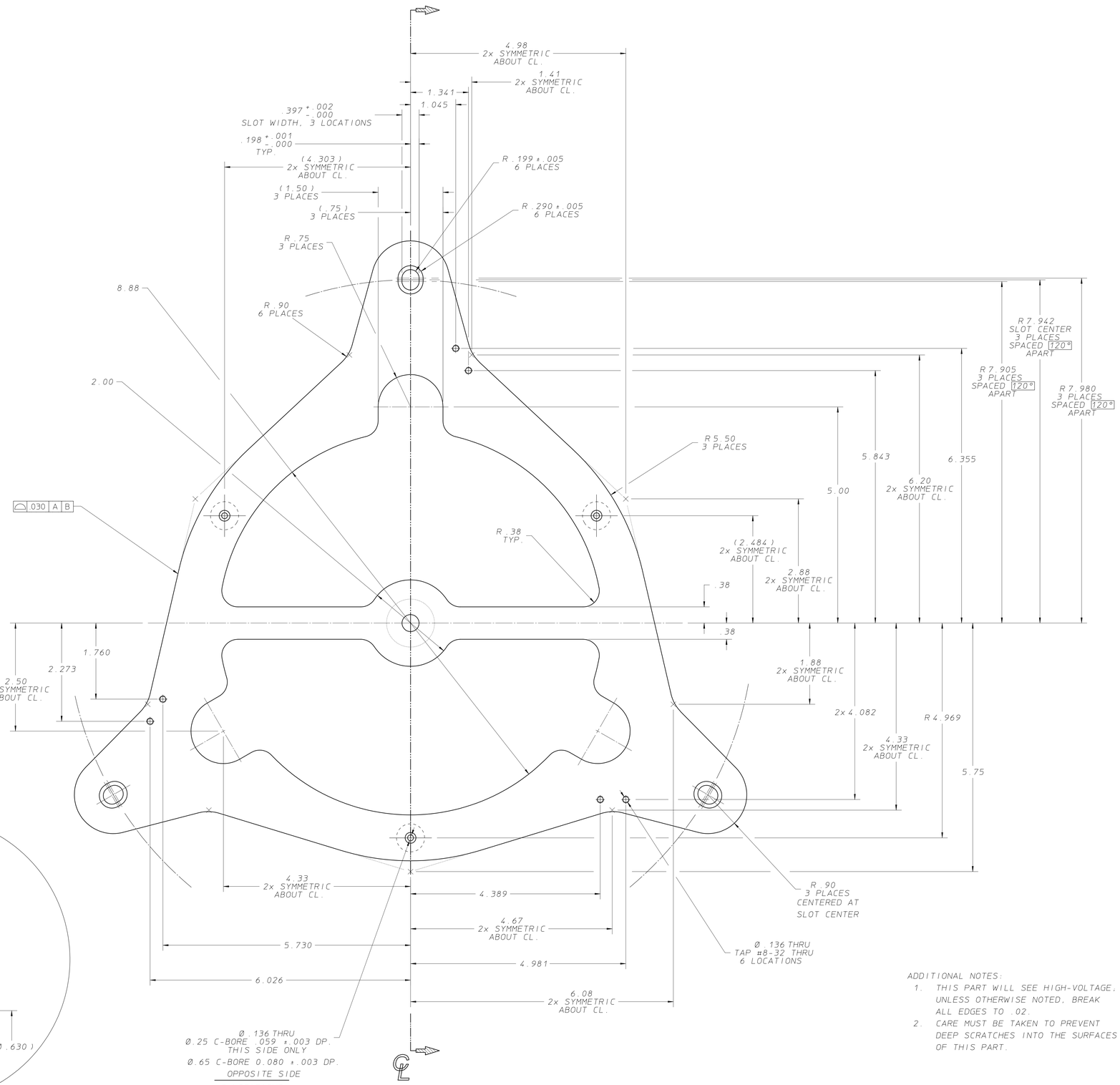
ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 4-29-99
CHK. BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
G3 ELECTRODE CLAMP RING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7044	2:1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7063	





DETAIL 1

SCALE 4:1

A

21G7086A

ADDITIONAL NOTES:

1. THIS PART WILL SEE HIGH-VOLTAGE, UNLESS OTHERWISE NOTED, BREAK ALL EDGES TO .02.
2. CARE MUST BE TAKEN TO PREVENT DEEP SCRATCHES INTO THE SURFACES OF THIS PART.

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		B7	4/1/00	ADDED CHAMFER TO Ø.630 THRU HOLE
A	DWC		A6-7	4/1/00	ADDED DETAIL 1 AND DIMENSIONS

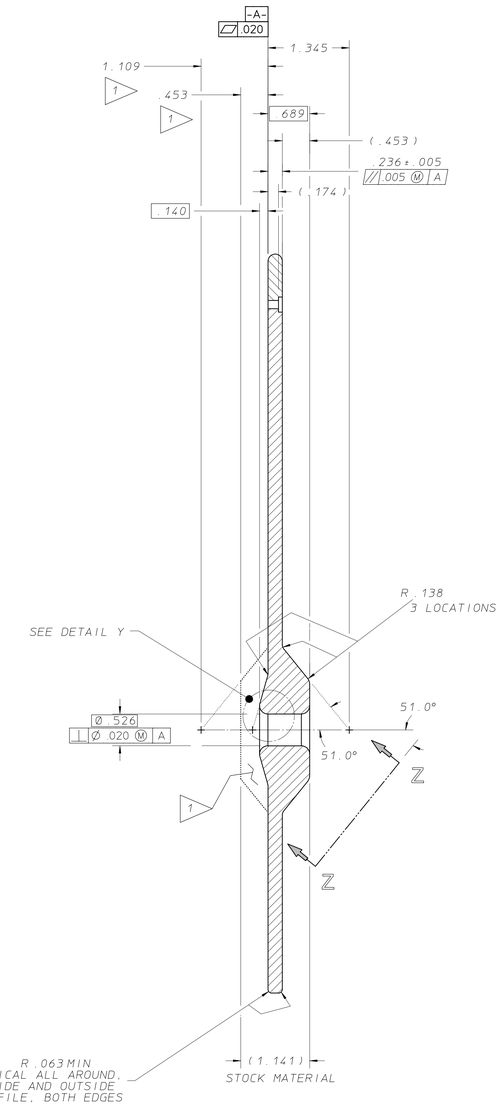
REQD	ITEM	PART NO.	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304, .375" THK

UNLESS OTHERWISE SPECIFIED
TOLERANCES:
x ± .1 FRAC. ±1/64
xx ± .01 ANGLES ± 1°
xxx ± .001 FINISH 32
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .020 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT ELECTROPOLISH
IDENT METH. TAG
DWG. BY D. CHENG DATE 5-3-99
CHK. BY
DATE

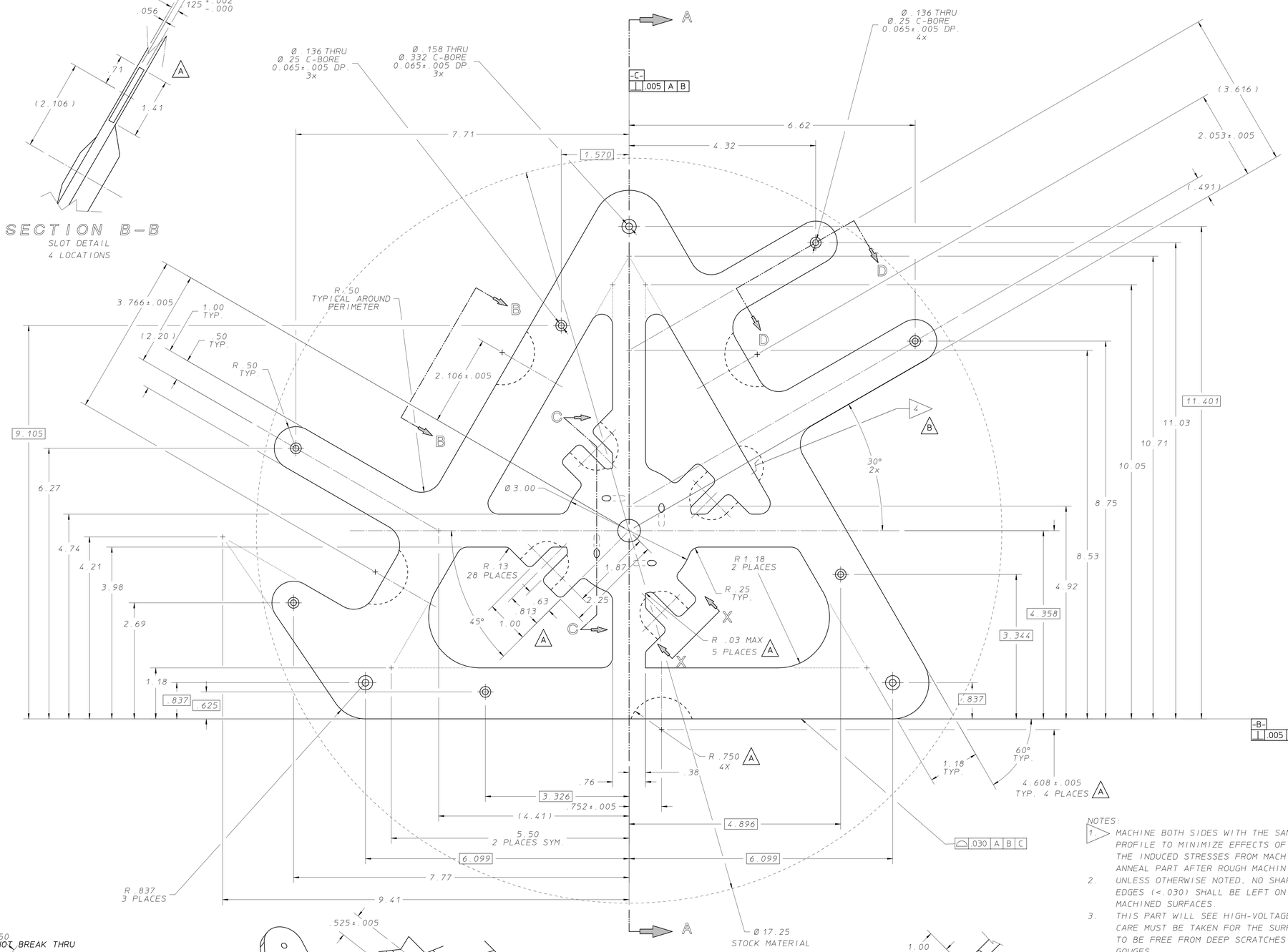
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
GROUND ELECTRODE MACHINING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7356	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE REV.
	8210-14	FE3111	21G7086	A



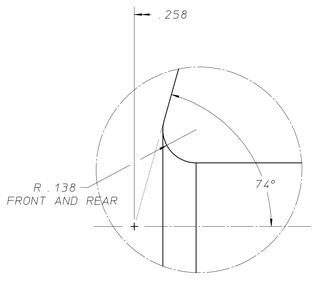
SECTION A–A

SECTION B–B
SLOT DETAIL
4 LOCATIONS

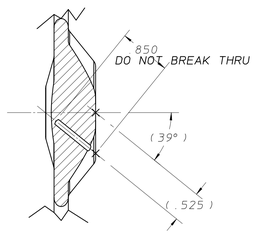


NOTES:

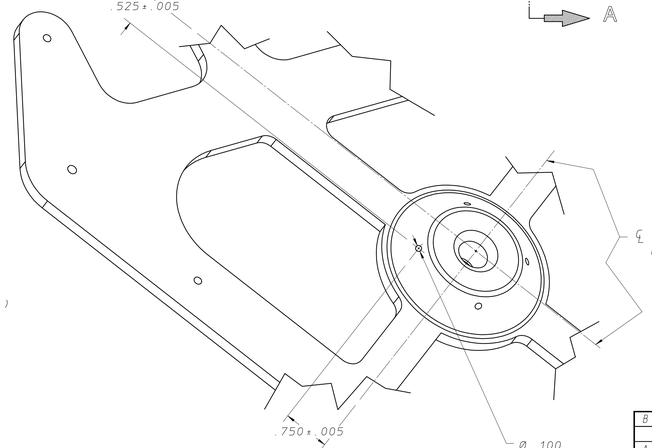
1. MACHINE BOTH SIDES WITH THE SAME PROFILE TO MINIMIZE EFFECTS OF THE INDUCED STRESSES FROM MACHINING. ANNEAL PART AFTER ROUGH MACHINING.
2. UNLESS OTHERWISE NOTED, NO SHARP EDGES (<.030) SHALL BE LEFT ON MACHINED SURFACES.
3. THIS PART WILL SEE HIGH-VOLTAGEs. CARE MUST BE TAKEN FOR THE SURFACE TO BE FREE FROM DEEP SCRATCHES AND GOUGES.
4. WHEN MACHINING THE SLOT IN THIS QUADRANT, IT IS OKAY TO CUT INTO THIS SECTION, AS SHOWN, IN ORDER TO SET UP THE CUTTER'S PATH.
5. USE A MODIFIED WOODRUFF KEY CUTTER THAT HAS BEEN HOLLOW GROUND FOR MORE EFFICIENT CHIP REMOVAL AND REDUCED DISTORTION ON THE FINISHED PART.
   ADDITIONALLY, USE HIGH PRESSURE AIR TO FACILITATE CHIP REMOVAL DURING THE MACHINING PROCESS.



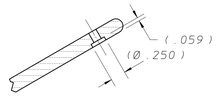
DETAIL Y
SCALE 4:1



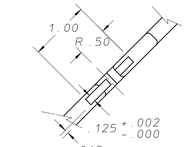
SECTION C–C
TYPICAL, 4 PLACES
ROTATED 90°



VIEW Z–Z
TRUE PROJECTION



SECTION D–D



VIEW X–X
SLOT MACHINING
DETAIL
SEE NOTE 5

21G7096B

REQD	ITEM	PART NO.	DESCRIPTION
1	1	-	STAINLESS STEEL, TYPE 304, 1.25" THK, Ø17.25

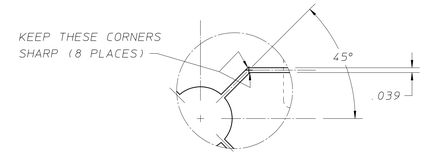
REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		A2	6/20/01	ADDED NOTE 5 CALLOUT TO VIEW X-X
			C3	6/20/01	ADDED NOTE 4 CALLOUT FOR SLOT
A	DWC		B2	6/17/99	ADDED 4.608 DIMENSION TO SCALLOP CENTER
			B3/B4		ADDED VIEW X-X
			B4		REMOVED PIN HOLES, ADDED SCALLOP AND SLOT DIM.
			D6		REMOVED PIN HOLES, ADDED SLOTS AND DIM.
			B3		MOVED R.03 DIMENSION TO THIS LOCATION
			B4		ADDED TAB GEOMETRY AND RELATED DIMENSIONS

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .001 FINISH 32 √
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° OUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .020 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

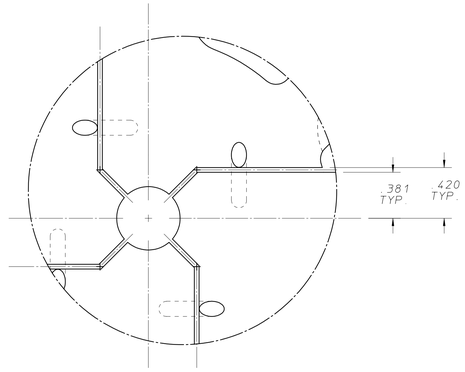
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT METH. TAG
DWG. BY D. CHENG DATE 5-7-99
CHK. BY DWC DATE 6/10/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
CHOPPER ELECTRODE FIRST MACHINING

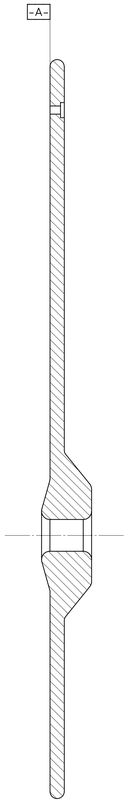
PATENT CLEAR | DWG. TYPE ASSEMBLY | SHOWN ON 21G7106 | SCALE FULL | DO NOT SCALE PRINTS
MICROFILMED | DESIGN ACCT. NO. 8210-14 | CATEGORY CODE FE3111 | DWG. NO. 21G7096 | SIZE B | REV.

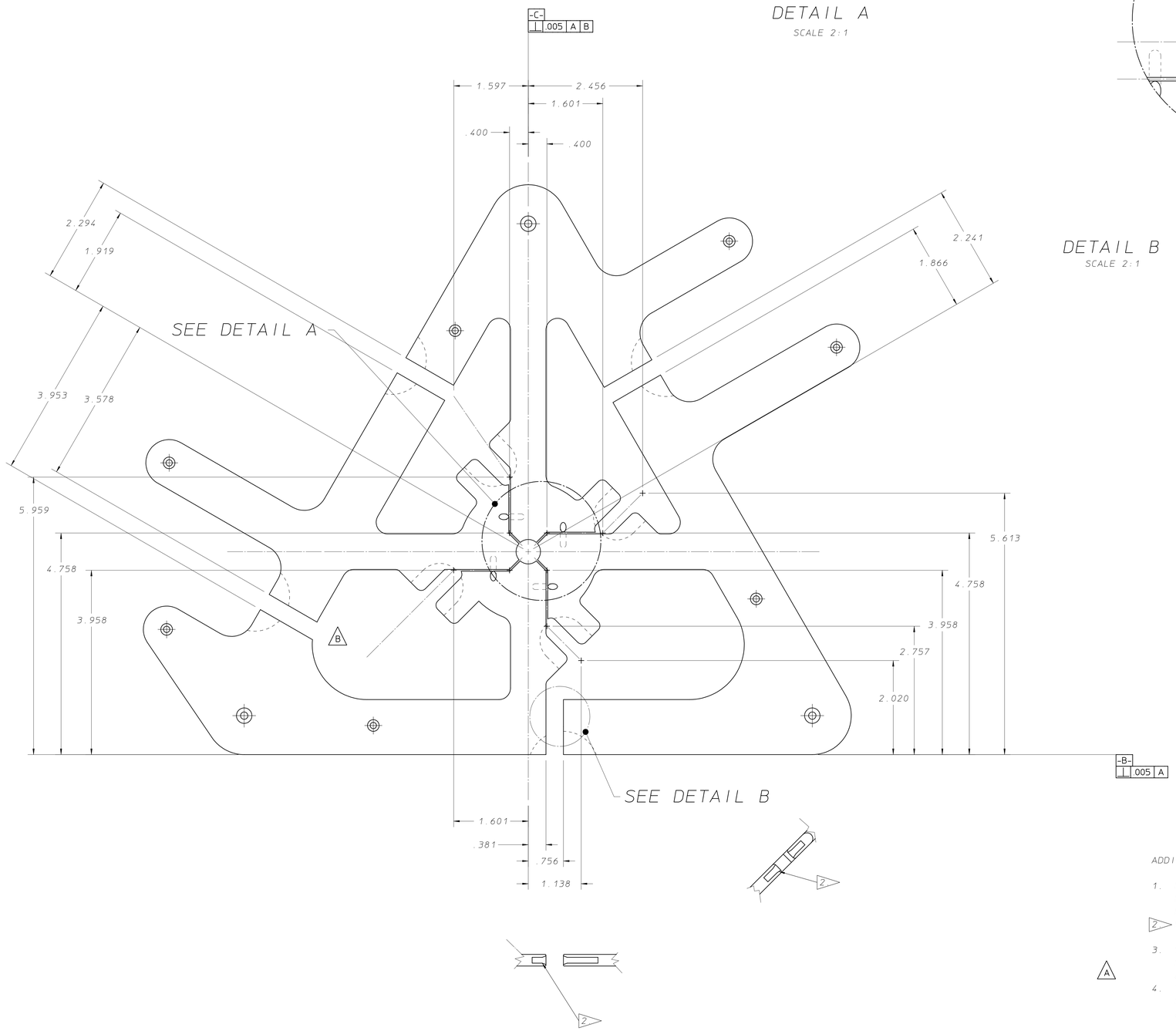


DETAIL A
SCALE 2:1



DETAIL B
SCALE 2:1





ADDITIONAL NOTES:

1. PART SHALL NOT HAVE ANY SHARP EDGES, EXCEPT WHERE INDICATED. BREAK ALL OTHER EDGES TO .030"
2. BREAK EDGES TO APPROXIMATELY .03 CHAMFERS, 16 LOCATIONS.
3. SAND AND FILE THE EDMed SURFACES TO REMOVE THE SCALE AND SURFACE PITTING.
4. THIS IS A HIGH-VOLTAGE PART. SHARP CORNERS SHOULD BE ROUNDED AFTER MACHINING.

A

21G7106B

REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		A5	8/23/01	CHANGED PERIMETER CUTS TO .375" WIDE, TYP.
A	DWC			6/20/01	CHANGED SURFACE TREATMENT TO ELECTROPOLISH
A	DWC		A2	6/20/01	ADDED NOTES 3-4

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 32
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .020 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD.
DELIVER TO
SURFACE TREATMENT ELECTROPOLISH
IDENT METH TAG
DWG BY D. CHENG DATE 6-7-99
CHK BY DWC DATE 6/10/99

REQD	ITEM	PART NO.	DESCRIPTION
1	1	21G7096	CHOPPER ELECTRODE FIRST MACHINING

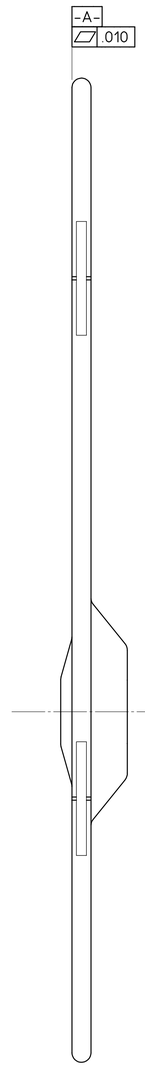
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
CHOPPER ELECTRODE SECOND MACHINING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7114	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV
	8210-14	FE3111	21G7106	B

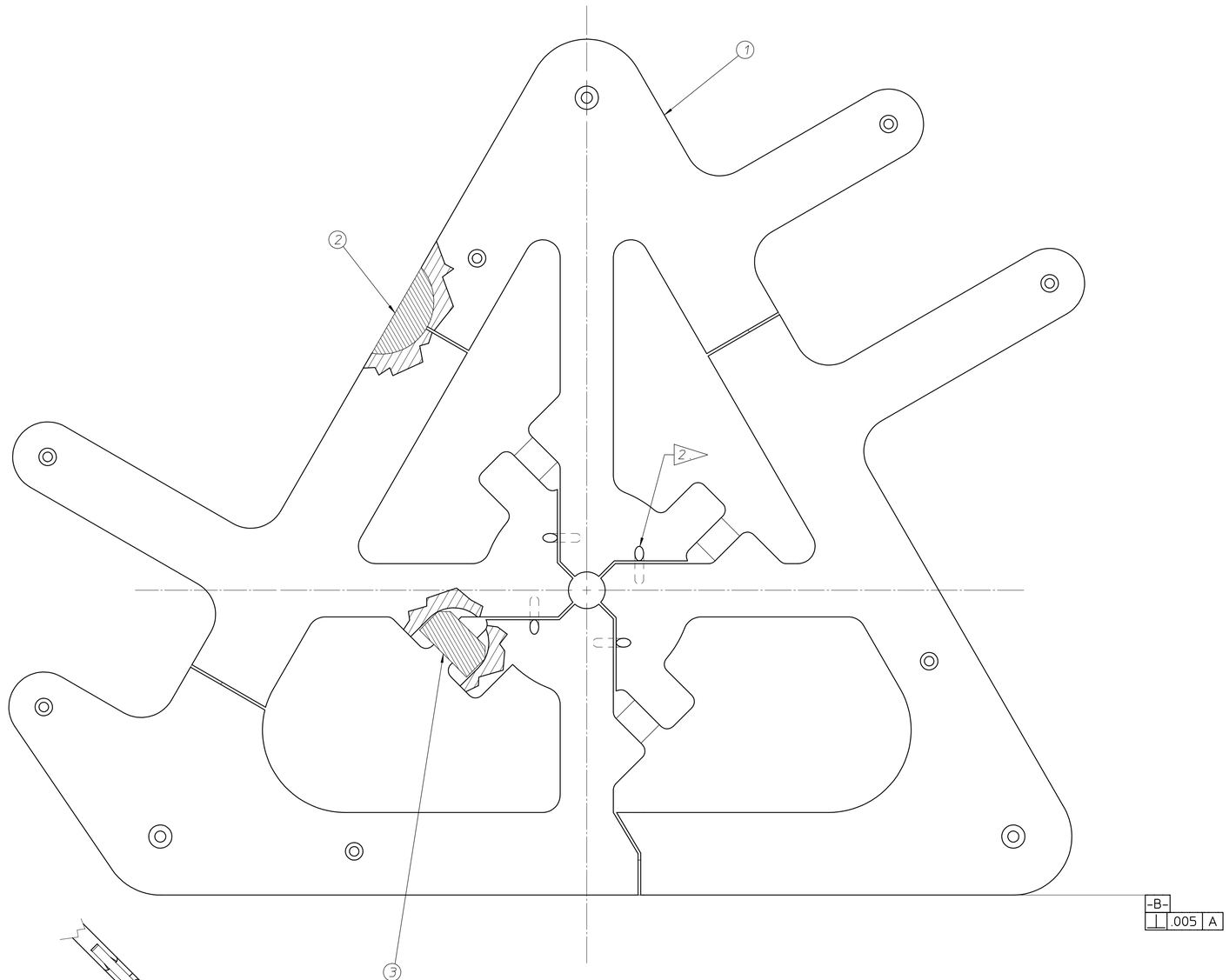
REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7106	CHOPPER ELECTRODE SECOND MACHINING
4	2	21G7362	CERAMIC STANDOFF KEY, ROUND
4	3	21G7372	CERAMIC STANDOFF KEY, RECTANGULAR

ADDITIONAL NOTES:

1. PART SHALL NOT HAVE ANY SHARP EDGES, EXCEPT WHERE INDICATED, BREAK ALL OTHER EDGES TO .030"
2. THE FOUR SEGMENTS OF ITEM (1) ARE TO BE SET ON BLOCKS AND ALIGNED WITH A #39 (Ø.995) DRILL ROD SET IN TO THE PIN HOLES.
3. ITEMS (2) AND (3) SHALL BE JOINED TO ITEM (1) USING EPON/VERSAMID EPOXY.
4. PRIOR TO JOINING, EPOXY MUST BE VACUUM PUMPED TO REMOVE GAS CONTENT. REFER TO ENG. NOTE M8000 TITLED, "PREPARING EPON-VERSAMID EPOXY FOR VACUUM SERVICE."
5. WET ALL CONTACT SURFACES OF THE CERAMIC (ITEMS (2) AND (3)), AS WELL AS THE INSIDE SURFACES OF ITEM (1) PRIOR TO INSERTION.
6. REMOVE ALL EXCESS EPOXY FROM THE JOINTS AFTER ASSEMBLY.
6. ALLOW TO CURE FOR 24 HOURS BEFORE REMOVING FROM BLOCKING FIXTURE.



THIS VIEW IS NOT A TRUE PROJECTION



21G7114A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C8	9/13/01	ADDED REFERENCE TO ENG. NOTE M8000 IN NOTE 4

UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ± 1°; .XXX ± .001 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

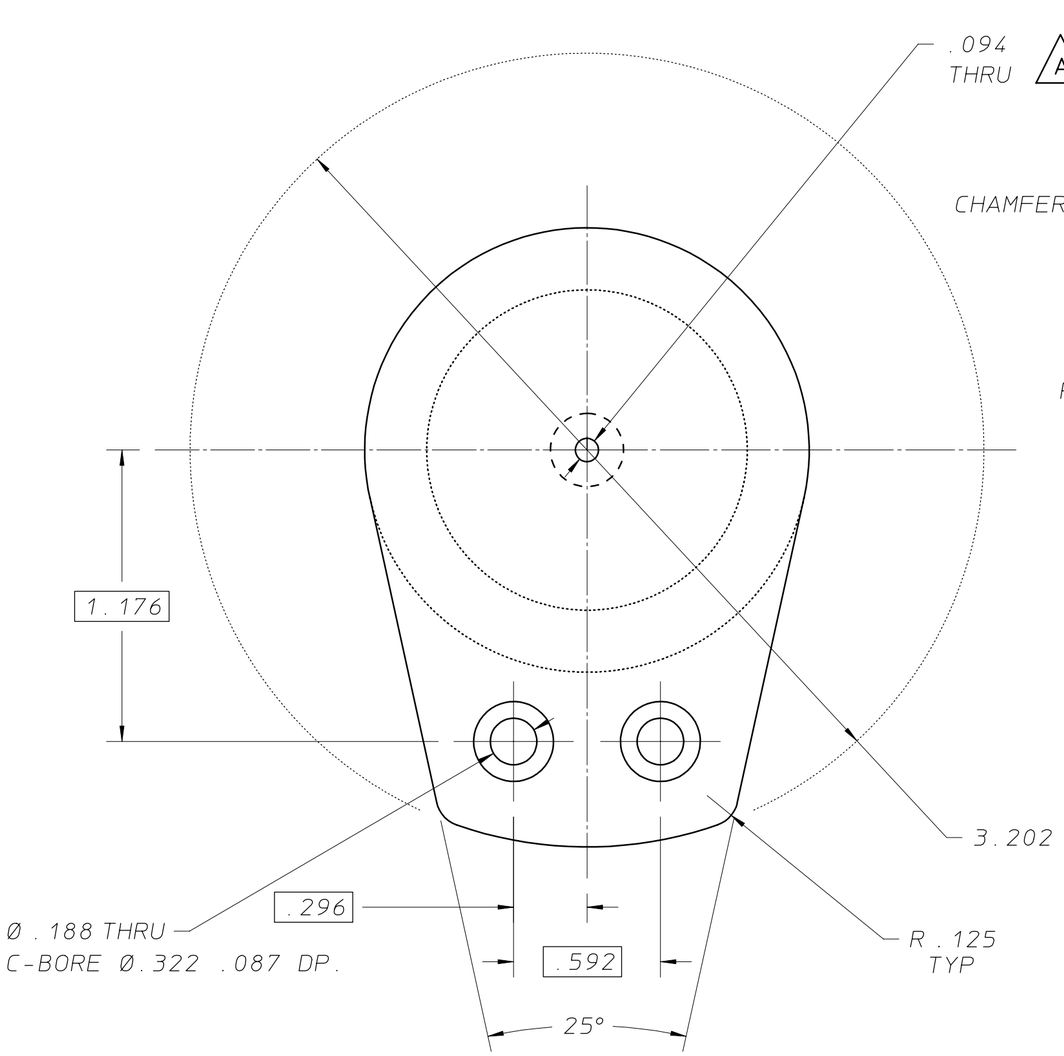
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG
DATE 6-9-99
CHK. BY
DATE

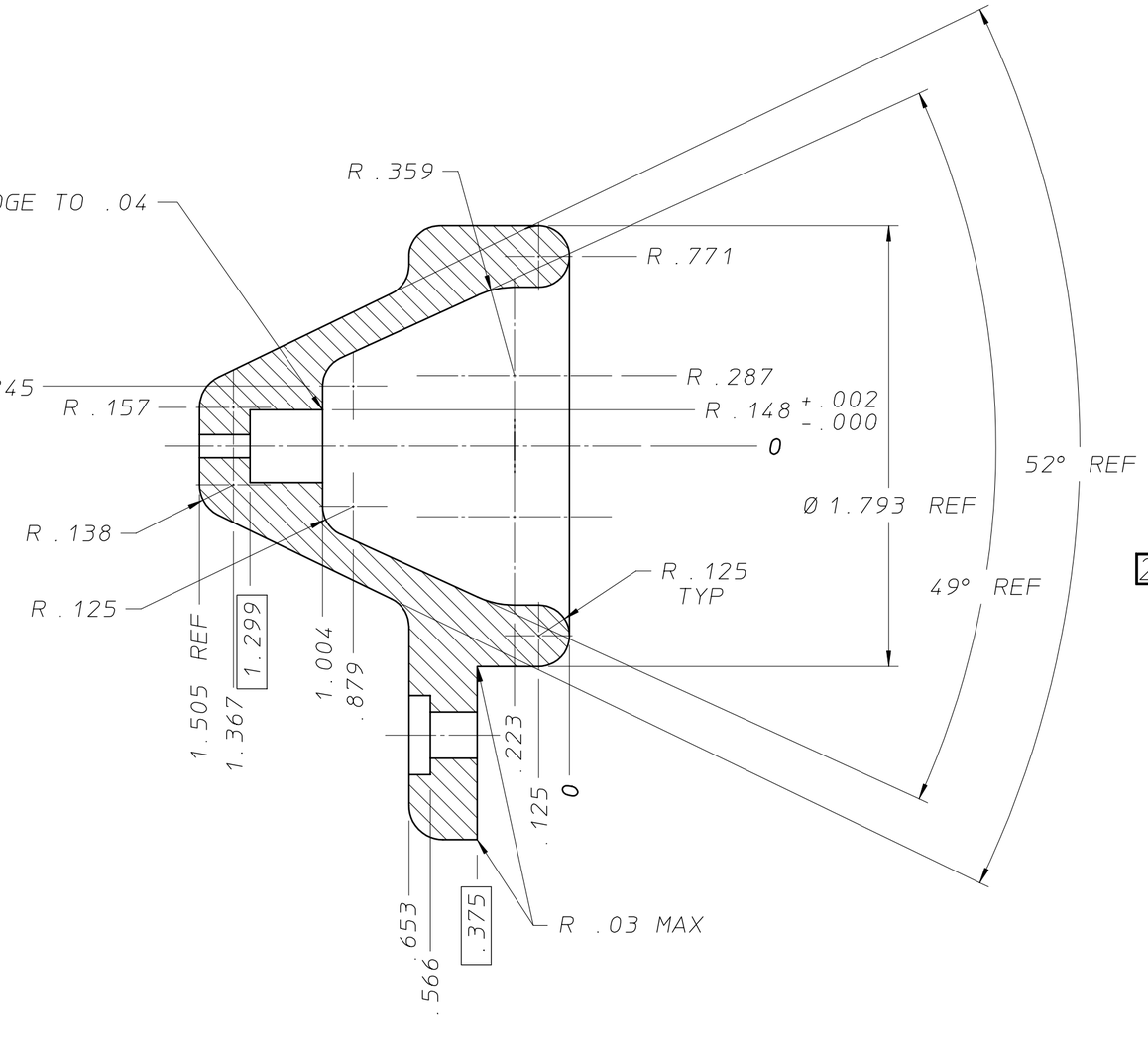
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
CHOPPER ELECTRODE ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY	21G7356		
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7114	A

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304

NOTES:
1. THIS PART WILL SEE HIGH VOLTAGES. CARE MUST BE TAKEN TO KEEP SURFACES FROM DEEP GOUGES AND SCRATCHES.





21G7123A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C4	6/1/99	ADDED .094 VENT HOLE

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ± 1°; .XXX ± .005 FINISH 32

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

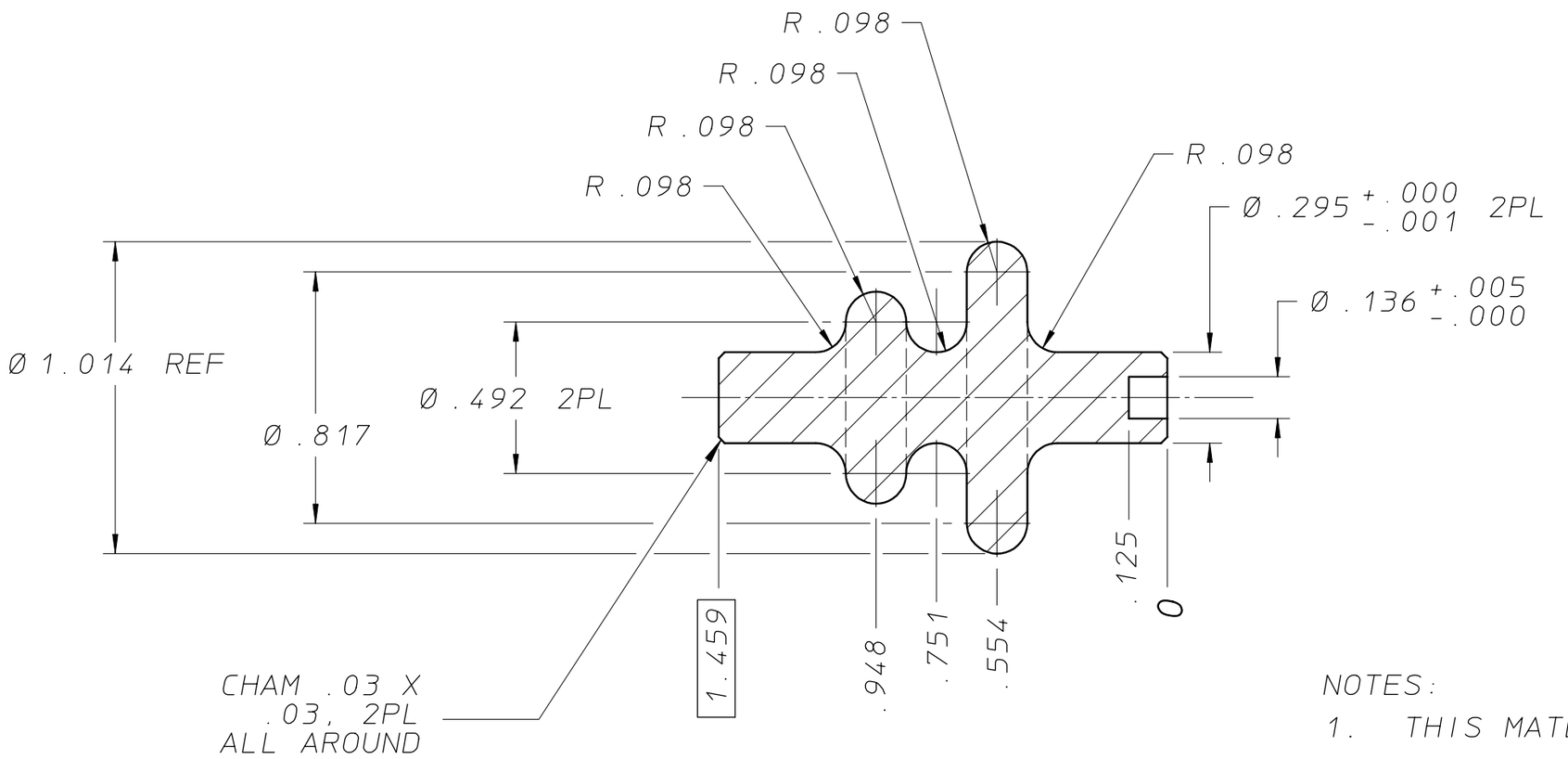
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: ELECTROPOLISH
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 5-14-99
CHK. BY | DATE

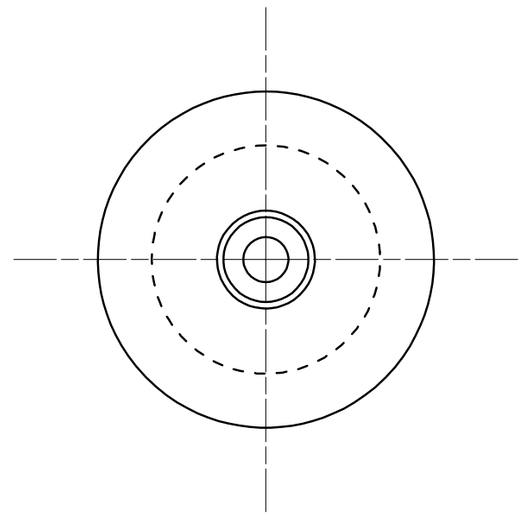
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
GROUND-CHOPPER INSULATOR SHIELD, OUTER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7252	2:1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7123	A

21G7132	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	ALUMINA, 85% Al2O3





NOTES:

1. THIS MATERIAL TO BE MACHINED FROM GREEN MATERIAL (85% Al2O3) THEN FIRED AFTER MACHINING.

REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 32 ✓

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 5-14-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

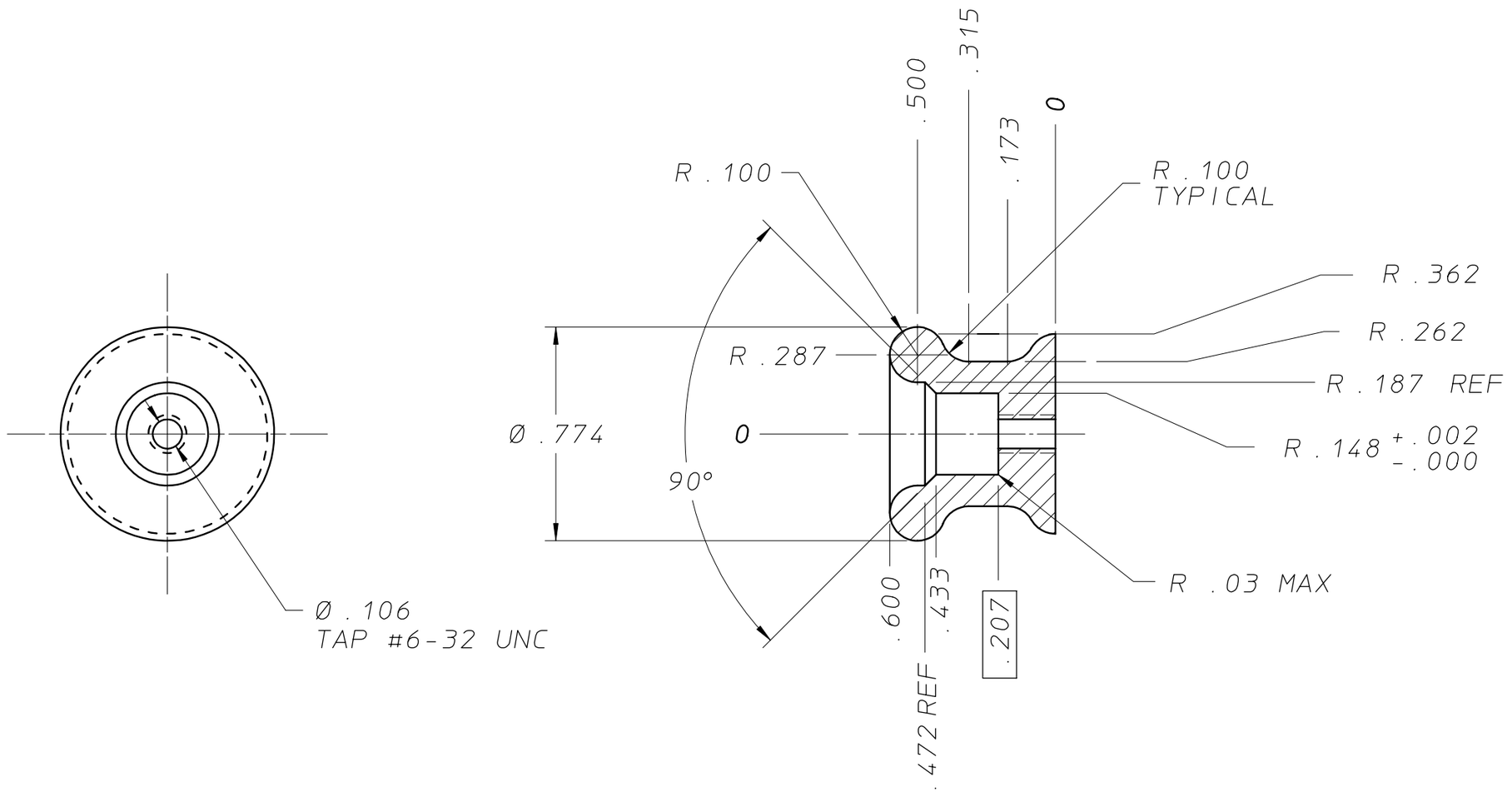
SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

GROUND-CHOPPER INSULATOR

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7252	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7132

21G7142	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	STAINLESS STEEL, TYPE 304



REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ±.01 .XXX ±.005

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT ELECTROPOLISH

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 5-14-99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

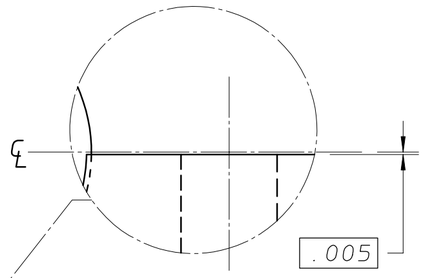
MECHANICAL SYSTEMS

GROUND-CHOPPER INSULATOR SHIELD, INNER

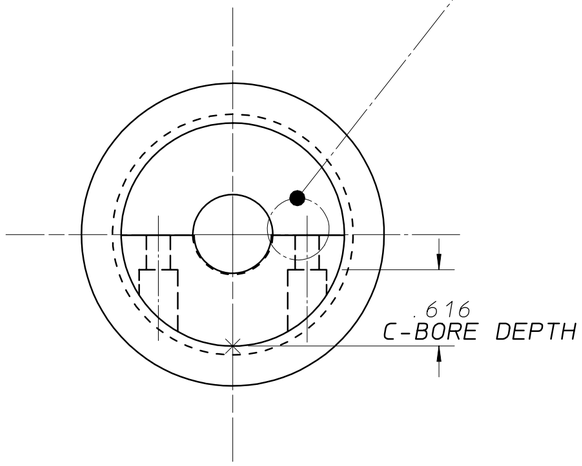
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7252	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO / REV
	8210-14	FE3111	21G7142

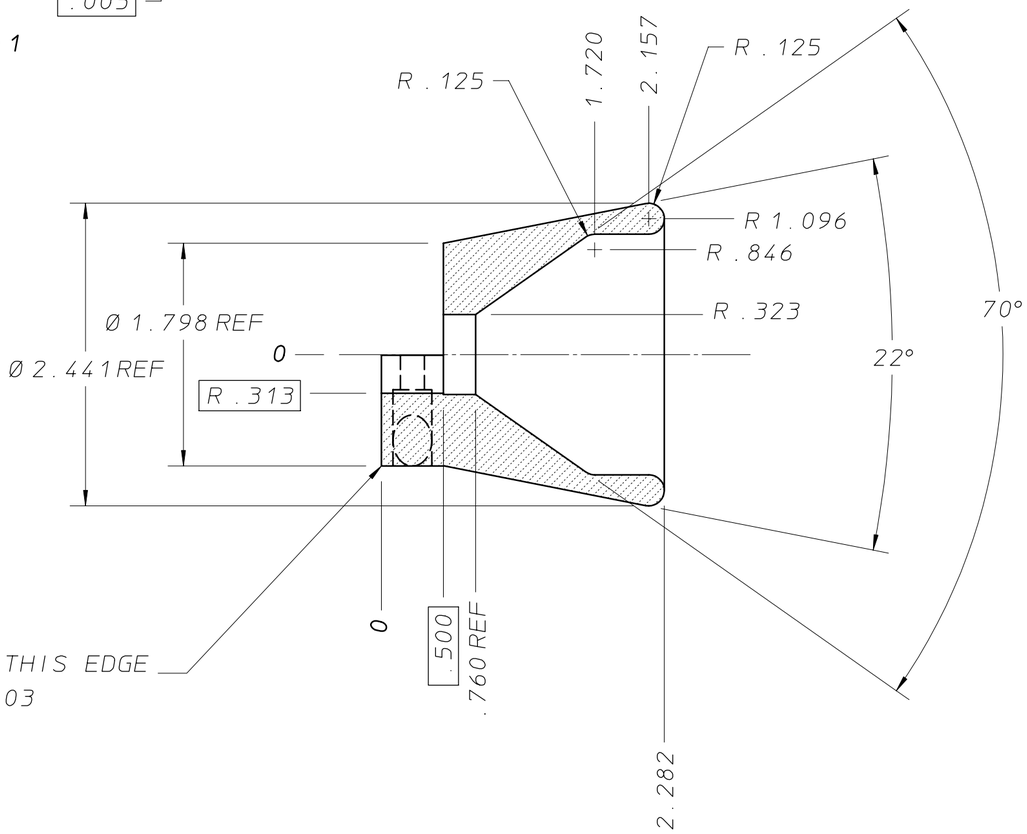
REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304

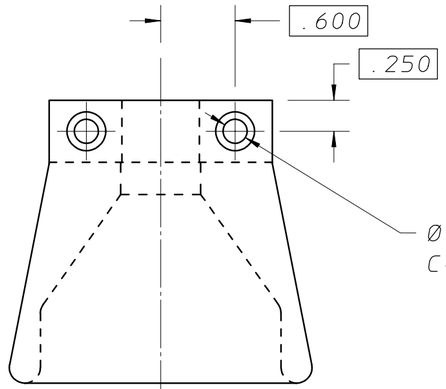
NOTES:
1. THIS PART WILL SEE HIGH VOLTAGES. CARE MUST BE TAKEN TO KEEP SURFACES FROM DEEP GOUGES AND SCRATCHES.



