Flexible Support Stanchion

D-Zero Engineering Note 3740.214-EN-91

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Approved 

Introduction

Figure 1 shows the assembly drawing of the Central Calorimeter Cryostat Flexible Support Stanchion. Figures 2 and 3 show the Flexible Support Stanchion in detail. These Stanchions support the cryostat safely, reduce the heat load to the cryostat from the ambient by a factor of more than ten, provide a spring like action that reduce the loads created by thermal contraction of the cryostat and position the cryostat accurately. Table 1 shows all of the details of the Flexible Support system for the C.C. Cryostat.

Table 1

Detail	Drawing #	Purpose	Engineering note	Comment
Argon support boss	223237	Support Argon Vessel		
G-10 Support Disc	223237	Reduce Heat Load	EN-71	Concave disc distributes load
Thermal Siphon	223237	Alleviate Heat Load	EN-75	Liquid Argon Heat Intercept
S.S. Shear Ring	223237	Reduce Shear Stress in G-10 Disc	EN-71	Addition to EN-71
Inconel Plates	222269	Alleviates forces due to contraction. Positions Cryostat.	EN-74	Model Failure Test--> EN-87
S.S. Adj. Weld Ring	223237	Allows Adjustment of stanchion upon welding		
Spherical Bearing		Alleviates Shear due to cradle deflection		Purchased Item

Other Features

The argon support boss and the lubricated spherical bearing are two features that are not presented in an Engineering Note.

The support boss is a stainless steel piece that will support the argon vessel as well as transferring the calorimeter load from the inner vessel to the flexible support. It extends around the spherical G-10 support disc to reduce the shear stress in that piece.

The spherical bearing at the bottom of the flexible support reduces the shear forces imposed by the cradle's deflection on the flexible support. It is a generic bearing that will be bought from a bearing manufacturer.

Conclusion

Table 1 contains a compiled list of the details of the flexible support system for the Central Calorimeter. Any calculations and specifics having to do with any detailed part can be found in the Engineering Notes sited

