



Jefferson Lab Alignment Group

Data Transmittal

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The central time of flights (CTOFs) were measured on October 24th, 2017. A plane was constructed on each of the installed (47) scintilators. Six points were used to establish each plane. The installation survey data, taken over a two week period, was used to determine the edges of the some of the scintilators. Where the edges were not measured, pro-rated values were determined between the measured sides. Edge lines were established on at least one edge of each detector and then projected to the measured October 24th planes. The projected line was then copied across the plane to establish a second edge line. This is explained in a diagram at the end of this transmittal.

The grid below shows the resulting diameters from the cross line ends. The scintilators are numbered starting at the 1st unit at the bottom, beam right side and numbered sequentially, counter clockwise. Side 'a' is the left side of the counter and side 'b' is the right side of each individual counter. A radius at the corners of the scintilators was obtained from the model. This value is 251.6 mm (**verification needed**). At the ideal centerline of each counter the radius should be 251.1 mm. Counter 23 is missing. All values are millimeters.

The lines are identified as s##a_us, s##a_ds, s##b_us and s##b_ds. 'us' is the upstream end; 'ds' the downstream line end. ## is the counter number. 'a' or 'b' indicates the counter's side.

Position 1	Opposite	Diameter	delta design	Position 1	Opposite	Diameter	delta design
s01a_ds	s25a_ds	506.5	3.3	s13a_ds	s37a_ds	505.6	2.4
s01a_us	s25a_us	504.0	0.8	s13a_us	s37a_us	505.6	2.4
s01b_ds	s25b_ds	506.6	3.4	s13b_ds	s37b_ds	505.3	2.1
s01b_us	s25b_us	503.7	0.5	s13b_us	s37b_us	505.3	2.1
s02a_ds	s26a_ds	506.0	2.8	s14a_ds	s38a_ds	506.1	2.9
s02a_us	s26a_us	504.0	0.8	s14a_us	s38a_us	505.2	2.0
s02b_ds	s26b_ds	506.3	3.1	s14b_ds	s38b_ds	507.2	4.0
s02b_us	s26b_us	504.0	0.8	s14b_us	s38b_us	506.2	3.0
s03a_ds	s27a_ds	505.2	2.0	s15a_ds	s39a_ds	506.9	3.7
s03a_us	s27a_us	503.4	0.2	s15a_us	s39a_us	506.6	3.4
s03b_ds	s27b_ds	505.7	2.5	s15b_ds	s39b_ds	507.1	3.9
s03b_us	s27b_us	503.6	0.4	s15b_us	s39b_us	506.7	3.5
s04a_ds	s28a_ds	505.2	2.0	s16a_ds	s40a_ds	507.3	4.1
s04a_us	s28a_us	502.6	-0.6	s16a_us	s40a_us	504.5	1.3
s04b_ds	s28b_ds	506.2	3.0	s16b_ds	s40b_ds	507.7	4.5
s04b_us	s28b_us	503.4	0.2	s16b_us	s40b_us	504.9	1.7
s05a_ds	s29a_ds	503.8	0.6	s17a_ds	s41a_ds	506.5	3.3

s05a_us	s29a_us	506.4	3.2	s17a_us	s41a_us	506.2	3.0
s05b_ds	s29b_ds	504.1	0.9	s17b_ds	s41b_ds	507.3	4.1
s05b_us	s29b_us	506.5	3.3	s17b_us	s41b_us	506.9	3.7
s06a_ds	s30a_ds	503.8	0.6	s18a_ds	s42a_ds	508.0	4.8
s06a_us	s30a_us	504.9	1.7	s18a_us	s42a_us	507.2	4.0
s06b_ds	s30b_ds	504.2	1.0	s18b_ds	s42b_ds	507.8	4.6
s06b_us	s30b_us	505.1	1.9	s18b_us	s42b_us	507.0	3.8
s07a_ds	s31a_ds	505.0	1.8	s19a_ds	s43a_ds	502.7	-0.5
s07a_us	s31a_us	506.7	3.5	s19a_us	s43a_us	503.7	0.5
s07b_ds	s31b_ds	506.2	3.0	s19b_ds	s43b_ds	503.3	0.1
s07b_us	s31b_us	507.7	4.5	s19b_us	s43b_us	504.3	1.1
s08a_ds	s32a_ds	507.0	3.8	s20a_us	s44a_ds	506.3	3.1
s08a_us	s32a_us	508.3	5.1	s20a_ds	s44a_us	502.4	-0.8
s08b_ds	s32b_ds	506.7	3.5	s20b_ds	s44b_ds	507.2	4.0
s08b_us	s32b_us	507.8	4.6	s20b_us	s44b_us	503.4	0.2
s09a_ds	s33a_ds	506.6	3.4	s21a_ds	s45a_ds	506.6	3.4
s09a_us	s33a_us	506.7	3.5	s21a_us	s45a_us	505.1	1.9
s09b_ds	s33b_ds	506.5	3.3	s21b_ds	s45b_ds	507.1	3.9
s09b_us	s33b_us	506.4	3.2	s21b_us	s45b_us	505.7	2.5
s10a_ds	s34a_ds	506.5	3.3	s22a_ds	s46a_ds	506.6	3.4
s10a_us	s34a_us	507.5	4.3	s22a_us	s46a_us	504.9	1.7
s10b_ds	s34b_ds	507.4	4.2	s22b_ds	s46b_ds	507.2	4.0
s10b_us	s34b_us	508.2	5.0	s22b_us	s46b_us	505.6	2.4
s11a_ds	s35a_ds	507.4	4.2				
s11a_us	s35a_us	506.9	3.7	s23 missing			
s11b_ds	s35b_ds	508.2	5.0				
s11b_us	s35b_us	507.5	4.3				
s12a_ds	s36a_ds	506.5	3.3	s24a_ds	s47a_ds	506.0	2.8
s12a_us	s36a_us	506.6	3.4	s24a_us	s47a_us	503.2	0.0
s12b_ds	s36b_ds	506.4	3.2	s24b_ds	s47b_ds	505.1	1.9
s12b_us	s36b_us	506.4	3.2	s24b_us	s47b_us	502.1	-1.1

The diagram on the next page explains how the edge lines for each scintillator were established.

1. Two observations (a) were taken of one side of some of the scintillators (c) as they were established. These observed values determined how much stack up error was occurring during the installation process.
2. A line was established (b) and extended to the approximate ends of the designed scintillators.
3. A final as found survey (Oct. 24th) was taken on each of the scintillator planes (e) to establish a plane (hatched).
4. Line B was projected onto the plane using the plane's coordinate frame to establish line D.
5. Based on the coordinate frame of the plane, the opposite edge (f) was calculated.

