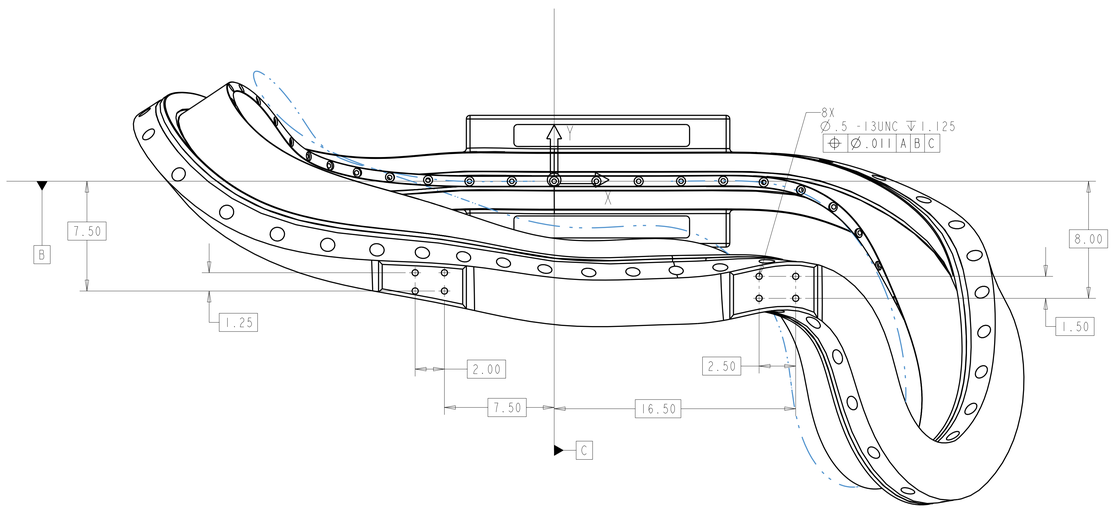
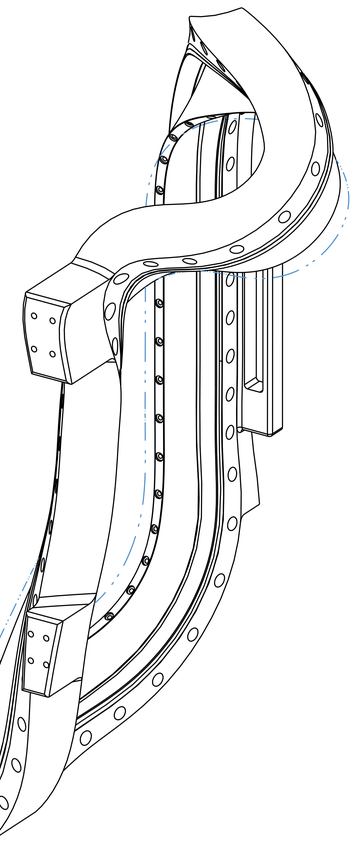
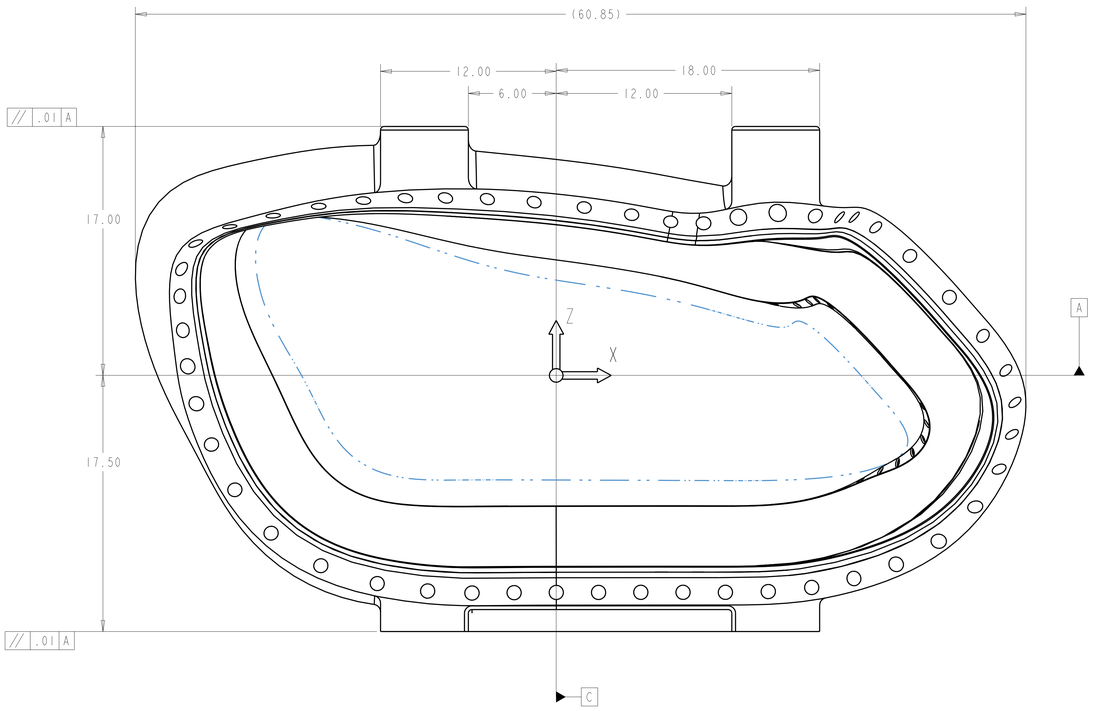