Figure 1

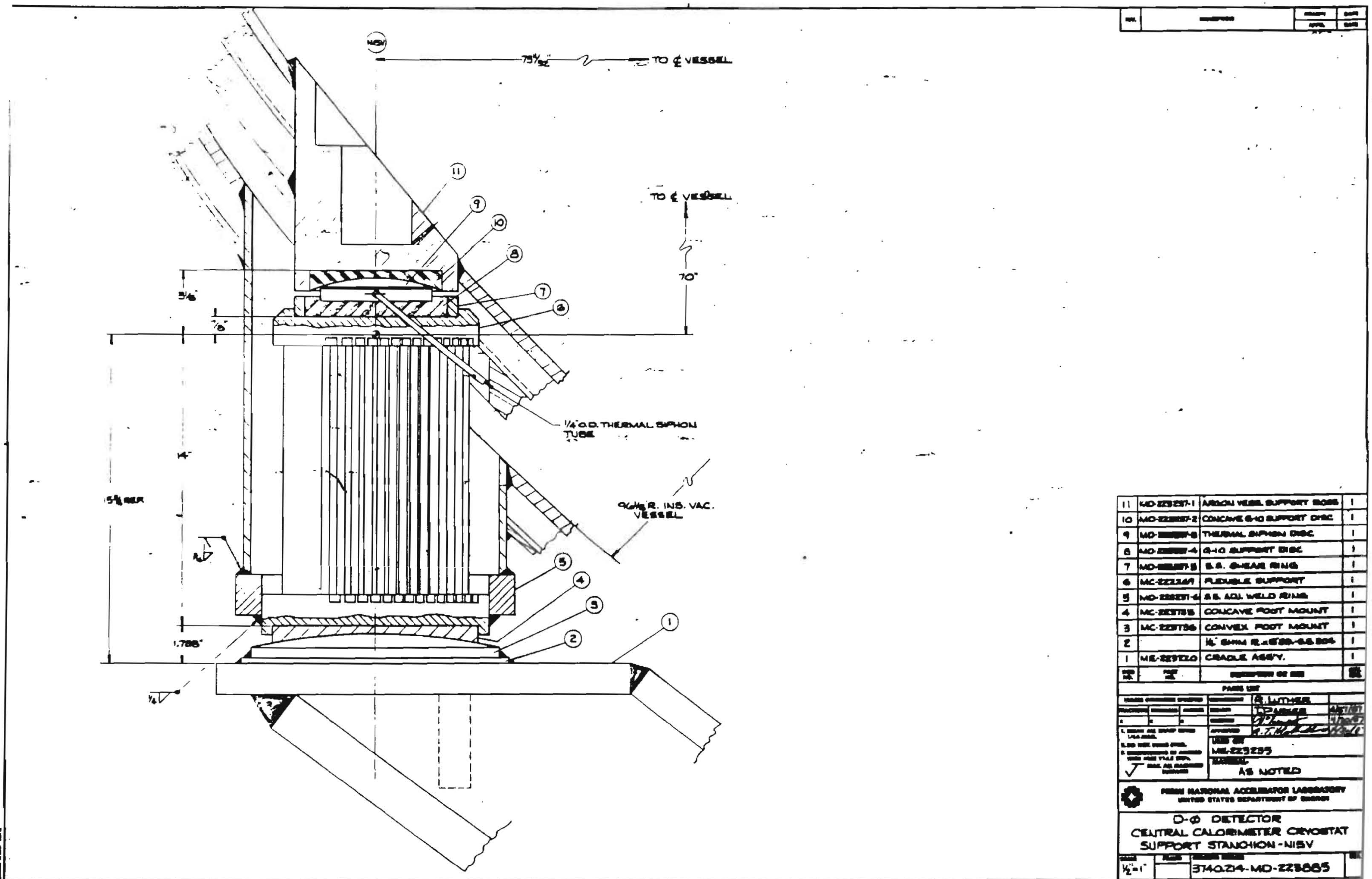