SCALE 4:1







21G7153

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ±. 1°; .XXX ± .005 FINISH 32

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT ELECTROPOLISH
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 5-14-99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

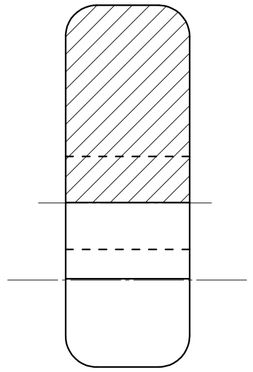
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
MAIN GROUND INSULATOR SHIELD, OUTER

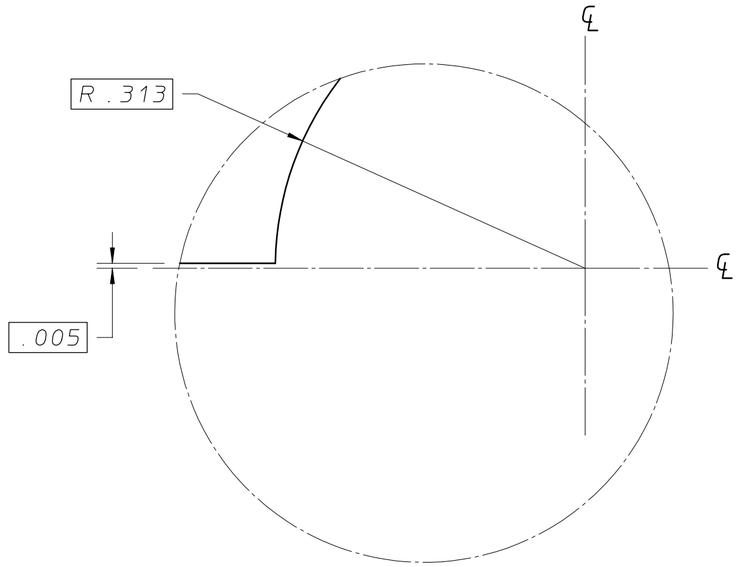
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7263	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7153	

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304

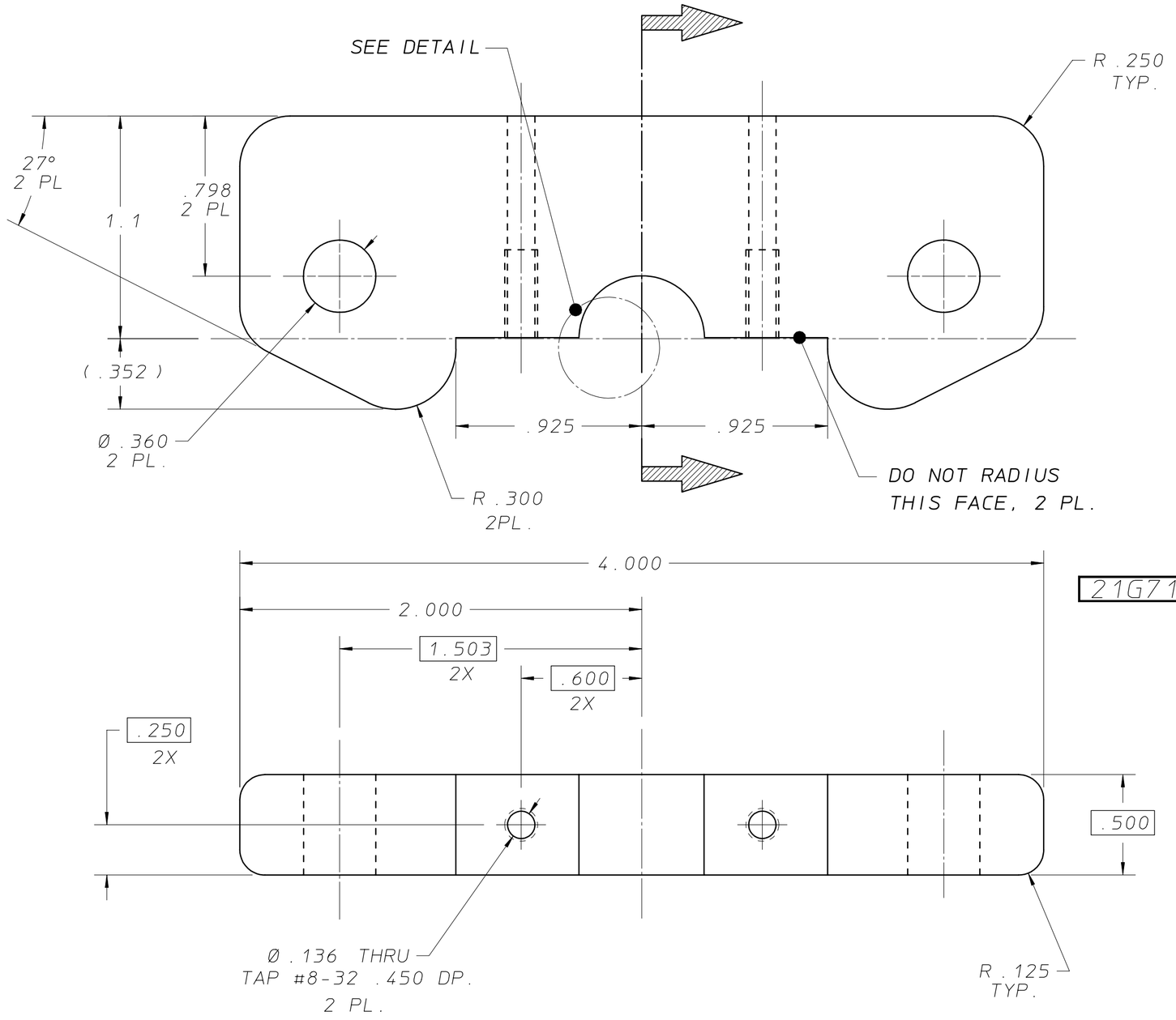
NOTES:

1. THIS PART WILL SEE HIGH VOLTAGES. CARE MUST BE TAKEN TO KEEP SURFACES FROM DEEP GOUGES AND SCRATCHES.





SCALE 4:1



21G7163

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 FRAC. ±1/64; .XX ± .01 ANGLES ±. 1°; .XXX ± .005 FINISH 32 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

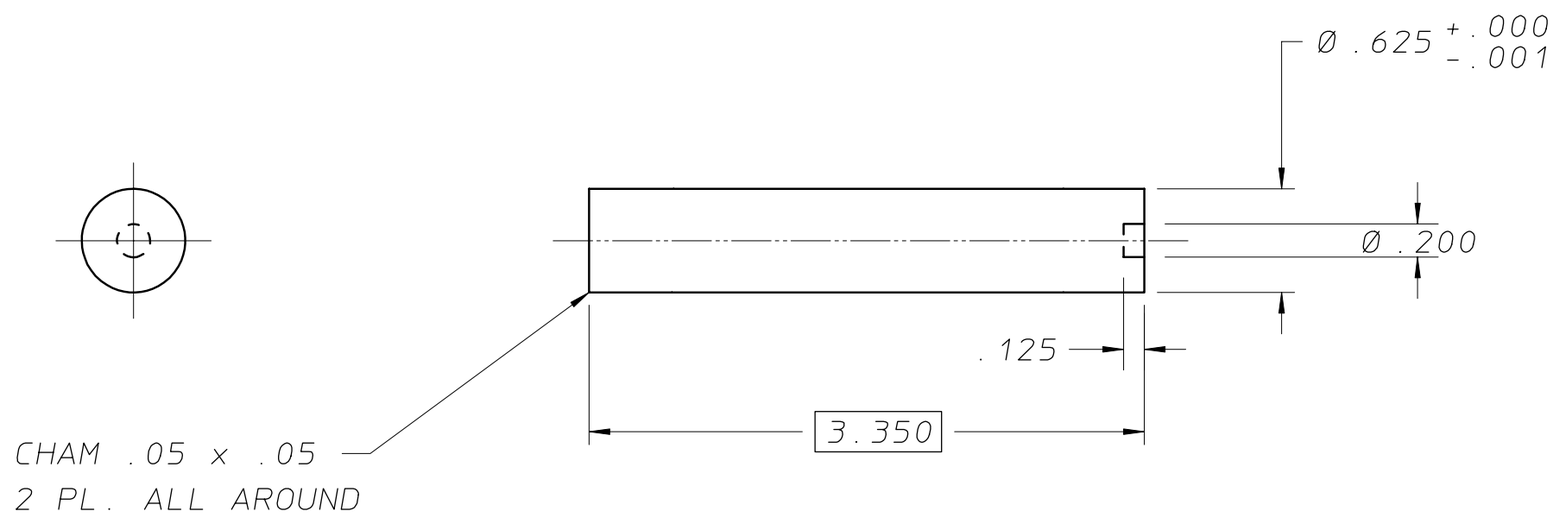
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT ELECTROPOLISH
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 5-14-99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
MAIN GROUND INSULATOR SHIELD, CLAMP

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7263	2:1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7163	

21G7172	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	ALUMINA, AT LEAST 99% Al2O3



REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.002

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 5-14-99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

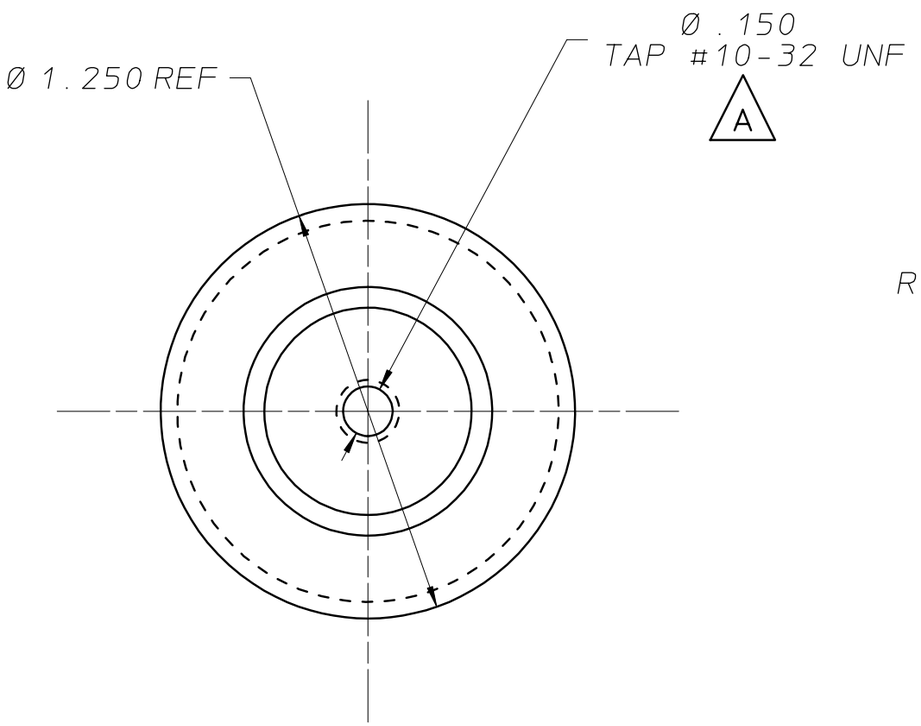
SNS-FES ION SOURCE AND LEBT

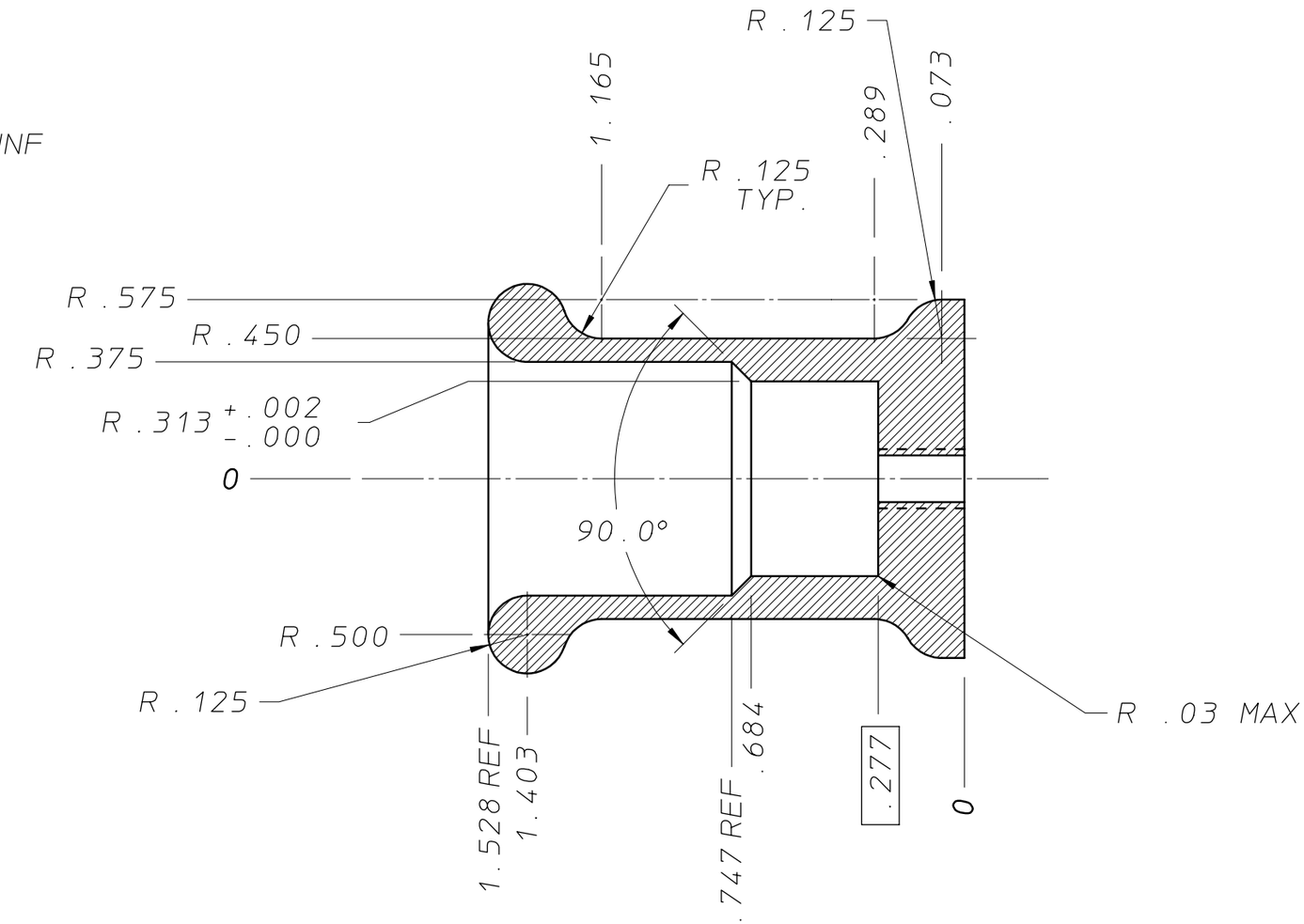
MECHANICAL SYSTEMS

MAIN GROUND INSULATOR

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7263	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7172

21G7182A	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	STAINLESS STEEL, TYPE 304





REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		8/10/99	#10-32 CALLOUT WAS #10-24

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ±.01 .XXX ±.005

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 5-14-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

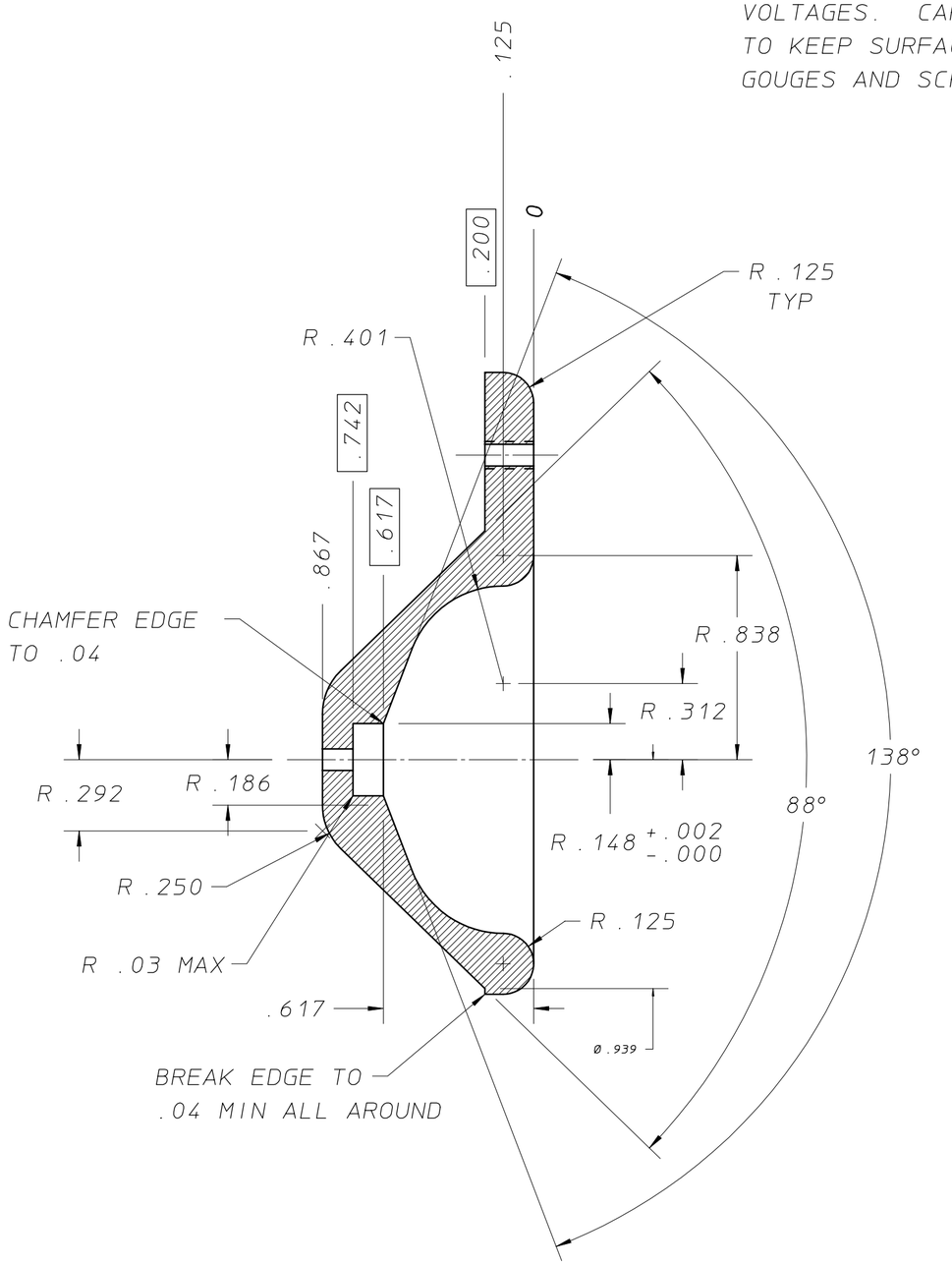
MECHANICAL SYSTEMS

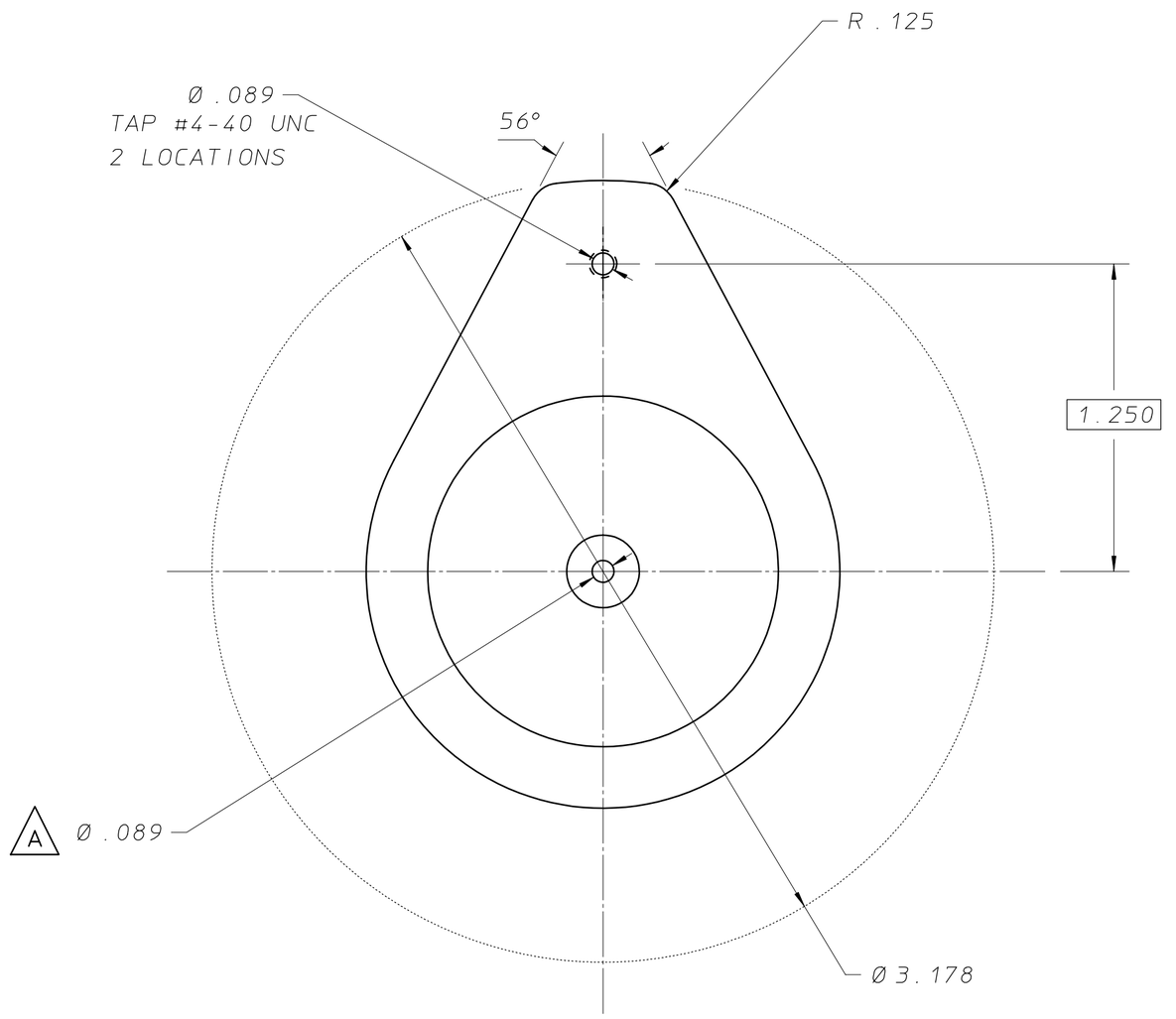
MAIN GROUND INSULATOR SHIELD, INNER

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7263	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7182A

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304

NOTES:
1. THIS PART WILL SEE HIGH VOLTAGES. CARE MUST BE TAKEN TO KEEP SURFACES FROM DEEP GOUGES AND SCRATCHES.





21G7193A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C2	6/14/99	CHANGED TAPPED HOLE TO THROUGH HOLE

UNLESS OTHERWISE SPECIFIED

TOLERANCES		
.X ± .1	FRAC. ±1/64	
.XX ± .01	ANGLES ±. 1°	
.XXX ± .005	FINISH 32 √	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 5-14-99
CHK. BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

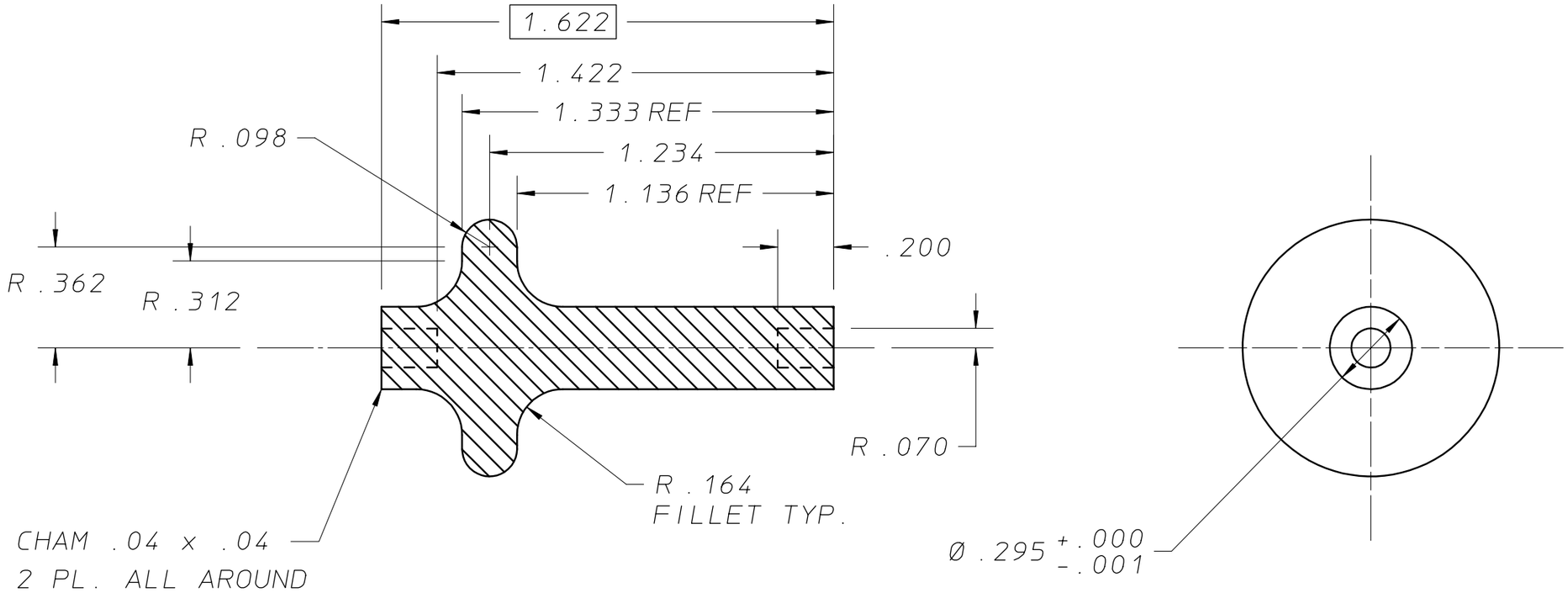
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
G3 INSULATOR SHIELD, OUTER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7272	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7193	A

21G7202	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	ALUMINA, 85% Al203

NOTES:

1. THIS PART TO BE MACHINED GREEN (85% Al203) PRIOR TO FIRING.



REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 5-16-99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

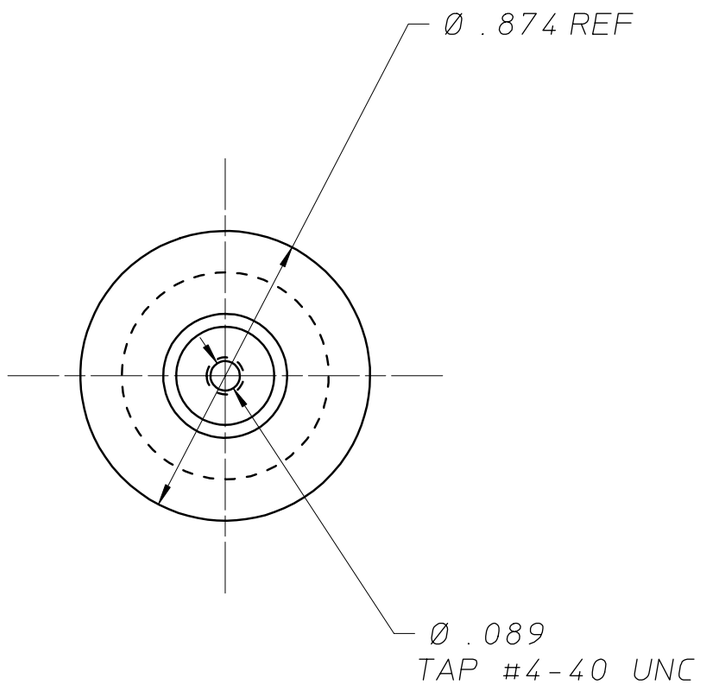
SNS-FES ION SOURCE AND LEBT

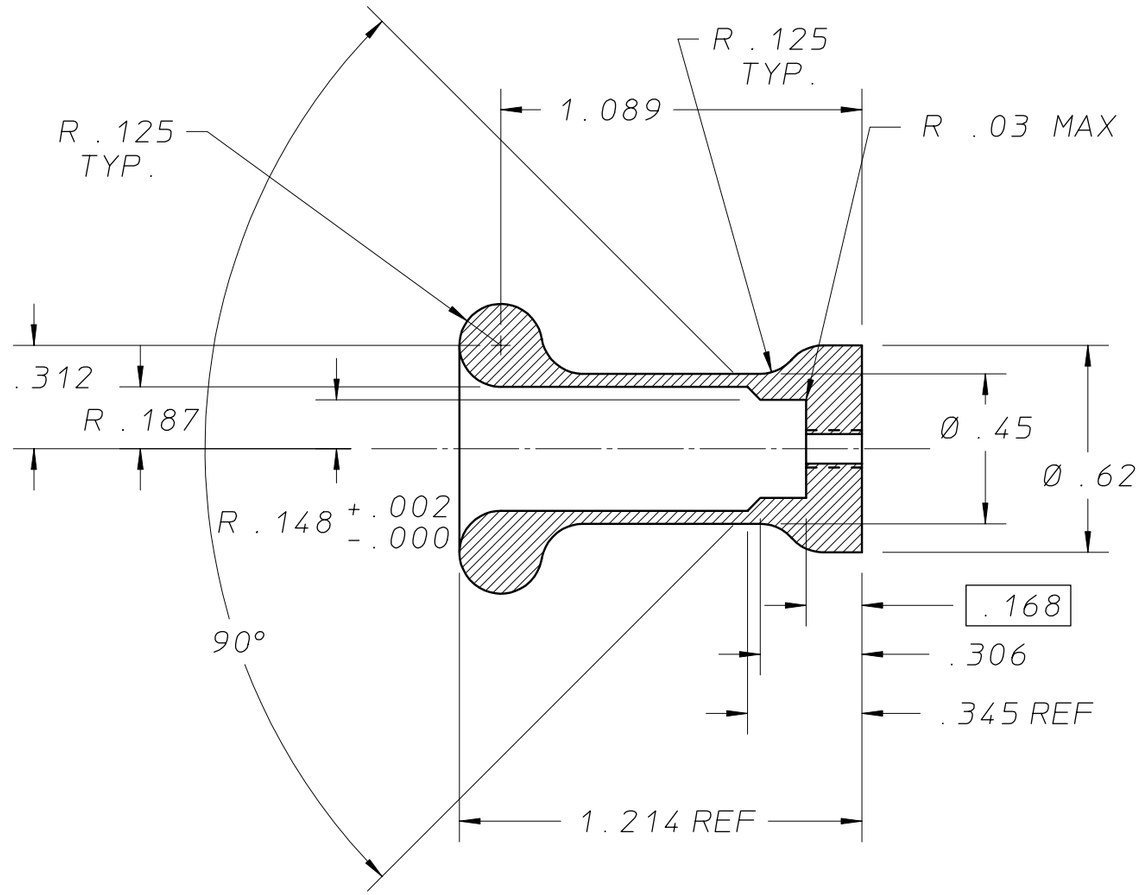
MECHANICAL SYSTEMS

G3 INSULATOR STANDOFF

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7272	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO / REV
	8210-14	FE3111	21G7202

21G7212	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	STAINLESS STEEL, TYPE 304





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ± .1 .XX ± .01 .XXX ± .005

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 5-16-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

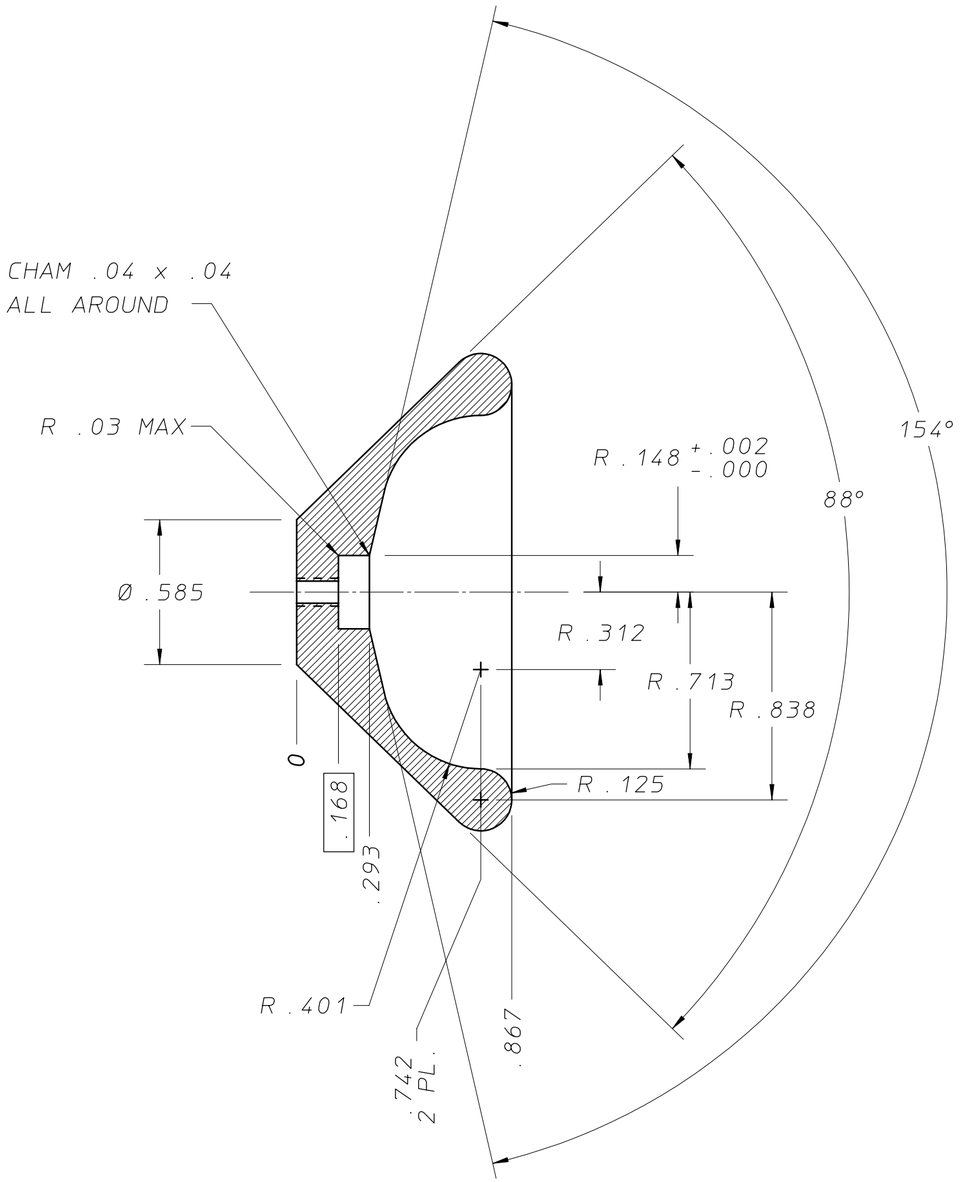
SNS-FES ION SOURCE AND LEBT

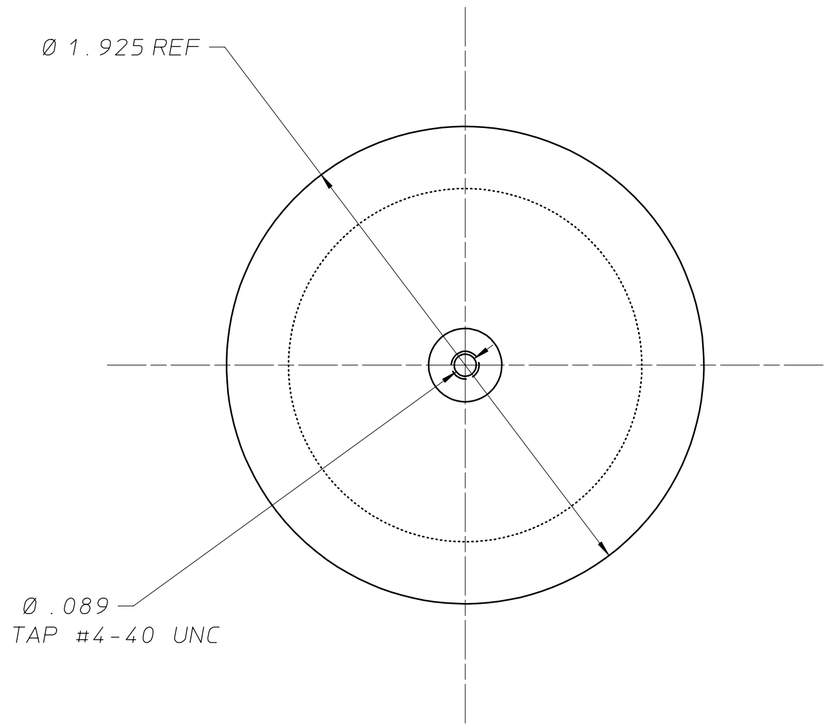
MECHANICAL SYSTEMS

G3 INSULATOR SHIELD, INNER

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7272	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO / REV
	8210-14	FE3111	21G7212

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304





21G7223

NOTES:
1. THIS PART WILL SEE HIGH VOLTAGES. CARE MUST BE TAKEN TO KEEP SURFACES FROM DEEP GOUGES AND SCRATCHES.

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1; FRAC. ±1/64; .XX ± .01; ANGLES ±. 1°; .XXX ± .005; FINISH 32 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

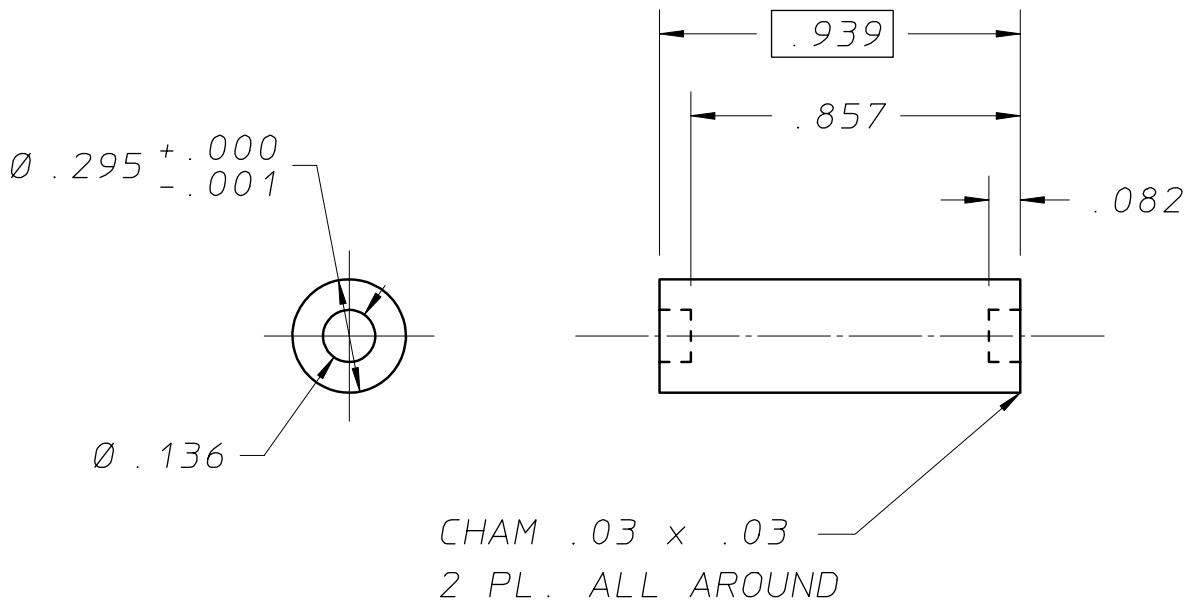
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: ELECTROPOLISH
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 5-16-99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
EXTRACTOR INSULATOR SHIELD, OUTER

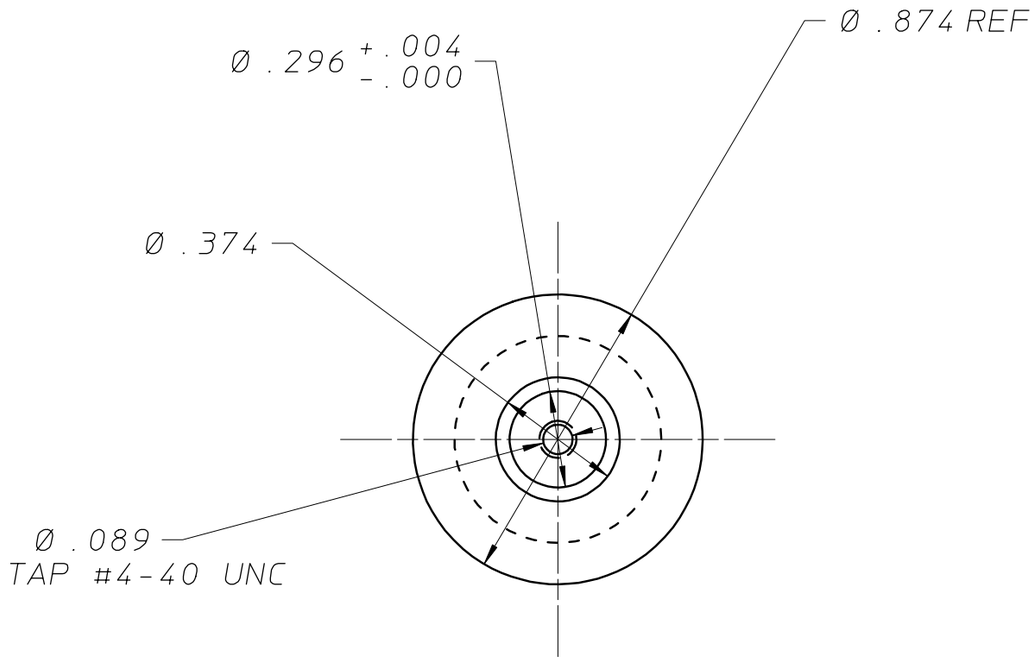
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7282	2 : 1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7223	

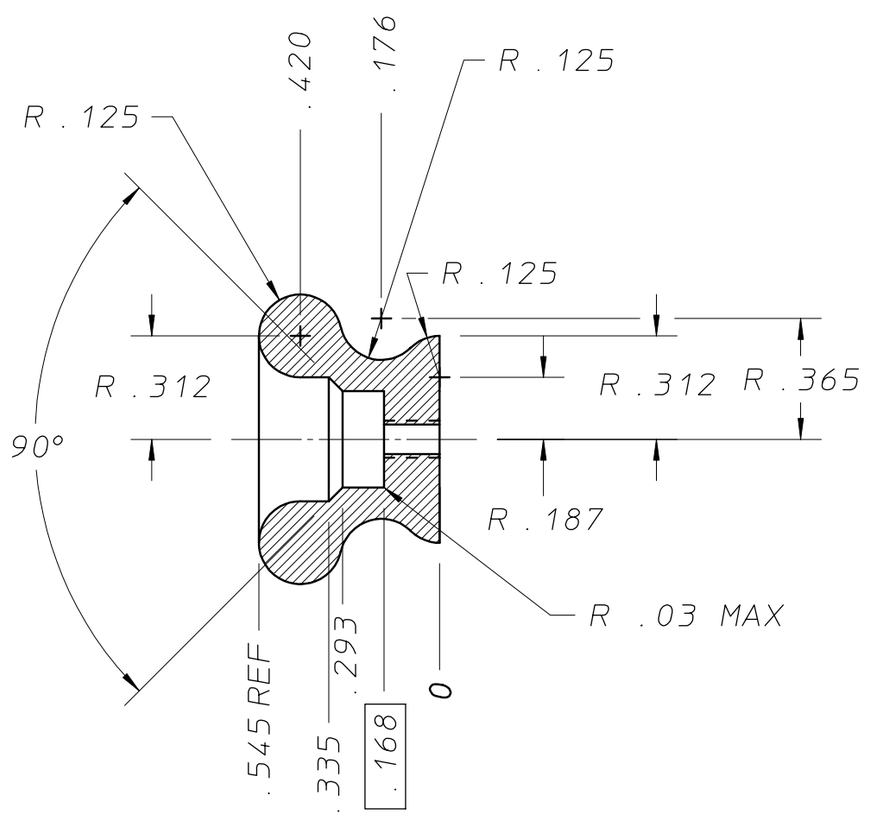
Dwg. No. 21G7231 Size Rev



Material - ALUMINA, AT LEAST 99% Al203		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California - Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number -	Finish √ 32	MECHANICAL SYSTEMS			
Date Issued -	Date Reqd -	EXTRACTOR INSULATOR STANDOFF			
Number Required -	Deliver To -	Shown on Dwg No. 21G7282			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By D. CHENG	Date 5-16-99	Micro-Filmed	Drawing Scale 2:1	Dwg. No. 21G7231	Size Rev
Check By	Date	Design Account 8210-14	Drawing Type Detail		

21G7242	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	STAINLESS STEEL, TYPE 304





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 32 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 5-16-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

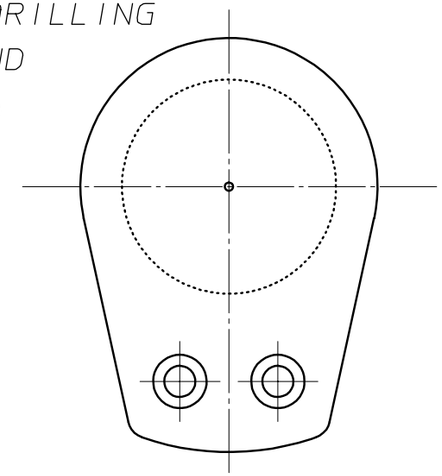
EXTRACTOR INSULATOR SHIELD, INNER

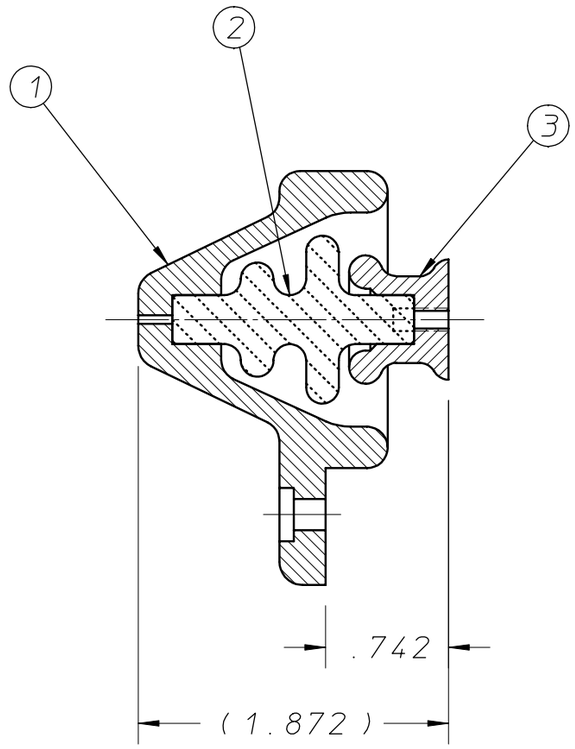
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 2:1
	DETAIL	21G7282	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7242

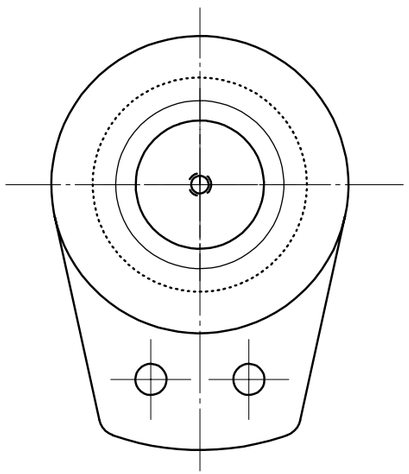
ADDITIONAL NOTES:

1. PART (2) IS TO BE JOINED TO PARTS (1) AND (3) USING EPON/VERSAMID EPOXY.
2. PRIOR TO JOINING, EPOXY MUST BE VACUUM PUMPED TO REDUCE THE GAS CONTENT. SEE ENGINEERING NOTE M8000, TITLED, "PREPARING EPON-VERSAMID EPOXY FOR VACUUM SERVICE".
3. AFTER CURING, ENSURE THAT NO TRAPPED VOLUMES ARE LEFT IN THE JOINT BY DRILLING VENT HOLES, AND CHASING WITH A TAP IF NECESSARY.

21G7252A	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1	21G7123	GROUND-CHOPPER INSULATOR SHIELD, OUTER
	1	2	21G7131	GROUND-CHOPPER INSULATOR STANDOFF
	1	3	21G7142	GROUND-CHOPPER INSULATOR SHIELD, INNER







REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		9/15/01	ADDED REFERENCE TO ENG. NOTE M8000 TO NOTE 2.

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ± .1 .XX ± .01 .XXX ± .010

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 5-20-99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

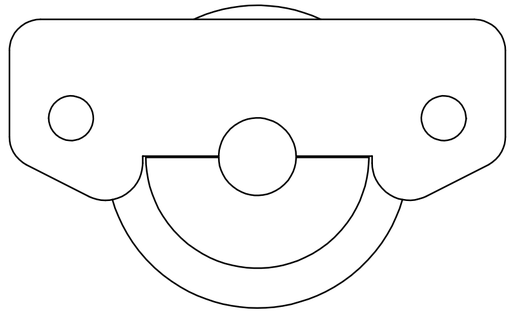
GROUND-CHOPPER INSULATOR ASSEMBLY

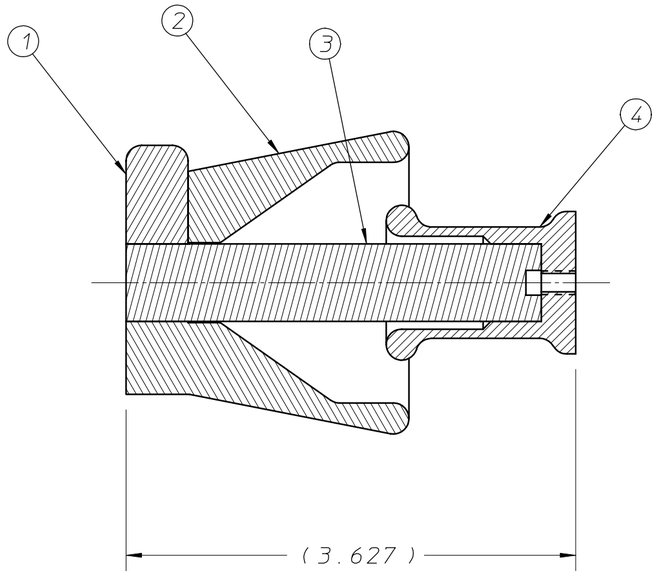
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	21G7116	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7252A

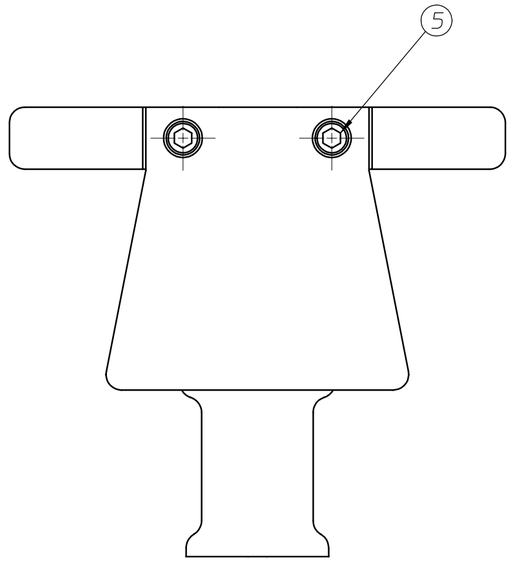
REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7163	MAIN GROUND INSULATOR SHIELD, CLAMP
1	2	21G7153	MAIN GROUND INSULATOR SHIELD, OUTER
1	3	21G7172	MAIN GROUND INSULATOR STANDOFF
1	4	21G7182	MAIN GROUND INSULATOR SHIELD, INNER
2	5		#8-32 UNC SHCS, STAINLESS, .75" LONG

ADDITIONAL NOTES:

1. PART (3) IS TO BE JOINED TO PART (4) USING EPON/VERSAMID EPOXY.
2. PRIOR TO JOINING, EPOXY MUST BE VACUUM PUMPED TO REDUCE CAS GONTENT. REFER TO ENG. NOTE M8000 TITLED "PREPPING EPON-VERSAMID EPOXY FOR VACUUM SERVICE."
3. AFTER CURING, ENSURE THAT NO TRAPPED VOLUMES ARE LEFT IN THE JOINT BY DRILLING AND CHASING THREADS WITH A TAP.







