

**Fiducials for BM1 Std. Vac. Chamber**

**BM1002**

Date:

5/7/02

Chamber:

BM1002

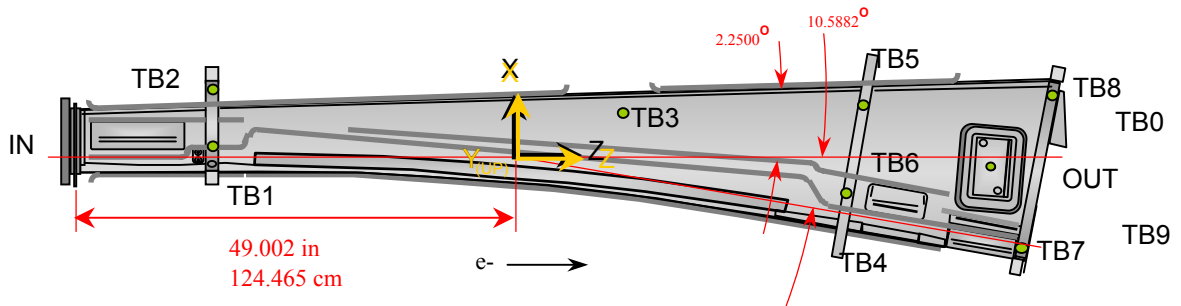
Operator(s):

L. Griffin

H. Imfeld

Notes:

Z on Exit port not measured.



**Fiducial Coordinates for BM1 Standard Vacuum Chamber: (inches)**

Fiducial	Z	X	Y
TB1	-34.831	1.468	4.377
TB2	-34.807	8.479	4.374
TB3	10.996	4.239	2.346
TB4	34.589	-4.996	4.353
TB5	36.608	6.266	4.313
TB6	52.448	-1.873	2.221
TB7	55.578	-11.201	3.009
TB8	59.447	8.944	2.922
TB9 (V4)	74.651	-20.292	4.402
TB0 (V4)	76.951	-8.044	4.399

inches      inches      inches

Nominal Deltas For H3 Absorber (TB6)		
Z	X	Y
52.454	-1.877	2.223
52.493	-1.891	2.242
<b>-0.039</b>	<b>0.014</b>	<b>-0.019</b>

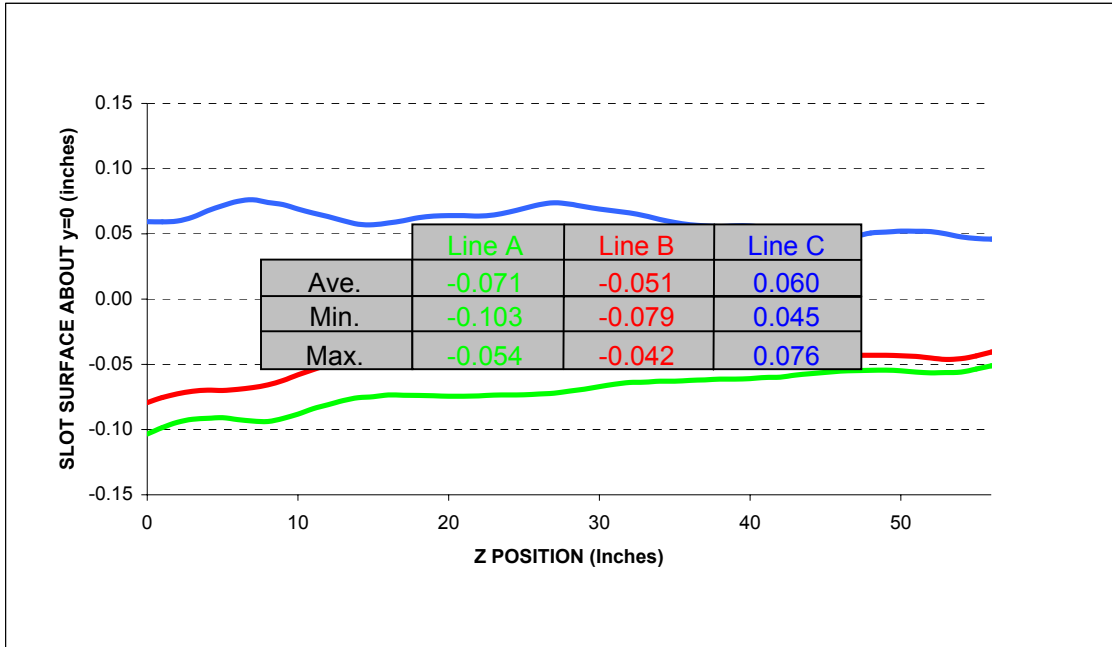
Source **V4 Step**

**Description:**

Fid. vals based on internal chamber datum. Source="V4 Step" indicates final data.