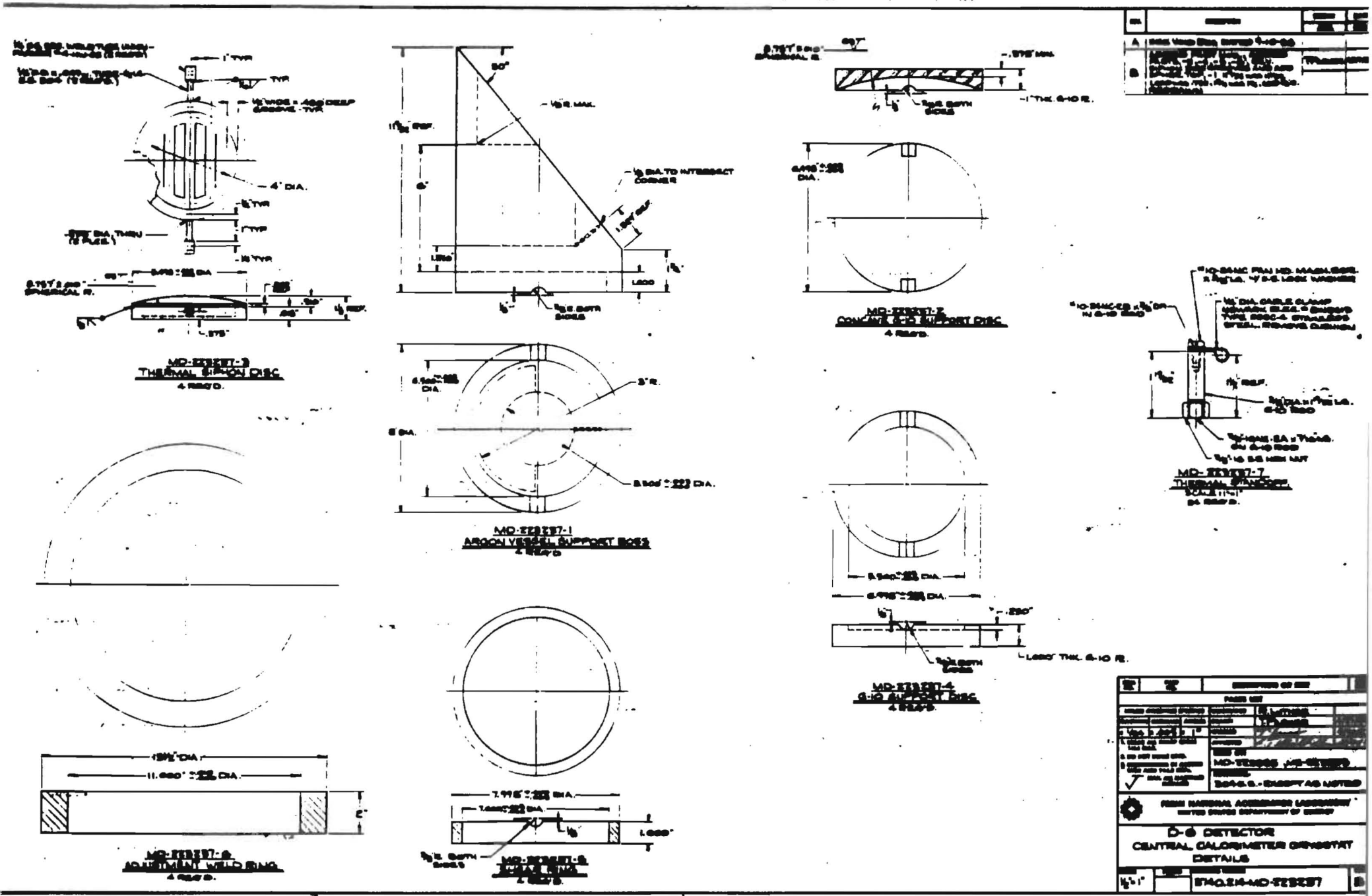