21G7263A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		D4	9/13/01	ADDED REFERENCE TO ENG NOTE M8000 IN NOTE 2

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ± 1/64 | .XX ± .01 | ANGLES ± .01° | .XXX ± .010 | FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 5-20-99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

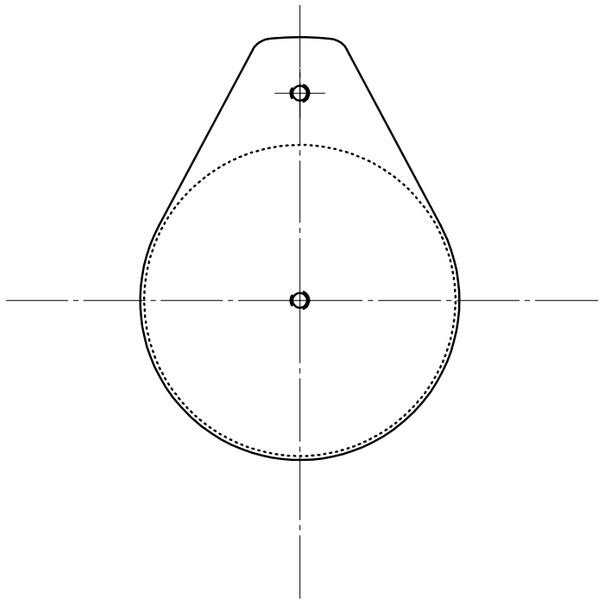
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
MAIN GROUND INSULATOR ASSEMBLY

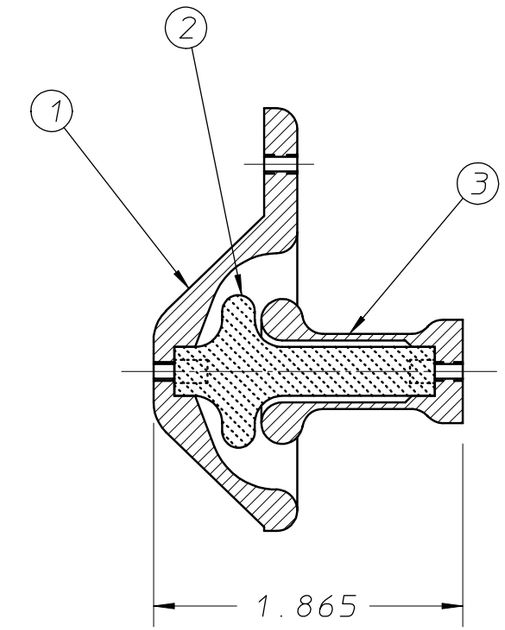
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7116	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7263	A

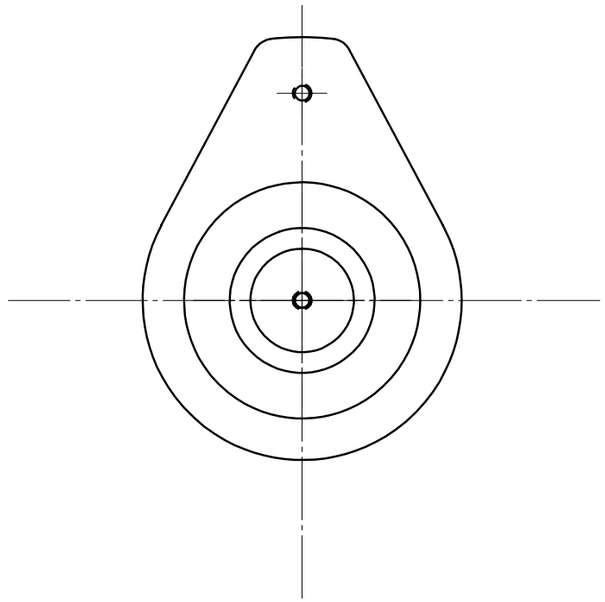
21G7272A	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1	21G7193	G3 INSULATOR SHIELD, OUTER
	1	2	21G7202	G3 INSULATOR STANDOFF
	1	3	21G7212	G3 INSULATOR SHIELD, INNER

ADDITIONAL NOTES:

1. PART (2) IS TO BE JOINED TO PARTS (1) AND (3) USING EPON/VERSAMID EPOXY.
2. PRIOR TO JOINING, EPOXY MUST BE DEGASSED TO REDUCE GAS CONTENT. REFER TO ENG. NOTE M8000 TITLED, "PREPARING EPON-VERSAMID EPOXY FOR VACCUM SERVICE".
3. AFTER CURING, ENSURE THAT NO TRAPPED VOLUMES ARE LEFT IN THE JOINT BY DRILLING AND CHASING THREADS WITH A TAP.







REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		9/15/01	ADDED REFERENCE TO ENG. NOTE M8000 IN NOTE #2.

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ± .1 .XX ± .01 .XXX ± .010

SURFACE FINISH 125

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 5-20-99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

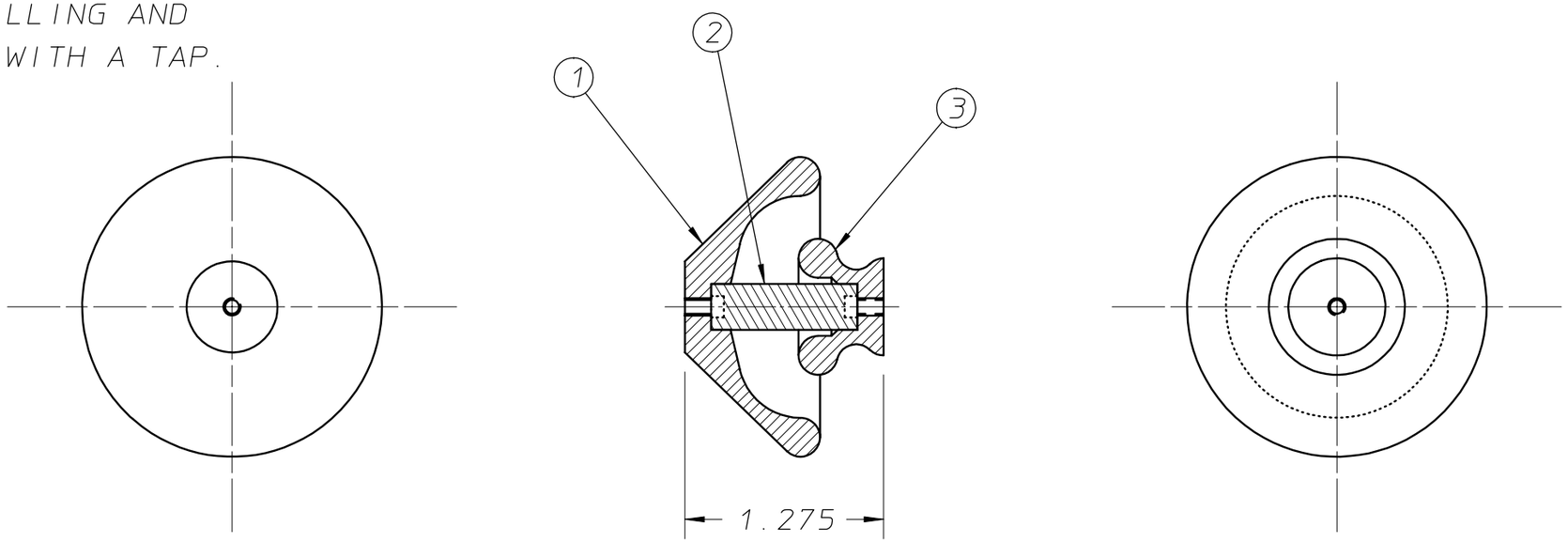
G3 INSULATOR ASSEMBLY

PAT CLEAR	DWG TYPE DETAIL	SHOWN ON 21G7116	SCALE: FULL (DO NOT SCALE PRINTS)
MICROFILMED	DESIGN ACCT NO 8210-14	CATEGORY CODE FE3111	DWG NO 21G7272A REV

21G7282A	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1	21G7223	EXTRACTOR INSULATOR SHIELD, OUTER
	1	2	21G7231	EXTRACTOR INSULATOR STANDOFF
	1	3	21G7242	EXTRACTOR INSULATOR SHIELD, INNER

ADDITIONAL NOTES:

1. PART (2) IS TO BE JOINED TO PARTS (1) AND (3) USING EPON/VERSAMID EPOXY.
2. PRIOR TO JOINING, EPOXY MUST VACUUM PUMPED TO REDUCE GAS CONTENT. REFER TO ENG. NOTE M8000 TITLED, "PREPARING EPON-VERSAMID EPOXY FOR VACUUM SERVICE".
3. AFTER CURING, ENSURE THAT NO TRAPPED VOLUMES ARE LEFT IN THE JOINT BY DRILLING AND CHASING THREADS WITH A TAP.



REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		9/15/01	ADDED REFERENCE TO ENG.
				NOTE M8000 IN NOTE #2.

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ±.01 .XXX ±.010

SURFACE FINISH 125

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 5-20-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

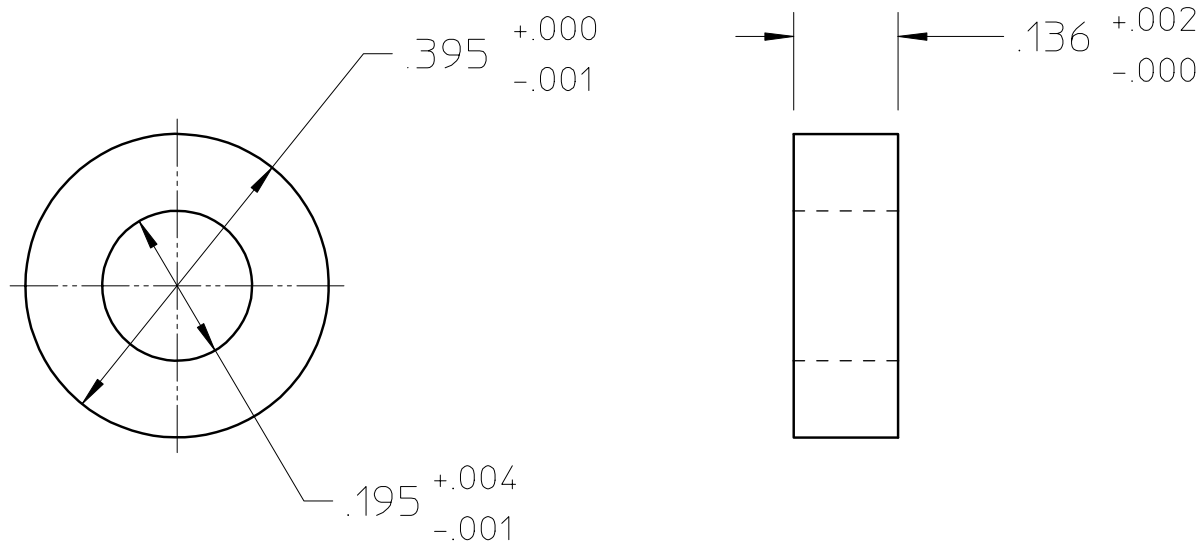
SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

EXTRACTOR INSULATOR ASSEMBLY

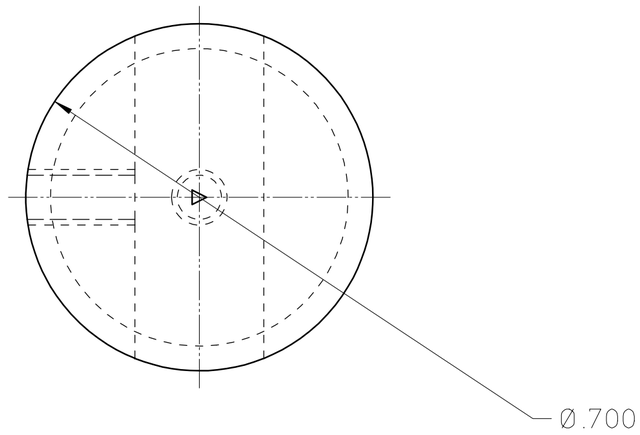
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	21G7116	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7282A

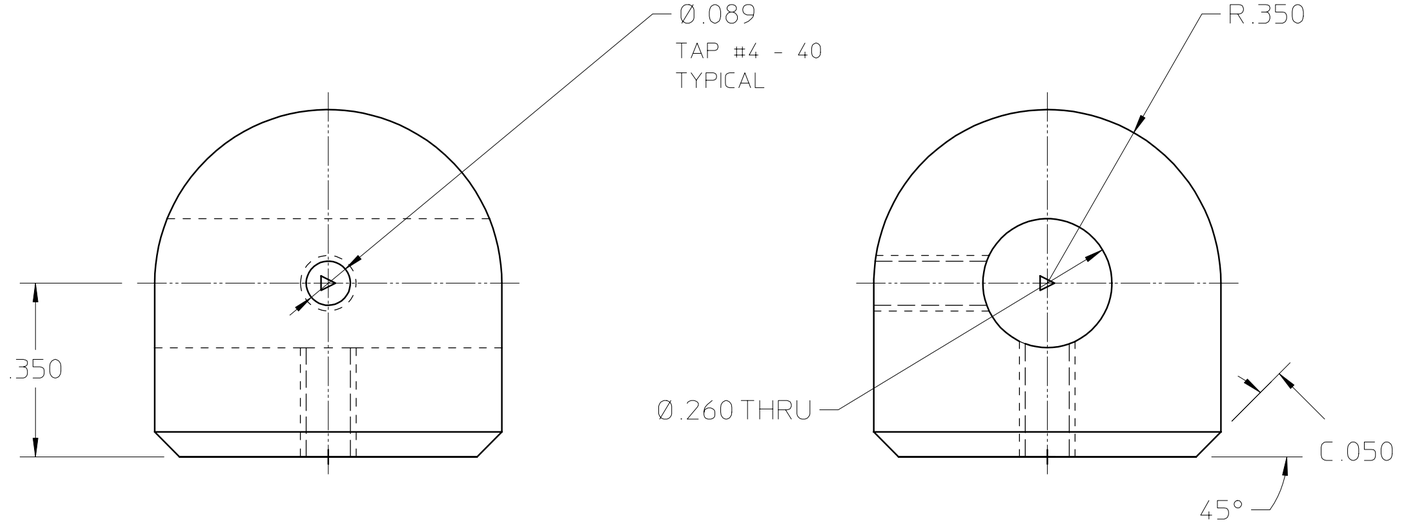
Dwg. No. 21G7301A Size Rev



Material - ALUMINUM, TYPE 6061		A	DWC	7/1/99	CHANGED MATERIAL CALLOUT	
UNLESS OTHERWISE SPECIFIED		Rev	Dwn	Date	Changes	
.X ± .1 | .XX ± .025 | .XXX ± .010 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY				
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California - Berkeley				
		SNS - FES ION SOURCE AND LEBT				
Account Number -	Finish √ 64	MECHANICAL SYSTEMS				
Date Issued -	Date Reqd -	MAIN SUPPORT HOLDOFF WASHER				
Number Required -	Deliver To -	Shown on Dwg No.				
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints		
Drawn By J. JAMES	Date 06-21-99	Micro-Filmed	Drawing Scale 4:1	Dwg. No. 21G7301	Size	Rev A
Check By	Date	Design Account 8210-14	Drawing Type Detail			

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304, .750" ROUND STOCK





21G7313

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES			
	.X ± .1	FRAC. ± 1/64	
	.XX ± .01	ANGLES ± .01°	
	.XXX ± .010	FINISH 64 √	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

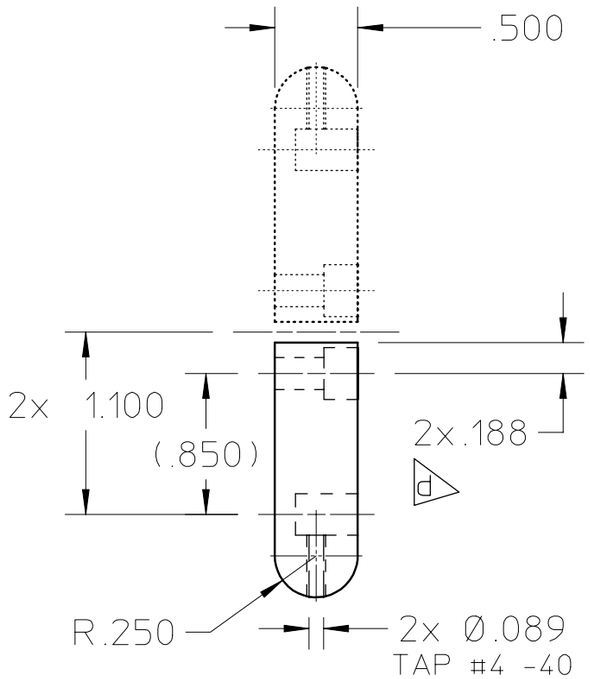
ACCT. NO.	SERIAL NO.	
DATE ISSD.	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	ELECTROPOLISH	
IDENT. METH.	TAG	
DWG. BY	J. JAMES	DATE 06-18-99
CHK. BY	D. CHENG	DATE 7/1/99

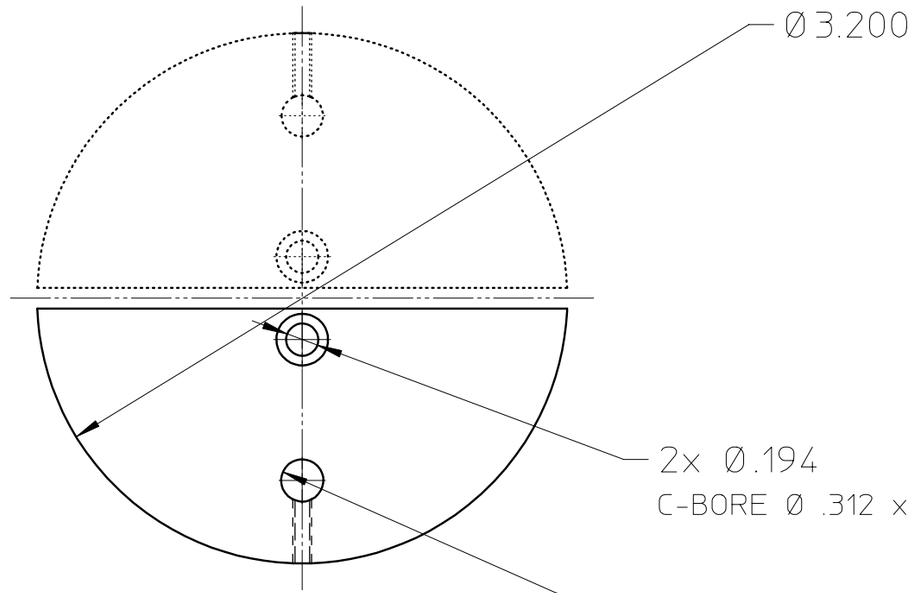
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
HIGH VOLTAGE ELECTRODE CONNECT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 4 : 1	DO NOT SCALE PRINTS
	DETAIL			
MICROFILMED	DESIGN ACCT. NO. 8210-14	CATEGORY CODE FE3111	DWG. NO. 21G7313	SIZE / REV.

21G7322	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	STAINLESS STEEL, TYPE 304





NOTES:

1. FABRICATION PROCEDURE AS FOLLOWS:
   a. MACHINE DISK TO OD/RADIUS
   b. MACHINE BOTH .255 x .375 DP AND THREADED HOLES
   c. SLICE INTO TWO HEMISPHERES
   d. MACHINE C-BORED Ø .312 HOLES TO DIMENSIONED LOCATIONS

2. EACH DISK MAKES TWO HEMISPHERES

REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 64 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT: ELECTROPOLISH

IDENTIFIC METHOD: TAG

DWG BY: J. JAMES | DATE: 06-22-99

CHK BY: D. CHENG | DATE: 7/1/99

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

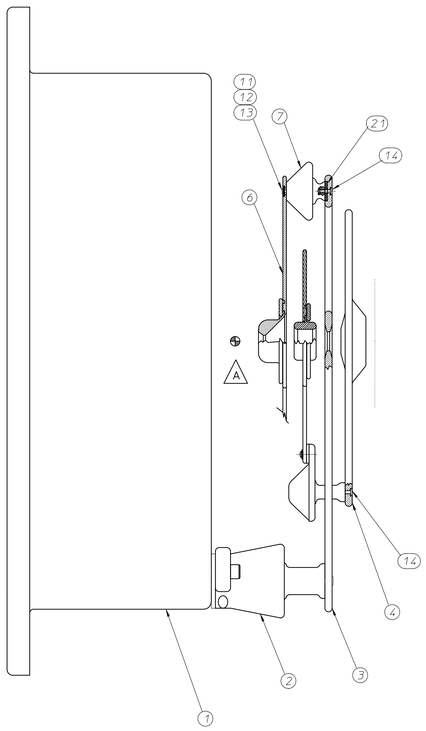
SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

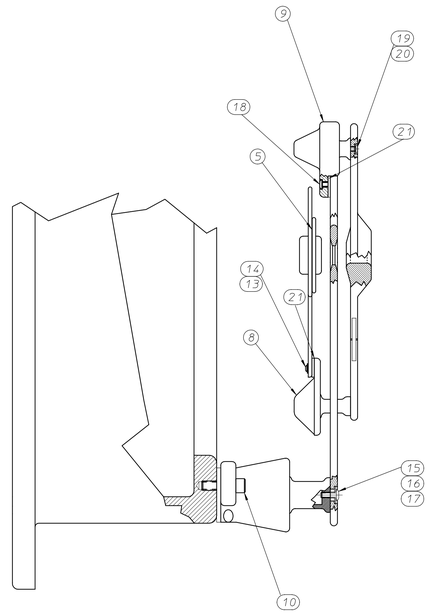
CHOPPER HI VOLTAGE FEED-THRU ELECTRICAL CONNECT

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL		DO NOT SCALE PRINTS

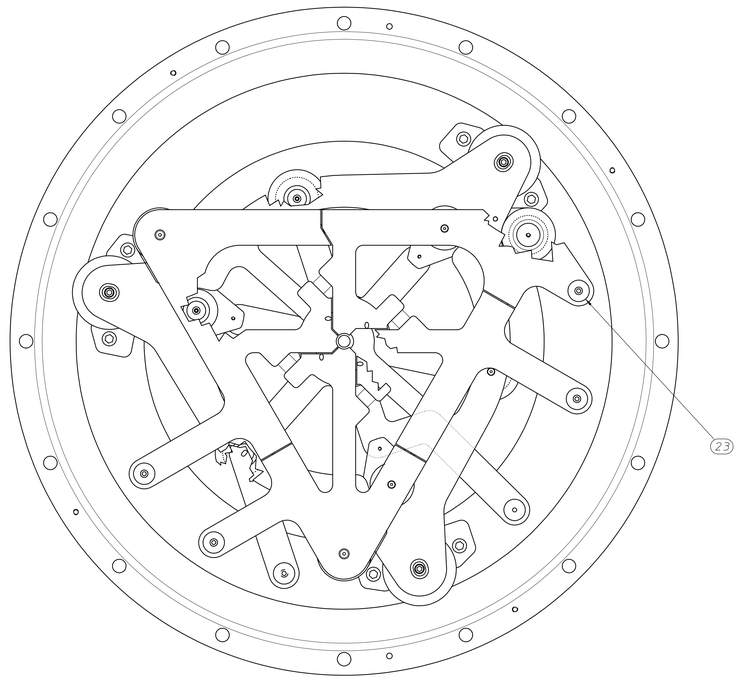
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO	REV
	8210-14	FE3111	21G7322	



VIEW IS NOT TRUE PROJECTION



VIEW IS NOT TRUE PROJECTION



6	23	21G7313	ELECTRDOE HIGH-VOLTAGE CONNECT
A/R	22	-	SHIM, STAINLESS STEEL, NOM. .138 THK
A/R	21	-	SHIM, STAINLESS STEEL, NOM. .08 THK.

21G7356A

3	20	-	WASHER, STAINLESS STEEL, #6
3	19	-	BUTTON HEAD CAP SCREW, STAINLESS STEEL, #6-32, .5" LG., VENTED
3	18	-	BUTTON HEAD CAP SCREW, STAINLESS STEEL, #8-32, .5" LG.
3	17	21G7301	MAIN SUPPORT CERAMIC HOLDOFF WASHER
3	16	-	WASHER, STAINLESS STEEL, #10
3	15	-	SHCS, #10-24, .5" LG., VENTED
9	14	-	BUTTON HEAD CAP SCREW, #4-40, .375" LG, VENTED
6	13	-	WASHER, SIZE #4, STAINLESS STEEL
2	12	9714 K21	WAVE DISC SPRING, TYPE 302 SS, .134" ID, .183" OD, MCMASTER-CARR
3	11	94035 A511	18-8 SS SOCKET SHOULDER SCREW, .125", .125" LG., #4-40, MCMASTER-CARR
6	10	-	SHCS, STAINLESS STEEL, 5/16-18, 1.125 LONG, VENTED
3	9	21G7252	GROUND-CHOPPER INSULATOR ASSEMBLY
3	8	21G7272	G3 INSULATOR ASSEMBLY
3	7	21G7282	EXTRACTOR INSULATOR ASSEMBLY
1	6	21G7004	EXTRACTOR ELECTRODE ASSEMBLY
1	5	21G7044	G3 ELECTRODE ASSEMBLY
1	4	21G7114	CHOPPER ELECTRODE ASSEMBLY
1	3	21G7086	GROUND ELECTRODE
3	2	21G7262	MAIN GROUND INSULATOR ASSEMBLY
1	1	21G7296	REENTRANT CYLINDER FINISH MACHINING
REQD	ITEM	PART NO.	DESCRIPTION

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		B6	12/6/00	ADDED THEORETICAL CENTERPOINT OF ION SOURCE

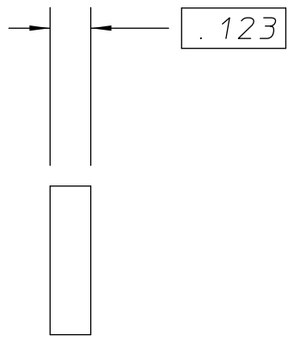
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .001 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

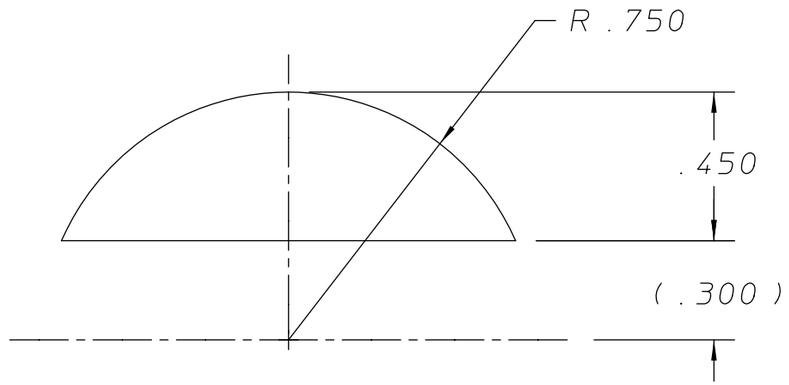
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG BY D. CHENG DATE 6-30-99
CHK BY
DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
LEBT ASSEMBLY

PATENT CLEAR | DWG. TYPE ASSEMBLY | SHOWN ON | SCALE 1:2 | DO NOT SCALE PRINTS
MICROFILMED | DESIGN ACCT. NO. 8210-14 | CATEGORY CODE FE3111 | DWG. NO. 21G7356 | SIZE A | REV.

21G7362	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	CERAMIC, ALUMINA, 99.9% AL203





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 6-1-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

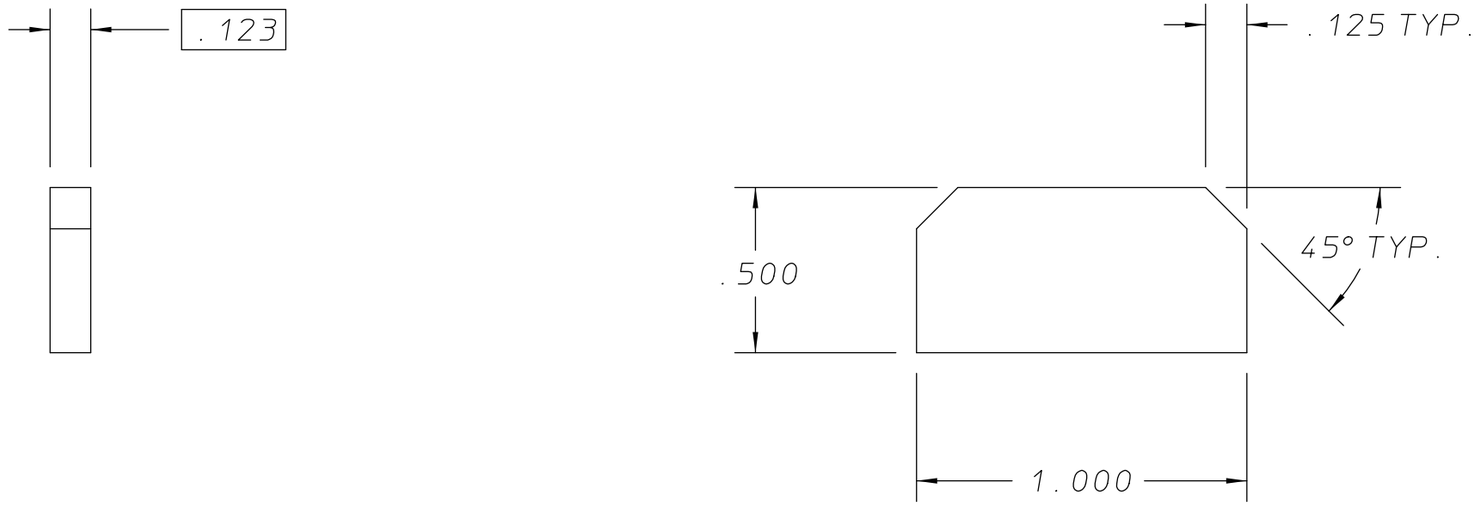
SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

CERAMIC STANDOFF KEY, ROUND

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 1:2
	DETAIL		DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7362

21G7372	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	CERAMIC, ALUMINA, 99.9% AL203



REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 6-1-99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY

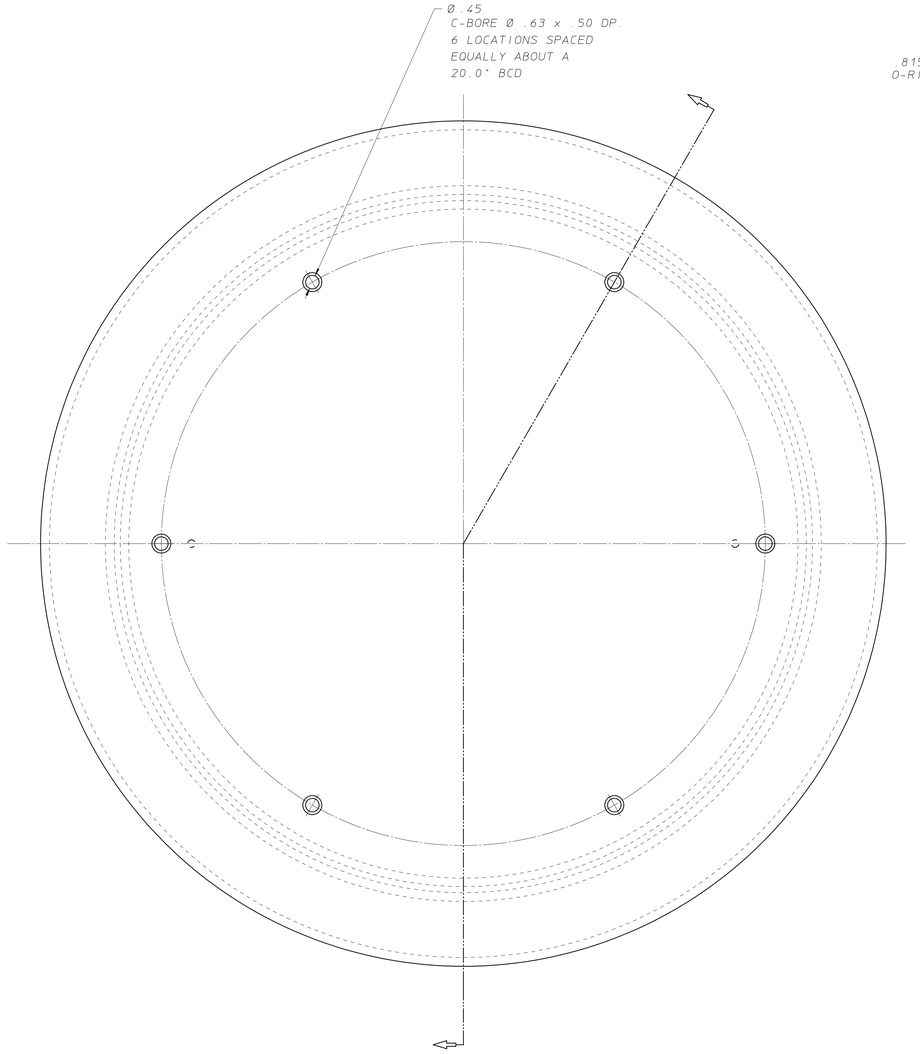
UNIVERSITY OF CALIFORNIA-BERKELEY

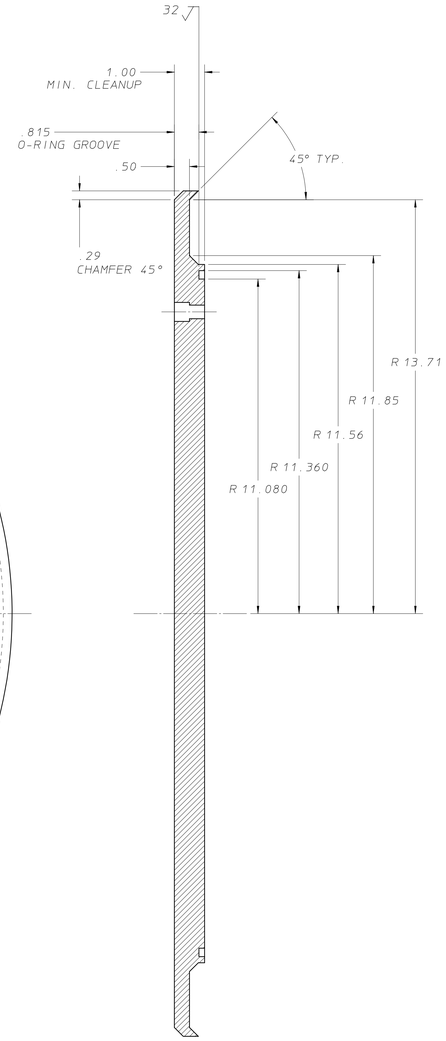
SNS-FES ION SOURCE AND LEBT

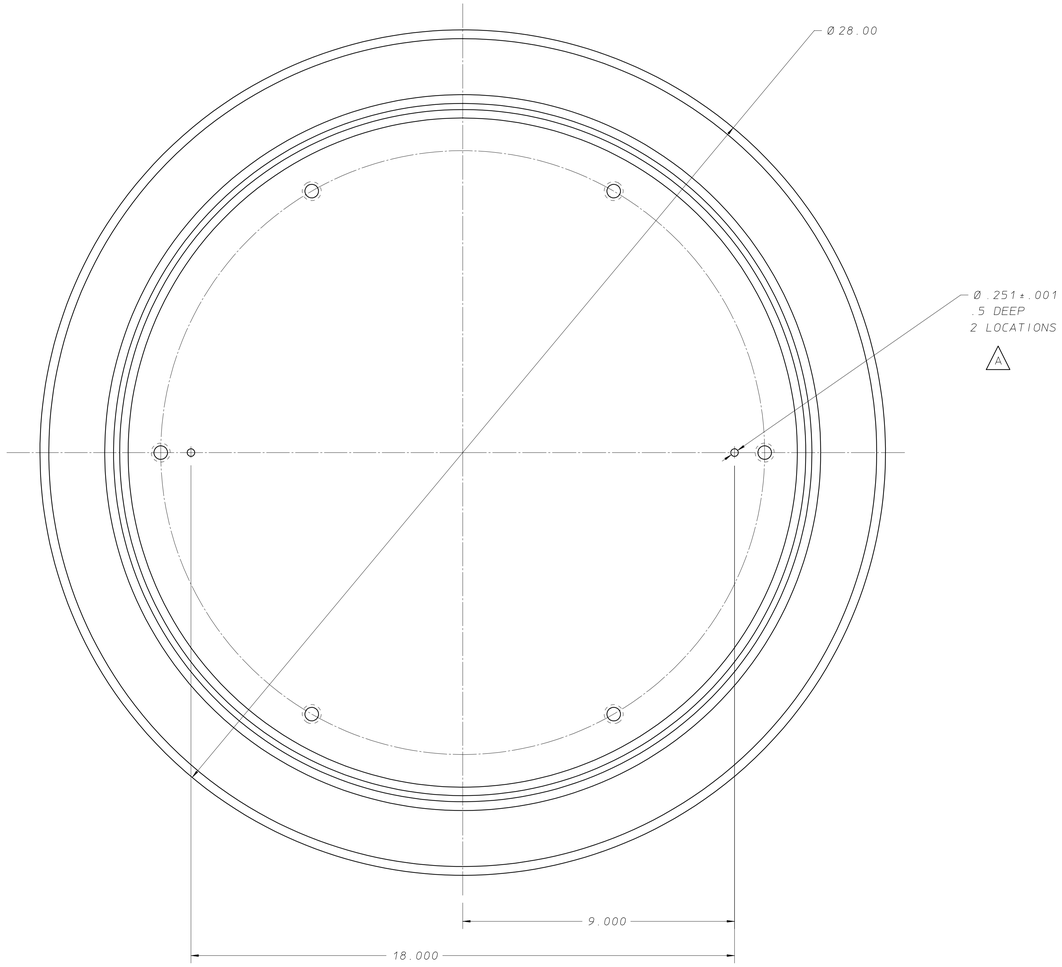
MECHANICAL SYSTEMS

CERAMIC STANDOFF KEY, RECTANGULAR

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 1:2
	DETAIL		DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7372







21G7386A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C2,C3	11/6/99	ADDED Ø.251 ± .001 DOWEL HOLES

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .020 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

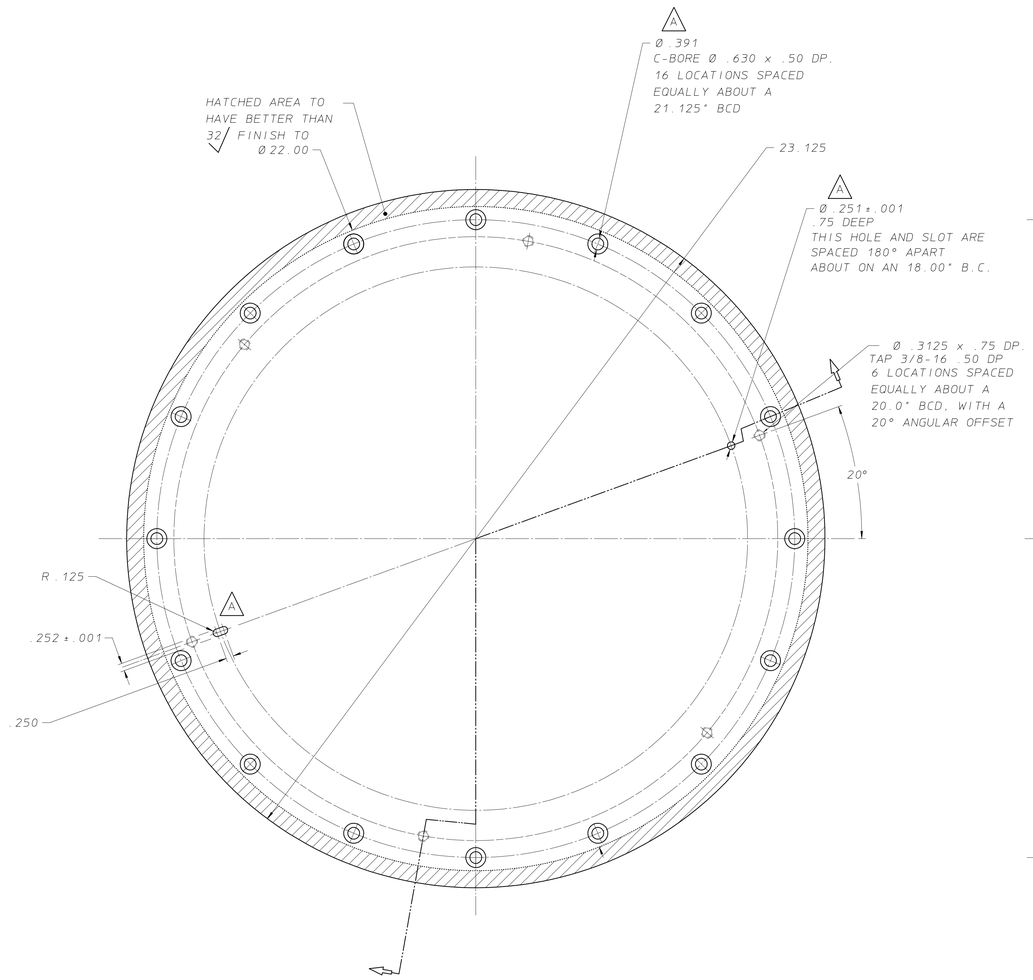
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT METH: TAG
DWG BY: D. CHENG DATE: 3/3/99
CHK. BY:
DATE

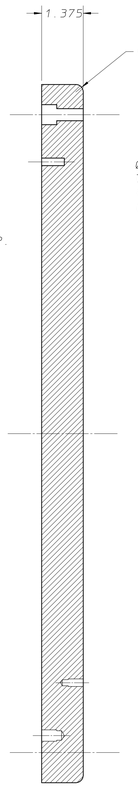
REQD	ITEM	PART NO.	DESCRIPTION
A/R	1	-	ALUMINUM PLATE, 1" THICK, 6061-T6

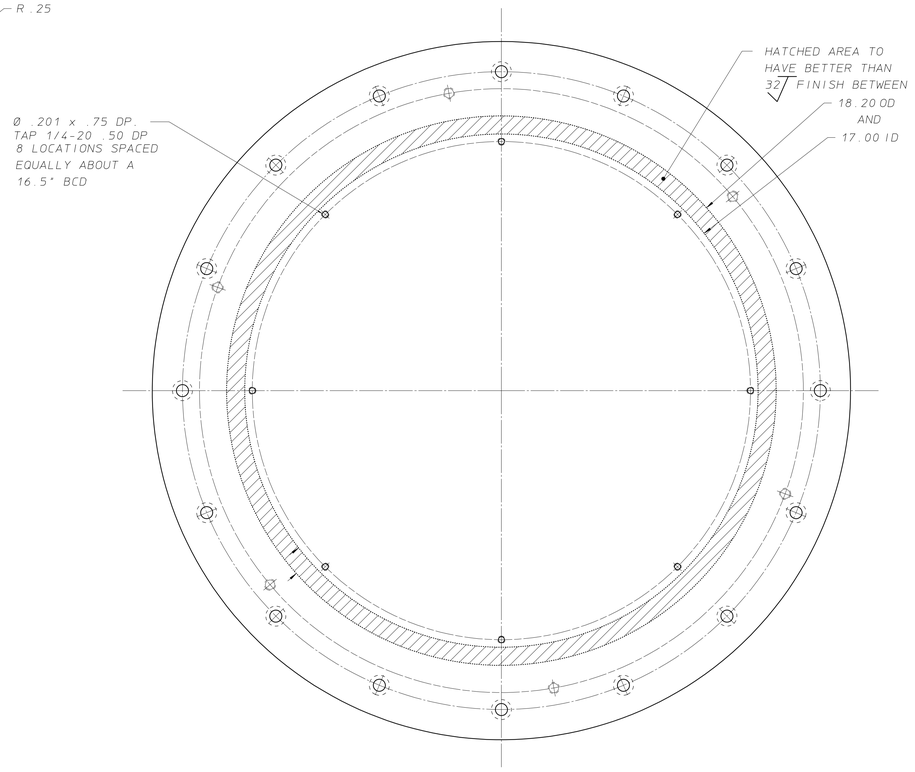
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FE
PROTOTYPE LEBT
MAIN INSULATOR MOLD BACKPLATE

PATENT CLEAR | MICROFILMED
DWG. TYPE: DETAIL
DESIGN ACCT. NO.: 8210-14
SHOWN ON: 21G7466
CATEGORY CODE: FE1100
SCALE: 1:2
DO NOT SCALE PRINTS
DWG. NO.: 21G7386
SIZE: A
REV.







21G7296A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C6	11/6/99	CHANGED Ø.450 THRU HOLE TO Ø.391
A	DWC		C5,B7	11/6/99	ADDED ALIGNMENT HOLE AND SLOT

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .020 MAX. ON MACHINED WORK.
REMOVE BURRS MELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

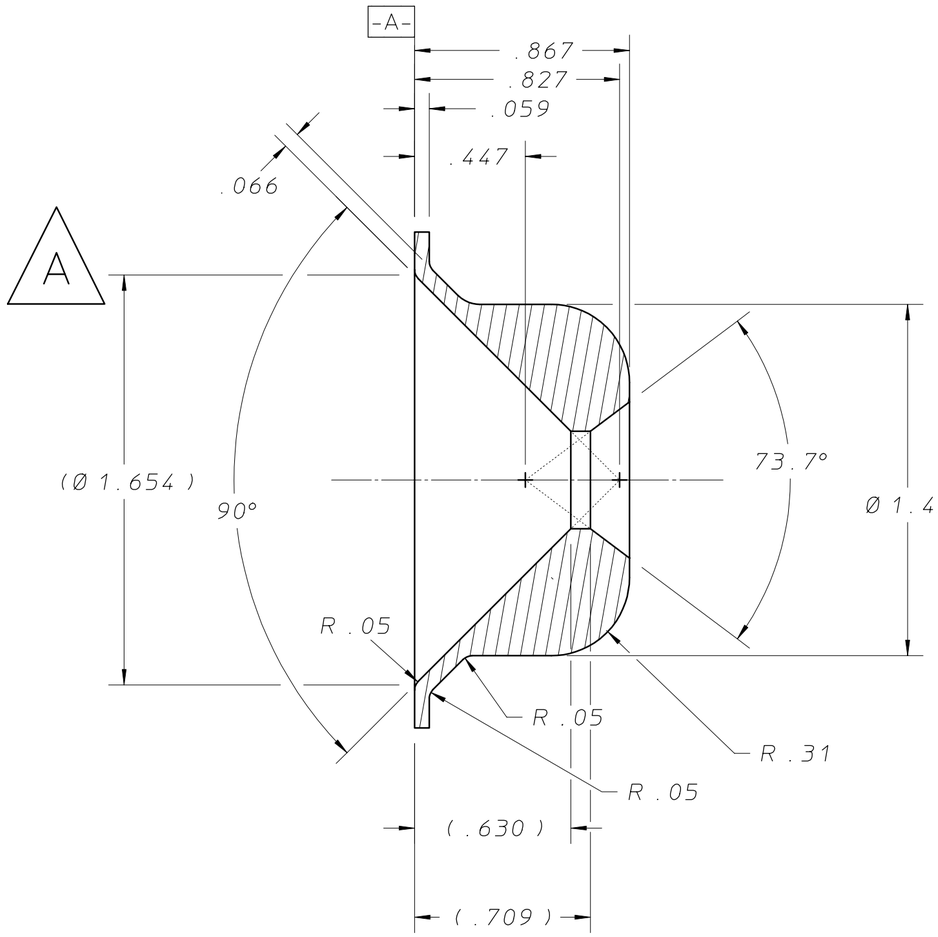
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT METH. TAG
DWG BY D. CHENG | DATE 3/3/99
CHK BY | DATE

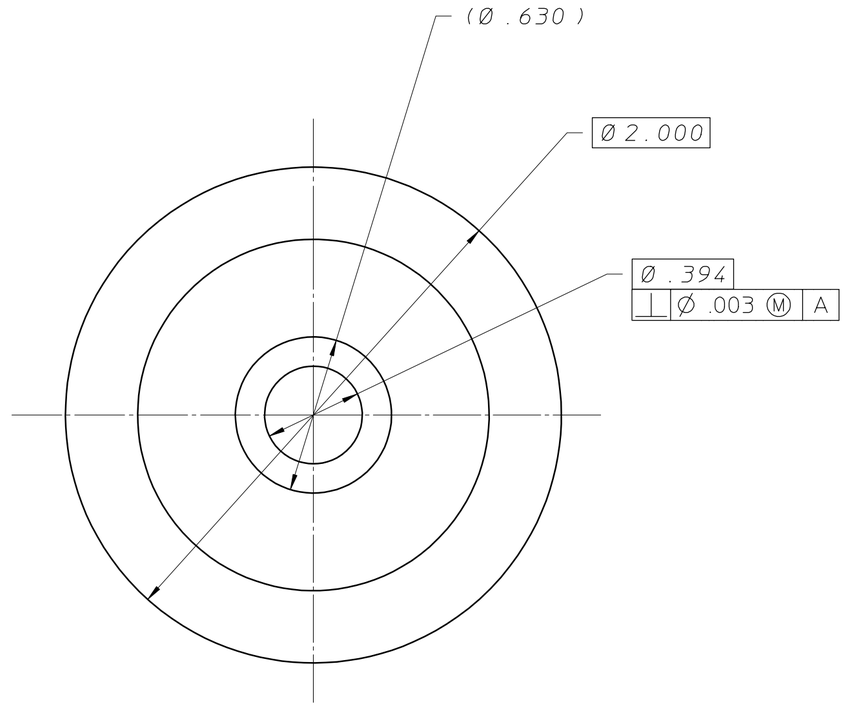
REQD	ITEM	PART NO.	DESCRIPTION
A/R	1	-	ALUMINUM PLATE, TYPE 6061, 1.5" STOCK

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
PROTOTYPE LEBT
MAIN INSULATOR MOLD MIDPLATE

PATENT CLEAR | DWG. TYPE DETAIL | SHOWN ON 21G7466 | SCALE FULL | DO NOT SCALE PRINTS
MICROFILMED | DESIGN ACCT. NO. 8210-14 | CATEGORY CODE FE1111 | DWG. NO. 21G7396 | SIZE A | REV

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 430 (MAGNETIC)





21G7403A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	JM	DC	D3	6/5/00	SHOULDER GEOMETRY Ø1.346 WAS REMOVED

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±.1° | .XXX ± .001 | FINISH 16 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .003 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

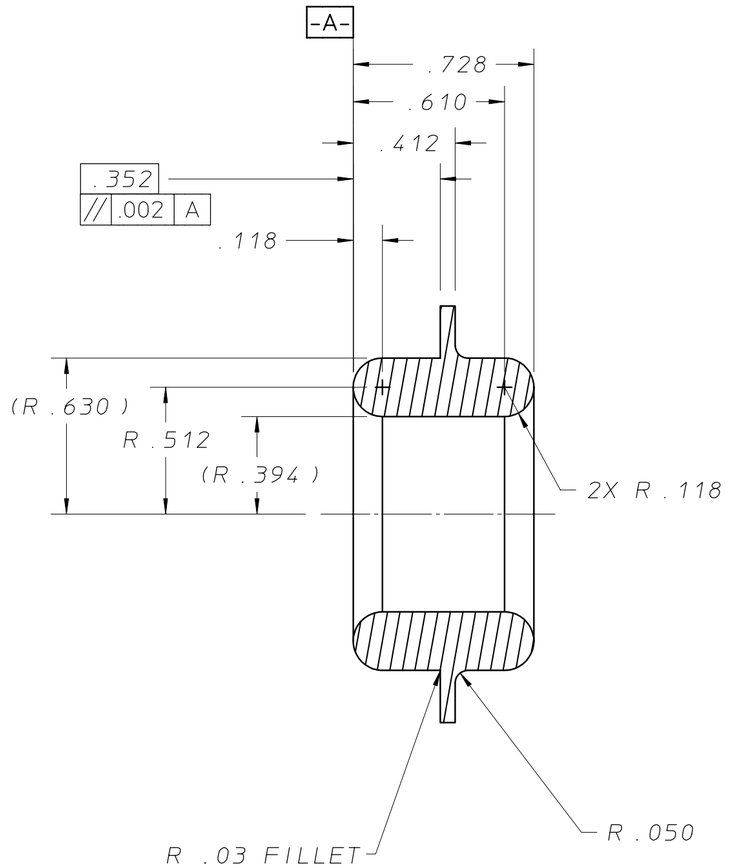
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 3/31/00
CHK. BY | DATE

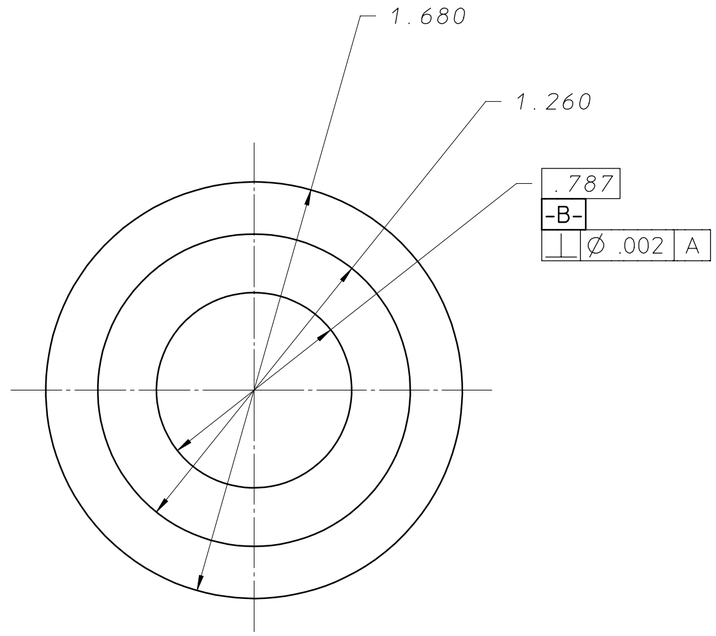
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
65mA EXTRACTOR APERTURE INSERT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7004	2:1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8212-A1	FE3111	21G7403	A

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304, .75" STOCK





21G7413A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C3	7/20/00	.412 DIMENSION WAS .312
A	DWC		D3	7/20/00	.352 DIMENSION WAS .252

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±.01° | .XXX ± .002 | FINISH 16

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: ELECTROPOLISH
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 3/30/00
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

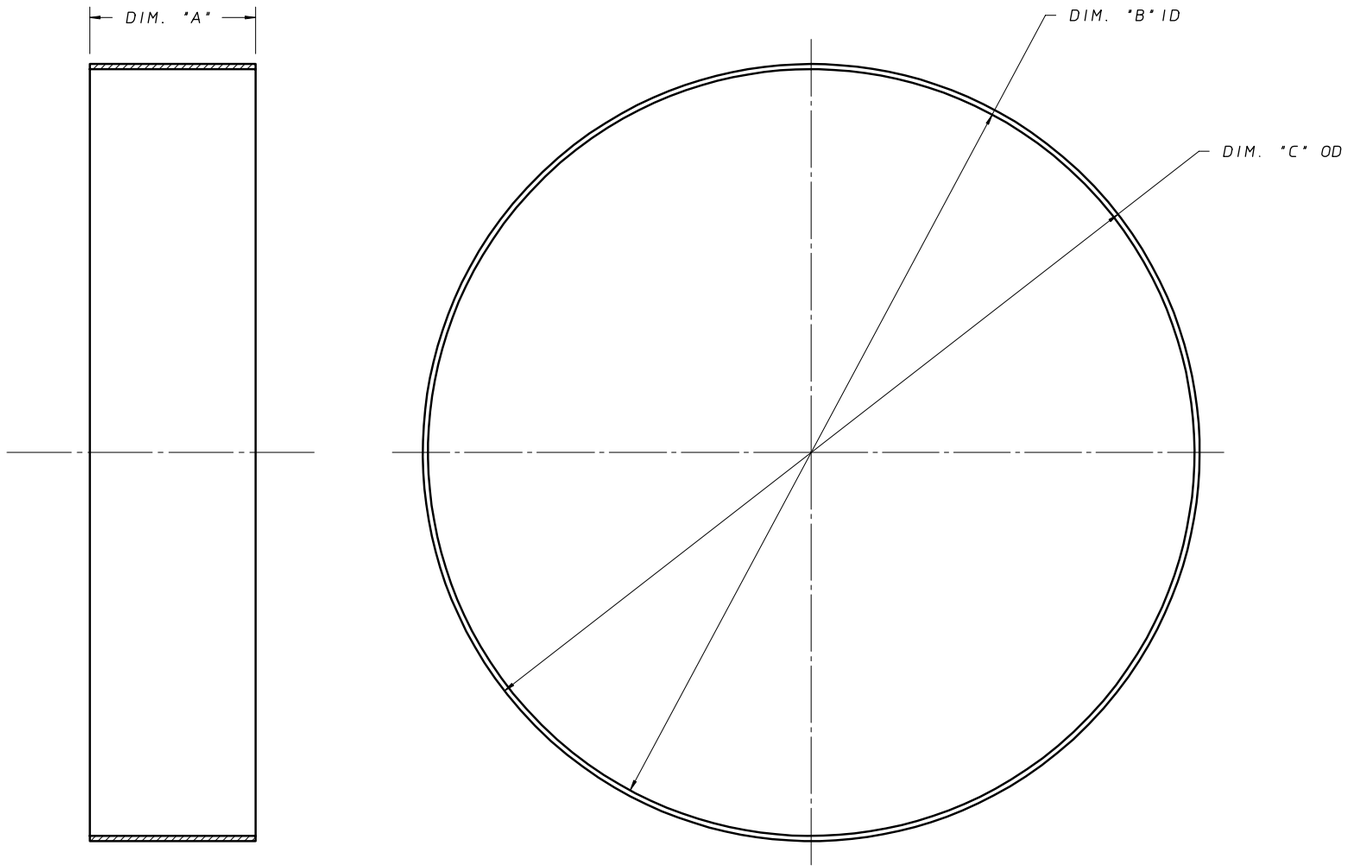
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
65 mA G3 ELECTRODE APERTURE INSERT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7044	2:1	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8212-A1	FE3111	21G7413	A

NOTES:

1. SEAM SHALL BE BUTT-WELDED AND LEAK TIGHT.

21G7422	REQD	ITEM	PART NUMBER	DESCRIPTION
				STAINLESS STEEL SHEET, .125" STK.