Fiducialization Step: (Traveler Step # 1380)

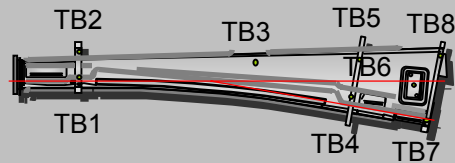
Slot Calibration	
Ideal	0.511
Meas.	0.138
Delta	-0.373



BM1002

**Step 1: Fiducial Coordinates for BM1 Std. Vac. Chamber**

Fiducial	Z	X	Y
TB1	-34.835	1.462	4.376
TB2	-34.825	8.474	4.326
TB3	10.993	4.257	2.341
TB4	34.591	-4.992	4.355
TB5	36.617	6.270	4.312
TB6	52.454	-1.877	2.223
TB7	55.577	-11.207	3.019
TB8	59.455	8.937	2.918
	inches	inches	inches

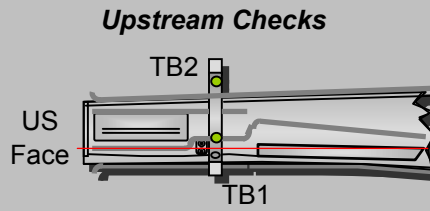


**Description:**

Fiducial values based on internal chamber datum.

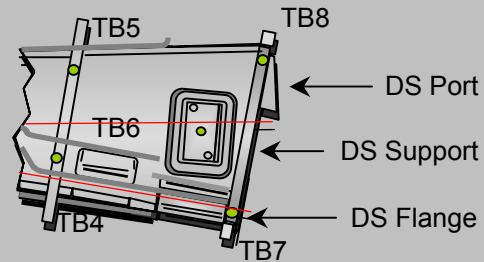
End Surface Attitudes for BM1 Std. Vac. Chamber

Upstream Face		
	yaw	pitch
Measured	4.5	-7.7
<b>Nominal</b>	<b>0.0</b>	<b>0.0</b>
<b>Difference</b>	<b>4.5</b>	<b>-7.7</b>
	mrad	mrad



Downstream Port		
	yaw	pitch
Measured	23.3	-5.3
<b>Nominal</b>	<b>25.3</b>	<b>0.0</b>
<b>Difference</b>	<b>-2.0</b>	<b>-5.3</b>

**Downstream Checks**



Downstream Support		
	yaw	pitch
Measured	-186.8	-11.0
<b>Nominal</b>	<b>-184.8</b>	<b>0.0</b>
<b>Difference</b>	<b>-2.0</b>	<b>-11.0</b>

Downstream Flange		
	yaw	pitch
Measured	-192.4	-12.2
<b>Nominal</b>	<b>-184.8</b>	<b>0.0</b>
<b>Difference</b>	<b>-7.6</b>	<b>-12.2</b>
	mrad	mrad

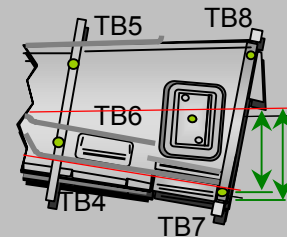
**Description:**

Orientation of the upstream and downstream surfaces compared to nominal values. Tol +/- 3 mrad

Datum Verification

DS Support	
	x
Measured	-11.900
<b>Nominal</b>	<b>-11.912</b>
<b>Diff.</b>	<b>0.012</b>
	inches

DS Flange	
	x
Measured	-11.942
<b>Nominal</b>	<b>-11.958</b>
<b>Diff.</b>	<b>0.016</b>
	inches