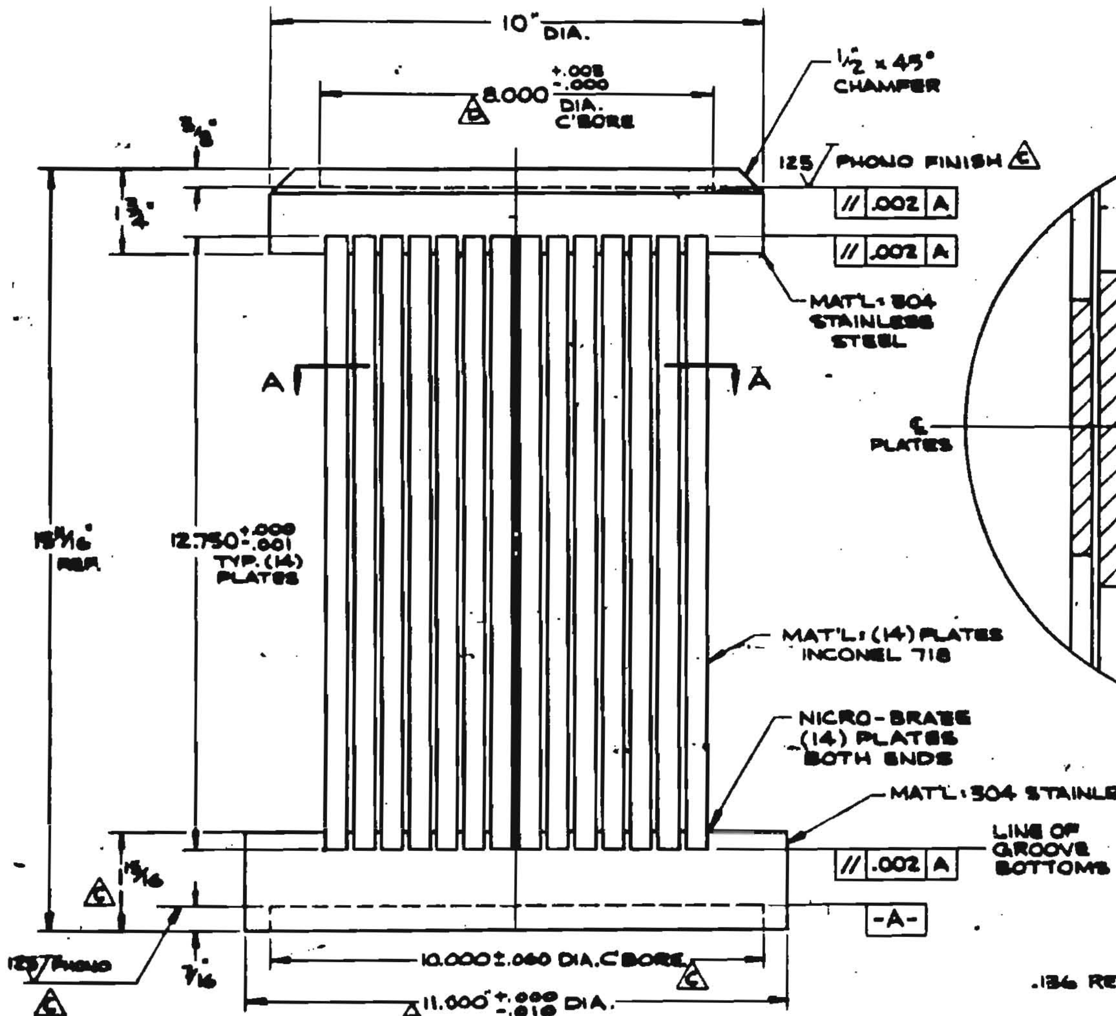