	DIM. "A"	DIM. "B"	DIM. "C"
21G7422-1	4.00	Ø18.50 ID	--
21G7422-2	4.00	--	Ø26.00 OD
21G7422-3	2.50	Ø28.00 ID	--

REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO | SER NO

DATE ISSD | DATE REQD | NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY D. CHENG | DATE 3/3/99

CHK BY | DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

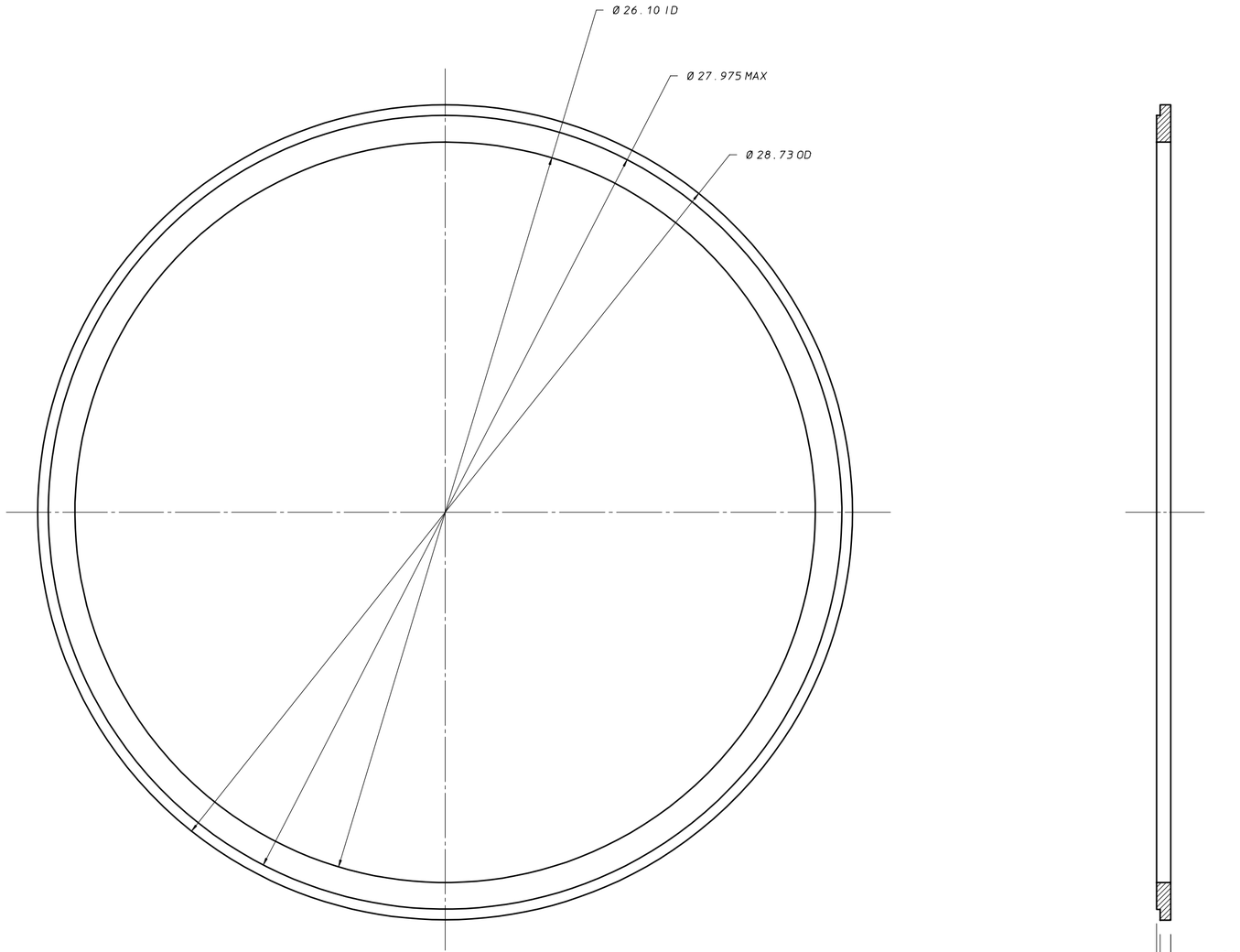
SNS-FES ION SOURCE AND LEBT

PROTOTYPE LEBT

INSULATOR MOLD RINGS

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 1:4
	DETAIL	21G7466	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE1111	21G7422

REQ	ITEM	PART NUMBER	DESCRIPTION
			ALUMINUM PLATE, .5" STK, 29" SQ.



21G7433

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES			
	.X ± .1	FRAC. ±1/64	
	.XX ± .01	ANGLES ±.01°	
	.XXX ± .005	FINISH 125√	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

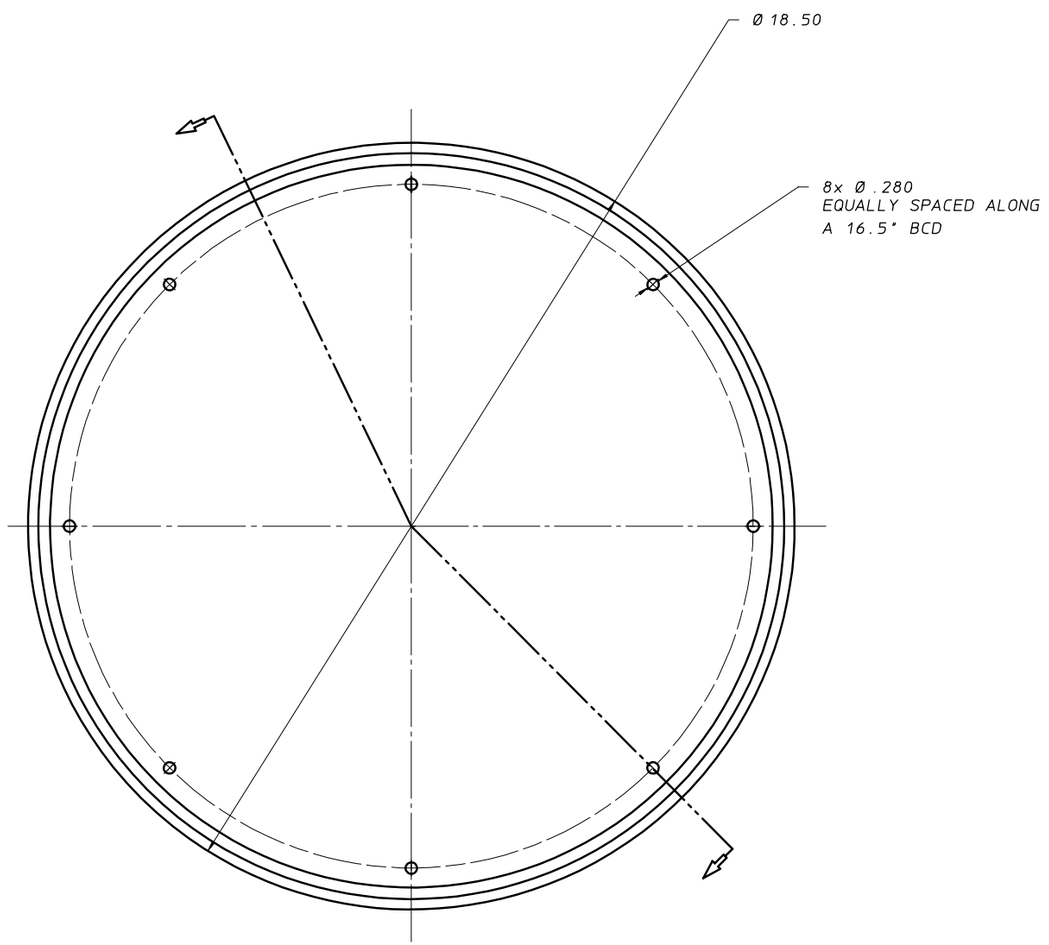
ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 3/3/99
CHK. BY		DATE

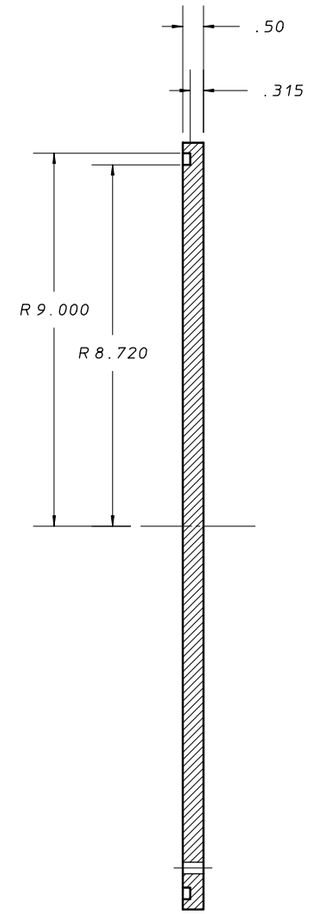
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FE
PROTOTYPE LEBT
MAIN INSULATOR MOLD OUTER RING PLATE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7466	1 : 4	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21G7433	

21G7442	REQD	ITEM	PART NUMBER	DESCRIPTION
				ALUMINUM PLATE, .5" STOCK, 19" x 19"





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ± .1 .XX ± .01 .XXX ± .005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES .020 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 3/3/99
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

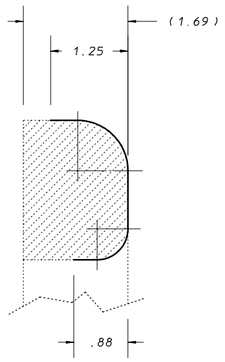
SNS-FES ION SOURCE AND LEBT

PROTOTYPE LEBT

MAIN INSULATOR MOLD TOP PLATE

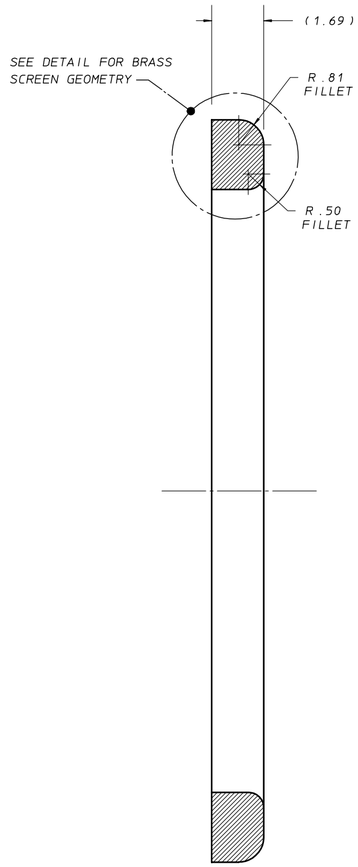
PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: 1:4
	DETAIL	21G7466	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7442

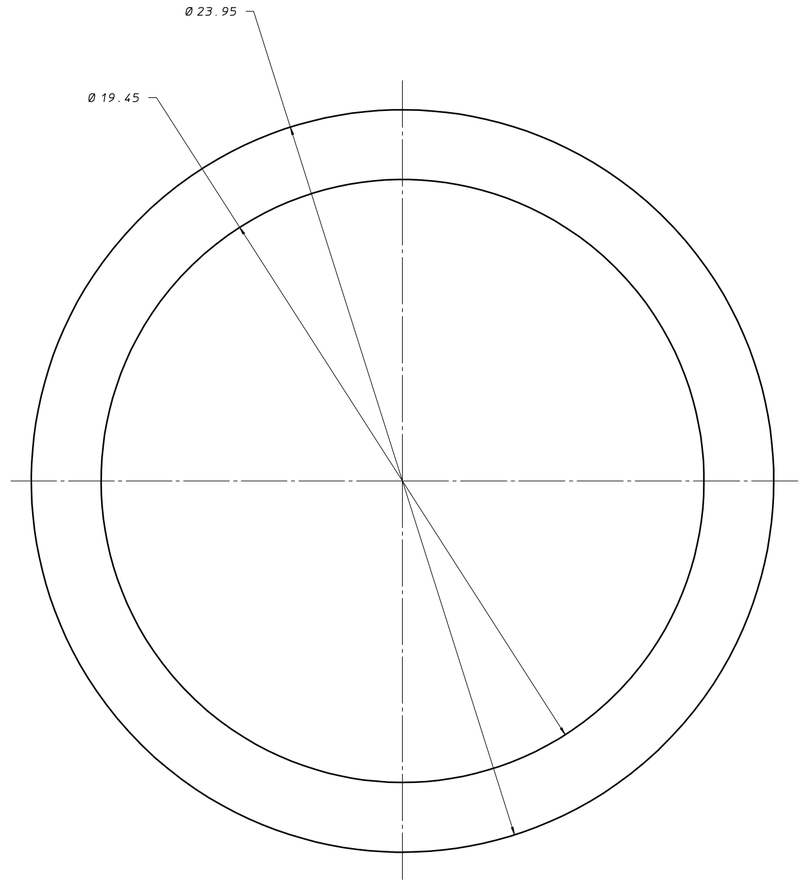
REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	PLYWOOD, 1.5" THICK STOCK
A/R	2	-	SCREEN, BRASS NET



DETAIL OF SCREEN

SCALE 2:1





21G7453

NOTES:

1. THIS WOODEN MANDREL IS TO BE USED TO FORM THE BRASS SCREEN'S SHAPE
2. BRASS SCREEN SHALL BE FORMED TO DIMENSIONS SHOWN IN DETAIL AND SOLDERED WHERE NECESSARY.

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES		
.X ± .1	FRAC. ±1/64	
.XX ± .05	ANGLES ±.01°	
.XXX ± .005	FINISH 125√	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 3/3/99
CHK. BY		DATE

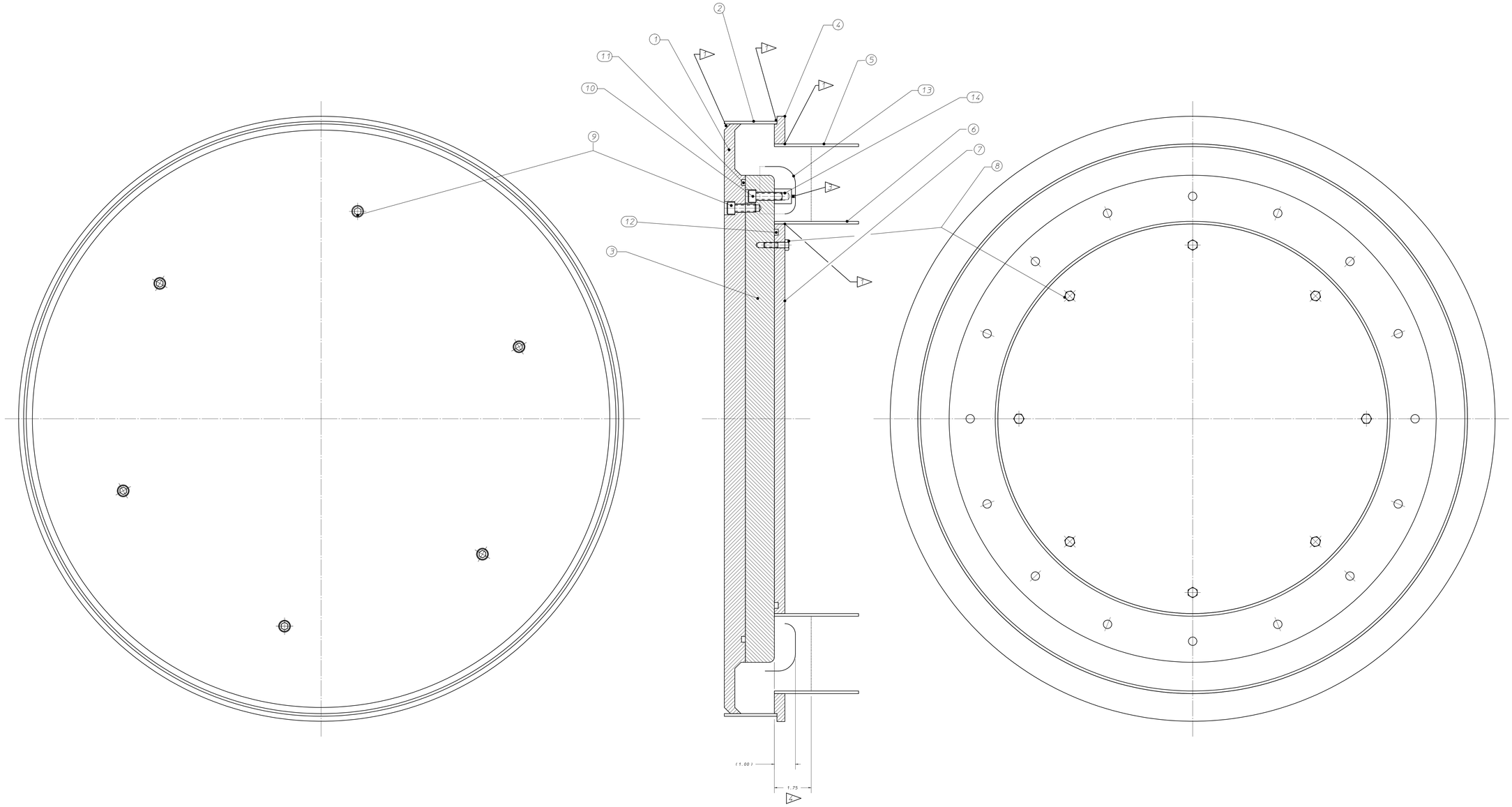
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FE

PROTOTYPE LEBT

MAIN INSULATOR MOLD SCREEN & MANDREL

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DETAIL	21G7466	1:4	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21G7453	



NOTES:

1. JOINTS INDICATED SHALL BE SEALED WITH RTV (ITEM (17)) TO BE VAC. TIGHT.
2. Ø.250" DOWEL PINS SHALL BE USED WHEN ASSEMBLING PARTS (1) AND (3) TO ENSURE PROPER ALIGNMENT.
3. ITEM (13) SHALL BE SOLDERED TO ITEM (14) AT A MINIMUM OF 8 PLACES TO ENSURE ELECTRICAL CONTACT PRIOR TO POURING OF EPOXY.
4. EPOXY (ITEMS (15) & (16)) SHALL BE POURED TO HEIGHT INDICATED AND ALLOWED TO CURE IN A VACUUM ENVIRONMENT.

21G7466

REQD	ITEM	PART NO.	DESCRIPTION
A/R	17	-	RTV SEALANT COMPOUND
A/R	16	-	HYSOL, HD3485 HARDENER
A/R	15	-	HYSOL, C9-4183 CASTING COMPOUND
16	14	-	BRASS INSERTS, TAPPED 3/8-16, .5" KNURLED O.D.
1	13	21G7453	MAIN INSULATOR MOLD BRASS SCREEN
1	12	-	O-RING, Ø1/4", 17.70" DIA., VITON
1	11	-	O-RING, Ø1/4", 22.40" DIA., VITON
16	10	-	SHCS, 3/8-16 x 1.25" LONG
6	9	-	SHCS, 3/8-16 x 1" LONG
8	8	-	1/4-20 HEX HEAD SCREW, 1" LONG
1	7	21G7442	MAIN INSULATOR MOLD TOPPLATE
1	6	21G7422-1	INSULATOR MOLD RING, 18.50" I.D.
1	5	21G7422-2	INSULATOR MOLD RING, 26.00" O.D.
1	4	21G7433	MAIN INSULATOR MOLD OUTER RING PLATE
1	3	21G7296	MAIN INSULATOR MOLD MIDPLATE
1	2	21G7422-3	INSULATOR MOLD RING, 28.00" ID
1	1	21G7386	MAIN INSULATOR MOLD BACKPLATE

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .05 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

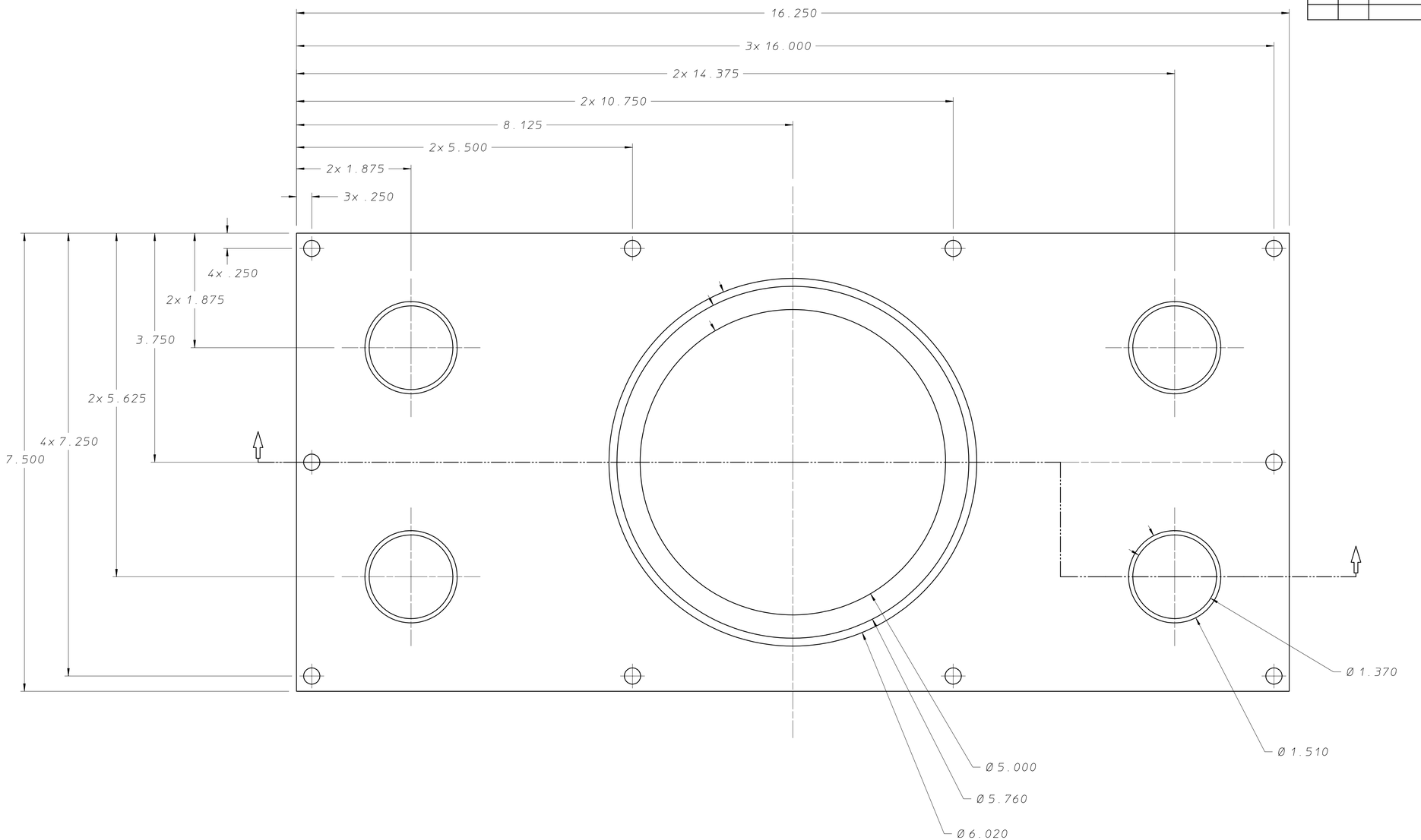
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT METH: TAG
DWG BY: D. CHENG DATE 3/3/99
CHK. BY:
DATE

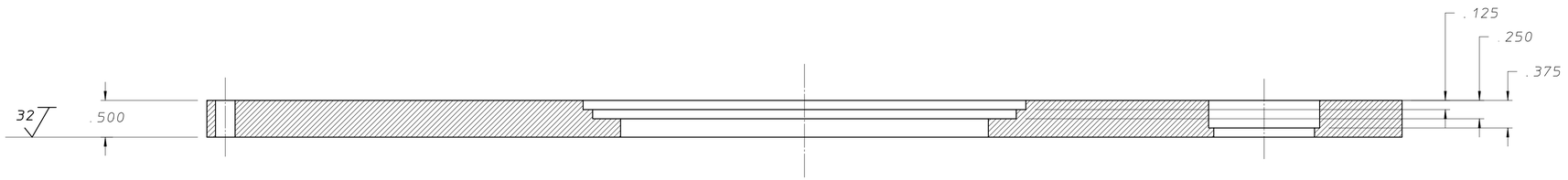
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
LEBT MAIN INSULATOR MOLD ASSEMBLY

PATENT CLEAR | DWG TYPE: ASSEMBLY | SHOWN ON | SCALE 2:1 | DO NOT SCALE PRINTS
MTCROFILMED | DESIGN ACCT NO. 8210-11 | CATEGORY CODE: FE3111 | DWG NO. 21G7466 | SIZE | REV.

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304





21G7504

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
- .X ± .1 — FRAC. ±1/64
- .XX ± .01 — ANGLES ±1°
- .XXX ± .005 — FINISH 64 √

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

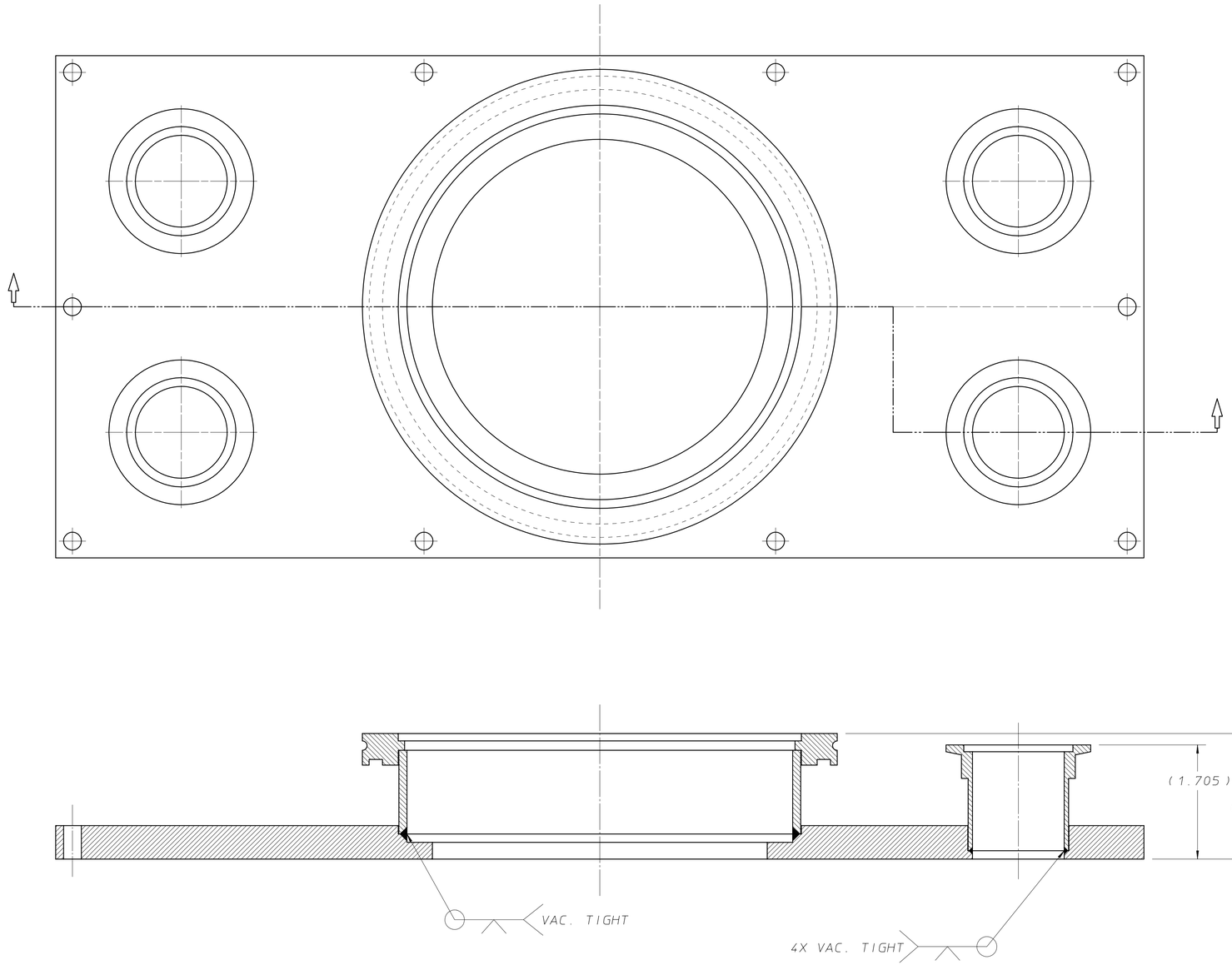
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO.
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VIEWPORT/VACUUM GAUGE FLANGE BLANK

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL	21G7514		
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-11	FE3111	21G7504	

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7504	VIEWPORT/VACUUM GUAGE FLANGE BLANK
1	2	820002	ISO NW160 HALF-NIPPLE, CUT TO 1.5" LG, MDC P/N
4	3	715108	KF NW40 HALF-NIPPLE, 1.58" LG, MDC P/N



21G7504

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ± 1° | .XXX ± .005 | FINISH 64 √

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

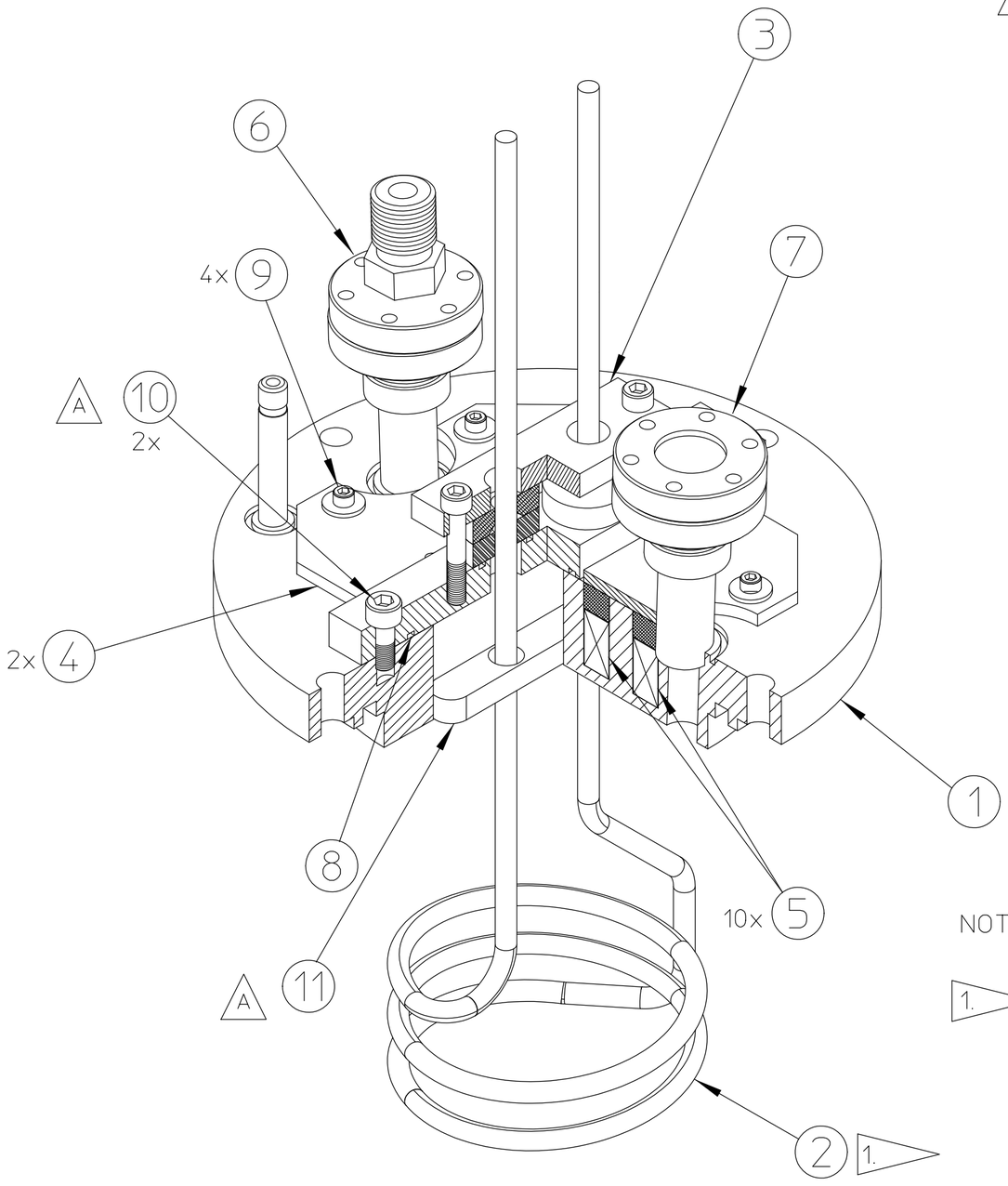
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VIEWPORT/VACUUM GAUGE FLANGE WELDMENT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-11	FE3111	21G7514	

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G7723	ION SOURCE BACK FLANGE WELDMENT
1	2	21C8423	RF ANTENNA (2 TURNS)
1	3	21G7802	ALUMINA RF FEEDTHRU FLANGE ASSEMBLY
2	4	21C9992	BACK FLANGE MAGNET COVER PLATE ASSY
10	5	21C8502-2	MAGNETS, BACK FLANGE (1" LONG)
1	6	21G7552	GAS INLET FLANGE
1	7	9722213	VIEWPORT,ZERO LENGTH FUSED SILICA "ISI INC"
1	8	2-035	O-RING 2.251Dx.06W BUNA N, "PARKER SEAL CO"
4	9		CAPSCR SOC HD #4-40UNCx1/4" LG SST
2	10		CAPSCR SOC HD #10-32UNCx.625" LG SST
1	11	21G7611	BORON NITRIDE PLASMA SHIELD



21G7543B

NOTES; (UNLESS OTHERWISE SPECIFIED)

1. ANTENNA (ITEM 2) SHALL BE INSTALLED AFTER ANTENNA ASSEMBLY (ITEM 3) IS ATTACHED TO BACK FLANGE (ITEM 1).

REV	DWG	CHK	ZONE	DATE	CHANGES
B	DWC		B4	3/13	CHANGED ITEM #3 FROM 21G7471 TO 21G7802
A	DWC		D3	3/13	ADDED LABELS FOR ITEMS 10 AND 11
A	DWC		B4	3/13	ADDED ITEMS 10 AND 11
A	DWC		B4	3/13	ITEM 1 P/N 21G7723 WAS 21C9874

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± FRAC. ± | .XX ± ANGLES ± | .XXX ± FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

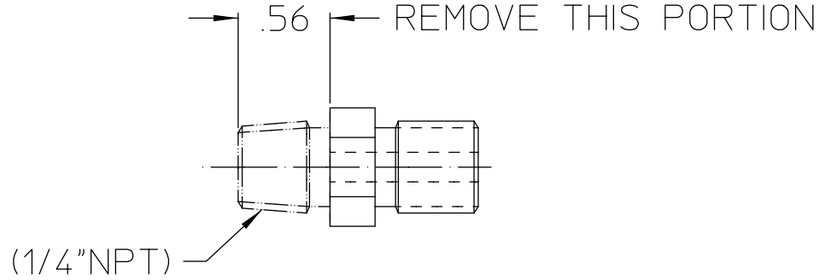
SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.
DWG. BY: RAY LOW | DATE: 06-30-00
CHK. BY: DAN CHENG | DATE: 06-30-00

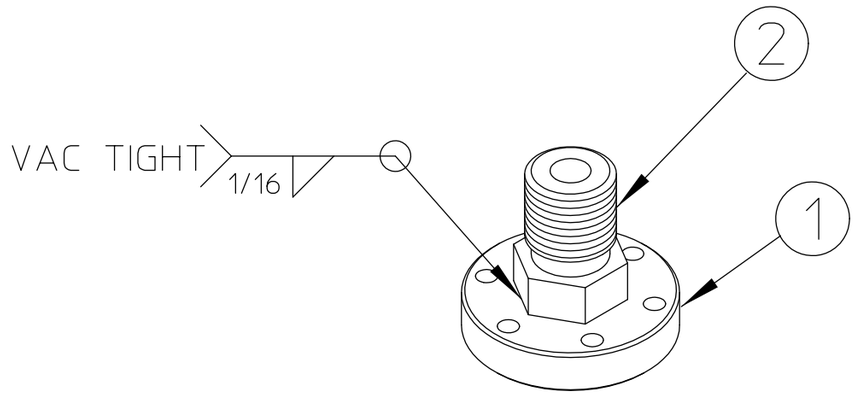
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
ION BEAM TECHNOLOGY
SNS-FES ION SOURCE AND LEBT STRUCTURE
BACK FLANGE ASSEMBLY

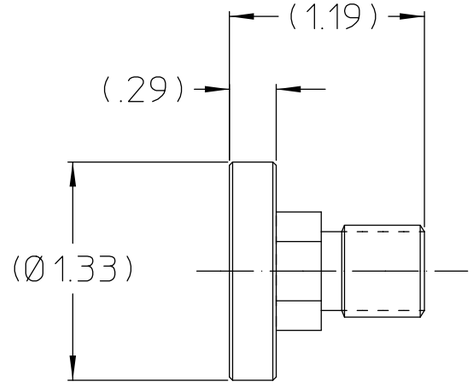
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY		DWG. NO. 21G7543	SIZE B / REV. B
MICROFILMED	DESIGN ACCT. NO. 8212-AC	CATEGORY CODE FE3111		

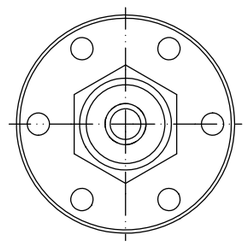
21G7552	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1	110001	FLANGE CFF, 1/4"IDx1-1/3"OD MINI "MDC CORP"
	1	2	SS-4-VCR-1-4	MALE NPT CONN VCR "SWAGELOK"



ITEM (2) MODIFICATION







REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ± .XX ± .01 .XXX ±

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD		
DWG BY	RAY LOW	DATE 07-03-00
CHK BY	DAN CHENGE	DATE 07-03-00

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

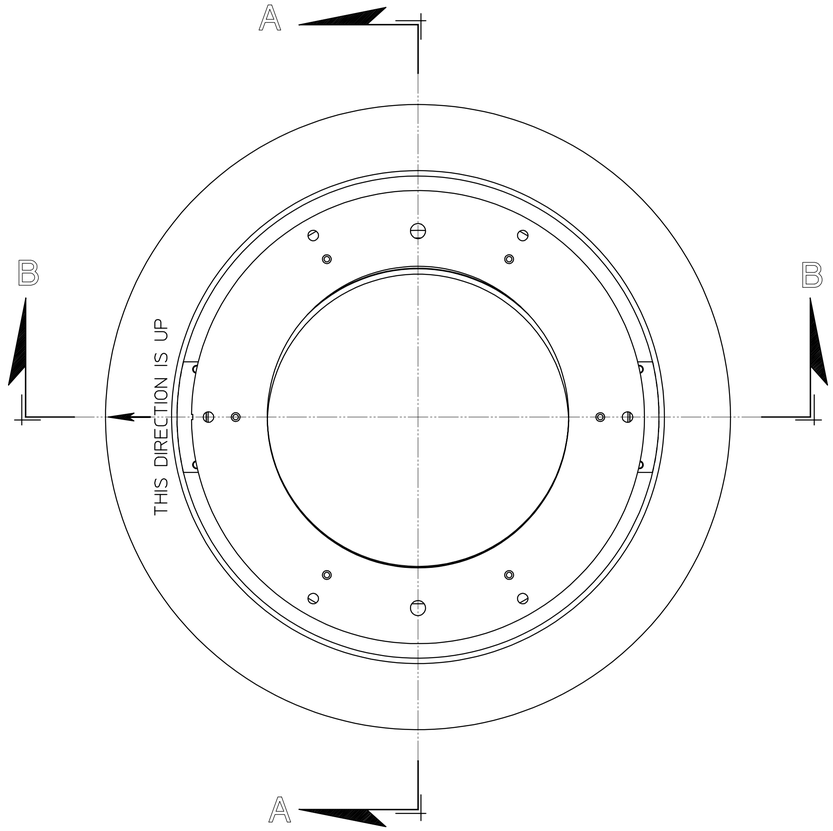
ION BEAM TECHNOLOGY

SNS-FES ION SOURCE AND LEBT STRUCTURE

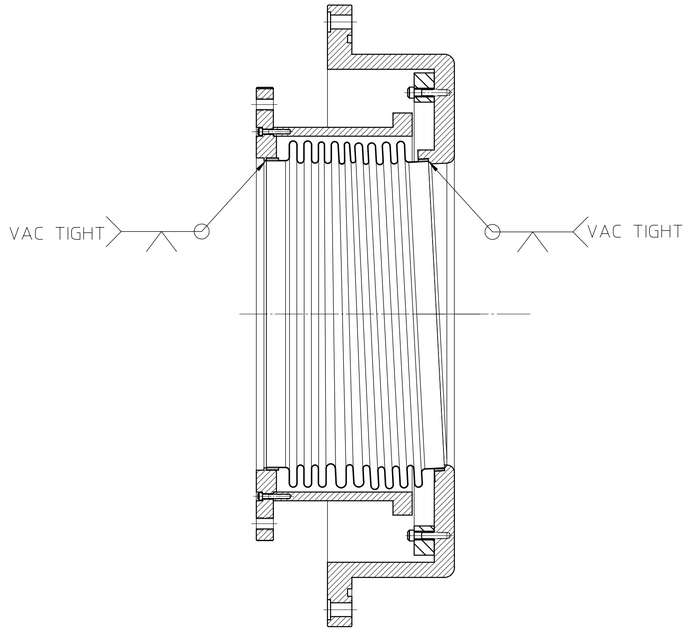
GAS INLET FLANGE

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	C-DETAIL	21G7543	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO / REV
	8212-AC	FE3111	21G7552

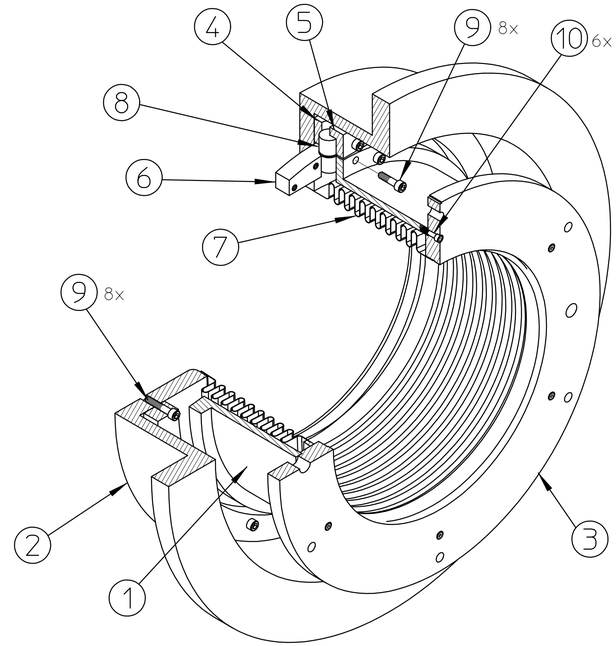
REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21C9836	SUPPORT CYLINDER
1	2	21C9826	BELLOWS FIXED FLANGE
1	3	21C9814	BELLOWS FLANGE
1	4	21C9844	PIN RETAINER RING
2	5	21C9852	PILLOW BLOCK OUTER
2	6	21C9862	PILLOW BLOCK INNER
1	7	7500SP-55095	FORMED METAL BELLOWS 7.5"IDx4.23"OAL 321 SST BELLOWS WITH 304 SST COLLAR "HYSPAN PRECISION PRODUCTS INC"
2	8	5016-600	FLEX PIVOT PIN 1/2"DIA "R.P. LUCE & CO INC"
16	9		CAPSCREW SOC HD #8-32UNCx3/4 STL CAD PL
6	10		CAPSCREW SOC HD #4-40UNCx3/8 STL CAD PL
A/R	11		LOC-TITE



SECTION B — B



SECTION A — A



NOTES, (UNLESS OTHERWISE SPECIFIED)
THE FOLLOWINGS STEPS SHALL BE FOLLOWED TO ASSEMBLE ALL PARTS,

21G7584

1. ASSEMBLE ITEMS 4,8,5 & 9, USE LOC-TITE TO SECURE ITEM 9.
2. PERFORM CMM ALIGNMENT OF ITEM 4 WITH RESPECT TO ITEM 2. APPLY LOC-TITE TO ITEM 9 WHEN POSITION IS FIXED.
3. LEVEL ITEM 1 ON FLEX PIVOTS AND PERFORM CMM ALIGNMENT TO ENSURE CONCONTRICITY OF ITEM 1 WITH RESPECT TO ITEM 2. APPLY LOC-TITE TO ITEM 9 PRIOR TO TIGHTENING DOWN ITEM 6.
4. WELD ITEM 3 AND 7.
5. MOUNT WELDED BELLOWS ASSEMBLY ONTO ITEM 1 MAKING SURE THAT ITS ORIENTATION IS CORRECT (SEE NOTCH). APPLY LOC-TITE TO ITEM 10.
6. WELD ITEM 7 TO ITEM 2.

