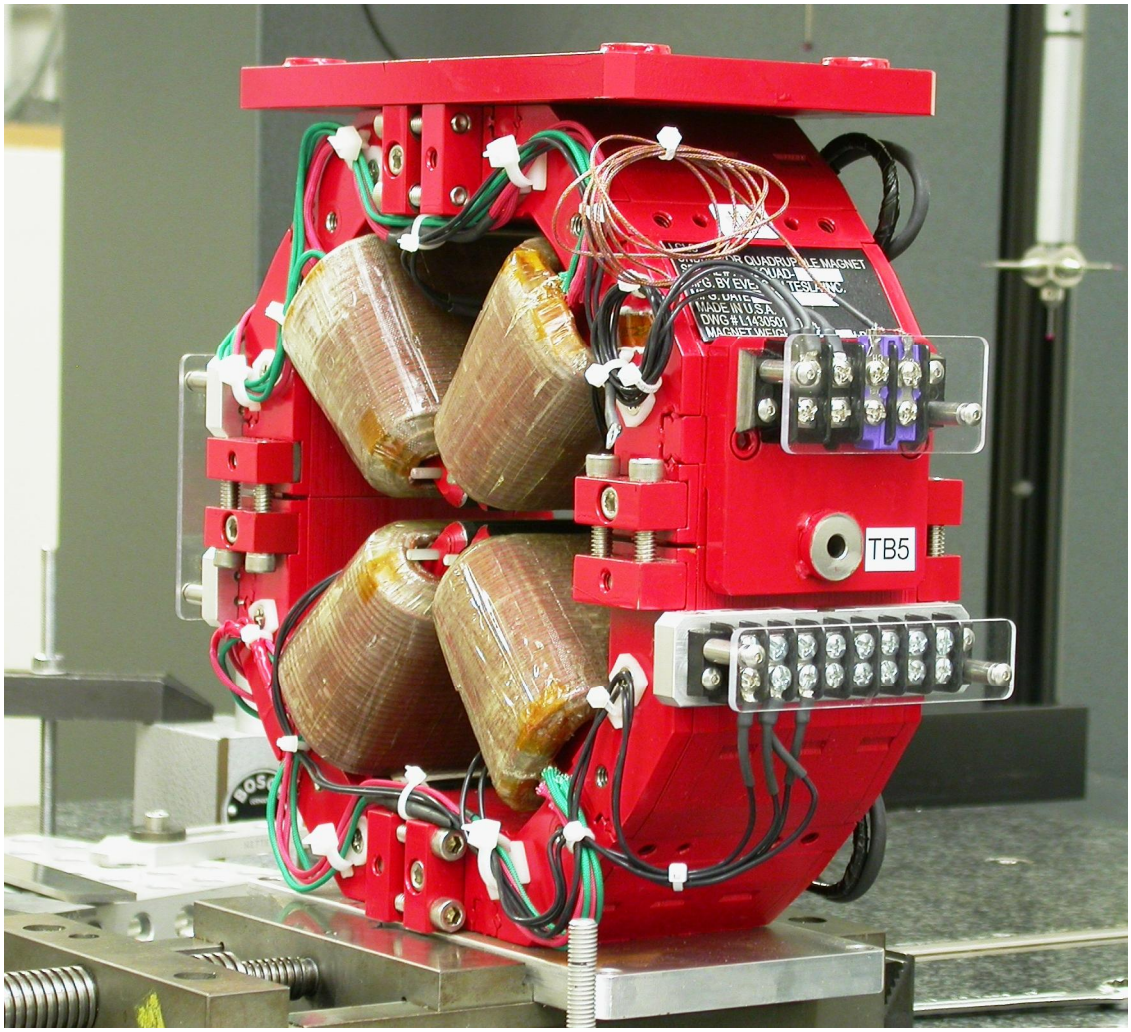
Linac Coherent Light Source

Stanford Linear Accelerator Center

Stanford Synchrotron Radiation Laboratory

LCLS Undulator Quadrupole Magnet FIDUCIALIZATION REPORT



Inspector:	Keith Caban
Responsible Engineer:	Scott Anderson
Date:	Thursday, January 25, 2008 (New TB Adapters)
Work Order/Charge No.:	88-1400-5
Serial Number:	SLAC – 000741 / STAMPED – 08
URL of Fiducial Report:	http://www-group.slac.stanford.edu/met/Quality/FIDUCIAL REPORTS/LCLS UNDULATOR QUADS/000741.pdf

Part Set-up – Coordinate System Set-up

Spatial Alignment

- Geometric axis of the poles of the magnet.