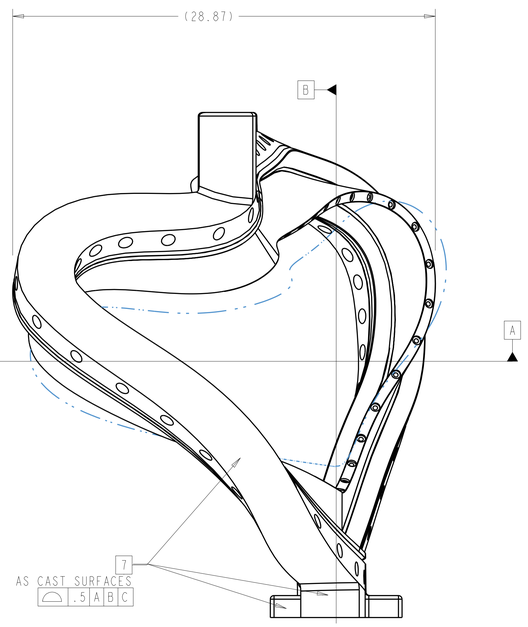
NOTES:

1. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5M
2. DIMENSIONS ARE IN INCHES
3. DIMENSIONS APPLY AT ROOM TEMPERATURE. OPERATING TEMP 80 K.
4. GEOMETRY IS DEFINED IN PRO ENGINEER CAD MODELS/FILES SE140-084.PRT
5. DRAWING AND MODELS COMBINED DEFINE FINISHED MACHINED PART.
6. MACHINE FINISHED SURFACES TO CAD DATA, PROFILE WITHIN 0.020" UNLESS OTHERWISE SPECIFIED. PROFILE TOLERANCE IS BILATERAL, ie. 0.010" EITHER SIDE OF THE REFERENCE SURFACE.
7. AS-CAST SURFACES SHOWN IN NOMINAL MATERIAL CONDITION, THICKNESS TOLERENCE +/- 0.25. SURFACE PROFILE MUST BE WITHIN 0.5 INCHES OF CAD DATA, EXCEPT IN REGIONS OF INTERSECTING SURFACES WHERE FILLETS ARE EXPECTED.
8. SEE SPECIFICATION, NCSX-CSPEC 141-02-00 FOR ADDITIONAL REQUIREMENTS.
9. SEE SPECIFICATION NCSX-CSPEC 141-02-00 SECTION 3.2.1.1 FOR MATERIAL REQUIREMENTS.)

DATUM A = PLANE THRU "XY"
DATUM B = PLANE THRU "XZ"
DATUM C = PLANE THRU "YZ"







ISOMETRIC VIEW

X	AR		SE140-084	WINDING FORM	SEE NOTE 9	SEE NOTE 8	-1
next assy SE140-080	CAGE CODE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION		FIND NO
	NEXT ASSEMBLY		PARTS LIST				

SE140-084 B

-1

RELEASED FOR FABRICATION / INSTALLATION

APPROXIMATE WEIGHT = 725 LBS

P THIS DRAWING PRODUCED ON PRO-ENGINEER

REV	DESCRIPTION	BY	DATE	CHK	DEPT	DATE	PE	REQ	DATE	ORNL	DOE	DATE
	REVISION OR ISSUE PURPOSE	REVISION APPROVAL										

SCALE .250 UNO

TOLERANCES UNLESS OTHERWISE SPECIFIED

FRACTIONS	.
XX DECIMALS	±.01
XXX DECIMALS	±.005
ANGLES	±0°15'
BREAK SHARP EDGES	.06 MAX
FINISH	125 UNLESS OTHERWISE SPECIFIED

DRAWING APPROVALS		DATE
DES	D. Williamson	11-03-03
DRW	G. Lovett	
CHK	G. Jones	
SECT	:	:
DEPT	:	:
PE	:	:
CR	:	:
PJ	:	:
REQ	:	:
PPPL DRFT	:	:
	:	:
	:	:

UT-BATTELLE
Oak Ridge National Laboratory
managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-00OR22725
UT-BATTELLE, LLC. Oak Ridge, Tennessee