TO ℄ VESSEL
TO ℄ VESSEL
70"
14"
1/4" O.D. THERMAL SIPHON TUBE
INS. VAC. VESSEL
1.788"
ARGON VESSEL SUPPORT BOSS
CONCAVE G-10 SUPPORT DISC
THERMAL SIPHON DISC
G-10 SUPPORT DISC
S.S. SHEAR RING
FLEXIBLE SUPPORT
S.S. ADJ. WELD RING
CONCAVE FOOT MOUNT
CONVEX FOOT MOUNT
CRADLE ASS'Y.
ME-223285
AS NOTED
D-Φ DETECTOR
CENTRAL CALORIMETER CRYOSTAT
SUPPORT STANCHION-NISV
1/2"=1"
3740.214-MD-223885

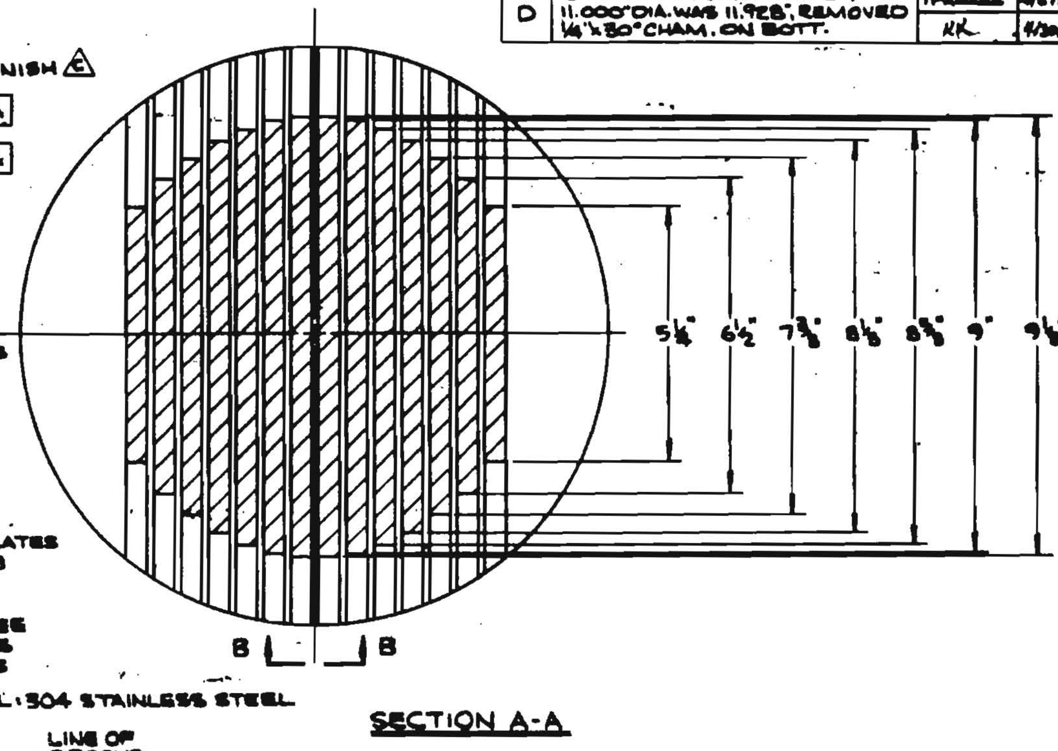
Figure 2



REV.	DESCRIPTION	DRAWN / APPD.	DATE
A	REDRAWN	C.REID	2-21-86
B	REDRAWN	J.BRANDT	9-16-86
C	125 PHONO FINISHES WERE 63. 7/16 WAS 1½", ADDED 10" C'BORE & 30° CHAMFER, MAX. SURFACE FINISH WAS 32	T.PARKER	11-21-86
D	8.000" C'BORE WAS 7.000", 11.000" DIA. WAS 11.928", REMOVED ¼"x30° CHAM. ON BOTT.	T.PARKER / KK	4/07/87 / 4/20/87

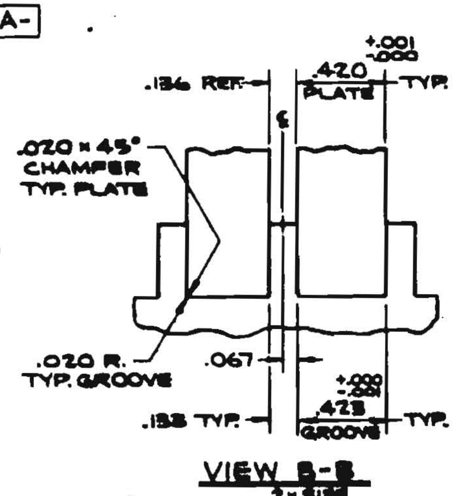
Figure 3





THE FOLLOWING TESTS SHALL BE PERFORMED AND DOCUMENTED FOR EACH FLEXIBLE SUPPORT ASSEMBLY:

1) WITH NO AXIAL LOAD ON THE ASSEMBLY AND WITH THE BOTTOM OF THE ASSEMBLY FIXED, THE TOP PLATE SHALL BE DEFLECTED .25"±.01" HORIZONTALLY IN A DIRECTION NORMAL TO THE VERTICAL PLATES. THE FORCE REQUIRED TO EFFECT THIS DEFLECTION SHALL BE RECORDED.
2) THE ASSEMBLY SHALL THEN BE LOADED AXIALLY WITH A MINIMUM FORCE OF 200,000 LB. AND THE TOP PLATE SHALL AGAIN BE DEFLECTED .25"±.01" AND THE REQUIRED FORCE RECORDED.
3) THE ASSEMBLY SHALL THEN BE VISUALLY EXAMINED FOR CRACKS, PERMANENT DISTORTIONS, AND BROKEN BRAZE JOINTS.



ITEM NO.	PART NO.	DESCRIPTION OR SIZE	QTY. REQ.

PARTS LIST

UNLESS OTHERWISE SPECIFIED: FRACTIONS ± 1/64, DECIMALS ± .005, ANGLES ± 1°	ORIGINATOR: K.KREMPETZ
1. BREAK ALL SHARP EDGES 1/64 MAX.	DRAWN: C.REID 2-21-86
2. DO NOT SCALE DWG.	CHECKED: R.D. [signature]
3. DIMENSIONING IN ACCORD WITH ANSI Y14.5 STD.	APPROVED: [signature]
4. 125 MAX. ALL MACHINED SURFACES	USED ON: MD-223565, 3740.214-ME-222285
	MATERIAL: AS NOTED

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

DØ DETECTOR
CENTRAL CALORIMETER CRYOSTAT
FLEXIBLE SUPPORT ASSEMBLY

SCALE	FILMED	DRAWING NUMBER	REV.
½ SIZE		3740.210-MC-222269	D