Planar Alignment

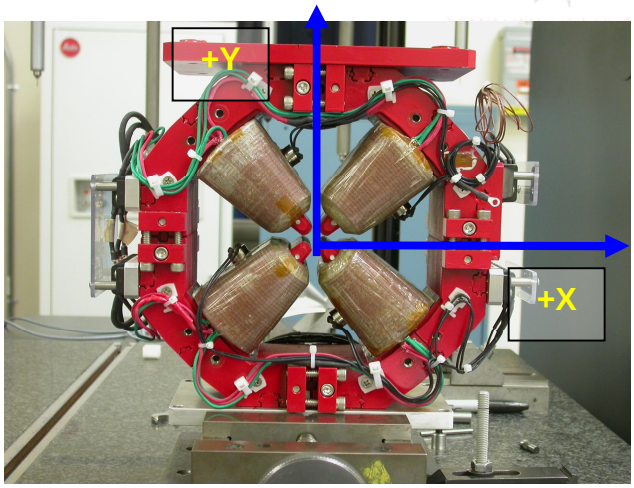
- Plane on where Aluminum Base Rests

“Z” Zero

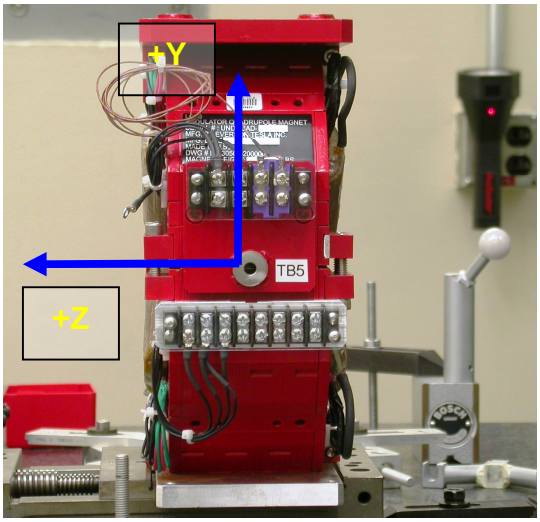
- Mid-plane of the magnet (middle of upstream and downstream ends).

“X” & “Y” Zero

- Geometric axis of the poles of the magnet.



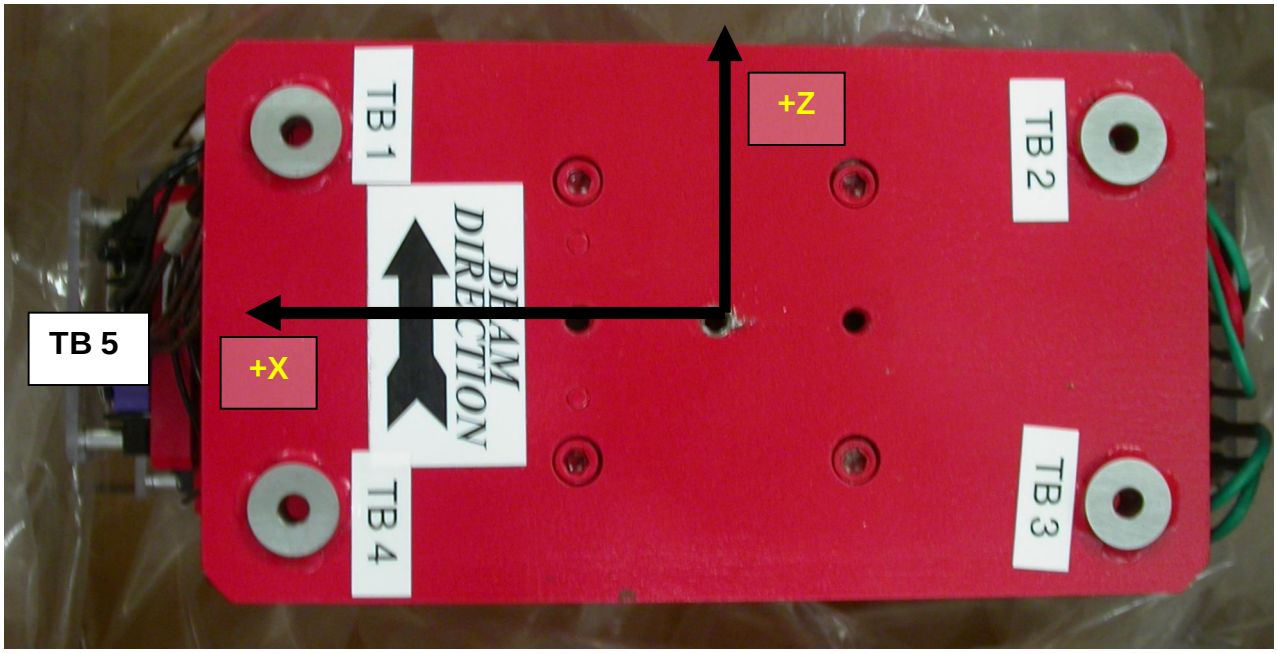
Front View



Side View

Tooling Ball Measurements/Locations

Top View looking from +Y



Tooling Ball Adapter Cylinder Projected 1" Offset to the Tooling Ball Adapter Plane