REV	DWG	CHK	ZONE	DATE	CHANGES

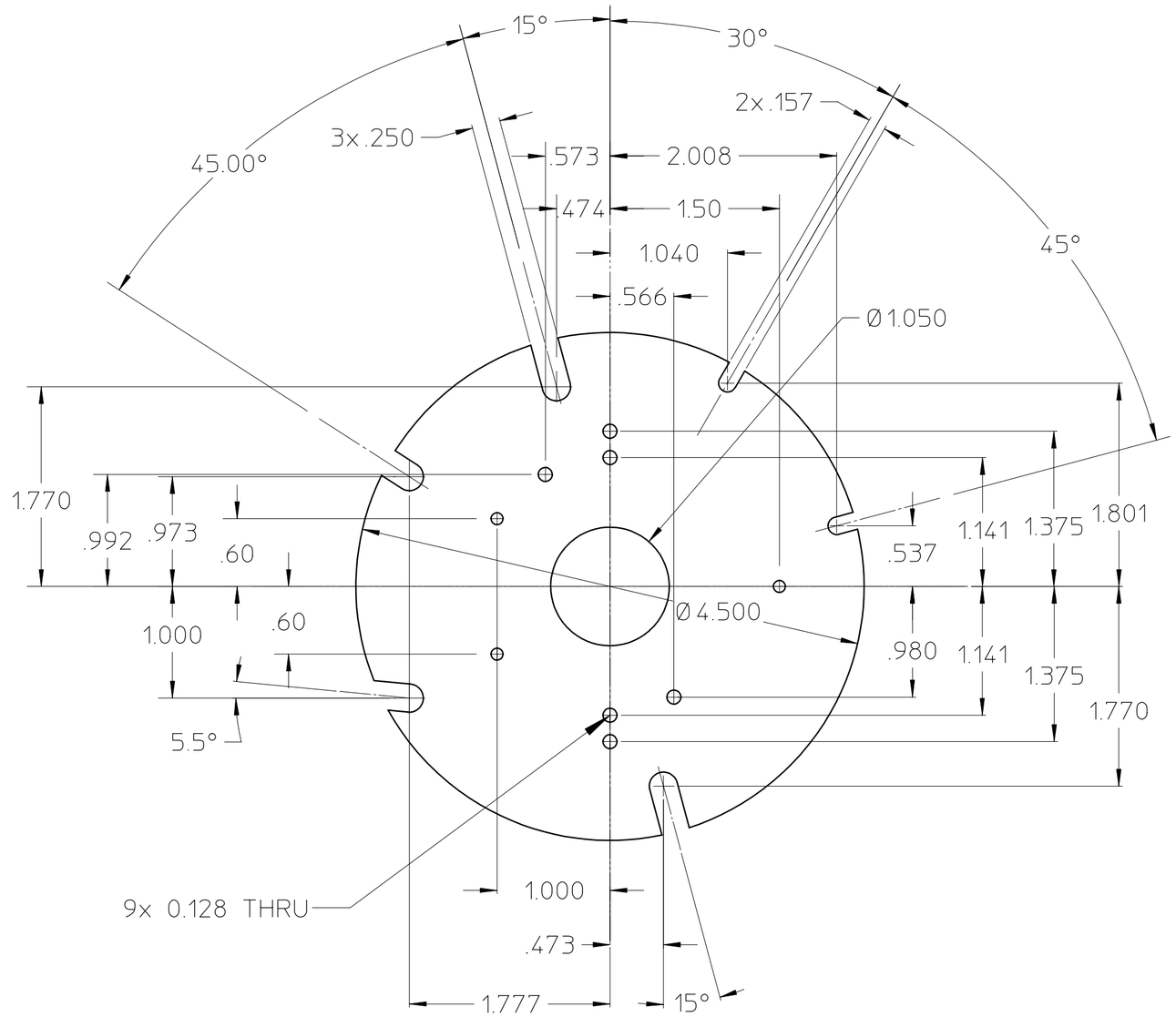
UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± FRAC. ± | .XX ± ANGLES ± | .XXX ± FINISH 125
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: RAY LOW | DATE: 07-14-00
CHK. BY: DAN CHENG | DATE: 07-14-00

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
ION BEAM TECHONOLOGY
SNS-FES ION SOURCE AND LEBT STRUCTURE
ION SOURCE BELLOWS ADJUSTMENT ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY	21G5776	HALF	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8212-AC	FE3111	21G7584	

REQ	ITEM	PART NUMBER	DESCRIPTION
			SHEET, .018 THK TYPE 304



21G7593

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ± 1/64 | .XX ± .01 | ANGLES ± .01° | .XXX ± .005 | FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

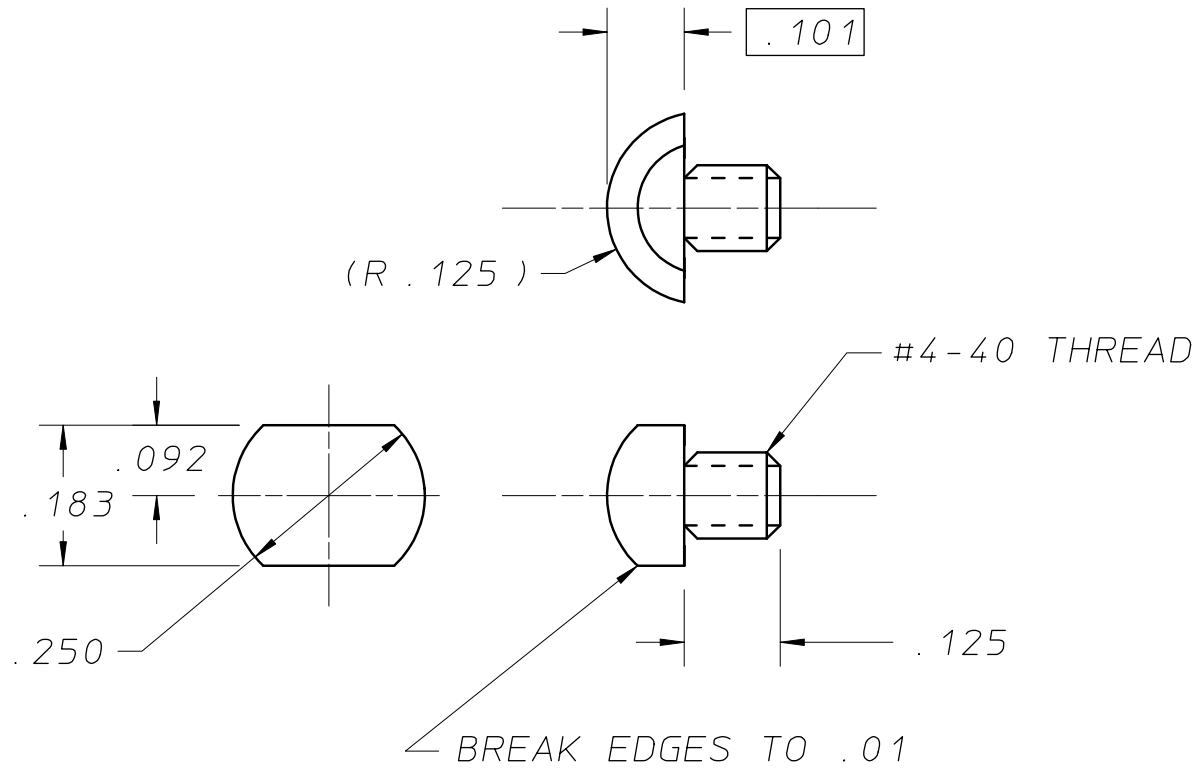
ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG. BY	RAY LOW	DATE 08-11-00
CHK. BY	DAN CHENG	DATE 08-11-00

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FRONT END SYSTEM
ION SOURCE PROTOTYPE SYSTEM
STAINLESS STEEL SHIELD

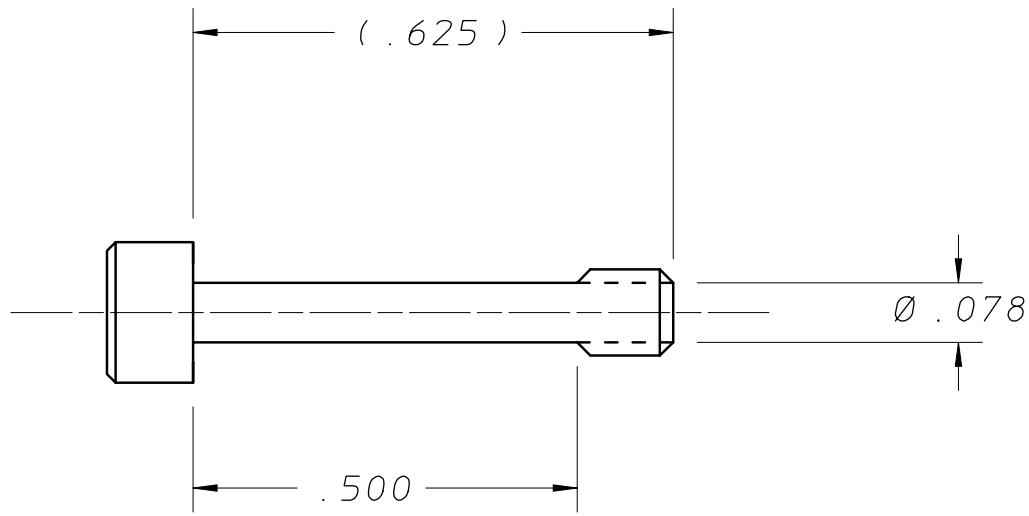
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL		DWG. NO. 21G7593	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8212-AC	CATEGORY CODE FE3111		

Dwg. No. 21G7621 Size Rev



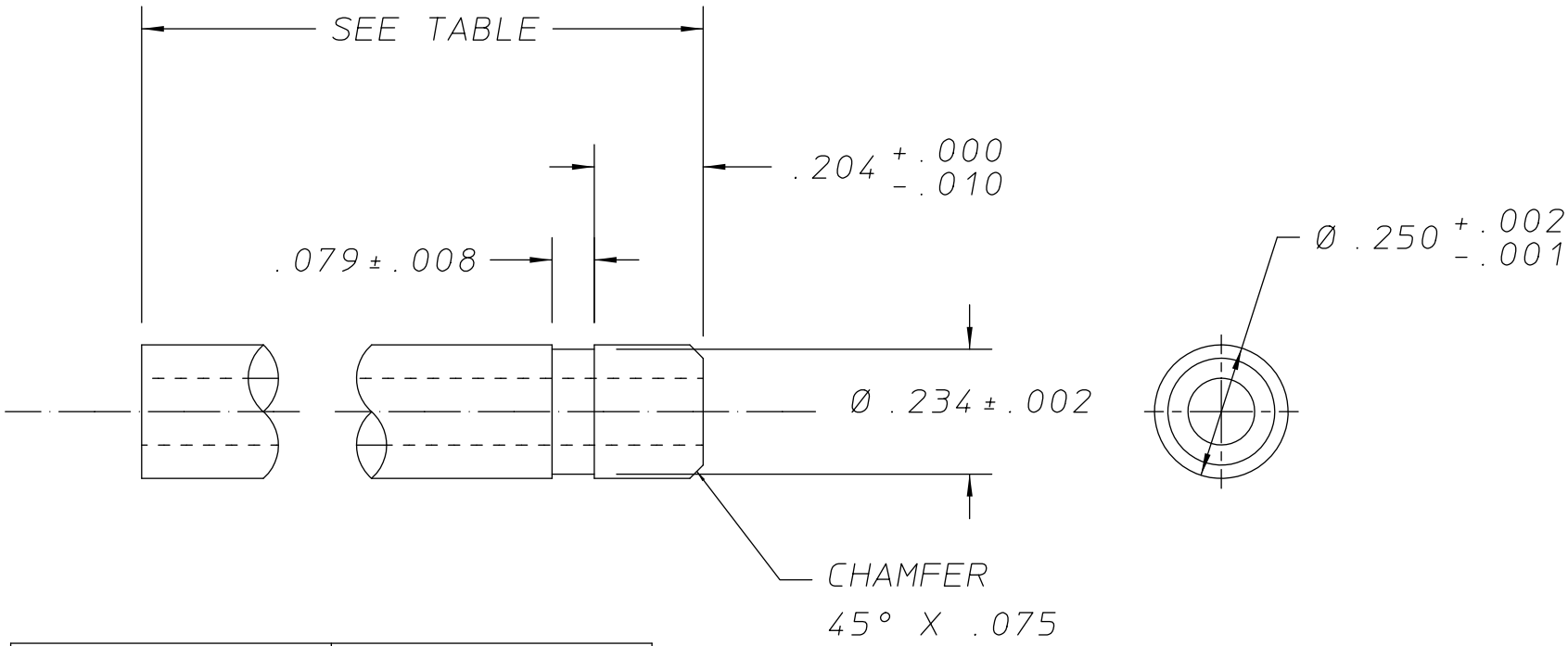
Material - ELKANITE, 70W/30Cu, SCHWARTZKOPF TECH.		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .001 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California - Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number -	Finish √ 125	MECHANICAL SYSTEMS			
Date Issued -	Date Reqd -	OUTLET ELECTRODE SPARK GAP			
Number Required -	Deliver To -	Shown on Dwg No. 21C8934			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By D. CHENG	Date 10/9/00	Micro-Filmed	Drawing Scale 4:1	Dwg. No. 21G7621	Size Rev
Check By R. THOMAE	Date 10/14/00	Design Account 8212-CT	Drawing Type Detail		

Dwg. No. 21G7631 Size Rev



Material - #4-40 SCREW, STAINLESS STEEL, .625" LONG				-	-	-	-
Unless Otherwise Noted				Rev	Dwn	Date	Changes
.X ± .1	.XX ± .025	.XXX ± .005	Angles ± .5°	LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California - Berkeley			
				SNS-FES ION SOURCE AND LEBT			
Account Number -	Finish √ 125			MECHANICAL SYSTEMS			
Date Issued -	Date Reqd -			MODIFIED #4-40 SCREW			
Number Required -	Deliver To -			Shown on Dwg No. 21C8934			
Surface Treatment Degrease	Identific Method Tag			Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By D. CHENG	Date 10/9/00			Micro-Filmed	Drawing Scale 4:1	Dwg. No. 21G7631	Size Rev
Check By R. THOMAE	Date 10/13/00			Design Account 8212-CT	Drawing Type Detail		

Dwg. No. 21G7711 Size Rev



PART NO.	LENGTH
21G7711-1	1.500"
21G7711-2	9.000"

Material - TUBING, STAINLESS, Ø.250" OD X Ø.125" ID

Unless Otherwise Noted

.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°

Break Edges .016 Max on Machined Work
Remove Burrs Weld Splatter and Loose Scale
References: ANSI Y 14.5 & B46.1

Account Number	-	Finish	√ 64
Date Issued	-	Date Reqd	-
Number Required	-	Deliver To	-
Surface Treatment	Degrease	Identific Method	Tag
Drawn By	D. CHENG	Date	3/2/01
Check By		Date	

Rev	Dwn	Date	Changes
-	-	-	-

LAWRENCE BERKELEY LABORATORY

University of California - Berkeley

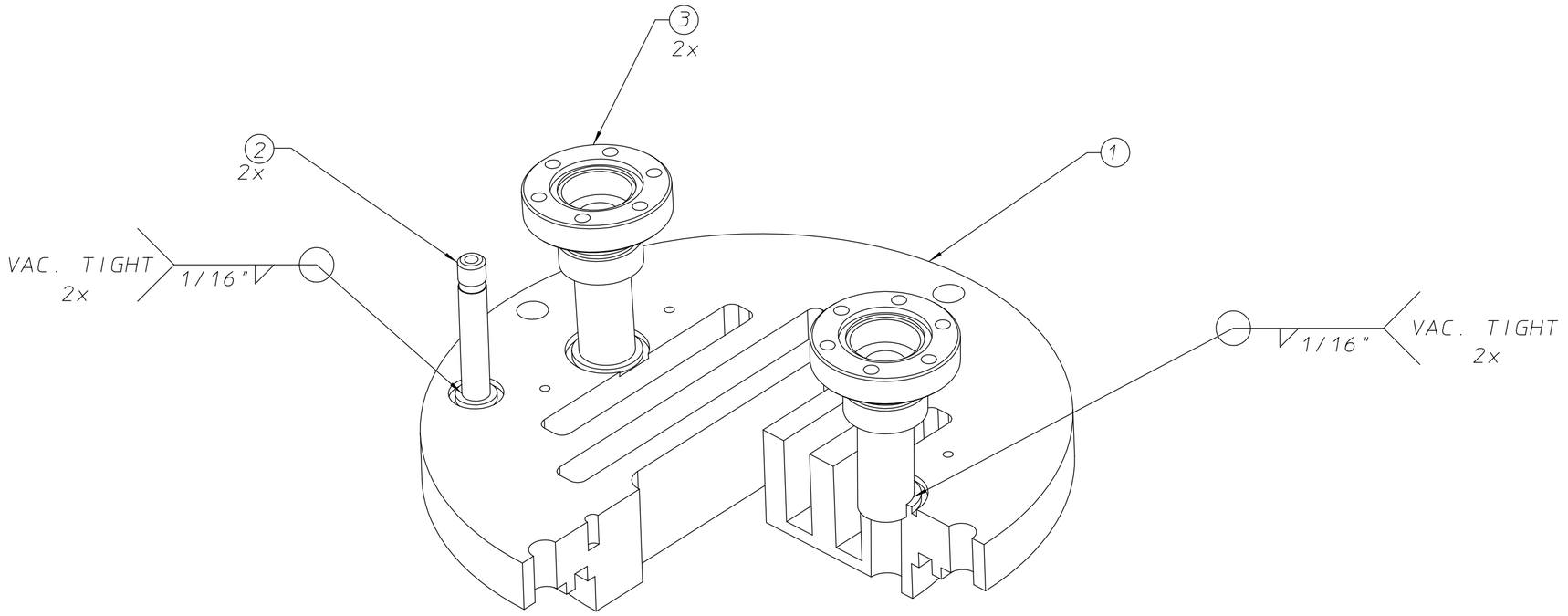
SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

1/4" LeGRIS WATER FITTING MACHINING PREP

Shown on Dwg No.					
Patent Clear		Category Code	FE-3130	Do not Scale Prints	
Micro-Filmed		Drawing Scale	3:1	Dwg. No. 21G7711	Size / Rev
Design Account	8212-CU	Drawing Type	Detail		

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21C9874	BACKFLANGE
2	2	21C7711-1	1/4" LeGRIS WATER FITTING PREP, 1.50" LG.
2	3	21G7732	ION SOURCE BACKFLANGE WELD NIPPLE



21G7723

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES			
	.X ± .1	FRAC. ±1/64	
	.XX ± .01	ANGLES ±.01°	
	.XXX ± .005	FINISH 125√	

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL
ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT. NO.	SERIAL NO.	
DATE ISSD	DATE REQD.	NO. REQD.
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENT. METH.	TAG	
DWG. BY	D. CHENG	DATE 03-05-01
CHK. BY		DATE

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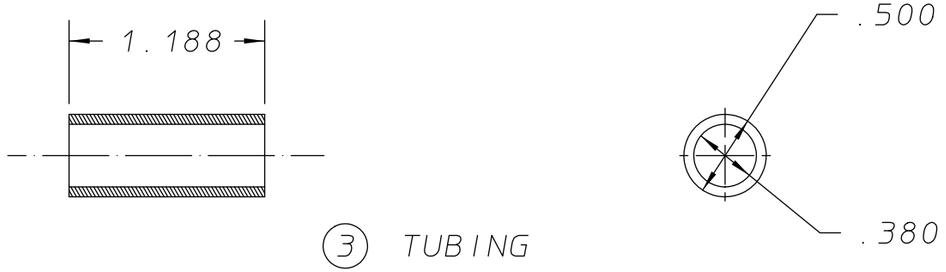
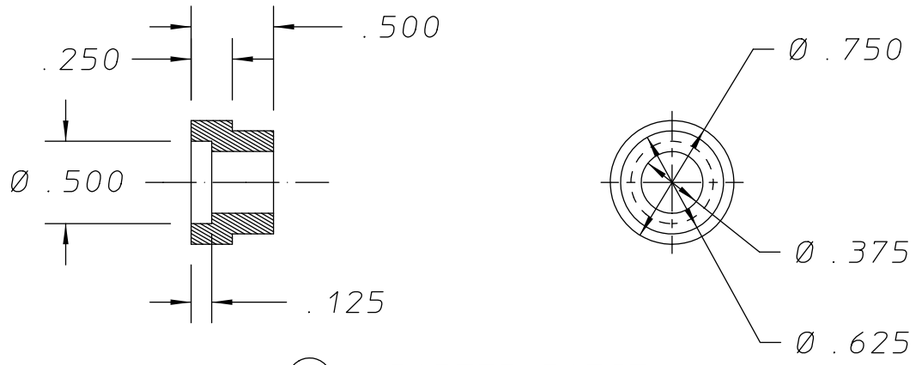
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
ION SOURCE BACKFLANGE WELDMENT

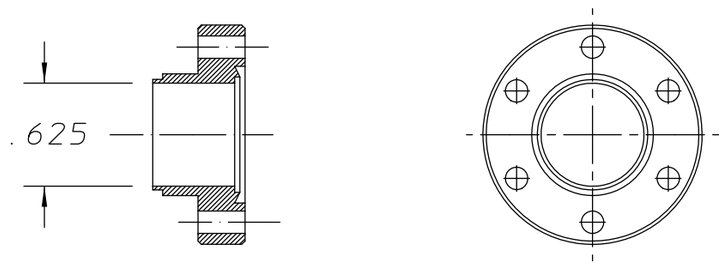
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL	21G7543	DWG. NO. 21G7723	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8212-CU	CATEGORY CODE FE3130		



③ TUBING

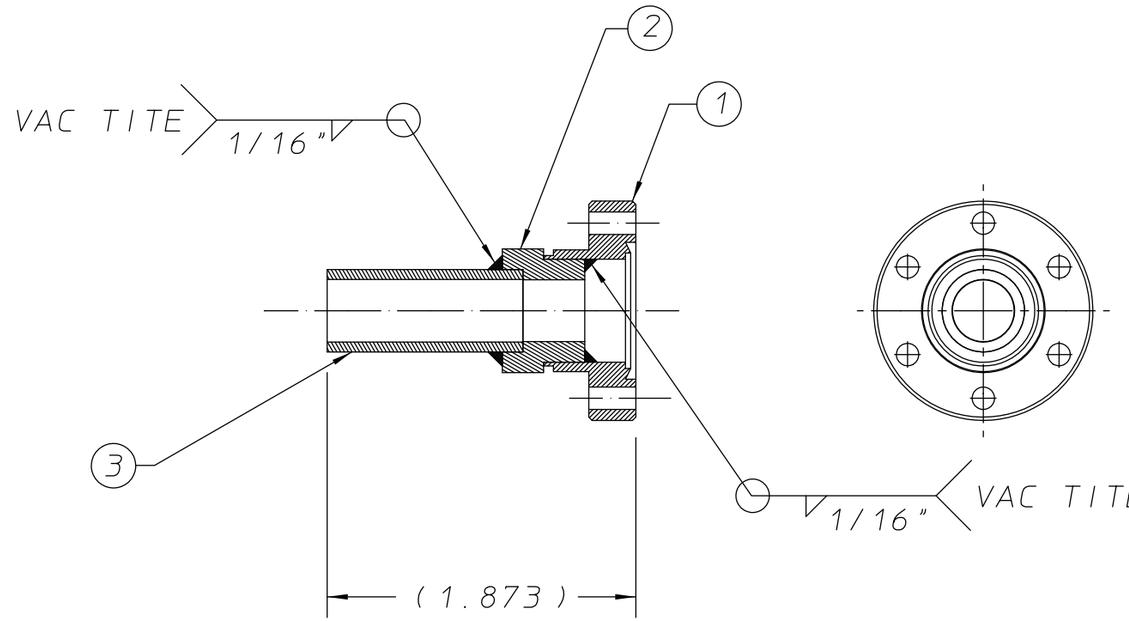


② ADAPTER PIECE



① MDC MINI-CONFLAT

21G7732	REQD	ITEM	PART NUMBER	DESCRIPTION
	1	1	130004	MDC VACUUM CORP., 1-1/3" O.D. CF FLANGE, TAPPED
	A/R	2	-	ROD, STAINLESS 304, .750" OD
	A/R	3	-	TUBING, STAINLESS 304, .500" OD, .060" WALL



NOTE:
PART IS CANNOT BE UHV
CLEANED AFTER WELDING.

REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 64 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

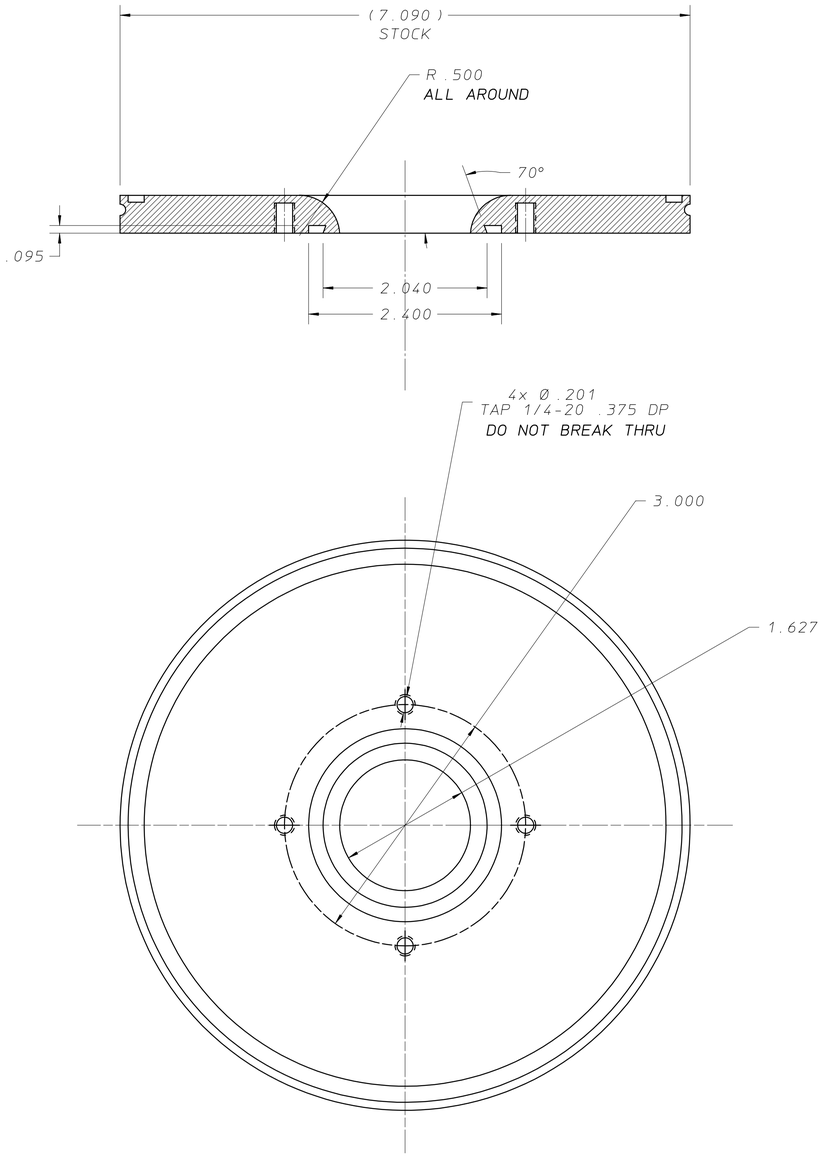
ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 03-05-01
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
ION SOURCE BACKFLANGE WELD NIPPLE

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	21G7723	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8212-CU	FE3130	21G7732

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	812002	ISO NW160 BLANK FLANGE, SS, FROM MDC, INC.



21G7754

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±1° | .XXX ± .005 | FINISH 32√

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 04/05/01
CHK. BY | DATE

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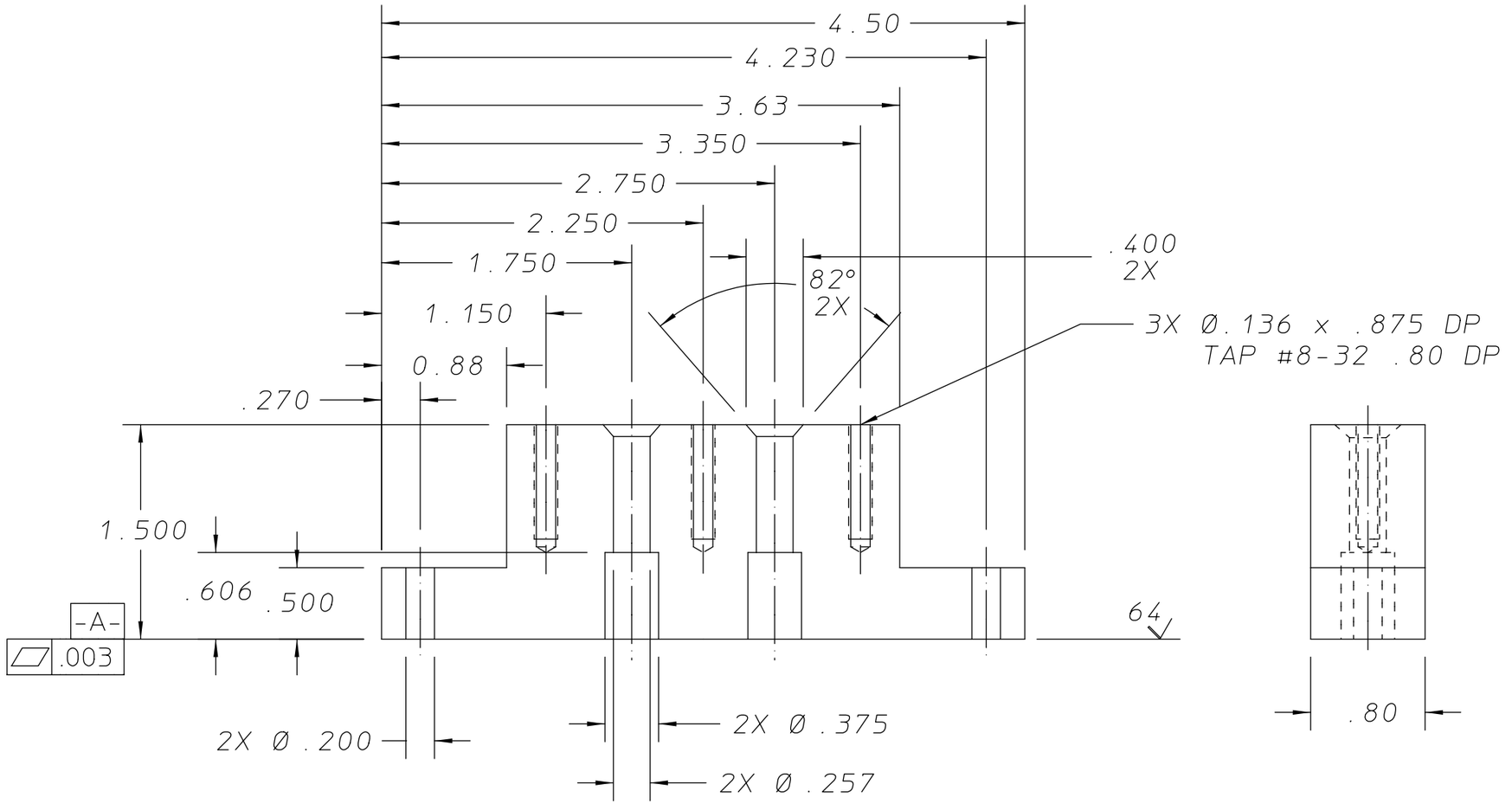
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
LEBT VIEWPORT HV FEEDTHRU FLANGE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL			
MICROFILMED	DESIGN ACCT. NO. 8212-CU	CATEGORY CODE FE3130	DWG. NO. 21G7754	SIZE / REV.

21G7782A	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R			MACHINEABLE (GREEN) CERAMIC, 85% AL203



REV	DWN	CHK	DATE	DESCRIPTION
A	DWC		7/25/01	.400 DIMENSION WAS .361

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 07-12-01
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

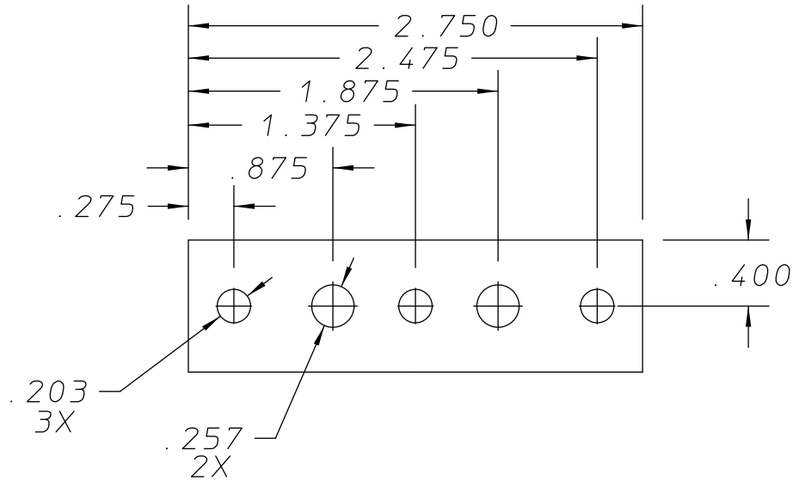
SNS-FES ION SOURCE AND LEBT

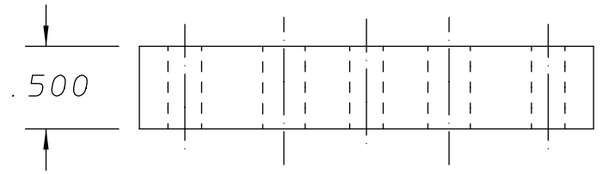
SOURCE 65mA UPGRADE

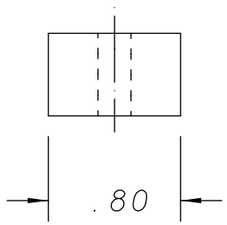
ALUMINA RF ANTENNA FEEDTHRU

PAT CLEAR	DWG TYPE DETAIL	SHOWN ON	SCALE: FULL (DO NOT SCALE PRINTS)
MICROFILMED	DESIGN ACCT NO 8212-CU	CATEGORY CODE FE3130	DWG NO 21G7782A REV

21G7792	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R			ALUMINA, AL203







REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 1/64 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO		SER NO
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	D. CHENG	DATE 07-24-01
CHK BY		DATE

LAWRENCE BERKELEY LABORATORY

UNIVERSITY OF CALIFORNIA-BERKELEY

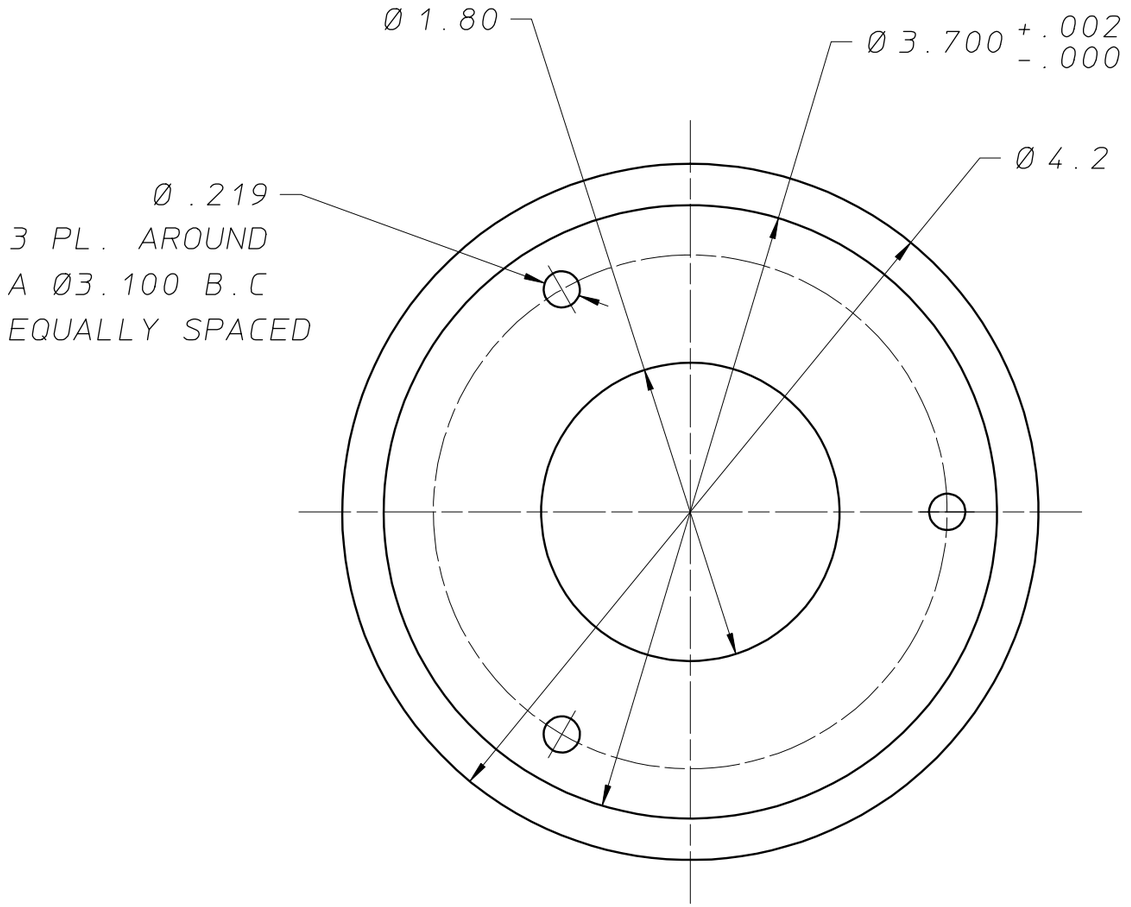
SNS-FES ION SOURCE AND LEBT

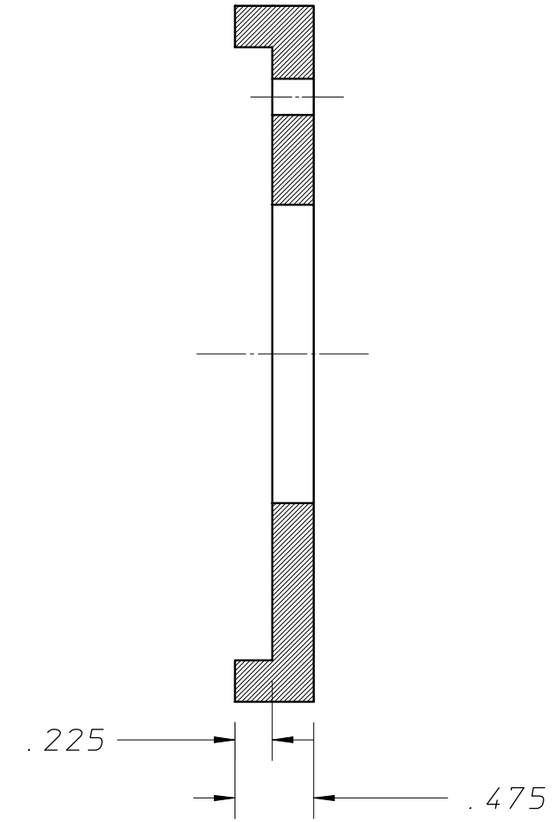
SOURCE 65mA UPGRADE

ALUMINA RF ANTENNA FEEDTHRU CLAMP

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL		DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8212-CU	FE3130	21G7792

21G7802	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	AL 6061-T6





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ±.01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 0.03 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD

DELIVER TO

SURFACE TREATMENT DEGREASE

IDENTIFIC METHOD TAG

DWG BY J. MANDRILLON	DATE 05-15-99
CHK BY D. CHENG	DATE 5/20/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

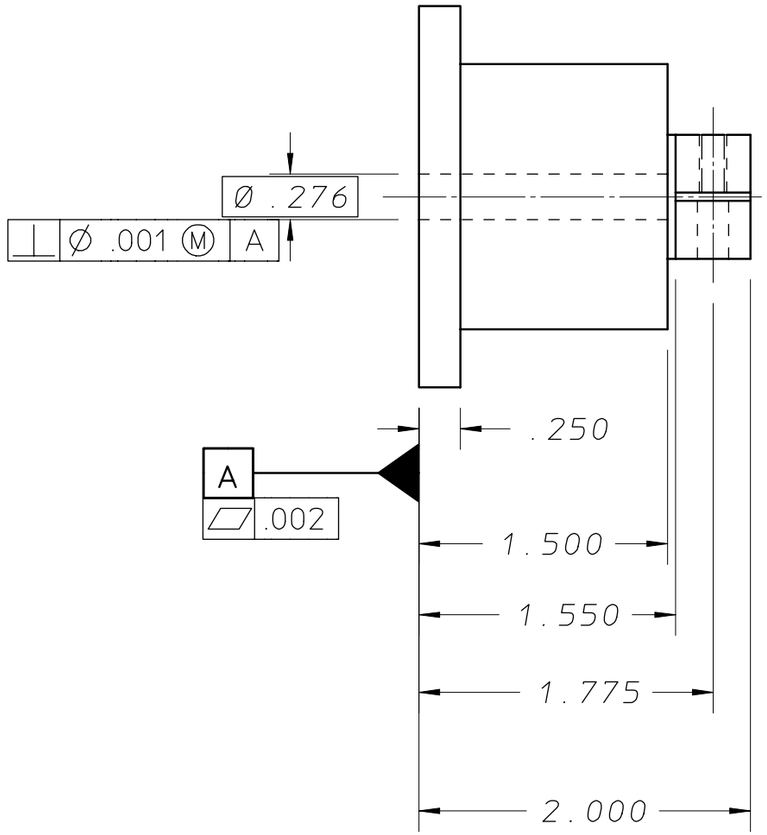
SNS-FES ION SOURCE AND LEBT

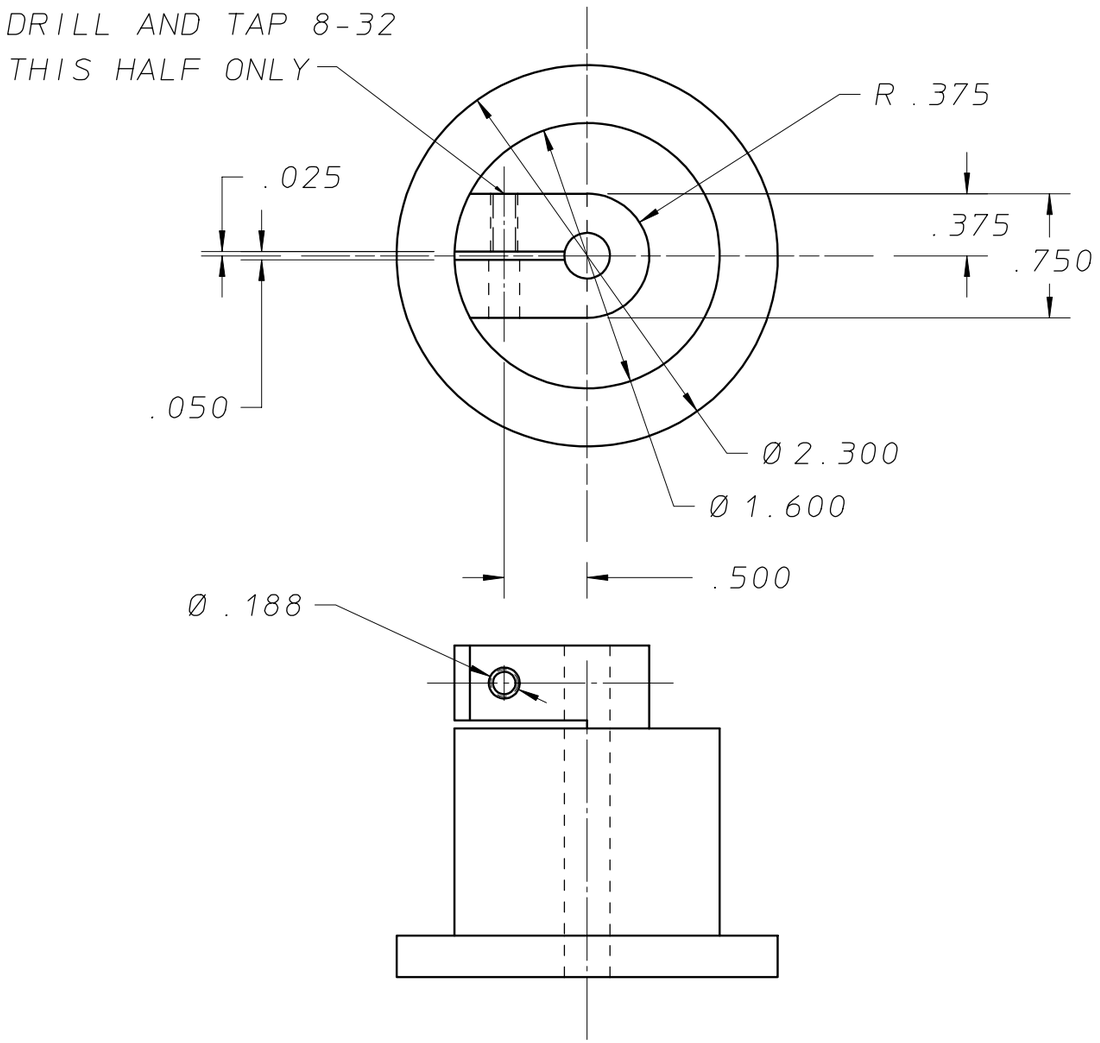
MECHANICAL SYSTEMS

CLAMP RING

PAT CLEAR	DWG TYPE DETAIL	SHOWN ON 21G7836	SCALE: FULL
			DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO 8210-14	CATEGORY CODE FE3111	DWG NO 21G7802 REV

21G7812	REQD	ITEM	PART NUMBER	DESCRIPTION
	A/R	1	-	BRASS





REV	DWN	CHK	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

TOLERANCE .X ±.1 .XX ± .01 .XXX ±.005

SURFACE FINISH 125 √

1. SAWED, FLAMECUT, SHEARED OR CUT STOCK FINISH.
2. THREADS CLASS 2.
3. CHAMFER ENDS OF ALL SCREW THRDS 30°.
4. 1 1/2 PITCH RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT THRDS.
5. BREAK EDGES 0.03 MAX. ON MACHINE WORK.
6. REMOVE BURRS, LOOSE SCALE AND WELD SPLATTER.
7. REF.-USASI OR ASA STDS SECT Y-14 & B46-1.

