Jefferson Lab Alignment Group

Data Transmittal

TO: D.Mack, D. Gaskell, D.Wood, M. Dalton		**DATE:** 25 Oct 2012	
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DETAILS:

The Quartz Bar Detectors in Hall C were surveyed post run on June 30th, 2012. The table shown on the following page contains the as-found coordinates in both the Qtor magnet system and the local Quartz Bar system as defined in Dave Mack's alignment system (see sketch on final page). Additionally the movements in the local system are shown.

The first group of coordinates are the as-found locations of the bars in the Qtor coordinate system, with the origin at the center of the Qtor magnet. The axis are: Z+ following the beam, X+ transverse in the horizontal direction and Y+ vertically up. Units are meters.

The second group of coordinates describes the as-found locations in the local system for each individual detector. Z+ is in the beam direction with origin at the downstream edge of the bar (570.625 cm downstream of Qtor center, 341 cm radially from beam centerline), X is radially outward from the beamline, and Y follows the downstream top edge of the bar at the appropriate angle.

The column labeled "Ri Component", is the amount that the bars need to be radial displaced in the local quartz X direction. The Ri amount is based upon the amount of Z movement from the ideal Z location and based upon the formula $Ri = \tan(22.24°) * (Zi - 570.625\text{cm}) + 341\text{cm}$. The formula corrects the radial (local X coordinate) position of the bars to catch the beam envelope, as described by D. Mack. Units are centimeters.

The final group of coordinates labeled "Movements", are the calculated amounts the detectors need to move in the local system. The X radial column is the amount the detectors would have to move out after applying the correction amount in the Ri column. A + value indicates the detector needs to move away from the beam centerline. The Y column indicates how much the detector needs to move along the local Y axis. A +Y value would mean the detector moves in positively along the Y axis. A + Z value indicates the detector needs to move downstream from the ideal local value (570.625cm from Qtor center). Units are centimeters.

On the third page, the position of Detector #9 relative to the Qtor coordinate system is shown. There is no ideal location for this 9th detector. The data has a table of coordinates, and rotation values associated with this detector.

Detector Side	Qtor Coord System			phi angle (deg)	Local Quartz Bar Coords			Ri compone nt	Movements (cm)		
	z (M)	X (M)	Y (M)		Local X (cm)	Local Y (cm)	Local Z (cm)		X Radial (cm)	Y (cm)	Z (cm)
MD1+	5.7757	3.4380	1.2532	0.00	343.80	125.32	577.57	343.84	0.04	0.41	6.94
MD1−	5.7725	3.4364	−1.2614		343.64	−126.14	577.25	343.71	0.07	0.41	6.63
MD2+	5.7796	1.5414	3.3185	45	343.65	125.66	577.96	344.00	0.35	0.07	7.34
MD2−	5.7687	3.3171	1.5381		343.31	−125.80	576.87	343.55	0.24	0.07	6.25
MD3+	5.7734	−1.2575	3.4331	90	343.31	125.75	577.34	343.74	0.44	−0.02	6.71
MD3−	5.7808	1.2571	3.4362		343.62	−125.71	578.08	344.05	0.43	−0.02	7.46
MD4+	5.7846	−3.3266	1.5376	135	343.95	126.50	578.46	344.20	0.25	−0.77	7.84
MD4−	5.7770	−1.5454	3.3125		343.50	−124.95	577.70	343.89	0.39	−0.78	7.07
MD5+	5.7817	−3.4395	−1.2609	180	343.95	126.09	578.17	344.09	0.14	−0.36	7.55
MD5−	5.7831	−3.4418	1.2537		344.18	−125.37	578.31	344.14	−0.04	−0.36	7.69
MD6+	5.7843	−1.5345	−3.3341	225	344.26	127.25	578.43	344.19	−0.07	−1.52	7.80
MD6−	5.7880	−3.3150	−1.5585		344.61	−124.21	578.80	344.34	−0.27	−1.52	8.18
MD7+	5.7877	1.2597	−3.4455	270	344.55	125.97	578.77	344.33	−0.22	−0.24	8.14
MD7−	5.7826	−1.2549	−3.4434		344.34	−125.49	578.26	344.12	−0.22	−0.24	7.64
MD8+	5.7769	3.3105	−1.5540	315	343.97	124.20	577.69	343.89	−0.08	1.53	7.07
MD8−	5.7777	1.5344	−3.3341		344.25	−127.26	577.77	343.92	−0.33	1.53	7.14

The 9th detector is shown below with coordinates based on the Qtor coordinate system referenced above. The units are meters, with angular units in decimal degrees. The horizontal angle formed between the line from the Qtor origin to the detector origin point that is made with the detector plane is 61.9645°. The face of the detector is yawed -1.0546 from the X axis and pitched 0.2074. The Det.Origin is the origin point of the detector and the pt_proj is a point projected perpendicular downstream from the Det.Origin.

