Survey RUN-3

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The survey analysis for the RUN-3 has just started. The survey was done before the run but apart from the TOF2 slats nothings so far has been put into the database as of March 29. The note is basically written by taking the run-2 note and modifying as needed.

This note describes the procedure and I give a table, which contains the first iteration on geometries that we should use. I recommend these get into the DB ASAP so we can look for difference in detail

Survey

The C-AD survey group carried out the survey during November 2002. The method employed was similar to the March 2002 survey also in terms of nomenclature.

Only tracking detectors and the move TOF slats were surveyed. It is assume that the other detectors as C1, RICH H1 and H2 and known accurately enough since they have not moved.

- T3 is a good reference detector since it was not removed/re-installed between run-2 and run-3. All other tracking have been remounted, and repositioned.
- TPC. As many corners of the Lucite box as possible was surveyed. This includes all 8 corners for MTP1 and MTP2, but fewer for T1 and T2. In addition T1 and T2 had some survey fixtures (1/2" markers) attached to either 3 or 4 positions on the top-plate; the positions are determined by a set of screw-holes.
- DC. Various survey sighting balls were held on the survey positions, thus defining a point perpendicular to the survey marker and at a determined distance of ¹/₂, ³/₄ inch from the actual point. In some cases the survey 'hole' itself was sighted.
- TOFW had 4 measurements per panel. Two at first and last slat at the edge, and at markers set top and bottom in the center of the slat. The markers were not placed symmetrically top and bottom, so those are only used to derive the x and z positions, not the height. The values derived are a grand average.
- TOFW ha the first panel removed. In addition electronics for TOFW slats were later moved over to the TFW2 detector so depending on the run period various number of tow slats were present actively. The numbering though is unchanged, so a given slatno will in regard to geometry be determine as before (using the panel number).
- The FS was surveyed at the nominal 4 deg position, while BFS was set at 11 for access reasons, not because we ever took any measurements there. It is unclear to me if the position was carefully set, rotating to 8 deg is close to the precious values but only to about 2 mm. The most important concern is the relative positions of T3-T4-T5 NOT the absolute and to T2.
- MRS was measured for the TPCs at nominal 90 deg an the plate in nominal position. During the dA the plate was not move to the back position at all.
- The TPM2 was move BACK by about 4 inches (as also reflected in the table) to make space for a MRS trigger counter (for Light HI and peripheral Au-Au).
- T1 was also moved by ~ 5 cm, to make space for a planned trigger counter. A same time it was attempted to push T1, and T2 as far towards the beam line as possible. Thus the significant changes in values.
- Two independent survey of T2 apparently were done, apparently from different spectrometer settings. The differences in Z,X in the order of 1 mm indicating the accuracy.
- All TPC's surveys for the bottom value of the box are identical to last years.
- For T4 (I recall) Pawel points out it was not leveled in y-x plane so final geom. Will have to be changed.

In addition to the detectors many fiducial points of platforms, magnets and stands were recorded.

Analysis method

The data from the survey were put into spreadsheets based on the model used previous. The general idea is that say for the TPC with 8 corners measured one can construct 12 vectors, 4 in each direction x, y and z calculate units vectors, angles etc. From these one gets dimensions that can be checked as well as rotation angle, and center positions. Depending on the detector corrective terms (to adjust from external to internal centers are taken into account) The best center position and angles are evaluated based on these vectors, and position. In addition the spreadsheet will used dimension of the detector and calculate the positions of all corners, and a deviation from each measurement. This thus also enables one to check any different position, rotation that one might attempt to use e.g from software.

There are considerable changes in T1 an T2 geometry. The geometry for T3,T4 an T5 is quite close to that of last year.

The main change in MRS is the movement back by ~ 10 cm of TPM2.

Survey Summary

This first table gives the results as obtained from the survey directly, without any modifications to fine-tune geometries for the looking at tracking results. The **Bold** values are from run-3 the regular font the RUN-2 surveys final numbers.

For the FS tracking the italic values are obtained from the bold by rotating to the nominal angle for the run-2 survey.