SHOP ORDERS

ACCT NO	SER NO	
DATE ISSD	DATE REQD	NO REQD
DELIVER TO		
SURFACE TREATMENT	DEGREASE	
IDENTIFIC METHOD	TAG	
DWG BY	J. MANDRILLON	DATE 05-15-99
CHK BY	D. CHENG	DATE 05-20-99

LAWRENCE BERKELEY LABORATORY

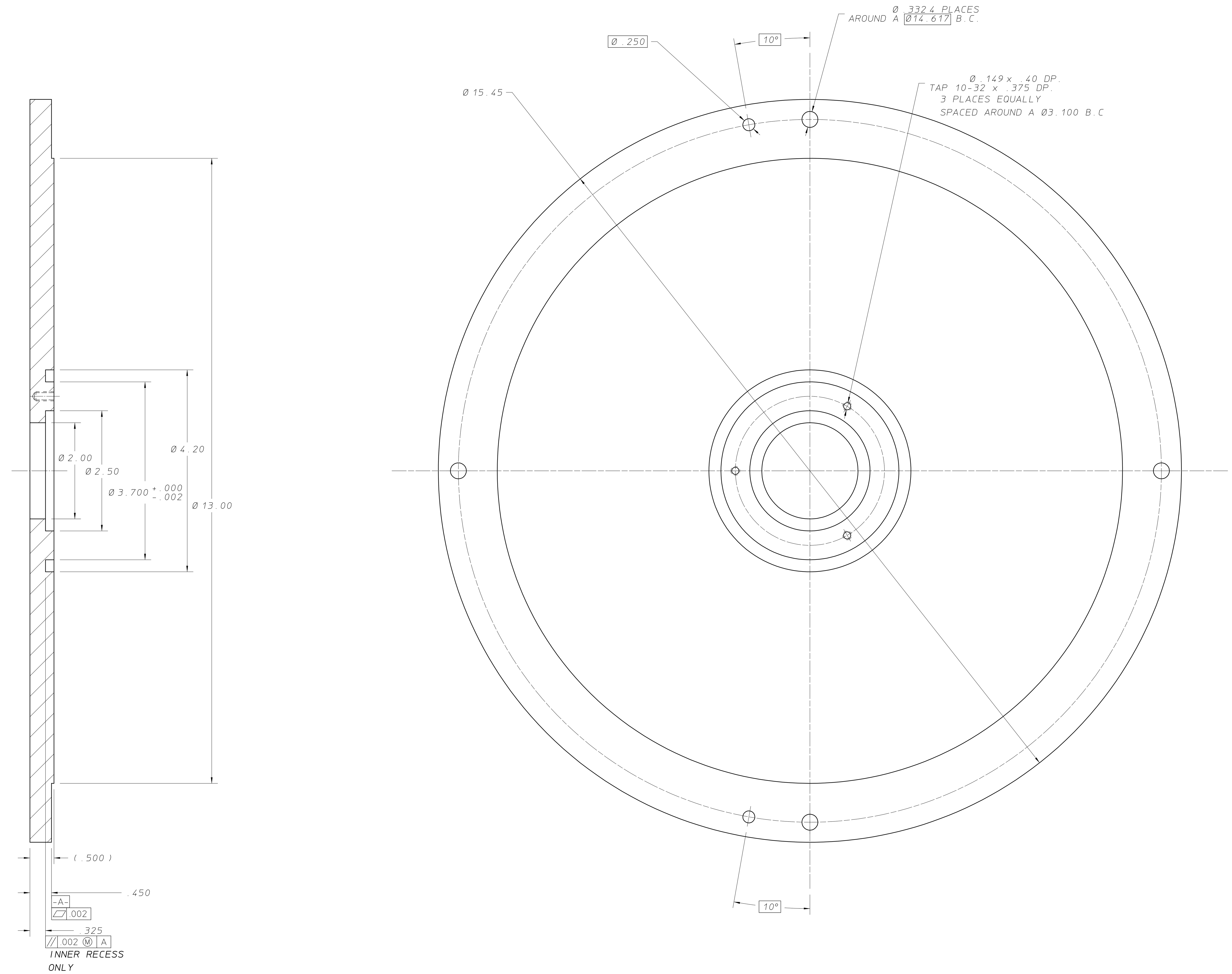
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT

MECHANICAL SYSTEMS

CENTERING ROD CLAMP

PAT CLEAR	DWG TYPE	SHOWN ON	SCALE: FULL
	DETAIL	21G7836	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO	CATEGORY CODE	DWG NO REV
	8210-14	FE3111	21G7812



21G7826

A/R	1	-	ALUMINIUM, 6061-T6
REQD	ITEM	PART NO.	DESCRIPTION

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

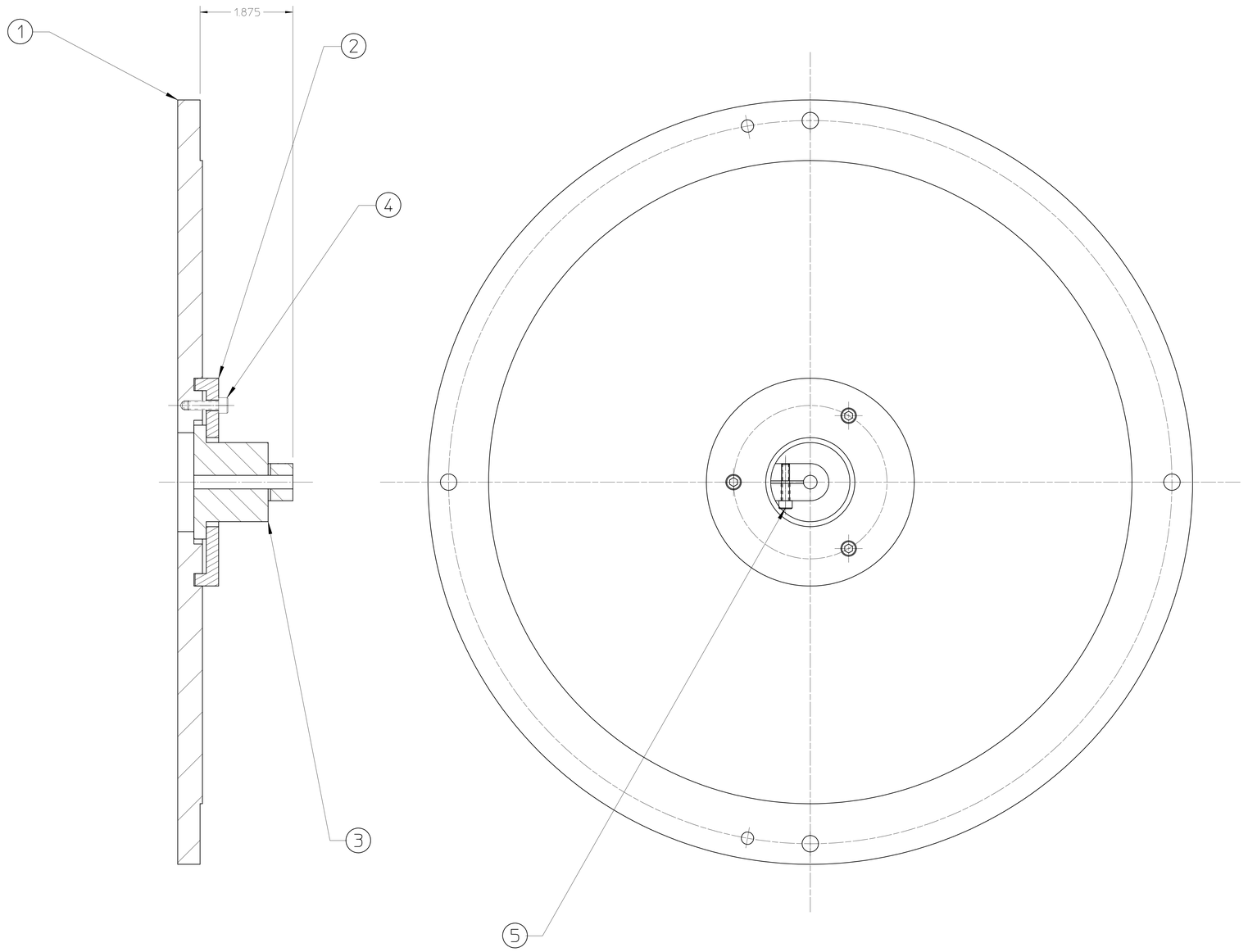
TOLERANCES: .X ± .1 — FRAC. ± 1/64; .XX ± .01 — ANGLES ± 1°; .XXX ± .005 — FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .03 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: J. MANDRILLON — DATE 05-15-99
CHK. BY: D. CHENG — DATE 05-20-99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
ALIGNMENT FLANGE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY	21G7836	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO. / SIZE	REV.
	8210-14	FE3111	21G7826	



NOTES:
1. THE CENTERS OF ITEMS (3) AND (1) SHALL BE ALIGNED WITH A TOLERANCE OF +/- .001" PRIOR TO TIGHTENING THE SCREWS.
2. ONCE TIGHTENED, DO NOT LOOSEN THE SCREWS OF THE CLAMP (ITEM (4))

21G7836

REQD	ITEM	PART NO.	DESCRIPTION
1	5	-	SHCS, 8-32 X .75" LONG
3	4	-	SHCS, 10-32, .625" LONG
1	3	21G7812	CENTERING ROD CLAMP
1	2	21G7802	CLAMP RING
1	1	21G7826	ALIGNMENT FLANGE

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC. ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .03 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

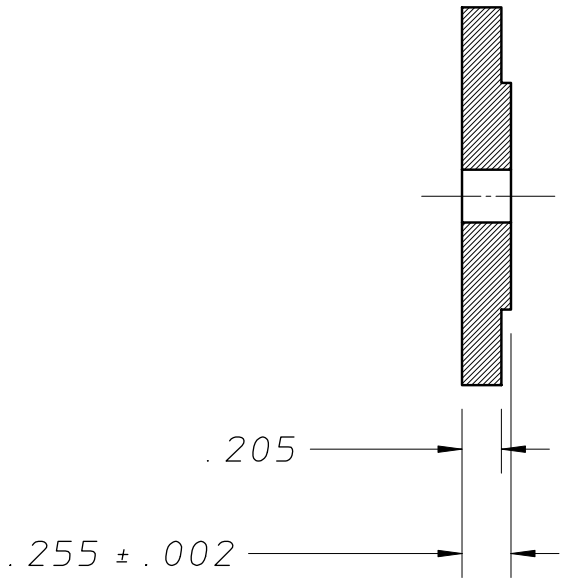
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY J. MANDRILLON DATE 05-15-99
CHK BY D. CHENG DATE 05-20-99

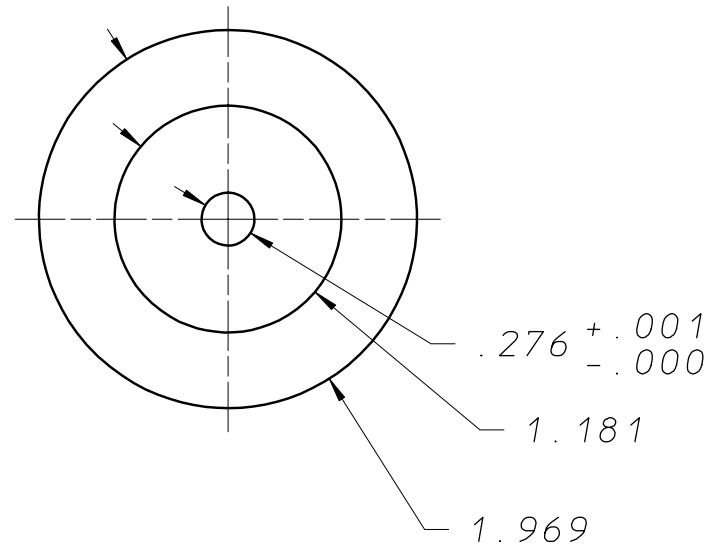
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
ALIGNMENT PLATE ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY			
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE3111	21G7836	

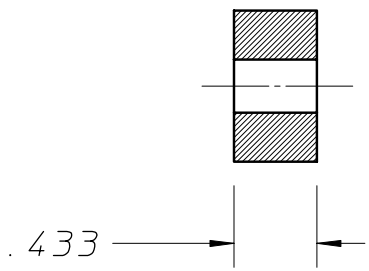
Dwg. No. 21G7841 Size Rev

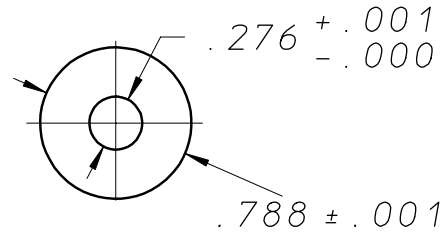




Material – BRASS		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California – Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number –	Finish √ 64	MECHANICAL SYSTEMS			
Date Issued –	Date Reqd –	EXTRACTOR-G3 ALIGNMENT SPACER			
Number Required –	Deliver To –	Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON	Date 05-15-99	Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7841	Size Rev
Check By D. CHENG	Date 05-20-99	Design Account 8210-14	Drawing Type Detail		

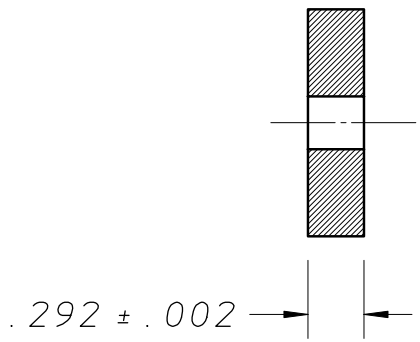
Dwg. No. 21G7851 Size Rev

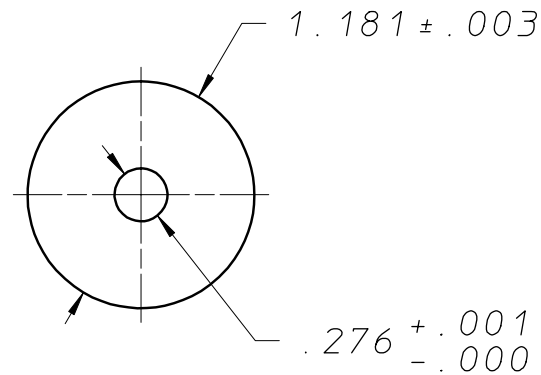




Material – BRASS				-	-	-	-
Unless Otherwise Noted				Rev	Dwn	Date	Changes
.X ± .1	.XX ± .025	.XXX ± .005	Angles ± .5°	LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California – Berkeley			
				SNS-FES ION SOURCE AND LEBT			
Account Number –		Finish √ 64		MECHANICAL SYSTEMS			
Date Issued –		Date Reqd –		G3 ELECTRODE CENTERING BUSHING			
Number Required –		Deliver To –		Shown on Dwg No.			
Surface Treatment Degrease		Identific Method Tag		Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON		Date 05-15-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7851	Size Rev
Check By D. CHENG		Date 05-20-99		Design Account 8210-14	Drawing Type Detail		

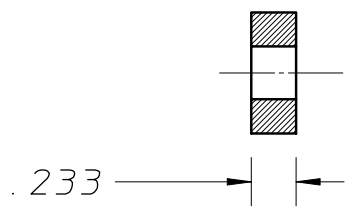
Dwg. No. 21G7861 Size Rev

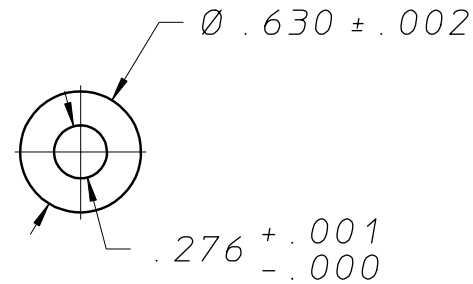




Material – BRASS			-	-	-	-
Unless Otherwise Noted			Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°			LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1			University of California – Berkeley			
			SNS-FES ION SOURCE AND LEBT			
Account Number –	Finish √ 64		MECHANICAL SYSTEMS			
Date Issued –	Date Reqd –		GROUND ELECTRODE ALIGNMENT SPACER			
Number Required –	Deliver To –		Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag		Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON	Date 05-15-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7861	Size Rev
Check By D. CHENG	Date 05-20-99		Design Account 8210-14	Drawing Type Detail		

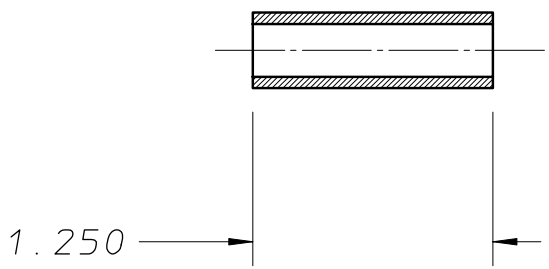
Dwg. No. 21G7871 Size Rev

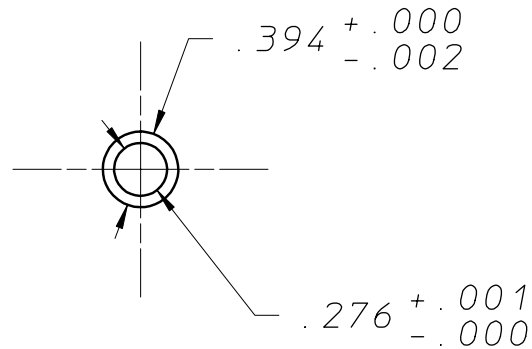




Material – BRASS		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California – Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number –	Finish √ 64	MECHANICAL SYSTEMS			
Date Issued –	Date Reqd –	GROUND ELECTRODE CENTERING BUSHING			
Number Required –	Deliver To –	Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON	Date 05-15-99	Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7871	Size Rev
Check By D. CHENG	Date 05-20-99	Design Account 8210-14	Drawing Type Detail		

Dwg. No. 21G7881 Size Rev





Material – BRASS				-	-	-	-
Unless Otherwise Noted				Rev	Dwn	Date	Changes
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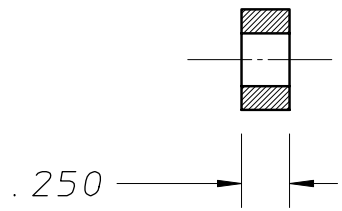
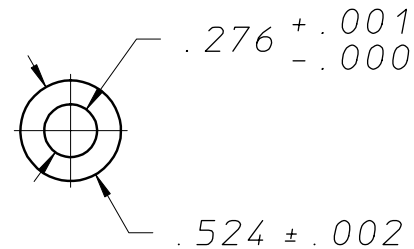
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California – Berkeley			
				SNS-FES ION SOURCE AND LEBT			
Account Number –		Finish √ 125		MECHANICAL SYSTEMS			
Date Issued –		Date Reqd –		EXTRACTOR CENTERING BUSHING			
Number Required –		Deliver To –		Shown on Dwg No.			
Surface Treatment Degrease		Identific Method Tag		Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON		Date 12-15-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7881	Size Rev
Check By D. CHENG		Date 12-17-99		Design Account 8210-14	Drawing Type Detail		

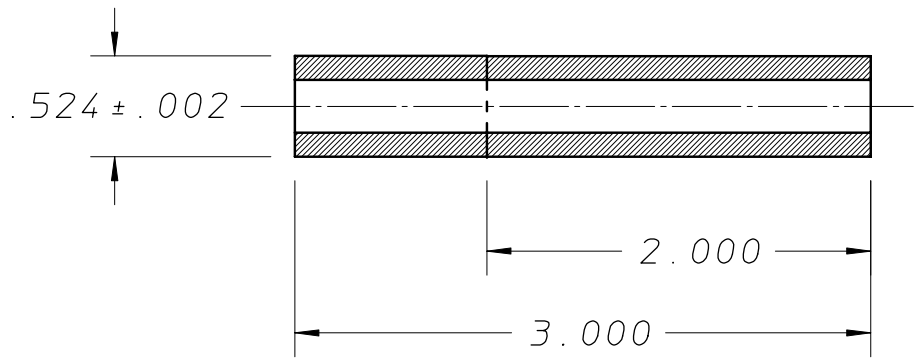
Dwg. No. 21G7891 Size Rev

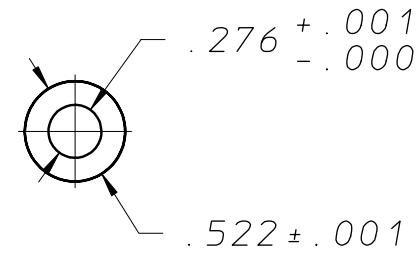




Material – BRASS		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California – Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number –	Finish √ 125	MECHANICAL SYSTEMS			
Date Issued –	Date Reqd –	CHOPPER ELECTRODE CENTERING BUSHING 1			
Number Required –	Deliver To –	Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON	Date 05-15-99	Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7891	Size Rev
Check By D. CHENG	Date 05-20-99	Design Account 8210-14	Drawing Type Detail		

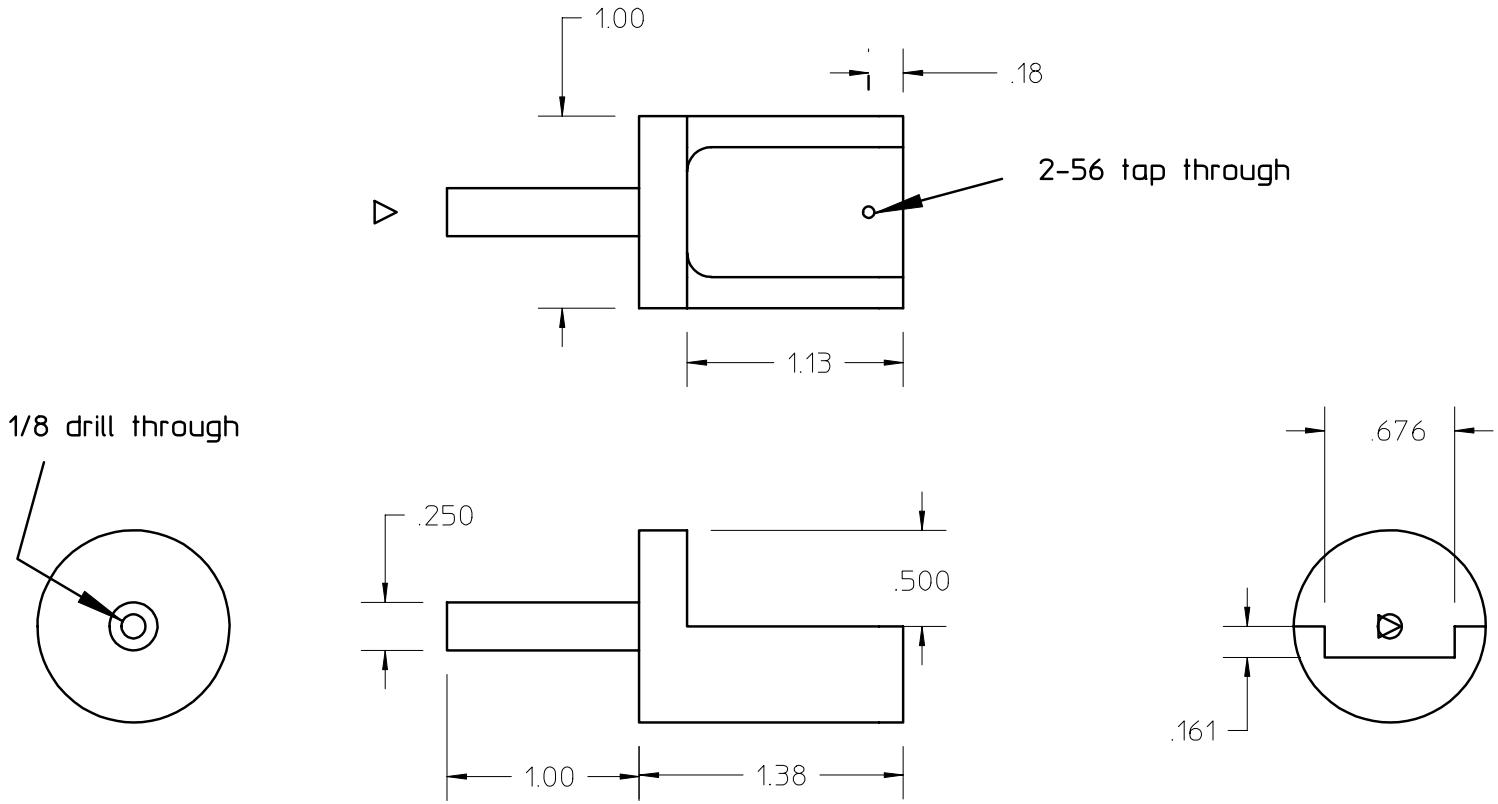
Dwg. No. 21G7901 Size Rev





Material – BRASS		-	-	-	-
Unless Otherwise Noted		Rev	Dwn	Date	Changes
.X ± .1 | .XX ± .025 | .XXX ± .005 | Angles ± .5°		LAWRENCE BERKELEY LABORATORY			
Break Edges .03 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1		University of California – Berkeley			
		SNS-FES ION SOURCE AND LEBT			
Account Number –	Finish √ 64	MECHANICAL SYSTEMS			
Date Issued –	Date Reqd –	CHOPPER ELECTRODE CENTERING BUSHING 2			
Number Required –	Deliver To –	Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By J. MANDRILLON	Date 05-15-99	Micro-Filmed	Drawing Scale Full	Dwg. No. 21G7901	Size Rev
Check By D. CHENG	Date 05-20-99	Design Account 8210-14	Drawing Type Detail		

Dwg. No. 21G8061 Size Rev

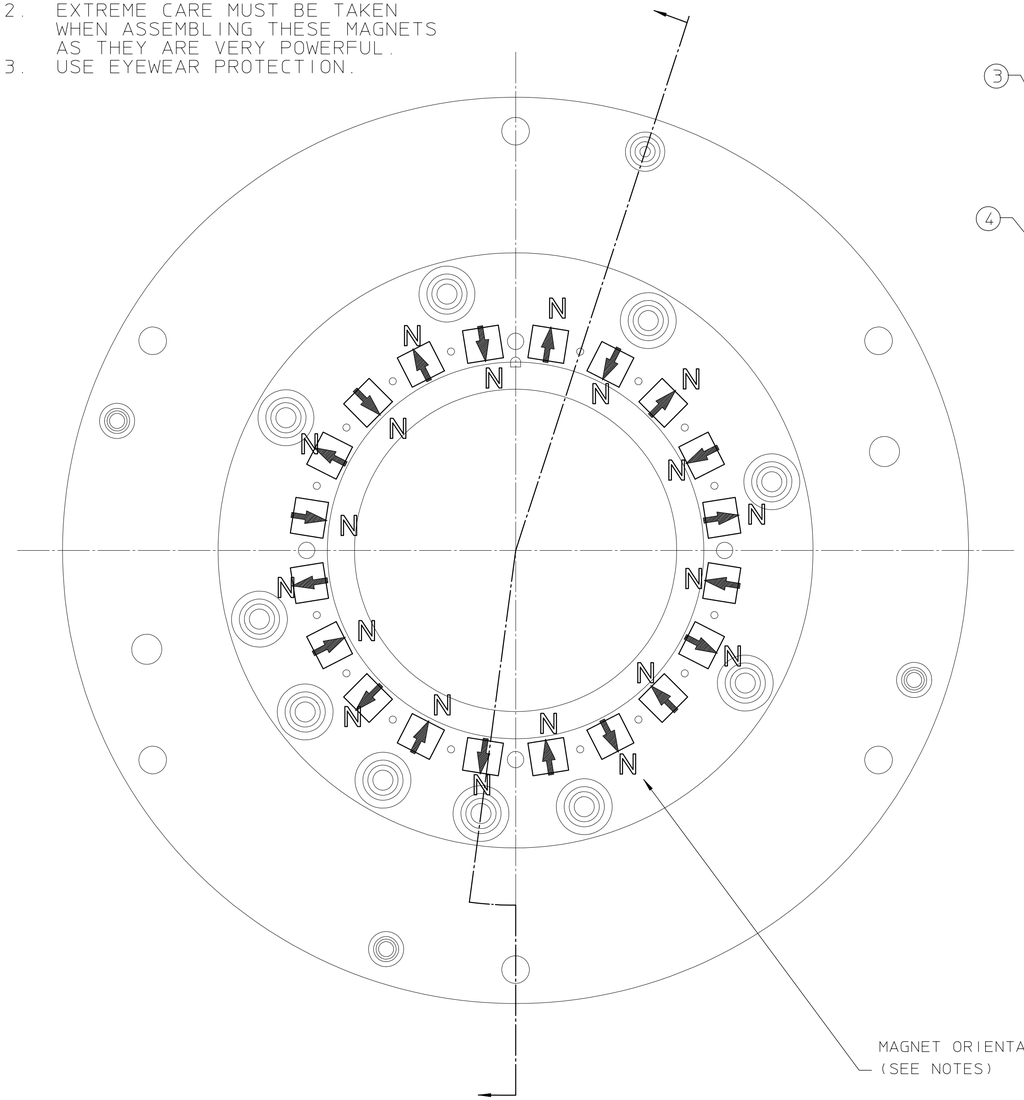


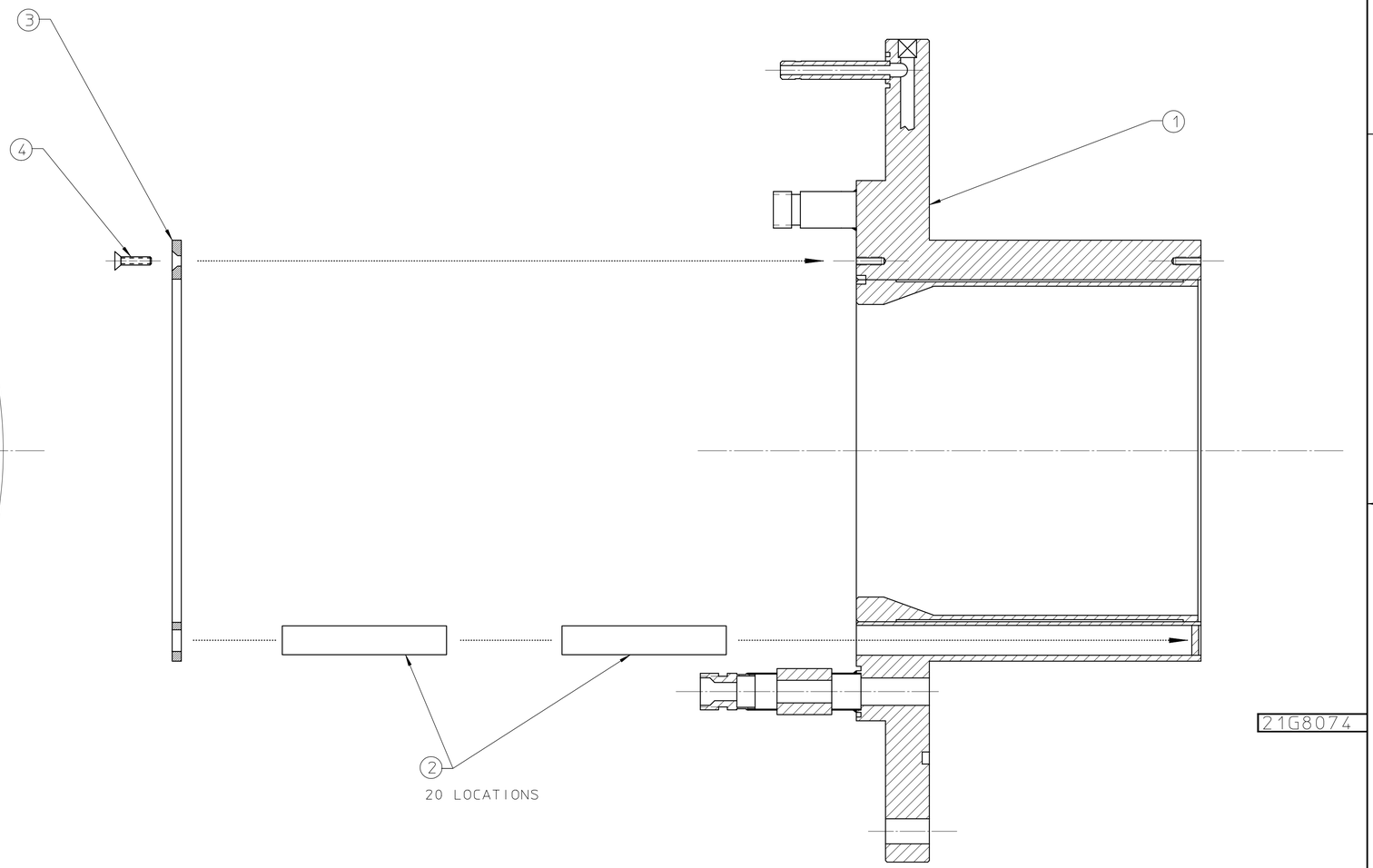
Material aluminum			- - - -		
Unless Otherwise Noted			Rev Dwn Date Changes		
.X ± .1 .XX ± .025 .XXX ± .002 Angles ± .5°			LAWRENCE BERKELEY LABORATORY		
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1			University of California – Berkeley		
			SNS-FES ION SOURCE AND LEBT		
Account Number –	Finish √ 64		MECHANICAL SYSTEMS		
Date Issued –	Date Reqd –		THERMOCOUPLE PROBE FEEDTHRU		
Number Required –	Deliver To –	Shown on Dwg No.			
Surface Treatment Degrease	Identific Method Tag	Patent Clear	Category Code FE-3130	Do not Scale Prints	
Drawn By S Wilde	Date Oct 19 00	Micro-Filmed	Drawing Scale Full	Dwg. No. 21G8061	Size Rev
Check By R. THOMAE	Date 10/20/00	Design Account 8212-CT	Drawing Type Detail		

ITEM	REQD	PART NUMBER	DESCRIPTION
1	1	21C9894	PLASMA CHAMBER WELDMENT
2	40	21C8502-1	CUSP MAGNETS
3	1	21C9982	CUSP MAGNET COVER RING
4	8	-	SCREW, FLATHEAD, SS, 4-40 X .375" LONG

NOTES (UNLESS OTHERWISE SPECIFIED):

1. DIRECTION OF MAGNETIZATION ON THE MAGNETS DENOTES THE "NORTH" END OF A MAGNET. I.E. A COMPASS NEEDLE WILL POINT IN THE OPPOSITE DIRECTION.
2. EXTREME CARE MUST BE TAKEN WHEN ASSEMBLING THESE MAGNETS AS THEY ARE VERY POWERFUL.
3. USE EYEWEAR PROTECTION.





21G8074

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ± 0.5° | .XXX ± .005 | FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REF: ASME Y14.5M & ANSI B46.1.

SHOP ORDERS

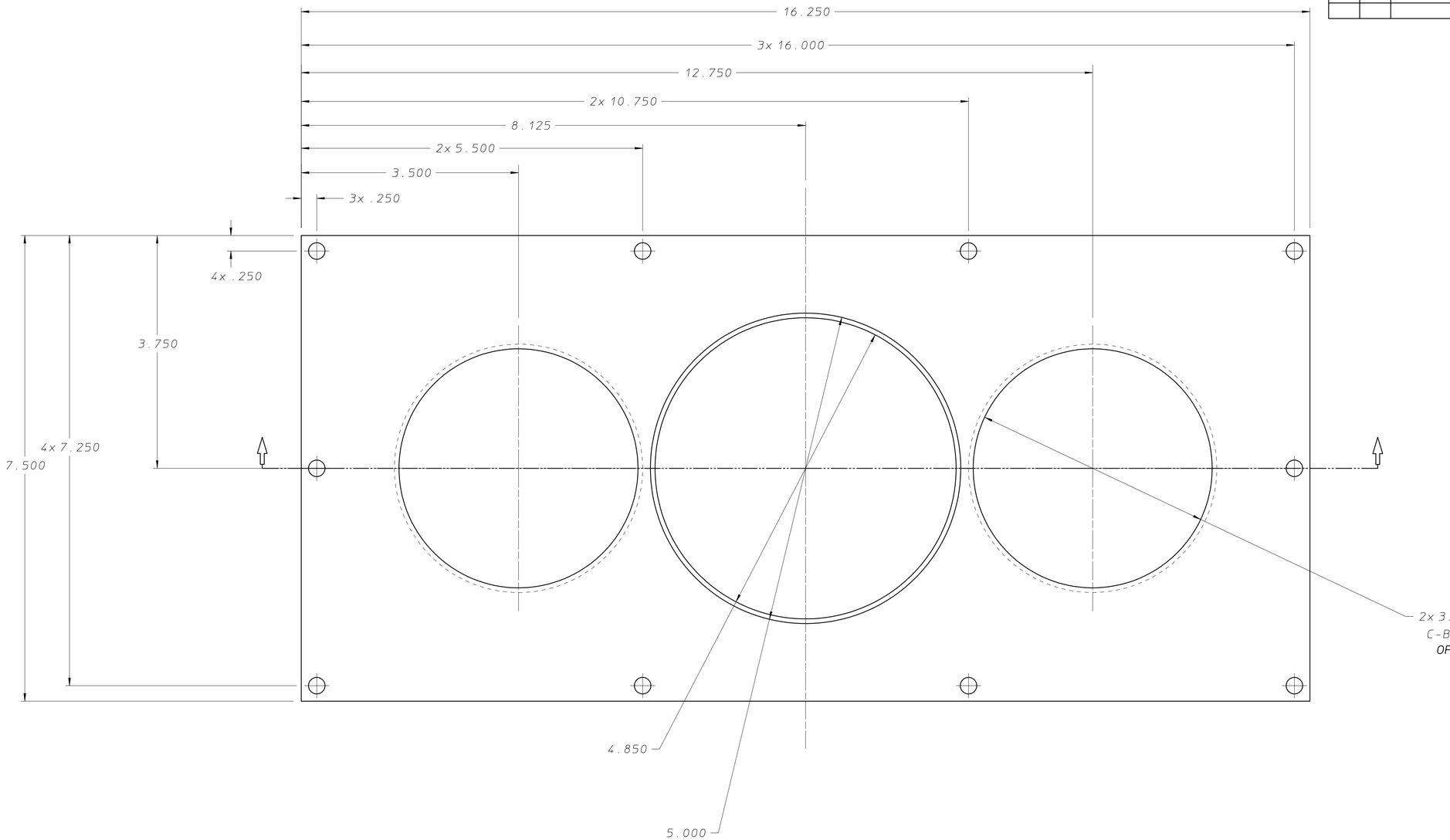
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: CLEAN
IDENT. METH.: TAG
DWG. BY: D. CHENG | DATE: 10-4-01
CHK. BY: D. CHENG | DATE: 10-6-01

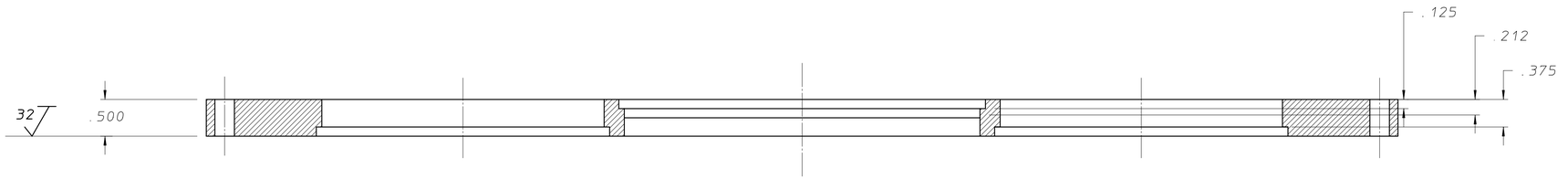
LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
PLASMA CHAMBER MAGNET ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL	21C8406	DWG. NO. 21G8074	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8212-A1	CATEGORY CODE FE-3130		

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304





21G8084

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ± 1/64 | .XX ± .01 | ANGLES ± 1° | .XXX ± .005 | FINISH 64 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

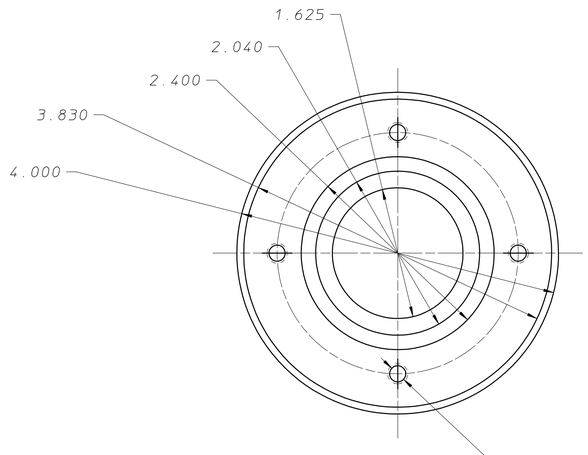
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

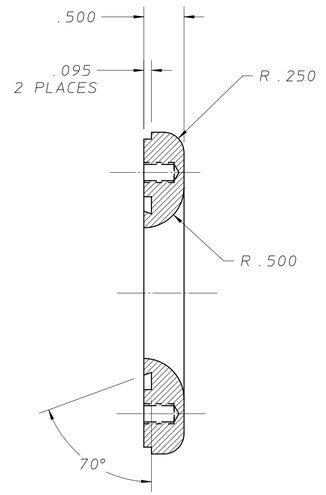
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VIEWPORT/FEEDTHRU FLANGE MACHINING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY	21G8104	DWG. NO. 21G8084	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8210-11	CATEGORY CODE FE3111		

REQ	ITEM	PART NUMBER	DESCRIPTION
A/R	1	-	STAINLESS STEEL, TYPE 304, .5" STOCK





21G8094

REV	DWG	CHK	ZONE	DATE	CHANGES

TOLERANCES
.X ± .1 — FRAC. ±1/64
.XX ± .01 — ANGLES ± 1°
.XXX ± .005 — FINISH 32 √

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

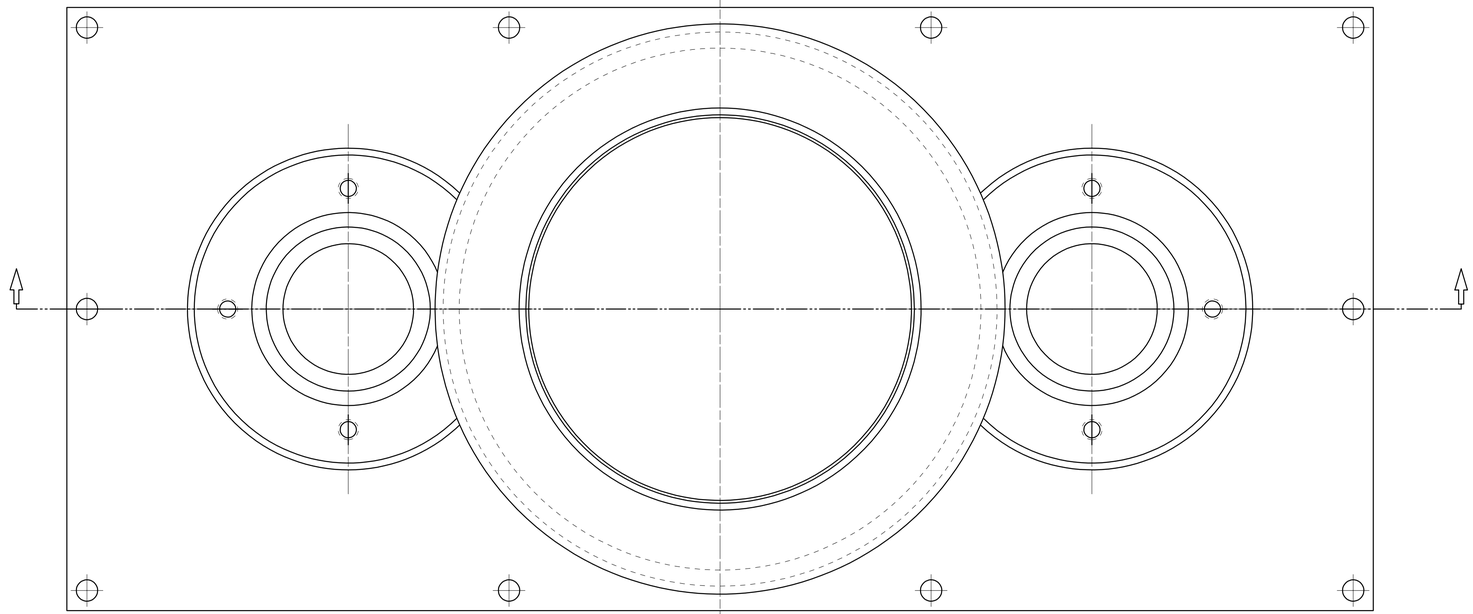
UNLESS OTHERWISE SPECIFIED

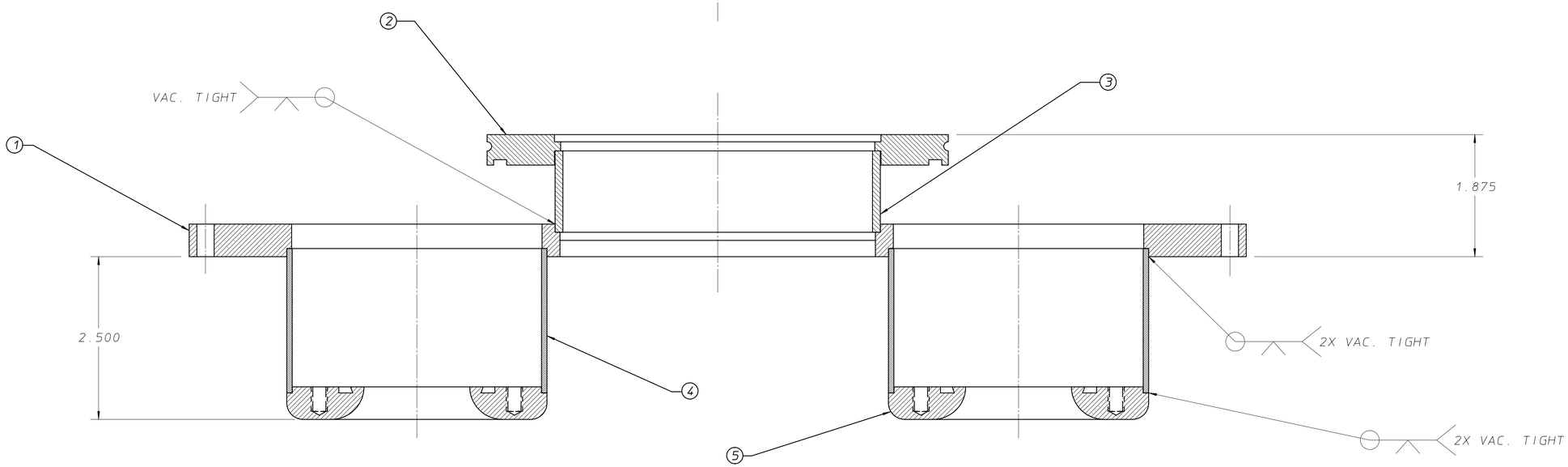
SHOP ORDERS
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
FEEDTHRU FLANGE MACHINING

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL	21G8104	DWG. NO. 21G8094	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8210-11	CATEGORY CODE FE3111		

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21G8084	VIEWPORT/FEEDTHRU FLANGE MACHINING
1	2	21G8113	MODIFIED NW160 FLANGE
1	3	-	TUBING, 5.000" X .125" WALL, 1.25 LONG, STAINLESS STEEL 304
2	4	-	TUBING, 4.000" X .083" WALL, 2.22" LONG, STAINLESS TYPE 304
2	5	21G8093	FEEDTHRU FLANGE MACHINING





21G8104

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
- .X ± .1 — FRAC. ± 1/64
- .XX ± .01 — ANGLES ± 1°
- .XXX ± .005 — FINISH 64 √

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

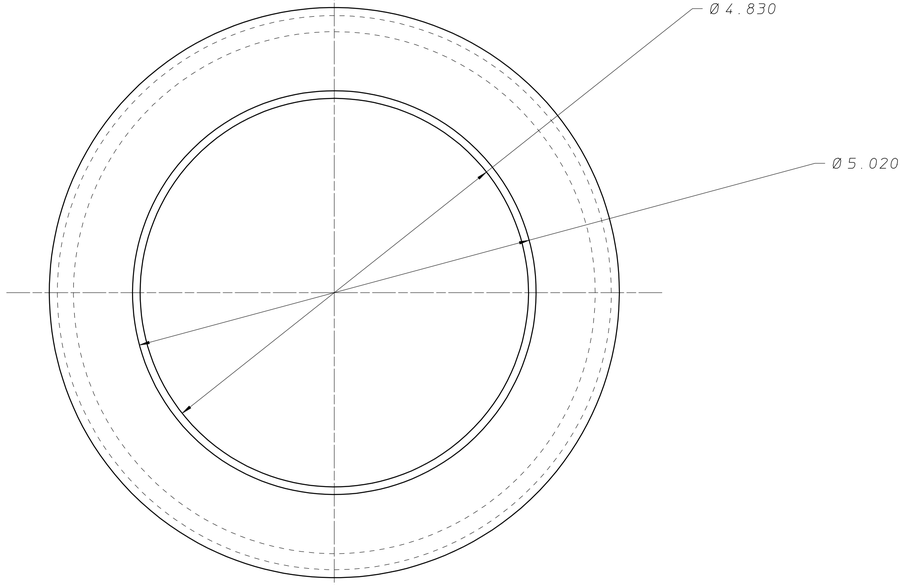
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

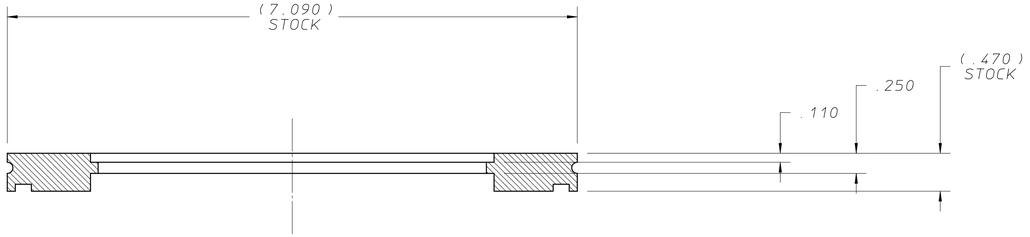
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VIEWPORT/FEEDTHRU FLANGE WELDMENT

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-11	FE3111	21G8104	

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	812002	ISO NW160 BLANK FLANGE, SS, FROM MDC, INC.





21G8114

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±1° | .XXX ± .005 | FINISH 64 √

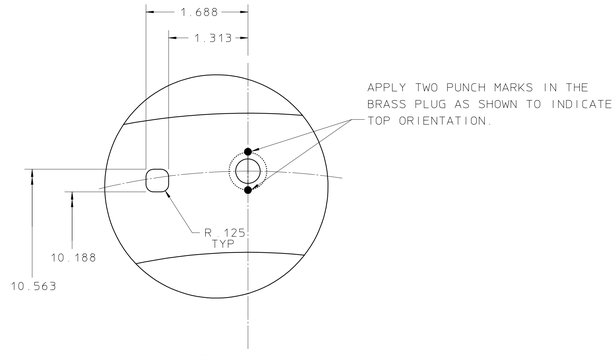
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS

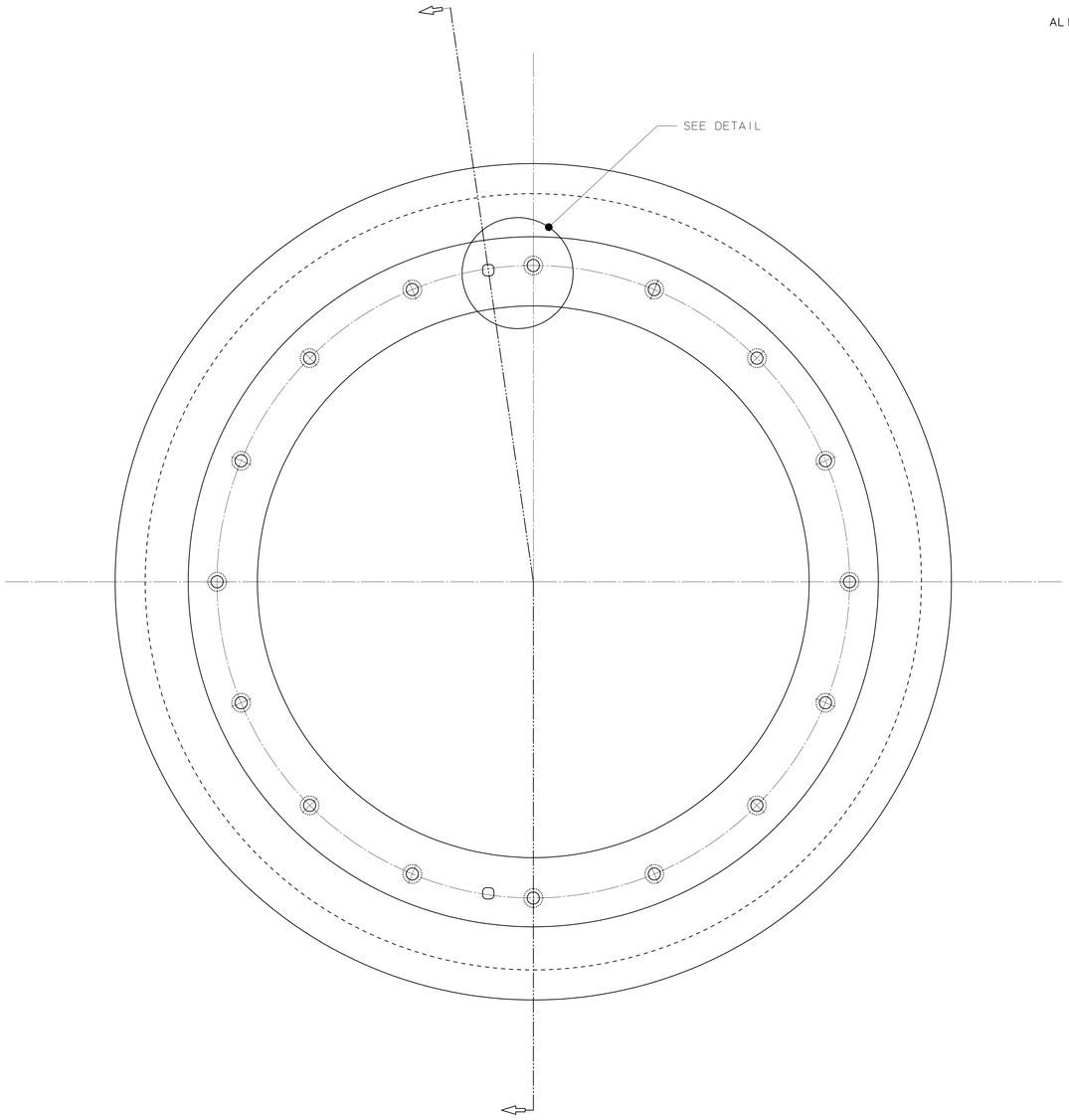
ACCT NO. 8212-CT | SERIAL NO.
DATE ISSD | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG. BY D. CHENG | DATE 11/30/99
CHK. BY | DATE

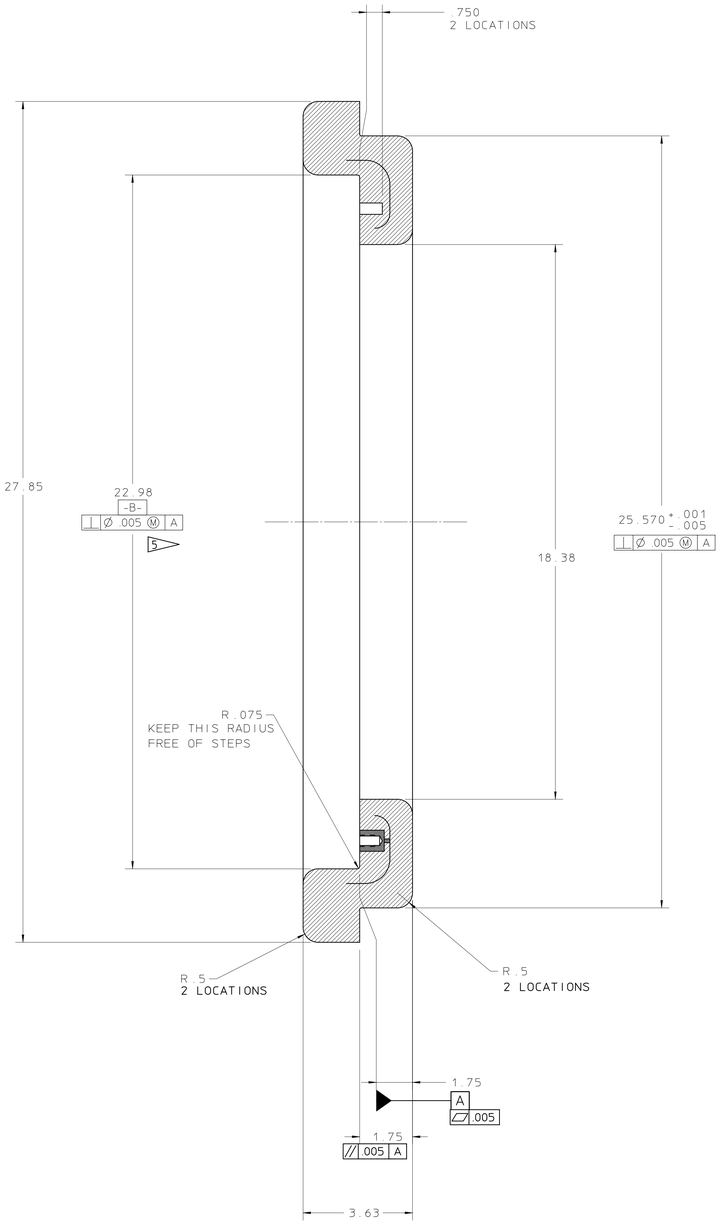
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
MODIFIED NW160 BLANK FLANGE

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	DETAIL	21G8104	DWG. NO.	SIZE / REV.
MICROFILMED	DESIGN ACCT. NO. 8210-11	CATEGORY CODE FE3111	21G8114	



ALIGNMENT POCKET DETAIL
2 LOCATIONS
SCALE: FULL





NOTES:

1. USE NO OILS.
2. PART SHALL BE CAST WITH HYSOL EPOXY C9-4190 AND HD3485 IN MOLD DESIGNED IN DWG. 21G7466.
3. PART MAY BE WIPED DOWN WITH ACETONE, FOLLOWED BY ALCOHOL.
4. DIAMOND TOOLS ARE REQUIRED TO MACHINE ALL SURFACES.