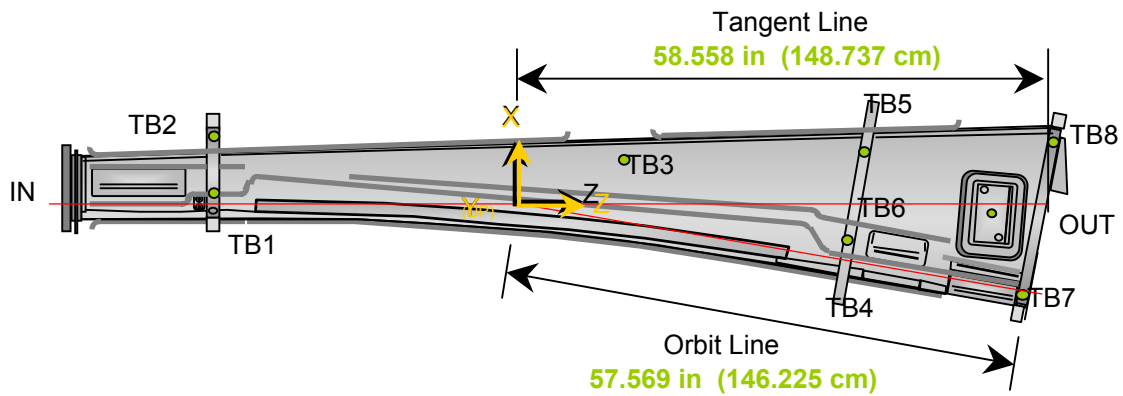


**Description:**

The x-distance from the center-line to the projection of the measured DS inside curve point on either of the DS surfaces. Tolerance values +/- 0.020 in.

BM1002  
Status

<u>BM1 Chamber Lengths</u>				
Tangent Line:	Length 58.569 inches	without SMR	Nominal Length 58.558	OK
Orbit Line:	Length 57.490 inches	without SMR	Nominal Length 57.569	OK
<b>Description:</b> Both lengths are to the faces of the weld flanges. Length tolerance +/- 0.125 in.				



**V4 Step A: Survey and Check of BM1 Standard Vacuum Chamber Fiducials Before Attaching V4 and the Exit Port:**

**Step A-1: Remeasurement of Fiducial Coordinates for BM1 Std. Vac. Chamber**

Fiducial	Z	X	Y	del Z	del X	del Y
TB1	-34.830	1.468	4.376	0.005	0.006	-0.001
TB2	-34.807	8.479	4.374	0.019	0.005	0.048
TB3	10.996	4.239	2.341	0.003	-0.018	0.000
TB4	34.588	-4.996	4.354	-0.003	-0.005	-0.001
TB5	36.608	6.266	4.313	-0.009	-0.004	0.002
TB6						
TB7	55.576	-11.201	3.021	-0.001	0.006	0.002
TB8	59.442	8.946	2.927	-0.013	0.010	0.009
	inches	inches	inches	Compared to Step 1 Fiducial Coords.		

**DS Port Level Check**

OK ?  (YES or NO)

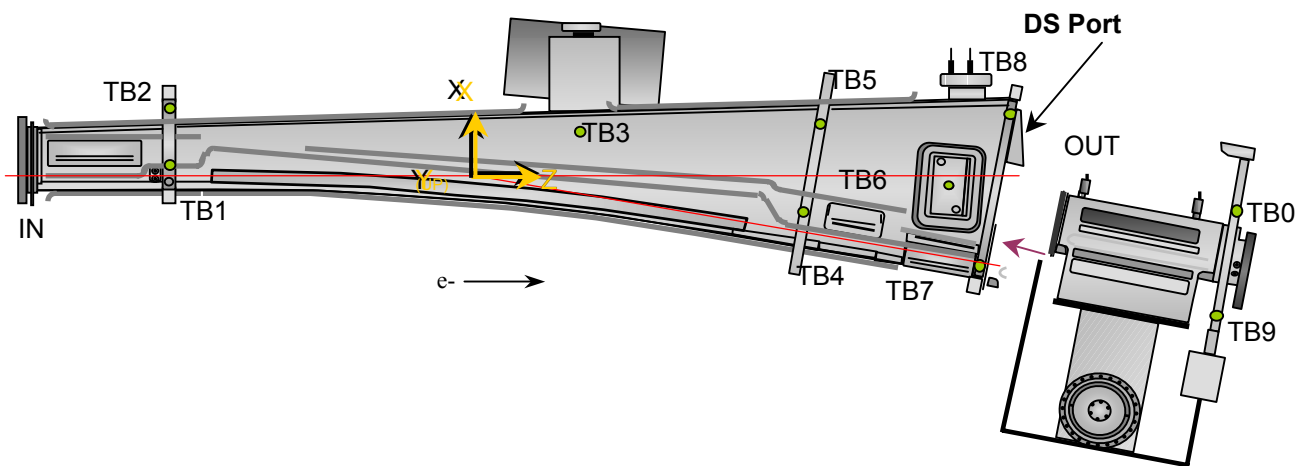
Level Status: OK

**US Flange Roll Check**

OK ?  (YES or NO)