Detector 9			
Plane Corner Points			
PT_2	7.3765	-3.7730	-0.2229
PT_3	7.3750	-3.6900	-0.2241
PT_14	7.3803	-3.7756	-1.2293
PT_15	7.3786	-3.6907	-1.2286
detector Points			
Det.Origin	7.3786	-3.7784	-0.7286
pt_proj	7.8785	-3.7688	-0.7268
Survey Targets			
TB_A	7.4104	-3.5270	-1.2321
TB_B	7.4159	-3.8483	-1.2300
TB_C	7.4122	-3.8474	-0.2236
TB_D	7.4059	-3.5255	-0.2282
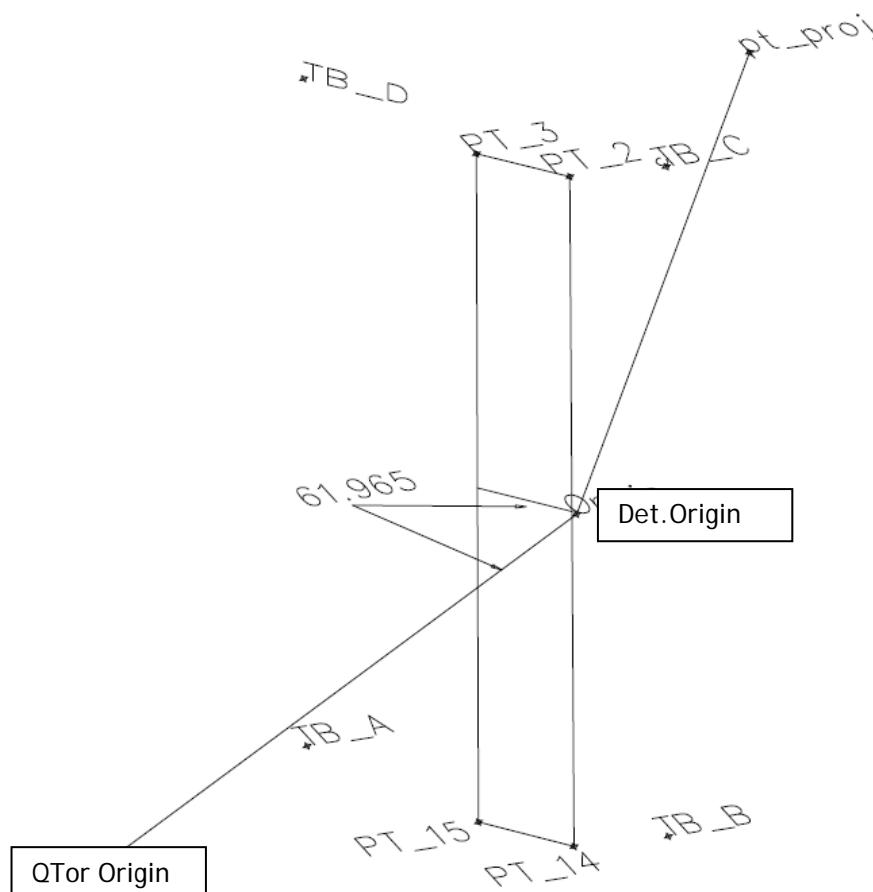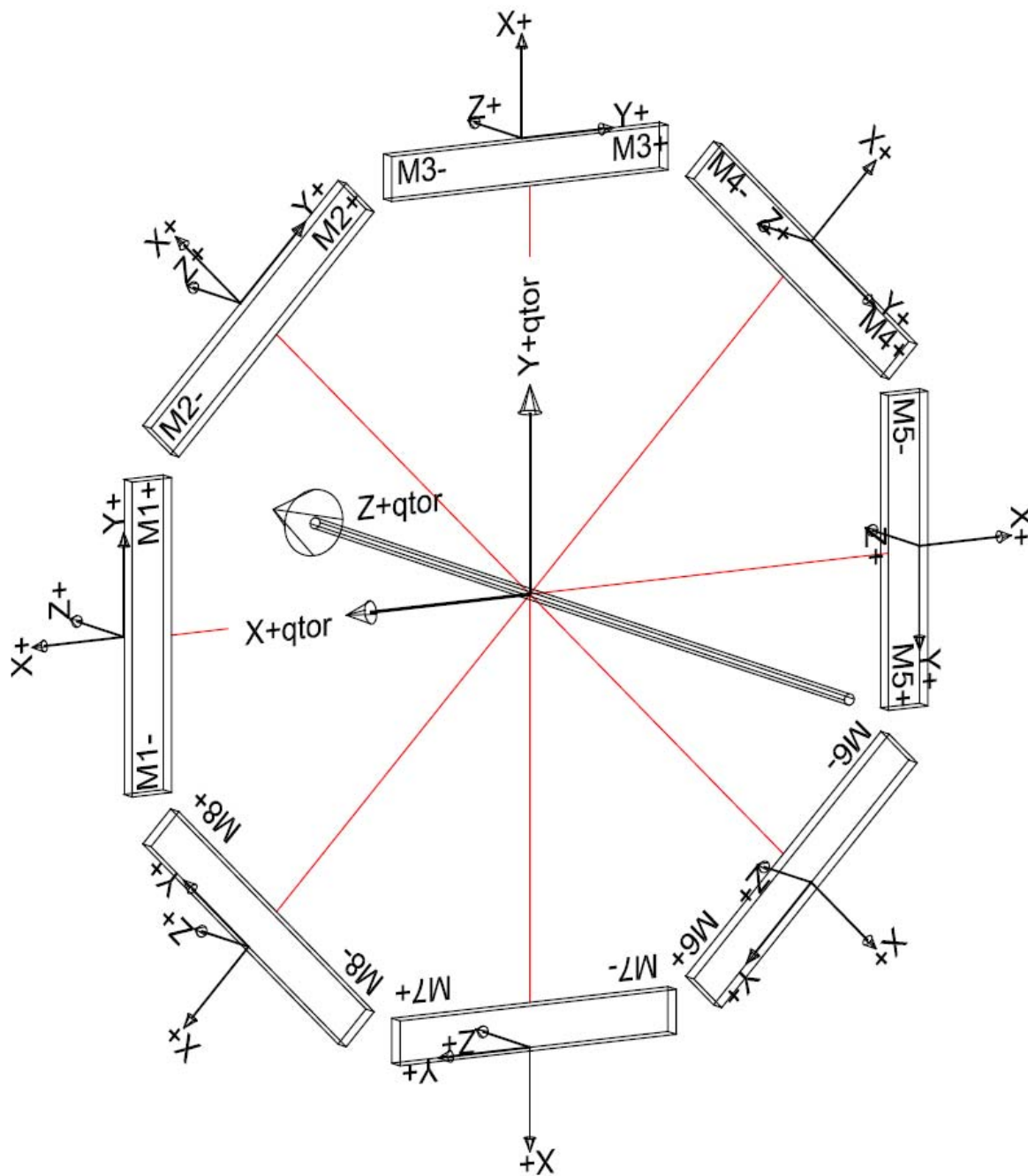
	Qtor Coord System					Local Quartz Bar Coords					
Detector Side	Z (M)	X (M)	Y (M)	phi angle (deg)		Local X (cm)	Local Y (cm)	Local Z (cm)		Ri component	
MD1+	5.7757	3.4380	1.2532	0.00		343.80	125.32	577.57		343.84	

MD1-	5.7725	3.4364	-1.2614			343.64	-126.14	577.25		343.71
MD2+	5.7796	1.5414	3.3185	45		343.65	125.66	577.96		344.00
MD2-	5.7687	3.3171	1.5381			343.31	-125.80	576.87		343.55
MD3+	5.7734	-1.2575	3.4331	90		343.31	125.75	577.34		343.74
MD3-	5.7808	1.2571	3.4362			343.62	-125.71	578.08		344.05
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MD5+	5.7817	-3.4395	-1.2609	180		343.95	126.09	578.17		344.09
MD5-	5.7831	-3.4418	1.2537			344.18	-125.37	578.31		344.14
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