5 DATUM -B- SHALL BE CONCENTRIC TO THE EXISTING BOLT HOLD PATTERN IN THE EPOXY CASTING.

21G8126

REQD	ITEM	PART NO	DESCRIPTION

REV	DWG	CHK	ZONE	DATE	CHANGES

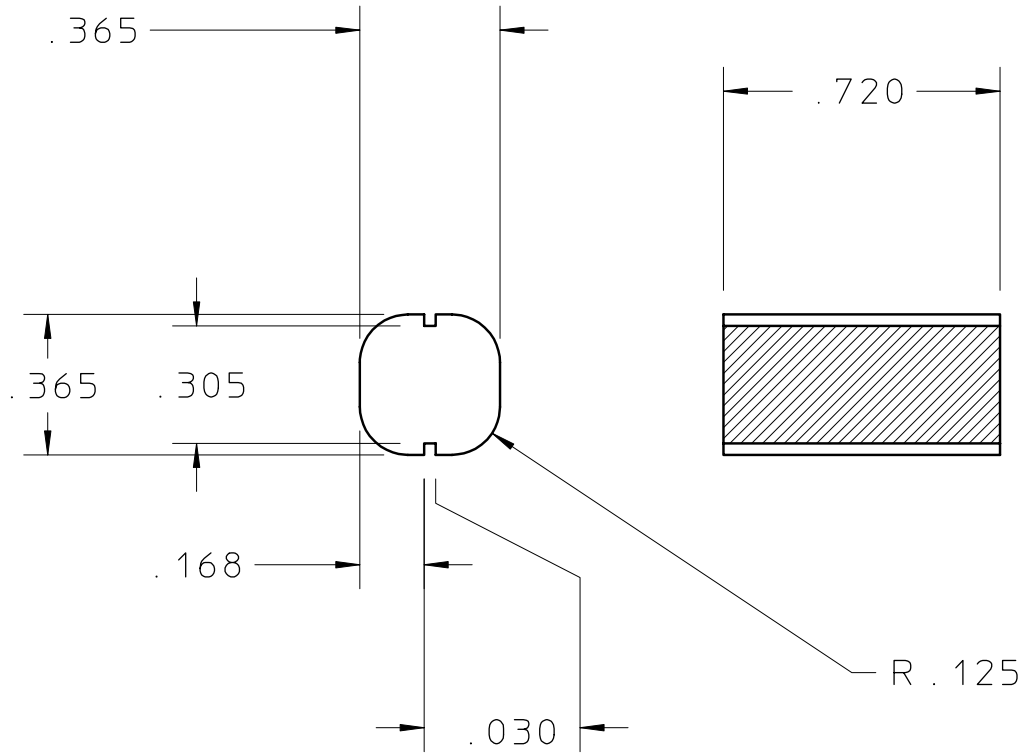
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC ±1/64; XX ± .01 ANGLES ± 1°; XXX ± .005 FINISH 64
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30° OUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS MOLD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

SHOP ORDERS
ACCT NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: ALCOHOL WIPE
IDENT METH: TAG
DWG BY: D. CHENG DATE: 5-10-99
CHK BY: DATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FRONT END SYSTEMS
ION SOURCE AND LEBT MECHANICAL
65KV FINISH MACHINING

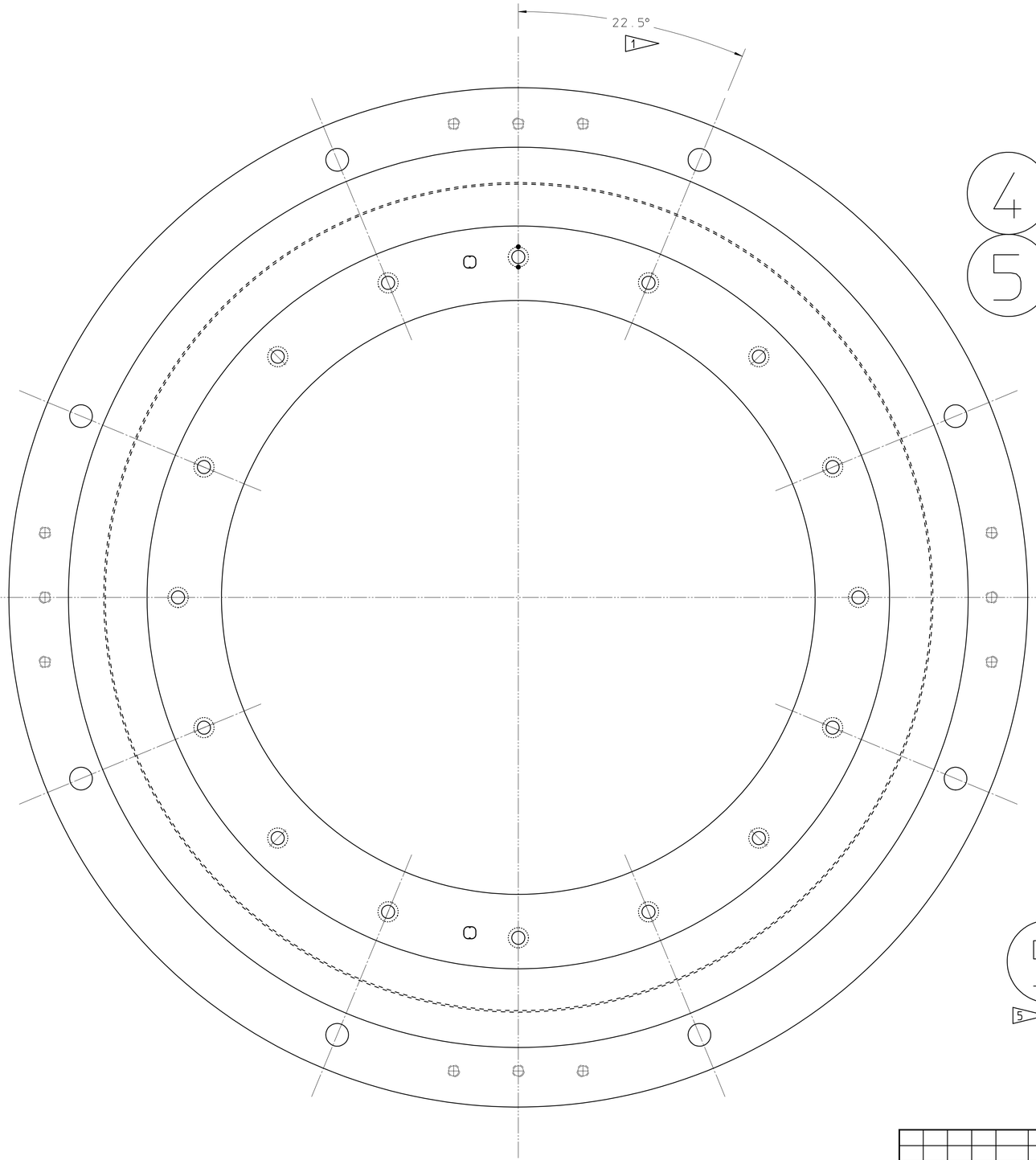
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	DET	21G8964	FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8212-A1	FE3130	21G8126	

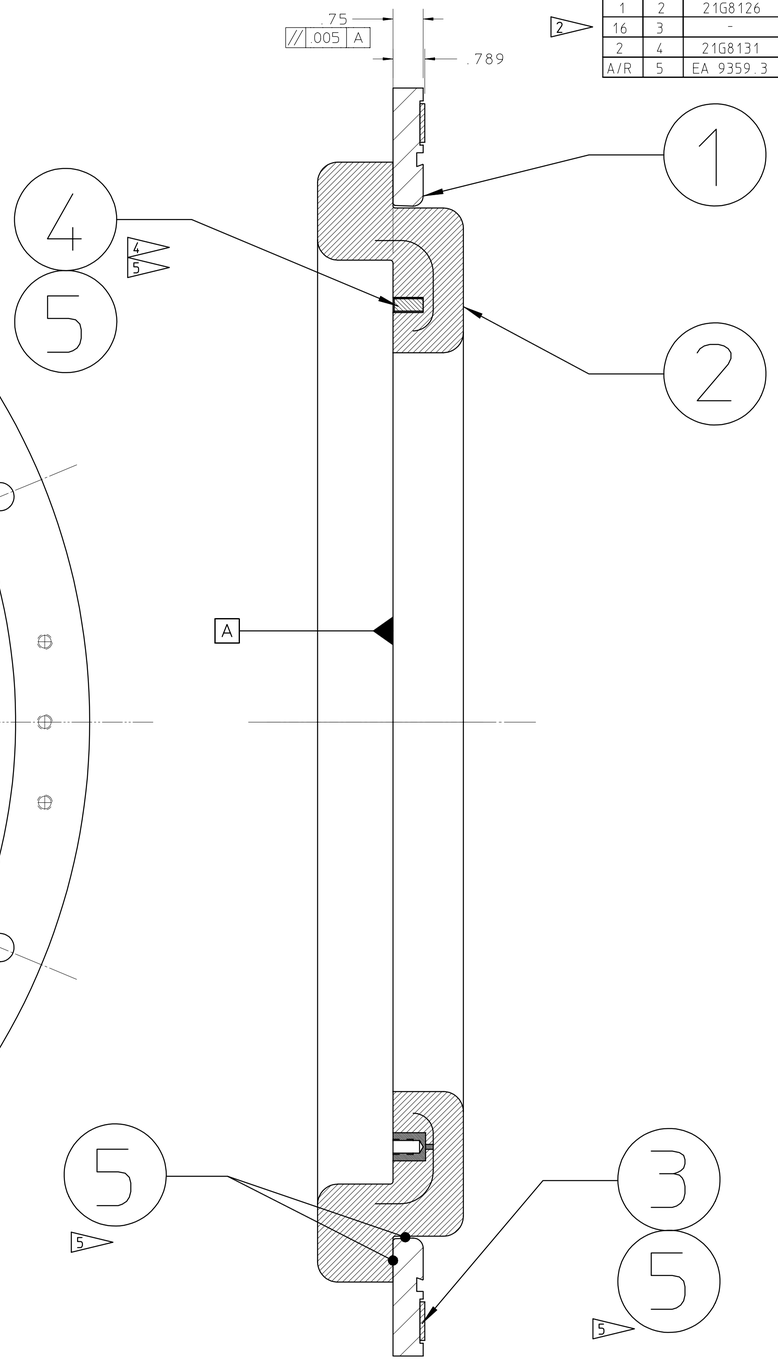
Dwg. No. 21G8131 Size Rev



Material - BRASS ROD STOCK				-	-	-	-
Unless Otherwise Noted				Rev	Dwn	Date	Changes
.X ± .1	.XX ± .025	.XXX ± .005	Angles ± .5°	LAWRENCE BERKELEY LABORATORY			
Break Edges .016 Max on Machined Work Remove Burrs Weld Splatter and Loose Scale References: ANSI Y 14.5 & B46.1				University of California - Berkeley			
				SNS-FES ION SOURCE AND LEBT			
Account Number -		Finish √ 64		MECHANICAL SYSTEMS			
Date Issued -		Date Reqd -		BRASS ALIGNMENT PLUG			
Number Required -		Deliver To -		Shown on Dwg No. 21G8964			
Surface Treatment Degrease		Identific Method Tag		Patent Clear	Category Code FE-3111	Do not Scale Prints	
Drawn By D. CHENG		Date 6-8-99		Micro-Filmed	Drawing Scale Full	Dwg. No. 21G8131	Size Rev
Check By D. CHENG		Date 6-11-99		Design Account 8210-14	Drawing Type Detail		

REQ	ITEM	PART NUMBER	DESCRIPTION
1	1	21C9976	LEBT INSULATOR FLANGE
1	2	21G8126	65 KV INSULATOR FINISH MACHINING
16	3	-	DU BEARING PAD MATERIAL, .0895" THK X 1" SQUARE
2	4	21G8131	BRASS ALINGMENT PLUG
A/R	5	EA 9359.3	HYSOL 2-PART ADHESIVE, 50 ML SEMPAK





NOTE:

1. THIS ANGLE SETS THE ORIENTATION OF THE HOLE PATTERN OF THE STEEL FLANGE WITH RESPECT TO THE EPOXY CASTING.
2. DU BEARING PAD MATERIAL CAN BE OBTAINED IN 5" X 18" SHEETS FROM APPLIED MOTION TECHNOLOGY OAKLAND, CA (510) 568-6690
3. WIPE ALL PARTS DOWN WITH ACETONE, FOLLOWED BY ALCOHOL PRIOR TO GLUE-UP OF ALL PARTS.
4. ENSURE THAT ITEM 4 SITS FLUSH OR BELOW THE SURFACE BEFORE BEING ALLOWED TO SET.
5. ALL EXCESS EPOXY SHALL BE WIPED UP USING ALCOHOL AND WIPES,

21G8964A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		-	10/27/01	GENERAL GEOMETRY UPDATE

UNLESS OTHERWISE SPECIFIED

TOLERANCES: .X ± .1 | FRAC. ±1/64 | .XX ± .01 | ANGLES ±1° | .XXX ± .005 | FINISH 64√

THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

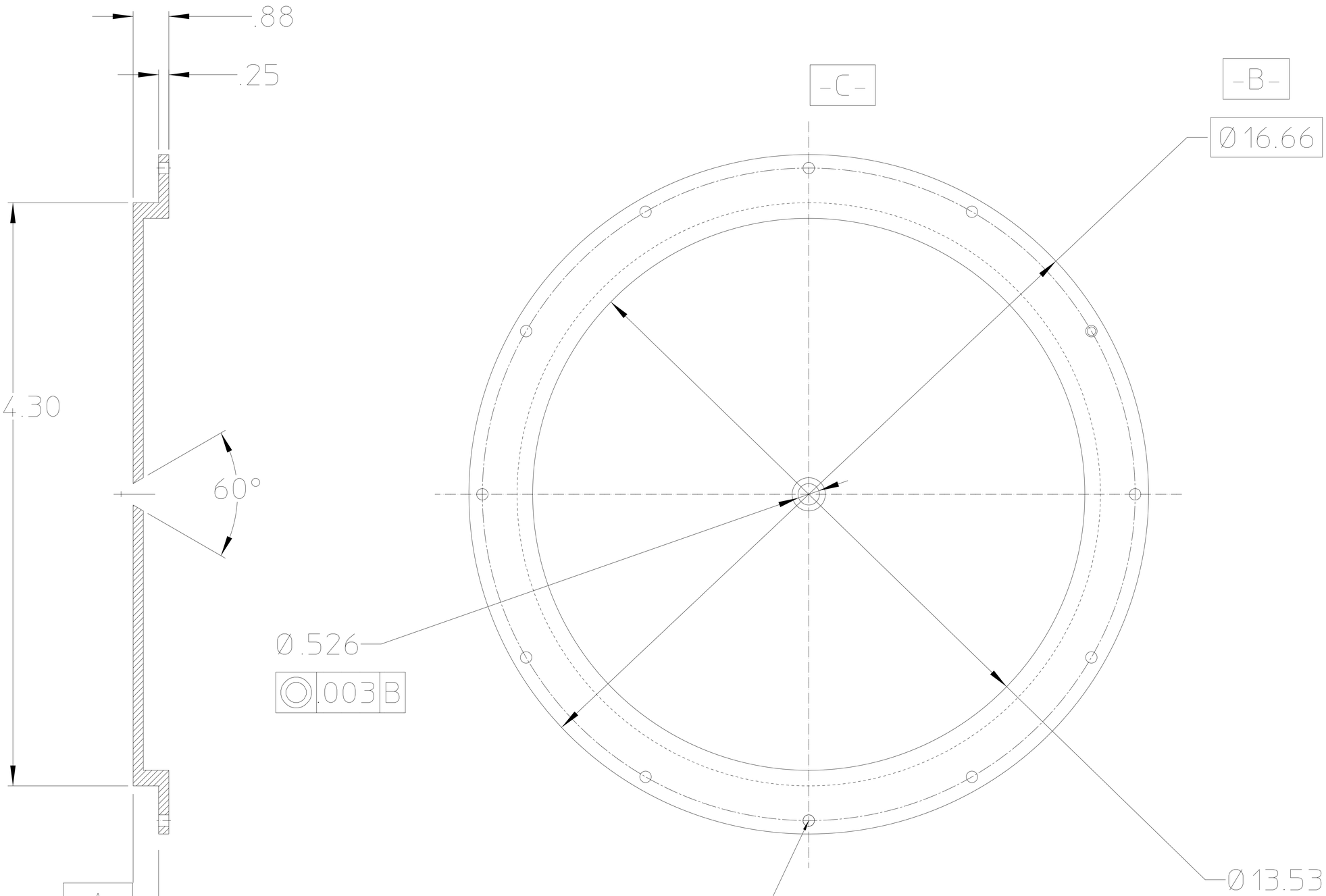
SHOP ORDERS

ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE | DATE: 06-04-99
CHK. BY: D. CHENG | DATE: 6/15/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
LEBT INSULATOR FLANGE ASSEMBLY

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21G8964	A



21G8986A

NOTE:
THIS IS A TEMPORARY PART FOR STARTUP TESTING. A FINAL RFQ DIAGNOSTIC ASSEMBLY WILL REPLACE IT.

REQD	ITEM	PART NO	DESCRIPTION
1			6061 - T4 ALUMINUM

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		A2	6/20/99	ADDED 'CHECKED BY' NAME

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .1 FRAC ± 1/64; XX ± .01 ANGLES ± 1°; XXX ± .001 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

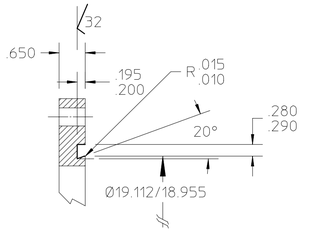
SHOP ORDERS
ACCT. NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT DEGREASE
IDENT. METH. TAG
DWG BY S. MUKHERJEE DATE 06-08-99
CHK DAN CHENG DATE 6/15/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
LEBT TEST STAND
LEBT LAST ELECTRODE

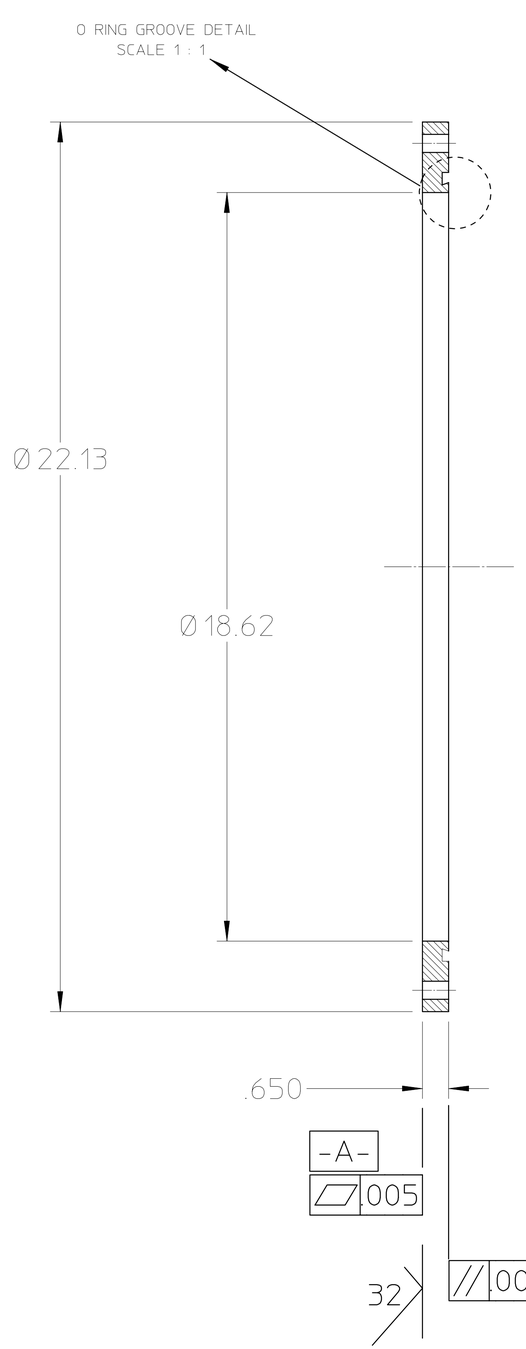
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	ASSEMBLY		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21G8986	A

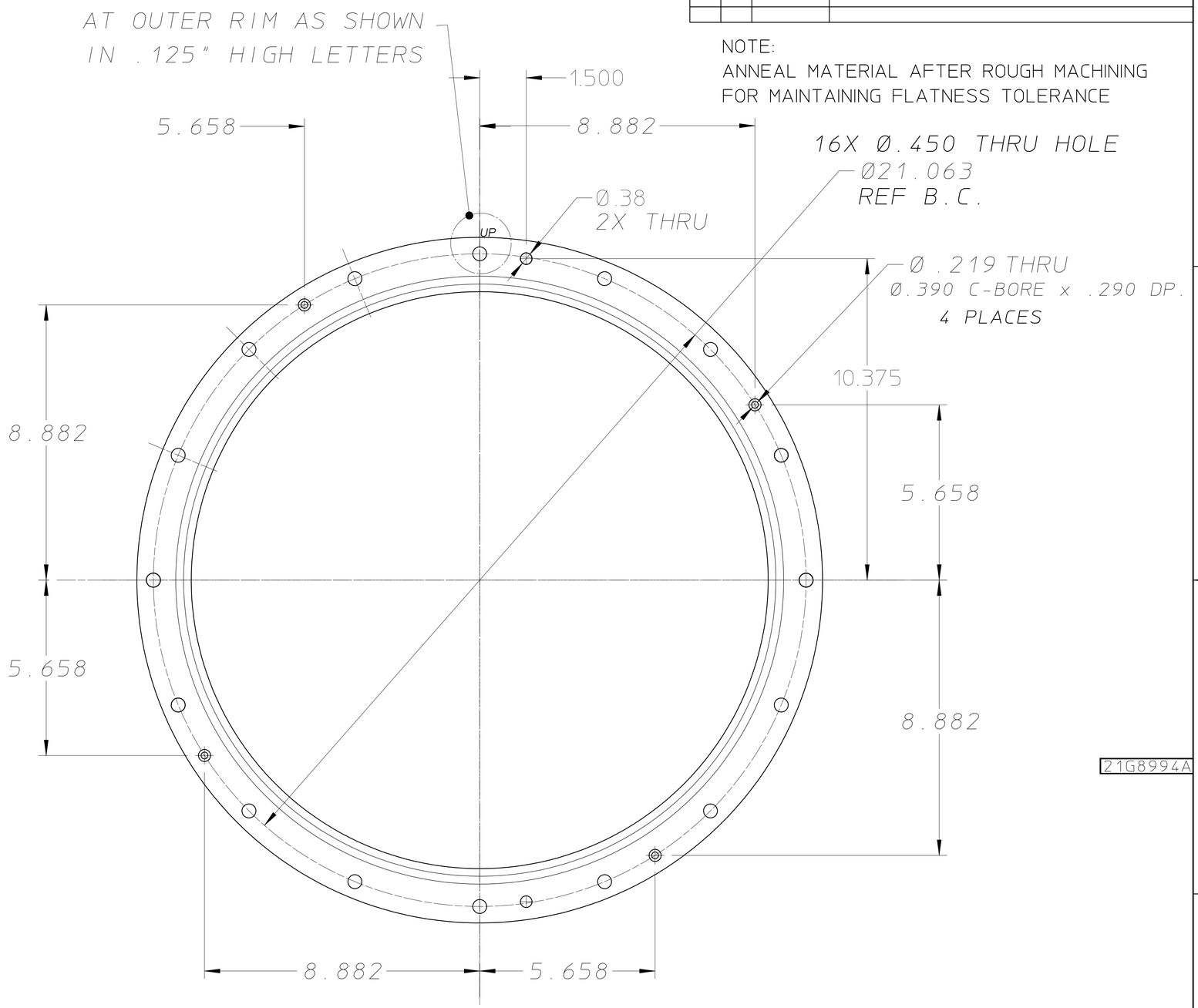
REQ	ITEM	PART NUMBER	DESCRIPTION
1	1		304 STAINLESS STEEL PLATE

NOTE:
ANNEAL MATERIAL AFTER ROUGH MACHINING
FOR MAINTAINING FLATNESS TOLERANCE



O RING GROOVE DETAIL
SCALE 1 : 1





21G8994A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		-	1/2/00	GENERAL GEOMETRY UPDATE

UNLESS OTHERWISE SPECIFIED
TOLERANCES: .X ± .1 | FRAC. ± 1/64 | .XX ± .01 | ANGLES ± 1° | .XXX ± .005 | FINISH 125
THREADS ARE CLASS 2.
CHAMFER ENDS OF ALL SCREW THREADS 30°.
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1.

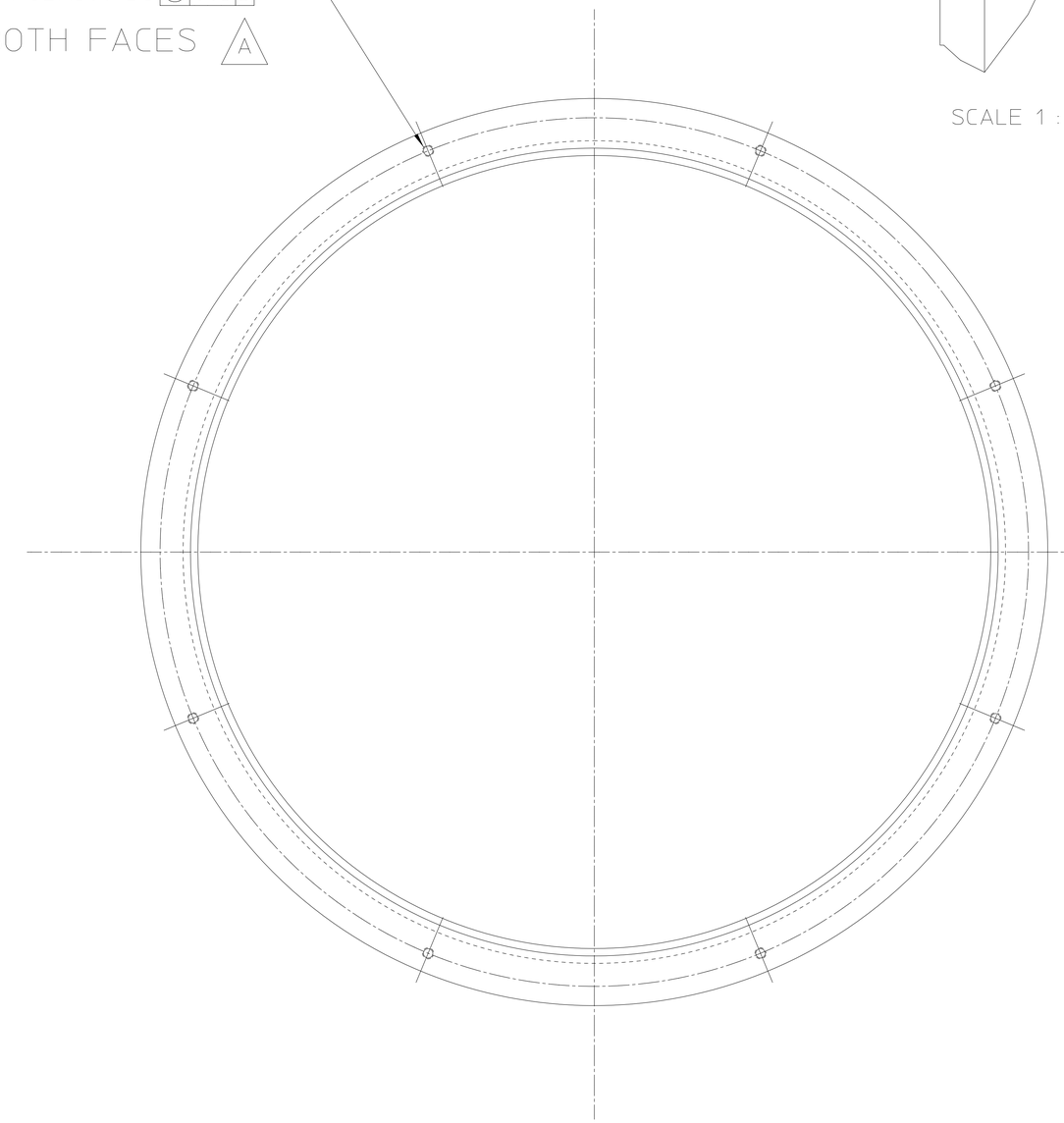
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD. | DATE REQD. | NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT. METH.: TAG
DWG. BY: S. MUKHERJEE | DATE: 06-08-99
CHK. BY: D. CHENG | DATE: 11-11-99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
SPACER FOR LEBT REENTRANT CYLINDER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
	PART		FULL	
MICROFILMED	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8210-14	FE1100	21G8994	A

8X 3/8-16 THRU EQ. SPD.
ON Ø29.300 BC ⌀.005 B

BOTH FACES A



SEAM WELD

VAC TIGHT 1/4 60°

.13

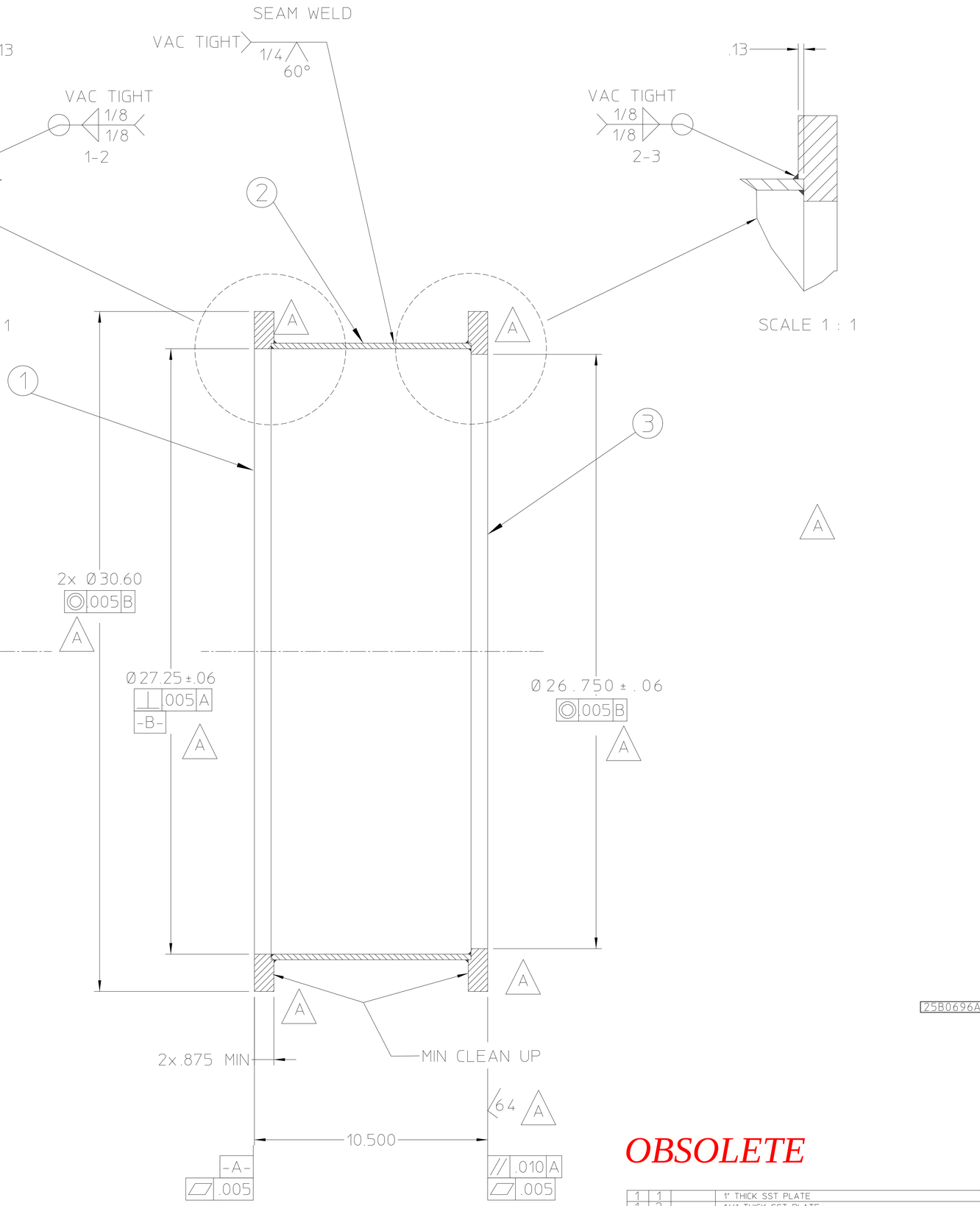
VAC TIGHT 1/8 1/8 1-2

SCALE 1 : 1

.13

VAC TIGHT 1/8 1/8 2-3

SCALE 1 : 1



25B0696A

OBSOLETE

REQD	ITEM	PART NO.	DESCRIPTION
1	1		1" THICK SST PLATE
1	2		1/4" THICK SST PLATE
1	3		1" THICK SST PLATE

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DC		A2	11/4/99	ADDED 64⁄ FINSH CALLOUT
A	DC		B2,4,C4	11/4/99	ADDED DATUM B, AND CONCENTRICITY CALLOUTS TO B
A	DC		D7	11/4/99	ADDED CONCENTRICITY CALLOUT TO DATUM B
A	DC		C2	11/4/99	REMOVED O-RING GROOVE DETAIL
A	DC		C3,4	11/4/99	REMOVED O-RING GROOVE
A	DC		B3,4	11/4/99	REMOVED O-RING GROOVE

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± FRAC. ±1/64; XX ± .030 ANGLES ± 1°; XXX ± .015 FINISH 125⁄
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD
DATE REQD
NO. REQD
DELIVER TO
SURFACE TREATMENT ELECTRO POLISH
IDENT METH TAG
DWG BY J.M.PRUYN DATE 3/30/99
CHK BY D.CHENG DATE 3/31/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS FRONT END
LEBT TEST STAND
VACUUM CHAMBER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
	ASSEMBLY			
MICROFILMED	DESIGN ACCT. NO. 821014	CATEGORY CODE	DWG. NO. 25B0696	SIZE A / REV

16 X Ø.406 THRU
X Ø.625 X .400 DP C BORE
EQ. SPD. ON [Ø21.063] BC

⌖ | Ø.014 | A | B | C

STAMP THE WORD 'UP'
AT THE LOCATION
IN 0.25" HIGH LETTERS

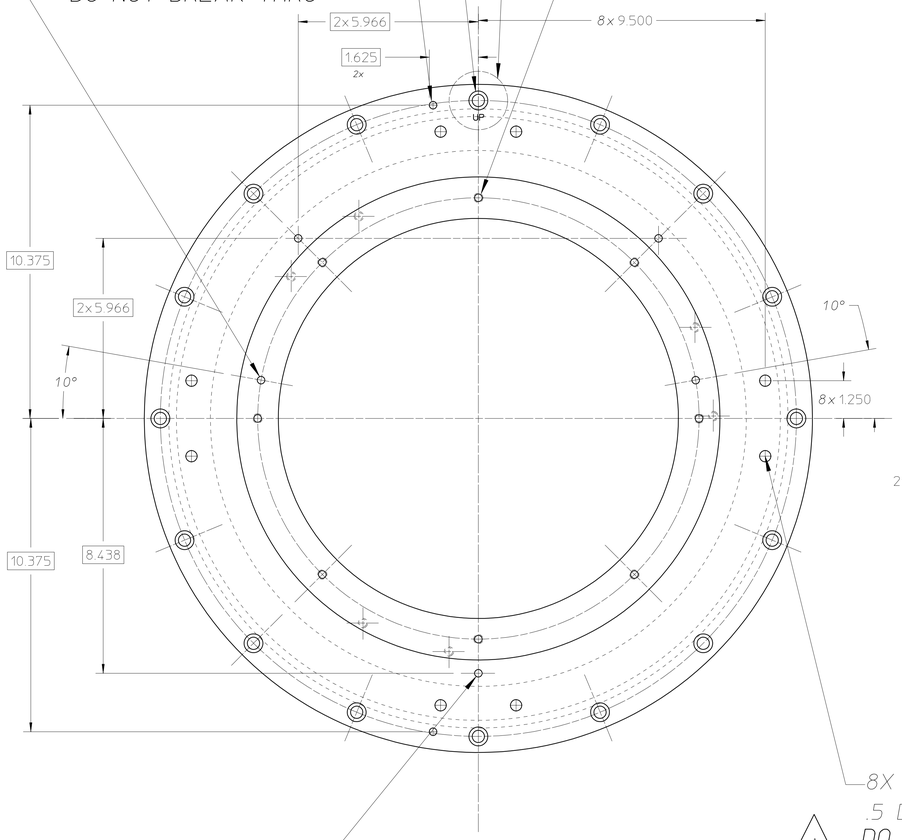
A

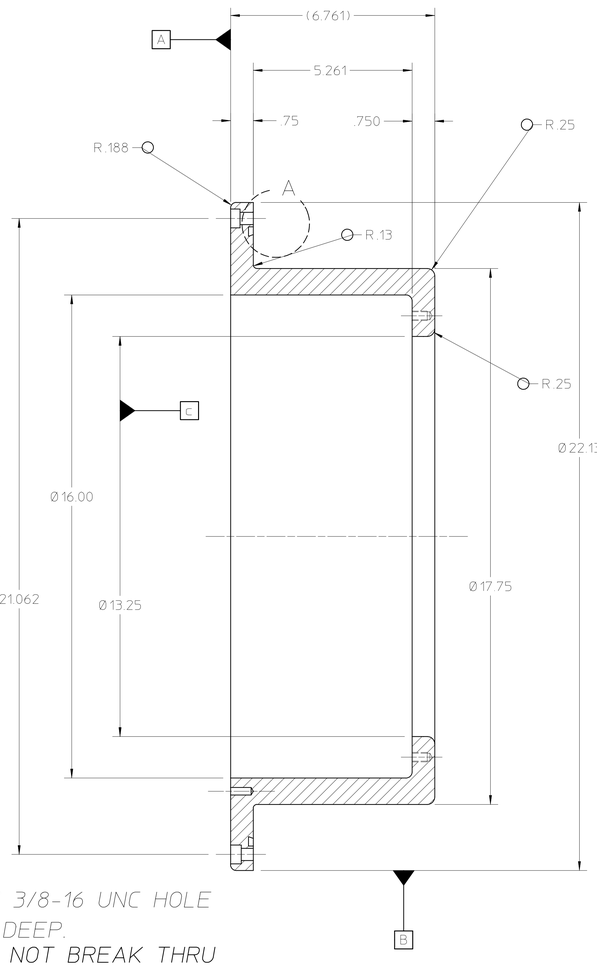
8X 5/16-18 X .500 DP
EQ SPD ON [Ø14.617] BC
DO NOT BREAK THRU

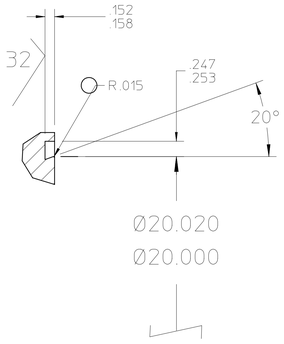
⌖ | Ø.014 | A | B | C

A Ø .188
2x PILOT HOLE
(Ø.250 FOR DOWEL PIN TO
BE MATCH DRILLED
TO INSULATOR AT ASSEMBLY)

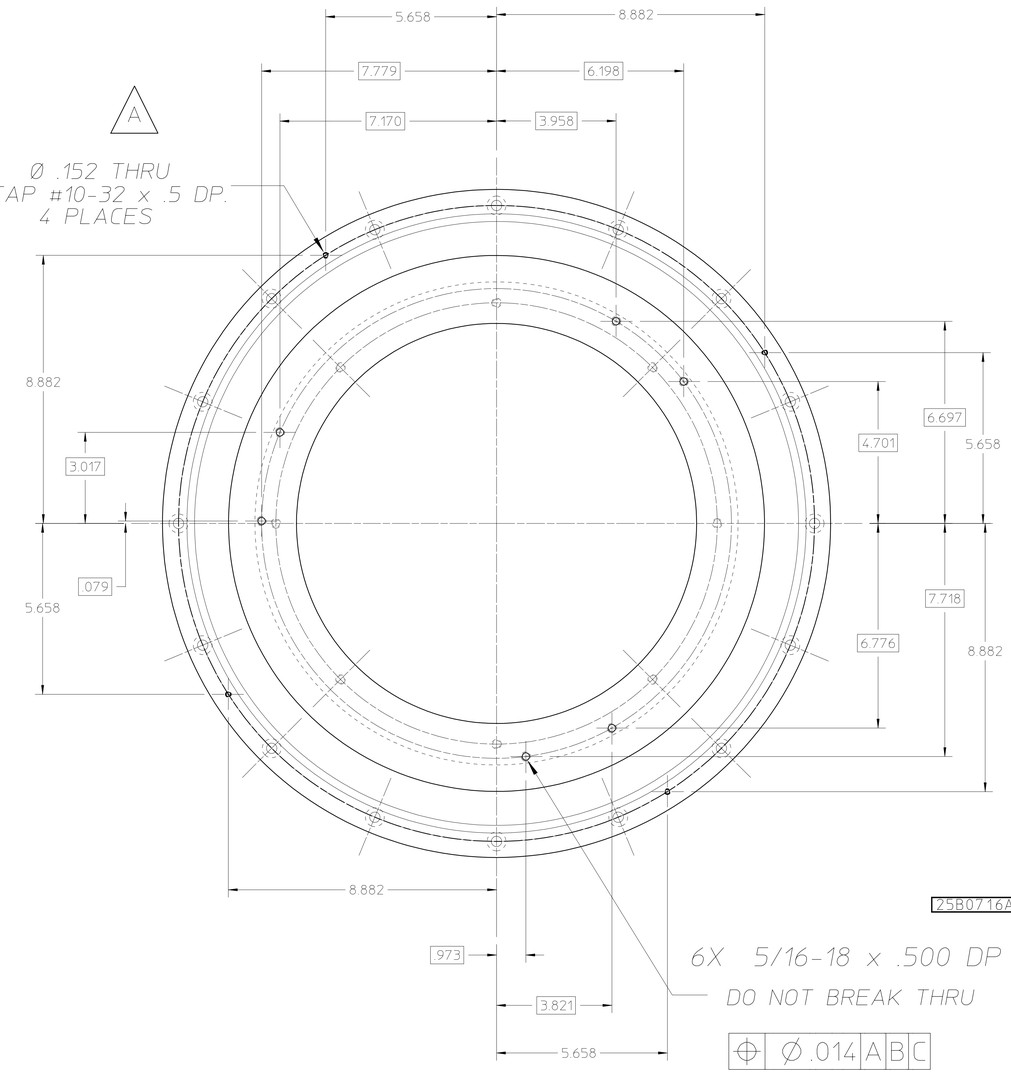
(Ø.250 FOR DOWEL PIN
TO BE MATCH DRILLED
TO 21C9826 AT ASSEMBLY)
2 LOCATIONS
DO NOT BREAK THRU







DETAIL A
O RING GROOVE FOR 2-389
FULL SCALE



25B0716A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	JMP	DC	D6	9/1/99	Added "UP" Label
A	JMP	DC	D8	9/1/99	Added 0.188 Pilot hole
A	JMP	DC	A6	9/1/99	'x8' was '2x'
A	JMP	DC	C3	9/1/99	Added 4 ea 10-32 holes

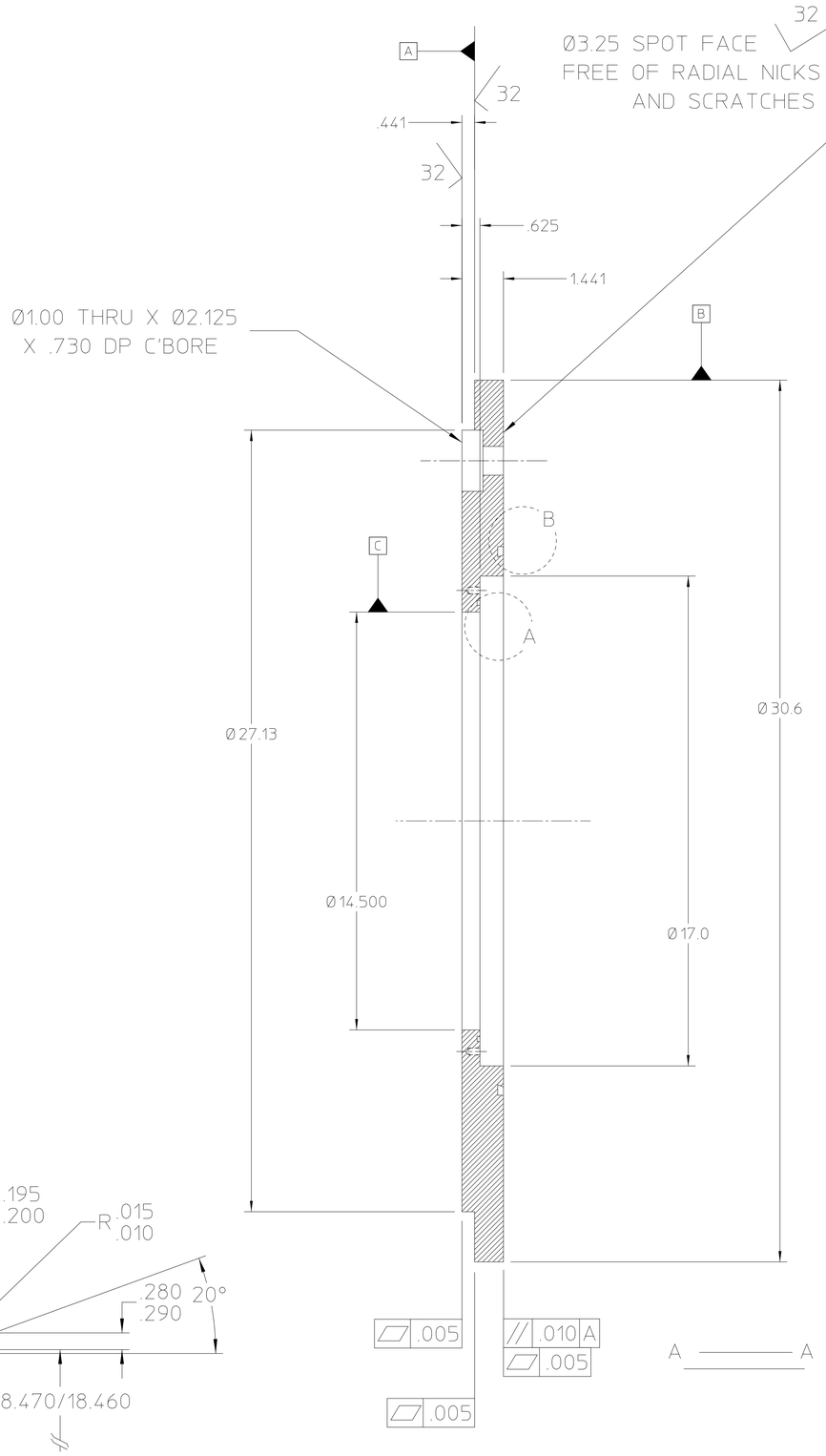
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± FRAC. ±1/64; .XX ± .010 ANGLES ± 1°; .XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

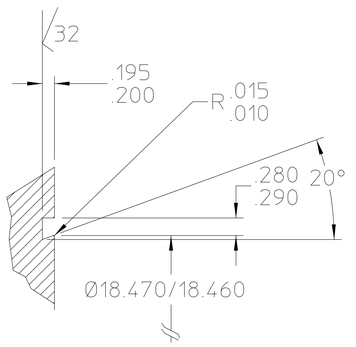
SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD.
DATE REQD.
NO REQD.
DELIVER TO
SURFACE TREATMENT: UHV CLEAN
IDENT METH.: TAG
DWG. BY: J.M.PRUYN DATE: 4/15/99
CHK BY: D. CHENG DATE: 4/16/99

REQD	ITEM	PART NO.	DESCRIPTION
			AL. FORGED RING - 6061-T6

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS - FRONT END SYSTEM
ION SOURCE PROTOTYPE DESIGN
PRIMARY REENTRANT CYLINDER

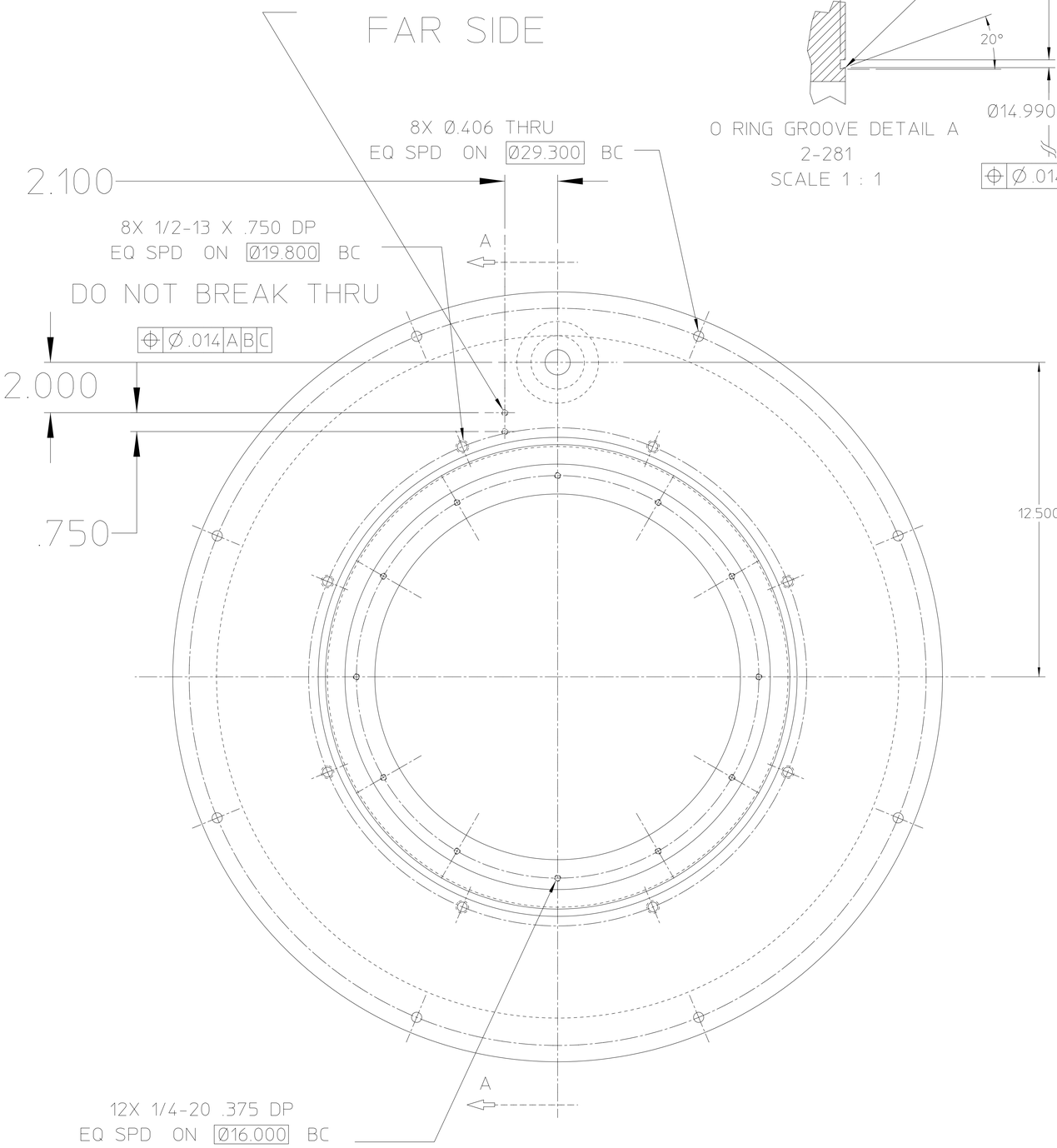
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT. NO. 821014	CATEGORY CODE	DWG. NO. 25B0716	SIZE A	REV.