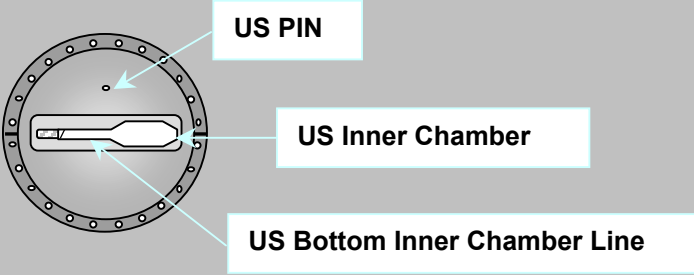
Roll Status: OK

**Description:**  
Fid. vals based on internal chamber datum.



**V4 Step A:** Check of US Flange Prior to V4 Installation

**Step A-2: Pre-Installation Check of UpStream Flange Position**



The diagram shows a top-down view of a circular flange with a central rectangular chamber. A small dot is labeled 'US PIN'. The central chamber is labeled 'US Inner Chamber'. A line along the bottom edge of the inner chamber is labeled 'US Bottom Inner Chamber Line'.

US PIN	Z	X	Y
Measured	-50.881	1.881	2.274
Nominal	-51.000	1.836	2.282
Difference (inches)	0.120	0.045	-0.008

US Inner Chamber	Z	X	Y
Measured	-50.550	-1.359	0.008
Nominal	-51.000	-1.404	0.000
Difference (inches)	0.450	0.045	0.008

US Bottom Inner Chamber Line	ROLL	(FINAL)
Measured	1.070	
Nominal	0.000	
Difference (mrads)	1.070	

Roll Status **UPDATE**

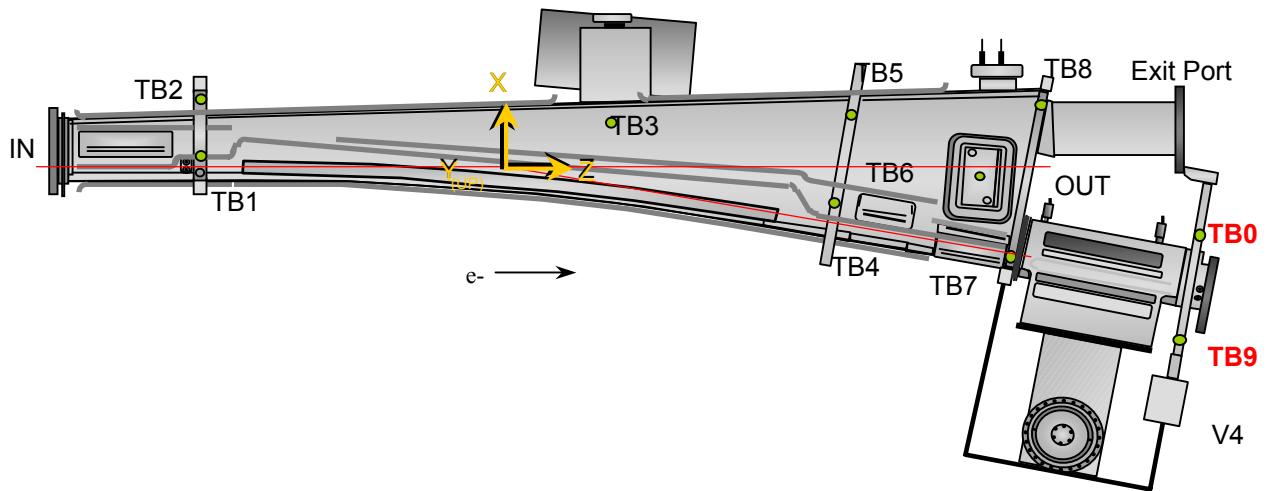
**Description:**  
 Measured vs. nominal values for US flange expressed in the PART coordinate system.  
 Fiducial values are updated (using those from Step A-1) if ROLL delta is not within 1 mrad.

**V4 Fiducialization Step: Survey of Fiducial Coordinates for BM1 Standard Vacuum Chamber with V4 and the Exit Port Attached:**

**Step Fid-1: Position of Added Tooling Balls TB9 and TB0**

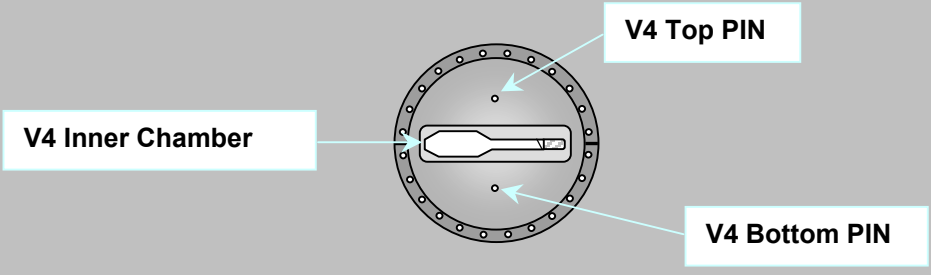
Fiducial	Z	X	Y
TB9 (V4)	74.677	-20.301	4.402
TB0 (V4)	76.975	-8.053	4.402
	inches	inches	inches