Tooling Ball	FORM	Cyl. Dia.	X	Y	Z	b
TB 1	0.00021	0.24997	3.38451	6.81459	1.49326	0.00011
TB 2	0.00016	0.24995	-3.35849	6.81228	1.52888	0.00017
TB 3	0.00013	0.24993	-3.37772	6.81208	-1.46101	0.00009
TB 4	0.00015	0.24989	3.36961	6.81125	-1.49888	0.00012
TB 5	0.00011	0.24999	6.58344	0.15021	0.01556	0.00031

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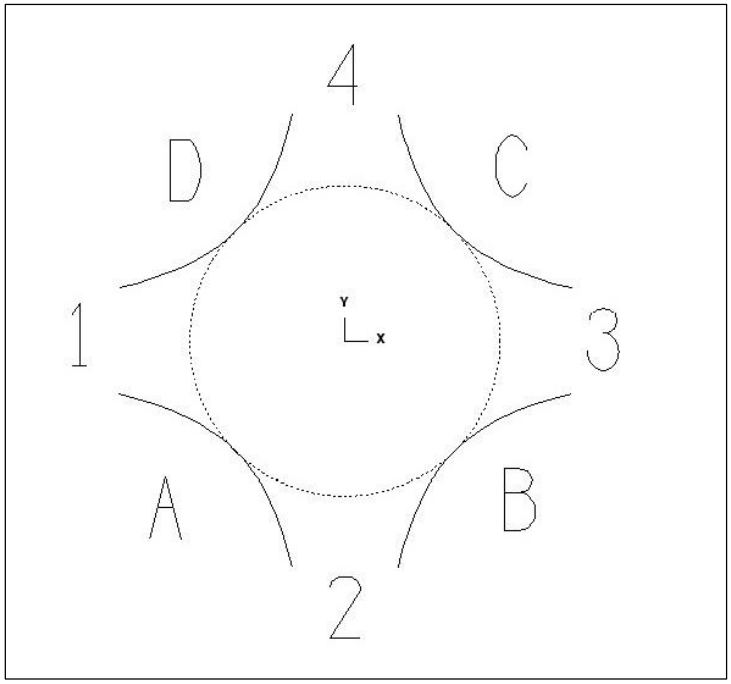
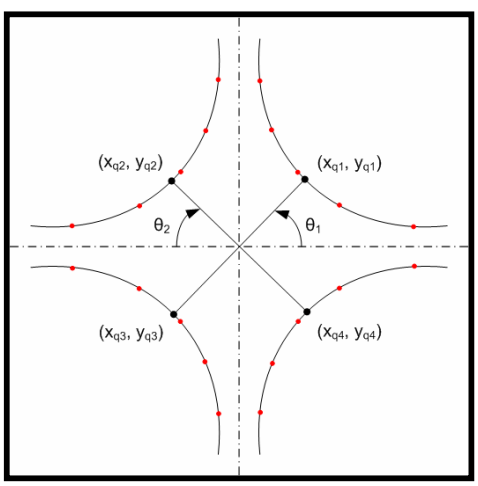
Pole Tip Additional Data
*Data looking from Downstream End



Side	Pole Dist A-C	Pole Dist B-D	Gap 1	Gap 2	Gap 3	Gap 4
Downstream End (+Z)	0.43449	0.43423	0.15901	0.16309	0.15935	0.15782
Upstream End (-Z)	0.43522	0.43443	0.15850	0.15981	0.16106	0.16277

Quadrupole Roll Angle
** Tolerance in milliradians is ± 5



Roll of the Base of Quad to Poles θ_1

$$\theta_1 = -0.31005°$$

$$\theta_1 = -5.41142 \text{ milliradians}$$

Transformation

1. Use TB locations 1, 2, & 3 to establish a Tooling Ball Plane this will be the Spatial Alignment.

2. Use TB locations 1 & 2 to establish an axis where the line from TB 2 to TB 1 is the +X direction and will be the Planar Alignment.

3. TB 1 will set zero in “X”, “Y”, & “Z”.

Transformation	**X**	**Y**	**Z**
Displacement Vector	-85.82406 mm	-173.05867 mm	-38.39396 mm
Rotation Matrix	X	Y	Z
X	0.99999	0.00034	-0.00528
Y	-0.00034	1.00000	-0.00007
Z	0.00528	0.00007	0.99999