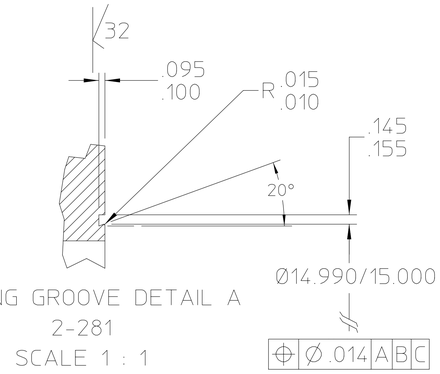




O RING GROOVE DETAIL B
2-466
SCALE 1 : 1

⌖ Ø .014 A B C





O RING GROOVE DETAIL A
2-281
SCALE 1 : 1

25B0726A

REQD	ITEM	PART NO.	DESCRIPTION
			AL PLATE .15" THICK

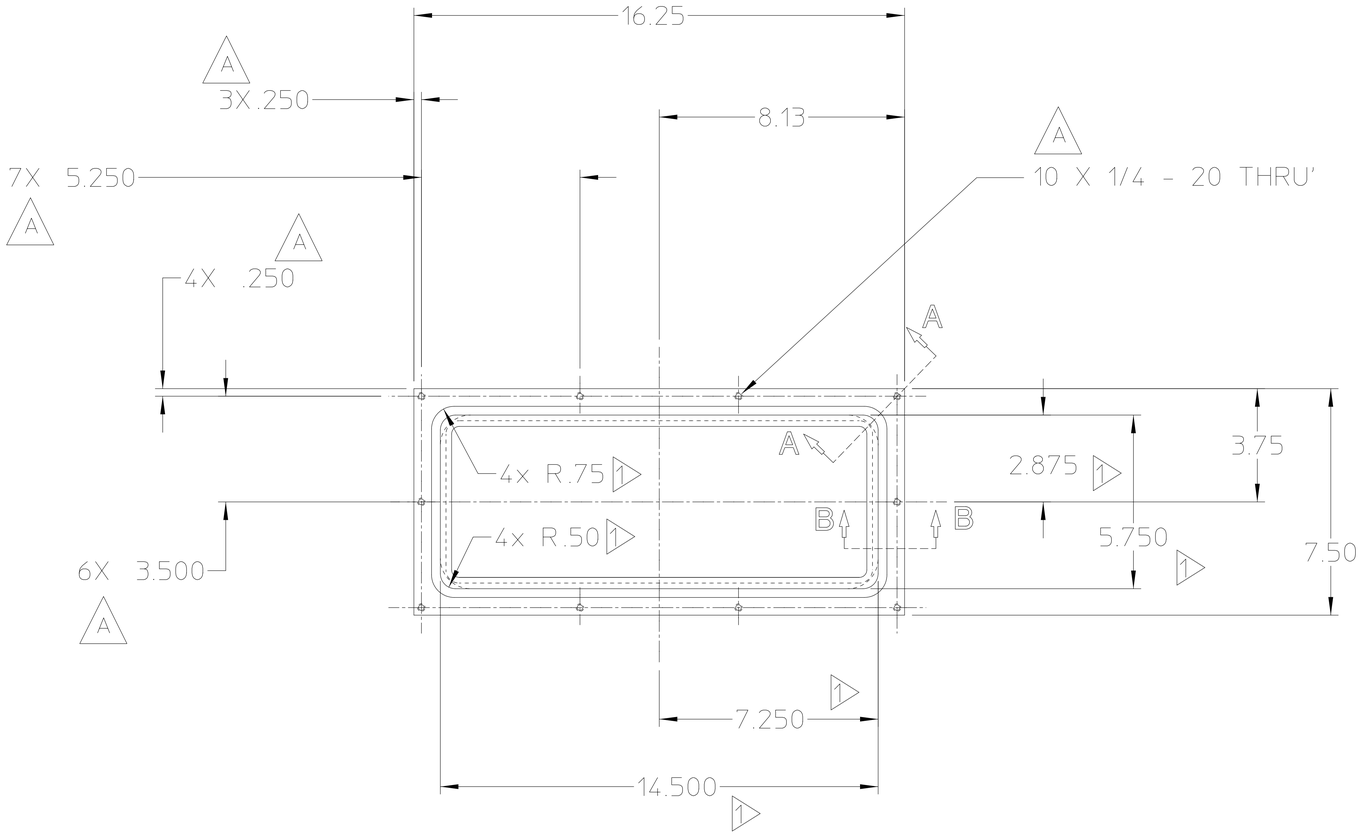
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± .015 FRAC. ±1/64; XX ± .010 ANGLES ± 1°; XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

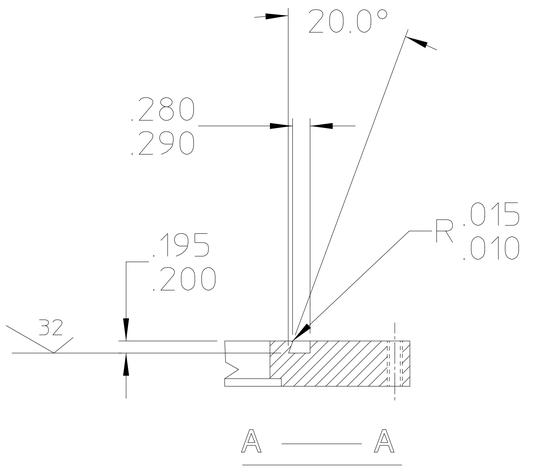
SHOP ORDERS
ACCT. NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO REQD.
DELIVER TO:
SURFACE TREATMENT: ELECTRO POLISH
IDENT METH: TAG
DWG BY: J. M. PRUYN DATE: 4/22/99
CHK BY: D. CHENG DATE: 4/23/99

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		ALL	9/30/00	CORRECTED PROJECTION VIEWS

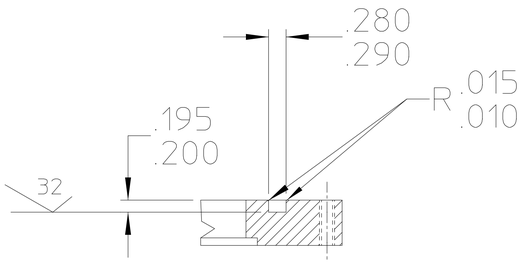
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS FRONT END
LEBT TEST STAND
BULKHEAD PLATE

PATENT CLEAR | MICROFILMED
DWG. TYPE: ASSEMBLY | SHOWN ON
SCALE 1 : 2 | DO NOT SCALE PRINTS
DESIGN ACCT. NO: 821014 | CATEGORY CODE: FE1100
DWG. NO: 25B0726 | SIZE | REV: A

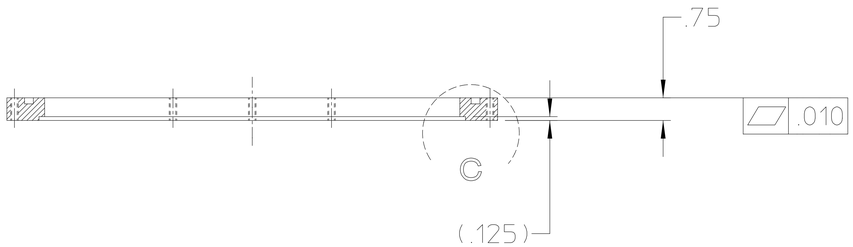


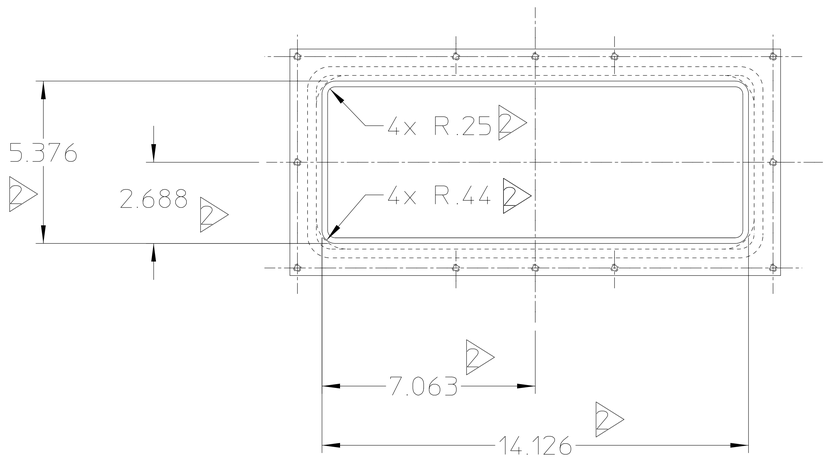


O RING GROOVE
FULL SCALE
4 PLCS

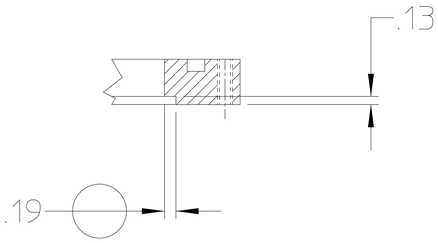


O RING GROOVE
FULL SCALE
4 PLCS





NOTES:
1. O RING GROOVE ID
2. TO FIT ITEM 7 DWG. 25B0786



25B0776A

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		D5	11/4/99	CHANGED 26X to 10X . . .
A	DWC		D7	11/4/99	CHANGED 10X to 4X
A	DWC		D7	11/4/99	CHANGED 5X TO 3X
A	DWC		C8	11/4/99	CHANGED '16X 1.750" TO '6X 3.500'
A	DWC		D8	11/4/99	CHANGED '21X 1.750" TO '7X 5.250'

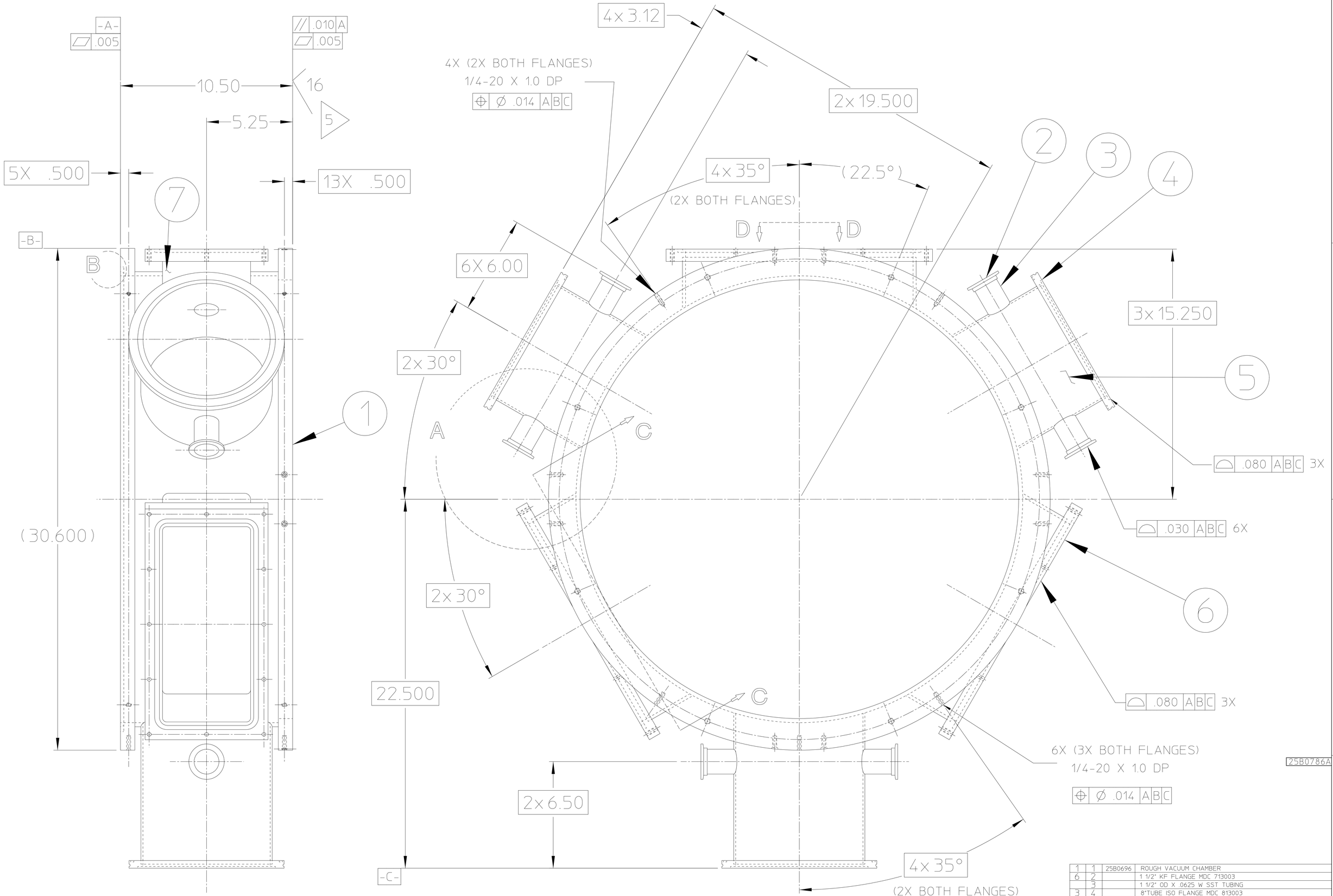
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± FRAC. ± 1/64; .XX ± .015 ANGLES ± 1°; .XXX ± .010 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD
DATE REQD.
NO. REQD.
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT METH: TAG
DWG. BY: J.M.PRUYN DATE: 5/12/99
CHK BY: D. CHENG DATE: 5/15/99

REQD	ITEM	PART NO.	DESCRIPTION
			SST PLATE

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FES ION SOURCE AND LEBT
MECHANICAL SYSTEMS
FLAT FLANGE-LEBT TEST STAND VACUUM CHAMBER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 1:2	DO NOT SCALE PRINTS
	DETAIL	25B0786		
MICROFILMED	DESIGN ACCT. NO	CATEGORY CODE	DWG. NO.	SIZE / REV.
	821014	FE3111	25B0776	A



25B0786A

REQD	ITEM	PART NO.	DESCRIPTION
1	1	25B0696	ROUGH VACUUM CHAMBER
6	2		1 1/2" KF FLANGE MDC 713003
	3		1 1/2" OD X .0625 W SST TUBING
3	4		8"TUBE ISO FLANGE MDC 813003
	5		8" X .120 W SST TUBING
3	6	25B0076	FLAT FLANGE
	7		3/16 STAINLESS STEEL PLATE

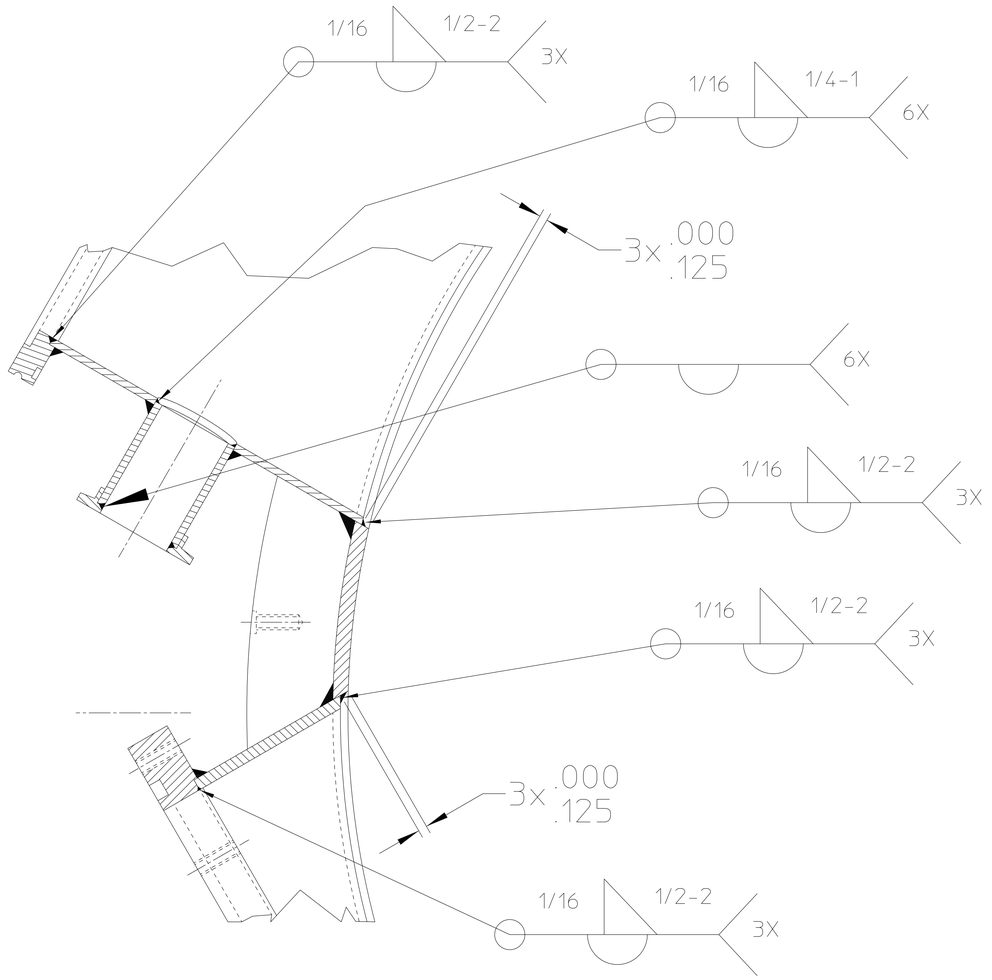
REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		-	11/9/99	SEE PAGE 2

UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± FRAC ±1/64; XX ± .030 ANGLES ± 1°; XXX ± .015 FINISH 125
THREADS ARE CLASS 2
CHAMBER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

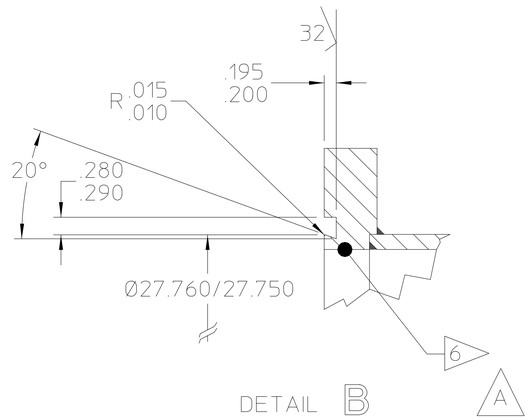
SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD
DATE REQD
NO REQD
DELIVER TO
SURFACE TREATMENT: UHV CLEAN
IDENT METH: TAG
DWG BY: J.M.PRUYN DATE 5/12/99
CHK BY: D.CHENG DATE 5/15/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FE ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VACUUM CHAMBER-LEBT TEST STAND

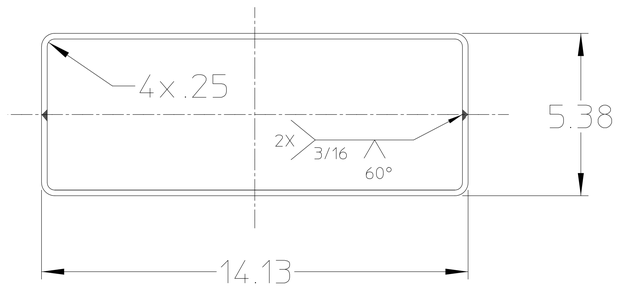
PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE 1:2	DO NOT SCALE PRINTS
	ASSEMBLY		DWG. NO. 25B0786	SIZE A / REV
MICROFILMED	DESIGN ACCT NO 821014	CATEGORY CODE FE3111		



DETAIL A
FULL SCALE



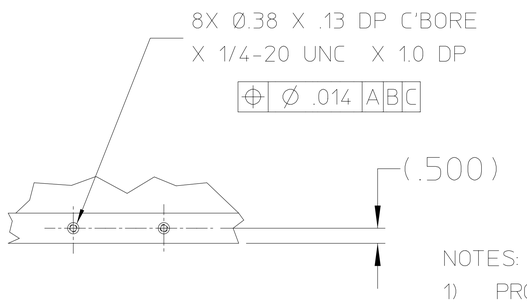
DETAIL B
O RING GROOVE
FULL SCALE

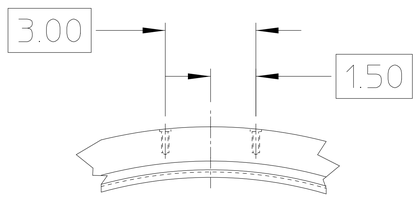


C — C

ITEM 7

PART TO FIT FLAT FLANGE 25B0776
3 PLCS





D — D

4 PLCS

NOTES:

1) PROTECT ALL SEALING SURFACES FROM NICKS, DENTS, SCRATCHES, ETC.
2) ALL INSIDE WELDS TO BE VACUUM TIGHT.SEE NOTE 3.
3) FINISHED VESSEL TO BE VACUUM TIGHT. LEAK RATE MUST NOT EXCEED 2.0 X 10 SCC PER SECOND OF HIELUM GAS.
4) FINISHED PART TO BE UHV CLEAN.
5) O RING SURFACE, FREE OF ALL NICKS GROOVES AND SCRATCHES.
6) O-RING GROOVE TO BE MACHINED ON FLANGE OF LARGER I.D.

25B0786A

REQD	ITEM	PART NO.	DESCRIPTION

REV	DWG	CHK	ZONE	DATE	CHANGES
A	DWC		C2	11/9/99	ADDED NOTE 6

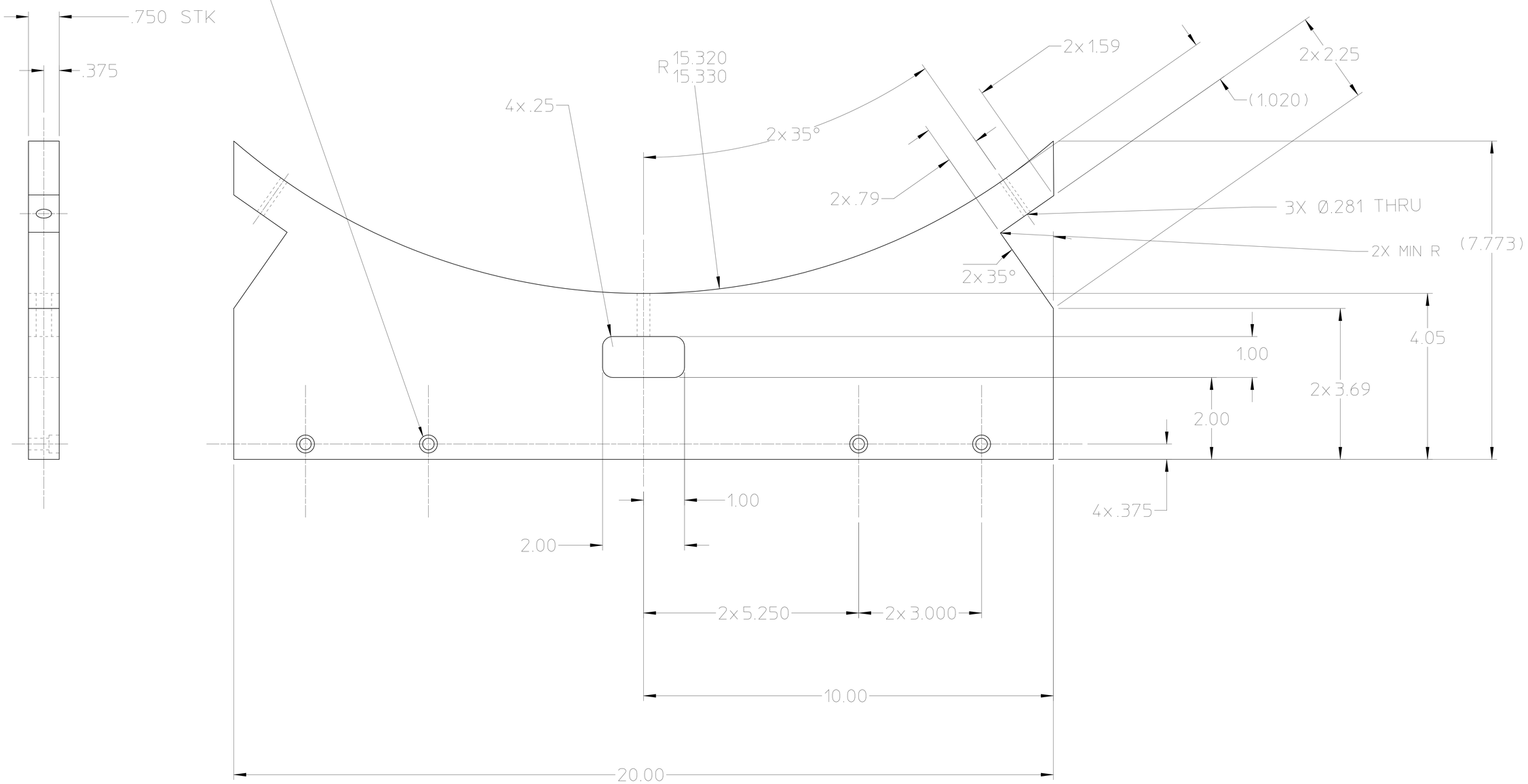
UNLESS OTHERWISE SPECIFIED
TOLERANCES: X ± FRAC ±1/64; XX ± .030 ANGLES ± 1°; XXX ± .015 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

SHOP ORDERS
ACCT NO. | SERIAL NO.
DATE ISSD | DATE REQD. | NO REQD.
DELIVER TO
SURFACE TREATMENT UHV CLEAN
IDENT METH. TAG
DWG. BY J.M.PRUYN DATE 5/12/99
CHK. BY D.CHENG DATE 7/15/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FE ION SOURCE AND LEBT
MECHANICAL SYSTEMS
VACUUM CHAMBER-LEBT TEST STAND

PATENT CLEAR	DWG. TYPE ASSEMBLY	SHOWN ON	SCALE 1:2	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT. NO. 821014	CATEGORY CODE FE3111	DWG. NO. 25B0786	SIZE A	REV.

4X Ø.281 THRU X Ø.438 X .3 DP CTR. BORE
FOR 1/4 SKT HD CAP SCREW



25B0876

REQD	ITEM	PART NO.	DESCRIPTION
			6061-T6 TOOLING PLATE

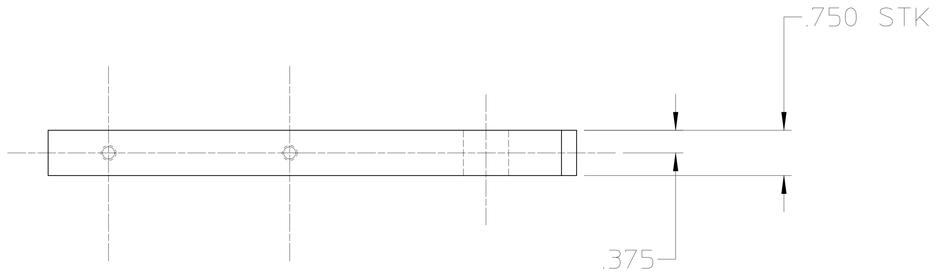
REV	DWG	CHK	ZONE	DATE	CHANGES

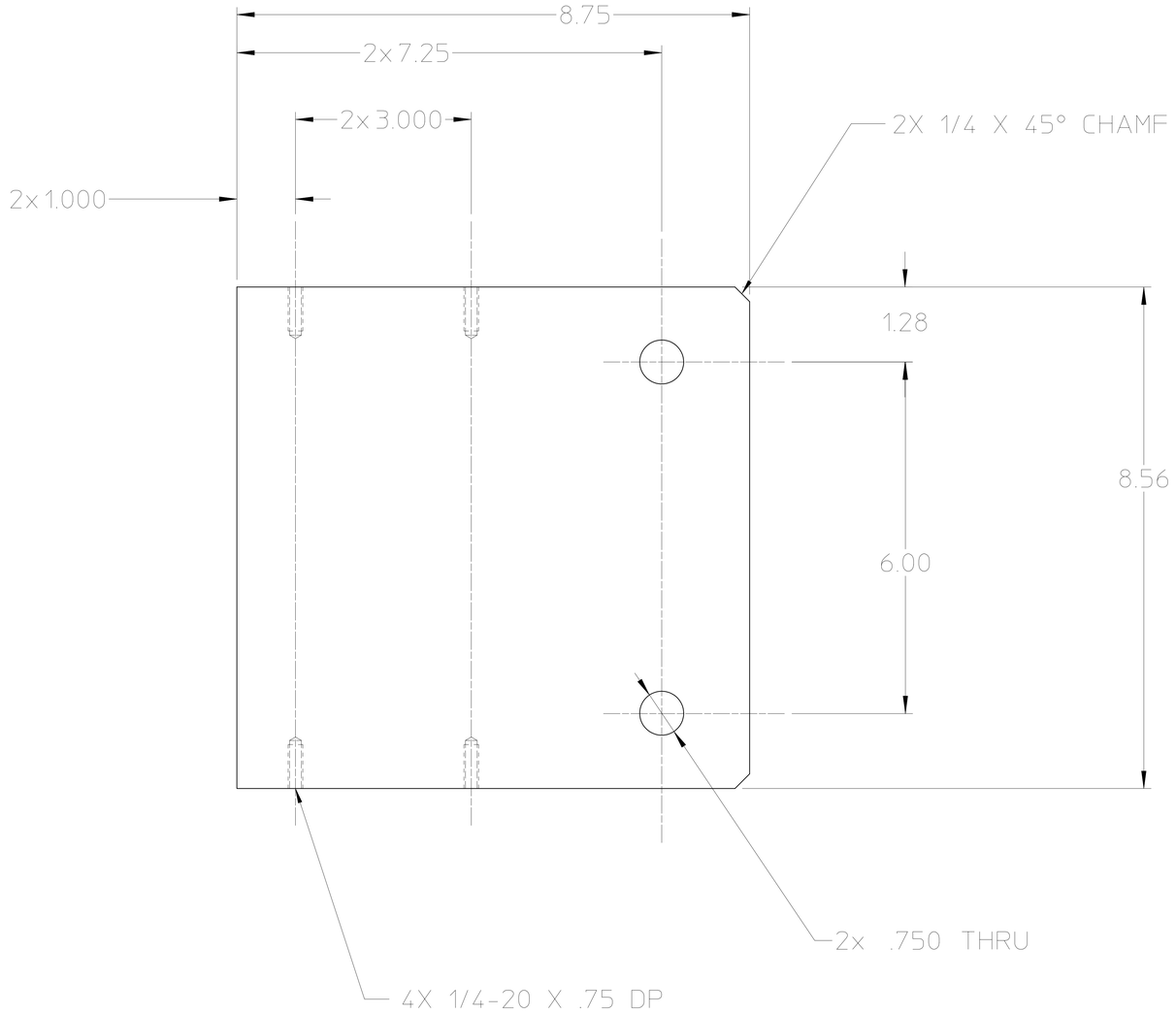
UNLESS OTHERWISE SPECIFIED
TOLERANCES:
X ± FRAC. ± 1/64
XX ± .01 ANGLES ± 1°
XXX ± .005 FINISH 125
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS
BREAK EDGES .016 MAX ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

SHOP ORDERS
ACCT NO.
SERIAL NO.
DATE ISSD.
DATE REQD
NO REQD
DELIVER TO
SURFACE TREATMENT: DEGREASE
IDENT METH: TAG
DWG BY: J. M. PRUYN DATE: 6/4/99
CHK BY: D. CHENG DATE: 6/7/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FE ION SOURCE AND LEBT
MECHANICAL SYSTEMS
STAND FACE-VACUUM CHAMBER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO. 821014	CATEGORY CODE FE3111	DWG. NO. 25B0876	SIZE REV





25B0886

REQD	ITEM	PART NO.	DESCRIPTION
			6061-T6 TOOLING PLATE

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
- X ± — FRAC. ± 1/64
- XX ± .01 — ANGLES ± 1°
- XXX ± .005 — FINISH 125

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30°
CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINE CUT THREADS.
BREAK EDGES .016 MAX. ON MACHINED WORK.
REMOVE BURRS WELD SPLATTER & LOOSE SCALE
REFERENCES: ANSI Y14.5 & B46.1

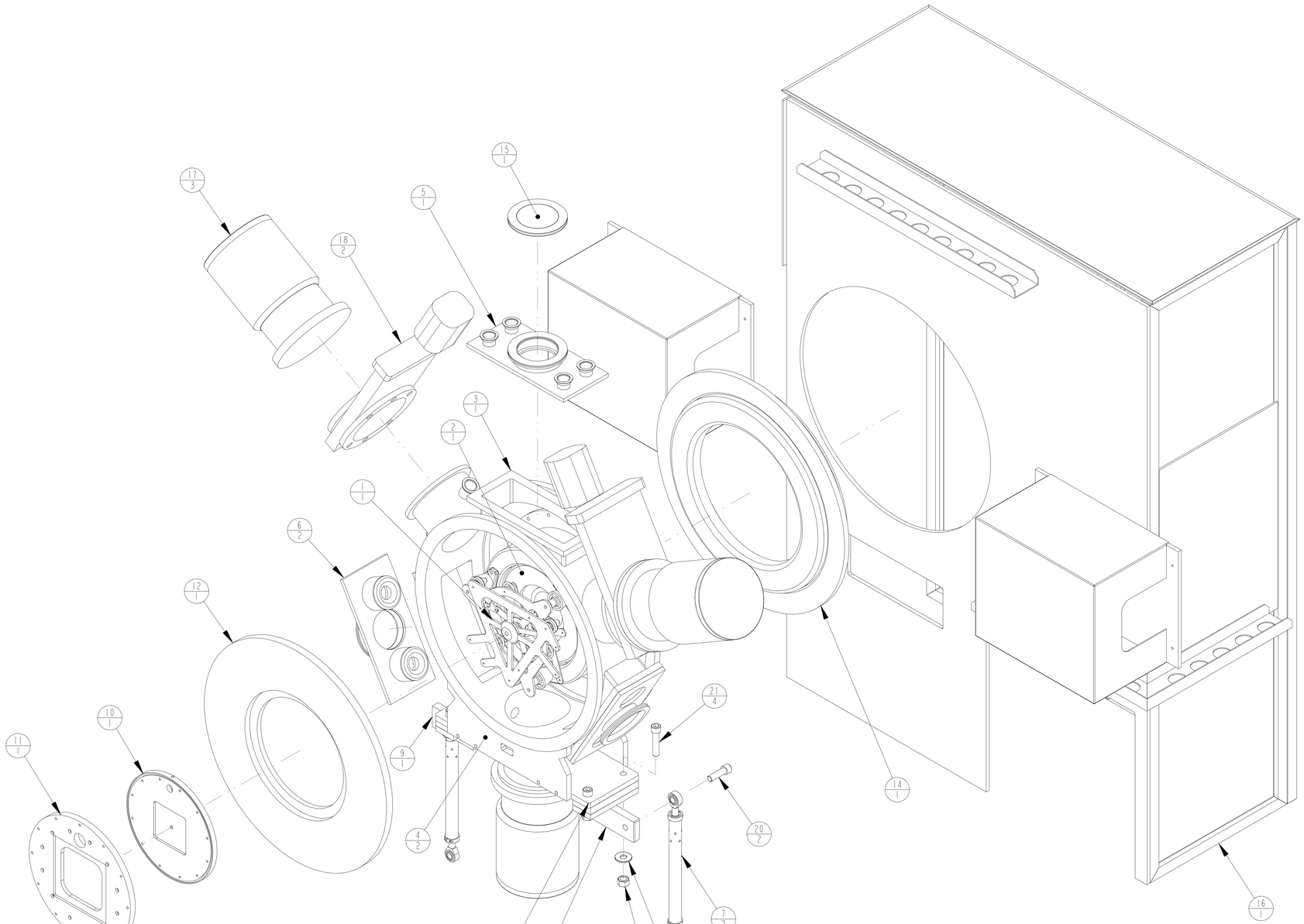
SHOP ORDERS

ACCT NO.	SERIAL NO.
DATE ISSD	DATE REQD
DELIVER TO	NO REQD
SURFACE TREATMENT	DEGREASE
IDENT METH	TAG
DWG BY	J. M. PRUYN — DATE 6/4/99
CHK D CHENG	DATE 6/7/99

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA-BERKELEY

SNS-FE ION SOURCE AND LEBT
MECHANICAL SYSTEMS
STAND FOOT-VACUUM CHAMBER

PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE FULL	DO NOT SCALE PRINTS
MICROFILMED	DESIGN ACCT NO 821014	CATEGORY CODE FE3111	DWG. NO. 25B0886	SIZE / REV



ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
22		4	WASHER, 3/4 FLAT, USS	-
21		4	SCREW, MACH, SOCKET HD 3/4 X 3 1/2 lg.	-
20		2	SCREW, MACH, SOCKET HD 3/4 X 2 1/2 lg.	-
19		4	NUT, HEX 3/4	-
18		2	VALVE, GATE MDC 8000, LGV-8000V-P-01-03	
17		3	PUMP, TURBO, PHEIFFER TMH PM P02 672 A	
16	25b750	1	BOX, BARRIER, LEBT	-
15	21G811	1	FLANGE, VIEWPORT	-
14	21G896	1	INSULATOR, 65kV, LEBT CHAMBER	-
13	25B088	2	STAND FOOT, VACUUM CHAMBER	-
12	25B072	1	PLATE, BULKHEAD, LEBT CHAMBER	-
11	25B808	1	FLANGE, SPLIT, DOWNSTREAM	-
10	25B809	1	FLANGE, SPLIT, UPSTREAM	-
9	25B821	1	BRACKET, LEBT STRUT, RH	-
8	25B821	1	BRACKET, LEBT STRUT, LH	-
7	25B820	2	STRUT ASSEMBLY, LEBT	-
6	21G810	2	FLANGE, LEBT VIEWPORT / FEEDTHRU	-
5	21G751	1	FLANGE, LEBT VIEWPORT / VAC GUAGE	-
4	25B087	2	STAND FACE, VACUUM CHAMBER	-
3	25B078	1	VACUUM CHAMBER, LEBT TEST STAND	-
2	21C840	1	ION SOURCE ASSY	-
1	21G735	1	LEBT ASSY	-

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
PROJECTION:
TOLERANCES: X.X ± 0.1 FRAC. ± 1/64; X.XX ± 0.03 Angles ± 1.0°; X.XXX ± 0.010 FINISH
DO NOT SCALE PRINT
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW THREADS 30° CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

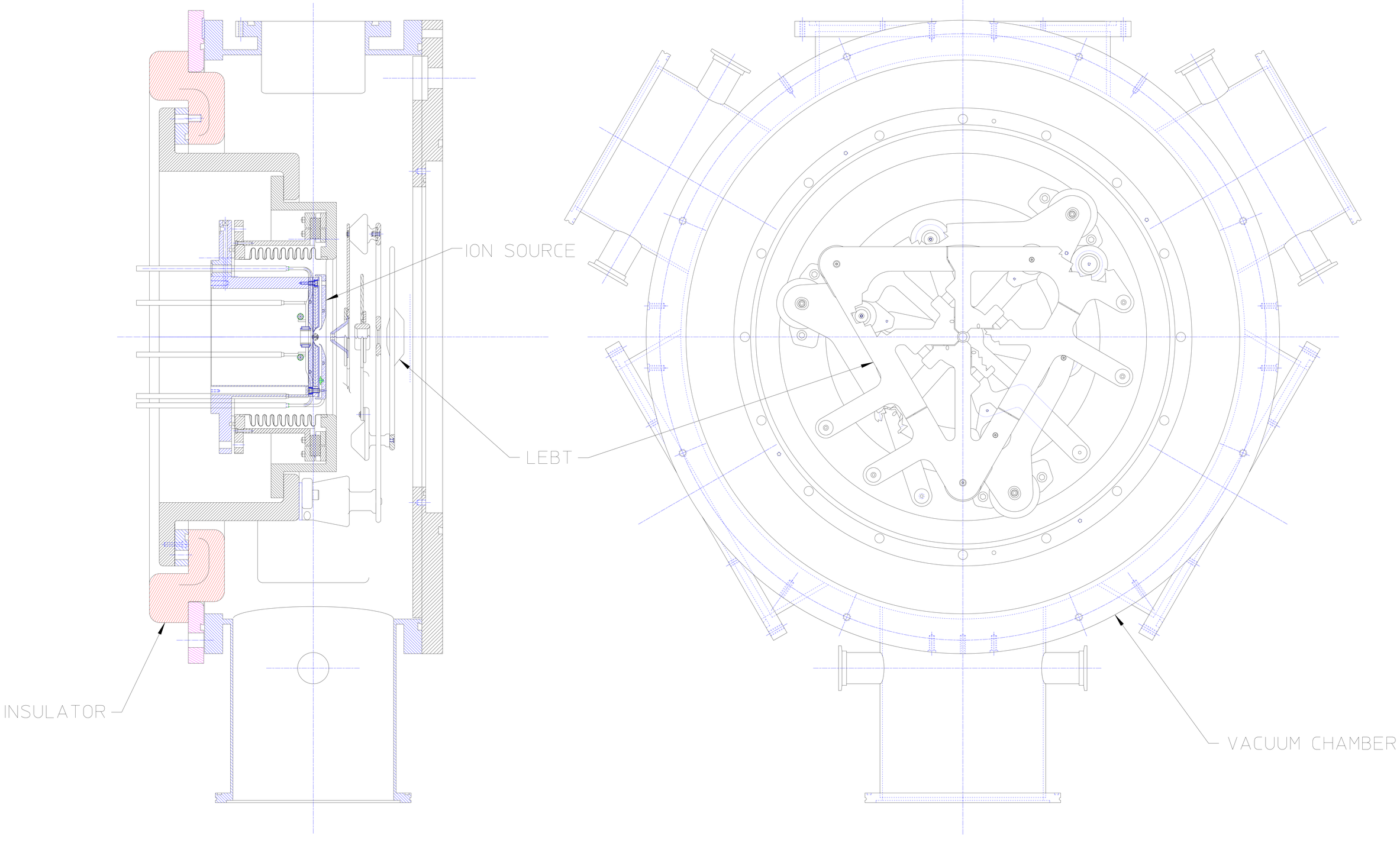
ACCT NO.	NO. REQD	ASR WO	-
		DATE ISSD	-
DEL TO		DATE REQD	-
SURFACE TREATMT	-		
IDENT METHOD	TAG		
PROJECT NUMBER	25B748		
PROJECT NAME	N/A		
DWG BY	PAL / ARH	DATE	21-Mar-02
CHK BY	DPO	DATE	
APR BY	DPO	DATE	

ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA - BERKELEY

SNS - INTEGRATION
FRONT END EQUIPMENT
ION SOURCE / LEBT ASSY

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 0.004	DO NOT SCALE PRINTS
	ASSEM	25BXXXX	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	8212EI	FE3000	25B7486	A / A

25B7486 A 1



ION SOURCE / LEBT ASSY LAYOUT

Active links shown in blue.
Drawing number format: *serial no_drawing size_revision letter*

ITEM	DRAWING NO.	TITLE
1	21C639_6_B	CUSP MAGNET BODY
2	21C840_6_A	GENERAL ARRANGEMENT (ION SOURCE ASSEMBLY)
3	21C841_4_A	BLANK FOR COPPER/IRON BRAZEMENT
4	21C842_3	RF ANTENNA (2 TURN)
5	21C843_4_C	CESIUM COLLAR
6	21C844_4_C	FILTER MAGNET ASSEMBLY
7	21C845_4_C	OUTLET ELECTRODE IRON PLATE
8	21C847_3_A	APERTURE PLATE
9	21C848_1	ION SOURCE WATER COOLING SCHEMATIC
10	21C850_2	CUSP MAGNET SIZE
11	21C892_4_C	ELECTRON DUMP ELECTRODE
12	21C893_4_A	OUTLET ELECTRODE ASSEMBLY
13	21C930_2_A	OUTLET ELECTRODE INSULATING INSERTS
14	21C978_6_B	PLASMA CHAMBER
15	21C981_4_A	FORMED BELLOWS FLANGE
16	21C982_6	FIXED FLANGE
17	21C983_6	SUPPORT CYLINDER
18	21C984_4	PIN RETAINING RING
19	21C985_2	PILLOW BLOCK OUTER
20	21C986_2	PILLOW BLOCK INNER
21	21C987_4_B	BACK FLANGE
22	21C989_4_A	PLASMA CHAMBER WELDMENT
23	21C990_3_A	MODIFIED ULTRA-TORR FITTING
24	21C991_2_A	CERAMIC INSULATOR FOR VACUUM FEED THRU
25	21C992_6	NEW DIAGNOSTIC SPOOL
26	21C993_4	DIAGNOSTIC SPOOL END COVER
27	21C994_1	OUTLET ELECTRODE MAGNET "MAIN #1 TO #8"
28	21C995_1_A	OUTLET ELECTRODE MAGNET "BLOCKER #1"
29	21C996_3_B	OUTLET ELECTRODE MAGNET SPECIFICATION
30	21C997_6_A	LEBT INSULATOR FLANGE
31	21C998_2_A	CUSP MAGNET COVER PLATE
32	21C999_2_A	BACK FLANGE MAGNET COVER PLATE
33	21G700_4_A	EXTRACTOR ELECTRODE ASSEMBLY
34	21G701_4_B	EXTRACTOR ELECTRODE BODY
35	21G702_3	EXTRACTOR ELECTRODE CLAMP RING
36	21G704_4_A	G3 ELECTRODE BODY
37	21G705_4	G3 ELECTRODE BODY
38	21G706_3	G3 ELECTRODE CLAMP RING
39	21G708_6_A	GROUND ELECTRODE MACHINING
40	21G709_6_B	CHOPPER ELECTRODE FIRST MACHINING
41	21G710_6_B	CHOPPER ELECTRODE SECOND MACHINING
42	21G711_4_A	CHOPPER ELECTRODE ASSEMBLY
43	21G712_3_A	GROUND-CHOPPER INSULATOR SHIELD, OUTER
44	21G713_2	GROUND-CHOPPER INSULATOR
45	21G714_2	GROUND-CHOPPER INSULATOR SHIELD, INNER
46	21G715_3	MAIN GROUND INSULATOR SHIELD, OUTER
47	21G716_3	MAIN GROUND INSULATOR SHIELD, CLAMP
48	21G717_2	MAIN GROUND INSULATOR
49	21G718_2_A	MAIN GROUND INSULATOR SHIELD, INNER
50	21G719_3_A	G3 INSULATOR SHIELD, OUTER
51	21G720_2	G3 INSULATOR STANDOFF
52	21G721_2	G3 INSULATOR SHIELD, INNER
53	21G722_3	EXTRACTOR INSULATOR SHIELD, OUTER
54	21G723_1	EXTRACTOR INSULATOR STANDOFF
55	21G724_2	EXTRACTOR INSULATOR SHIELD, INNER
56	21G725_2_A	GROUND-CHOPPER INSULATOR ASSEMBLY
57	21G726_3_A	GROUND-CHOPPER INSULATOR ASSEMBLY
58	21G727_2_A	G3 INSULATOR ASSEMBLY
59	21G728_2_A	EXTRACTOR INSULATOR ASSEMBLY

60	21G730_1_A	MAIN SUPPORT HOLDOFF WASHER
61	21G731_3	HIGH VOLTAGE ELECTRODE CONNECT
62	21G732_2	CHOPPER HI VOLTAGE FEED-THRU ELECTRICAL CONNECT
63	21G735_6_A	LEBT ASSEMBLY
64	21G736_2	CERAMIC STANDOFF KEY, ROUND
65	21G737_2	CERAMIC STANDOFF KEY, RECTANGULAR
66	21G738_6_A	MAIN INSULATOR MOLD BACKPLATE
67	21G739_6_A	MAIN INSULATOR MOLD MIDPLATE
68	21G740_3_A	65mA EXTRACTOR APERTURE INSERT
69	21G741_3_A	65mA G3 ELECTRODE APERTURE INSERT
70	21G742_2	INSULATOR MOLD RINGS
71	21G743_3	MAIN INSULATOR MOLD OUTER RING PLATE
72	21G744_2	MAIN INSULATOR MOLD TOP PLATE
73	21G745_3	MAIN INSULATOR MOLD SCREEN & MANDREL
74	21G746_6	LEBT MAIN INSULATOR MOLD ASSEMBLY
75	21G750_4	VIEWPORT/VACUUM GAUGE FLANGE BLANK
76	21G751_4	VIEWPORT/VACUUM GAUGE FLANGE WELDMENT
77	21G754_3_B	BACK FLANGE ASSEMBLY
78	21G755_2	GAS INLET FLANGE
79	21G758_4	ION SOURCE BELLOWS ADJUSTMENT ASSEMBLY
80	21G759_3	STAINLESS STEEL SHIELD
81	21G762_1	OUTLET ELECTRODE SPARK GAP
82	21G763_1	MODIFIED #4-40 SCREW
83	21G771_1	1/4" LEGRIS WATER FITTING MACHINING PREP
84	21G772_3	ION SOURCE BACKFLANGE WELDMENT
85	21G773_2	ION SOURCE BACKFLANGE WELD NIPPLE
86	21G775_4	LEBT VIEWPORT HV FEEDTHRU FLANGE
87	21G778_2_A	ALUMINA RF ANTENNA FEEDTHRU
88	21G779_2	ALUMINA RF ANTENNA FEEDTHRU CLAMP
89	21G780_2	ALUMINA RF ANTENNA FEEDTHRU CLAMP
90	21G781_2	CENTERING ROD CLAMP
91	21G782_6	ALIGNMENT FLANGE
92	21G783_6	ALIGNMENT PLATE ASSEMBLY
93	21G784_1	EXTRACTOR - G3 ALIGNMENT SPACER
94	21G785_1	G3 ELECTRODE CENTERING BUSHING
95	21G786_1	GROUND ELECTRODE ALIGNMENT SPACER
96	21G787_1	GROUND ELECTRODE CENTERING BUSHING
97	21G788_1	EXTRACTOR CENTERING BUSHING
98	21G789_1	CHOPPER ELECTRODE CENTERING BUSHING 1
99	21G790_1	CHOPPER ELECTRODE CENTERING BUSHING 2
100	21G806_1	THERMOCOUPLE PROBE FEEDTHRU
101	21G807_4	PLASMA CHAMBER MAGNET ASSEMBLY
102	21G808_4	VIEWPORT/FEEDTHRE FLANGE MACHINING
103	21G809_4	FEEDTHRU FLANGE MACHINING
104	21G810_4	VIEWPORT/FEEDTHRU FLANGE WELDMENT
105	21G811_4	MODIFIED NW160 BLANK FLANGE
106	21G812_6	65KV FINISH MACHINING
107	21G813_1	BRASS ALIGNMENT PLUG
108	21G896_4_A	LEBT INSULATOR FLANGE ASSEMBLY
109	21G898_6_A	LEBT LAST ELECTRODE
110	21G899_4_A	SPACER FOR LEBT REENTRANT CYLINDER
111	25B069_6_A	VACUUM CHAMBER
112	25B071_6_A	PRIMARY REENTRANT CYLINDER
113	25B072_6_A	BULKHEAD PLATE
114	25B077_6_A	FLAT FLANGE - LEBT TEST STAND VACUUM CHAMBER
115	25B078_6_A	VACUUM CHAMBER - LEBT TEST STAND (sheet 1 of 2)
116	25B078_6_A	VACUUM CHAMBER - LEBT TEST STAND (sheet 2 of 2)
117	25B087_6	STAND FACE - VACUUM CHAMBER
118	25B088_6	STAND FOOT - VACUUM CHAMBER
119	25B748_6	ION SOURCE / LEBT ASSY