**Description:**  
 Fid. vals after V4 and exit port attached.



**V4 Fiducialization Step: V4 Flange**

**Step Fid-2: Set Position of V4 Flange Position**



The diagram shows a top-down view of a circular V4 flange. A central rectangular chamber is labeled 'V4 Inner Chamber'. Two small circular pins are located on the inner edge of the flange, labeled 'V4 Top PIN' and 'V4 Bottom PIN'.

V4 Top PIN	Z	X	Y
Measured	80.204	0.007	2.283
Nominal	80.000	0.000	2.282
Difference (inches)	0.204	<b>0.007</b>	<b>0.001</b>

V4 Bottom PIN	Z	X	Y
Measured	80.170	0.008	-2.283
Nominal	80.000	0.000	-2.282
Difference (inches)	0.170	<b>0.008</b>	<b>-0.001</b>

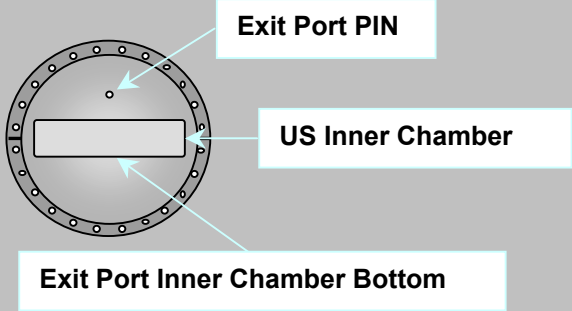
V4 Inner Chamber	Z	X	Y
Measured	79.927	-1.396	-0.024
Nominal	80.000	-1.404	0.000
Difference (inches)	-0.073	<b>0.008</b>	-0.024

V4 Downstream Z Value	Z
Measured	80.722
Nominal	80.764
Difference (inches)	<b>-0.042</b>

**Description:**  
 Measured vs. nominal values for V4 flange expressed in the V4 coordinate system.  
 Tol +/- 10mils except for the V4 Z-value. Values in **BOLD** or **RED** are most critical.

**V4 Fiducialization Step: Exit Port**

**Step Fid-3: Post-Installation Check of Exit Port Flange Position**



Exit Port PIN	Z	X	Y
Measured	75.321	4.134	2.289
Nominal	75.000	4.168	2.282
Difference (inches)	0.321	<b>-0.034</b>	<b>0.007</b>

Exit Port Inner Chamber Side	Z	X	Y
Measured	75.067	7.380	0.063
Nominal	75.000	7.418	0.000
Difference (inches)	0.067	<b>-0.038</b>	0.063

Exit Port Inner Chamber Bottom	Z	X	Y
Measured	74.947	3.945	-0.364
Nominal	75.000	0.000	-0.366
Difference (inches)	-0.053	3.945	<b>0.002</b>

Exit Port DS Z Value (PART Frame)	Z
Measured	
Nominal	75.768
Difference (inches)	-----

**Metrology Dept:**  
Did not measure flange face.

**Description:**  
Measured vs. nominal values for Exit Port flange expressed in the EXIT PORT coordinate system.  
Tol +/- 10mils except for the V4 Z-value. Values in **BOLD** or **RED** are most critical.

**V4 Final Step: Re-Survey of all Ten Fiducials**

Fiducial	Z	X	Y	del Z	del X	del Y
TB1	-34.831	1.468	4.377	-0.001	0.000	0.001
TB2	-34.807	8.479	4.374	-0.001	0.000	0.000
TB3	10.996	4.239	2.346	-0.001	0.000	0.006
TB4	34.589	-4.996	4.353	0.001	0.000	0.000
TB5	36.608	6.266	4.313	0.000	0.000	0.000
TB6	52.448	-1.873	2.221			
TB7	55.578	-11.201	3.009	0.003	-0.001	-0.012
TB8	59.447	8.944	2.922	0.005	-0.003	-0.005
TB9 (V4)	74.651	-20.292	4.402	-0.026	0.009	0.001
TB0 (V4)	76.951	-8.044	4.399	-0.024	0.008	-0.003
	inches	inches	inches			

**Description:**  
 Final survey of BM1 standard vacuum chamber. (With V4 and exit port attached.)  
 Note that all comparisons are relative to the most current fiducial values.  
 (I.e. deltas are computed using values from Steps A-1 and Fid-1)