Detector	#datapoints	x-center	z-center	Theta	y-center	Beta
		Cm	Cm	Degrees	Cm	Degrees
TPM1	8	94.90	0.13	90.10		
	6	95.13	0.13	90.03		
TPM2	8	286.96	-0.11	89.64		
	8	297.18	-0.04	89.64		
T1 (at 8deg)	4	-90.626	494.19	-10.03	As before	
T1 (at 4deg)	4	-54.98	503.52	-5.92		
		-89.97	498.46	-9.92		
T2 (at 8deg)	3+3	-151.36	799.55	-11.88	0.8	
T2 (at 4 deg)	at 4	-94.52	808.39	-8.30		
	rotate to 8	-150.68	7 99. 79	-12.20		
H1	4	-164.36	857.57	-11.60	-0.4	~0
C1	6	-177.88	913.93	-11.94	-0.06	
Т3	8+1	-209.53	1074.14	-11.72	0.2	~+.1
T3 at 11	8	-265.34	1061.49	-14.72	0.16	
T3 rot to 8		-209.33	1073.94	-11.72		
T4	7	-297.50	1438.21	-13.55	0.22	0.018+-
		-372.51	1420.84	-16.57	0.15	0.005
		-297.64	1438.39	-13.57		
T5		-386.32	1781.1	-15.61	0.38	-0.1->-0.2
		-478.82	1758.42	-18.62	0.29	
		-386.14	1781.07	-15.62		
H2	4	-399.13	1838.65	-15.45	-0.1	
RICH	4	-435.243	1963.36	-15.45	-0.05	0

TOFW	(at 90 deg position)					
TFP1	REMOVED	425.083	-66.323	104.941	-0.10	
TFP2	4	430.597	-41.084	99.336	-0.22	
		428.21	-53.22	102.10	-0.21	
TFP3	4	433.557	-14.748	93.094	-0.25	
		432.43	-27.11	95.91	-0.10	
TFP4	4	433.554	11.816	86.903	-0.40	
		433.98	-00.745	0.00	0.0	
TFP5	4	431.033	38.256	80.762	-0.45	
		432.69	25.63	83.69	0.11	
TFP6	4	425.162	64.098	75.236	-0.40	
		428.21	51.73	77.89	0.21	

Database information

Temporary values for TPM2 i.e. incrementing the values from RUN-II by 10 cm is quite close to actual values. They had been inserted into DB earlier.

Comparison with tracking

This was done by Pawel et. Al. and reported at the Krakow collaborations meeting. These numbers are not in this document.

Final Geometry Values

All of these have been committed to the DB late spring/summer (Kris)

Detector	x-center	z-center	Theta	y-center	Beta
	Cm	Cm	Degrees	Cm	Degrees
T1	-90.5791	494.1821	-10.0160		0
	-90.626	494.19	-10.03	0.8	
T2	-151.3170	799.5387	-11.90	0.8	0
	-151.36	799.55	-11.88		
H1	-164.36	857.57	-11.60	-0.4	~0
C1	-177.88	913.93	-11.94	-0.06	
Т3	-209.5258	1074.1440	-11.6860	0.35	0.35
	-209.53	1074.14	-11.72	0.2	~+.1
T4	-297.4249	1438.2377	-13.5870	0.2795	0.02
	-297.50	1438.21	-13.55	0.22	0.018+-
					0.005
T5	-386.2449	1781.1240	-15.6387	0.2380	-0.1446
	-386.32	1781.1	-15.61	0.38	-0.1->-0.2
H2	-399.13	1838.65	-15.45	-0.1	
RICH	-435.243	1963.36	-15.45	-0.05	0

RUN-II table. For reference the old values are given here.

	Detector	x-center	z-center	Theta	y-center	Beta
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	Cm	Cm	Degrees	Cm	Degrees
TPM1	94.90	0.13	90.10		
TPM2	286.96	-0.11	89.64	Dy =0	
TPM1+50	145.13	0.15	90.12		
TPM2+50	337.13	-0.08	89.67	Dy=+0.2	
TOFW					
TFP1	425.083	-66.323	104.941	-0.10	
TFP2	430.597	-41.084	99.336	-0.22	
TFP3	433.557	-14.748	93.094	-0.25	
TFP4	433.554	11.816	86.903	-0.40	
TFP5	431.033	38.256	80.762	-0.45	
TFP6	425.162	64.098	75.236	-0.40	

FootNotes

The C4 has yet to be surveyed. The TFW2 is the new large slat TOF wall behind C4. At 40 degree it was extended to even larger distances from the pivot.