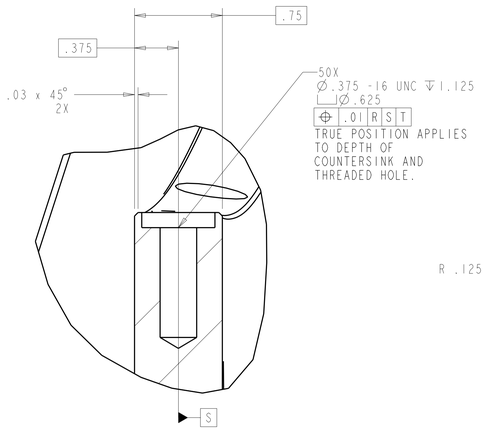
NATIONAL COMPACT STELLARATOR EXPERIMENT

TWISTED RACETRACK WINDING FORM

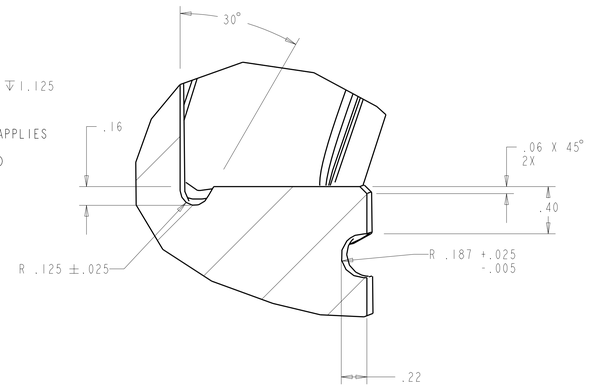
VERSION NO.	PLANT	BLDG	FL	SHT	OF	TYPE	CLASS
13	X-10	5700	3	1	3	S	U

RELEASE LEVEL: Fabrication
SE140-084
REV 0

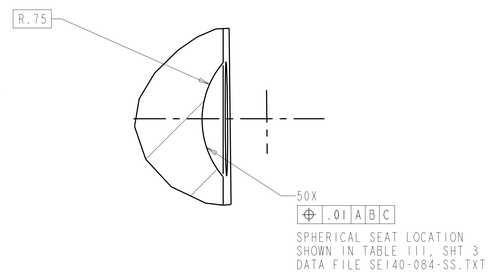
FOR GENERAL NOTES AND PARTS LIST
SEE SHEET 1



DETAIL 1
SCALE 2.0

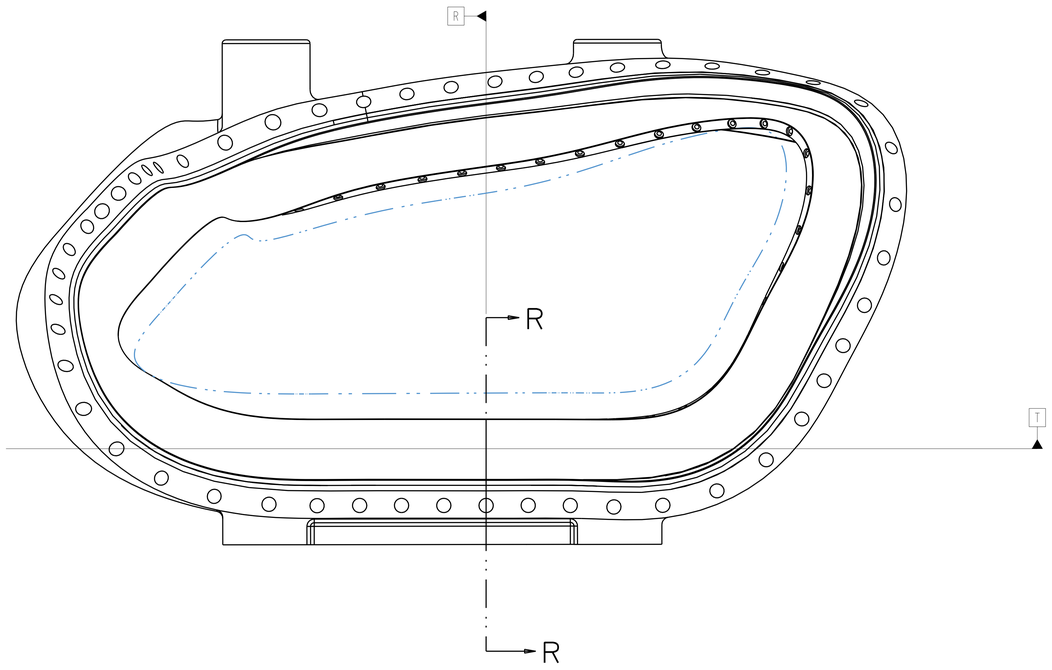


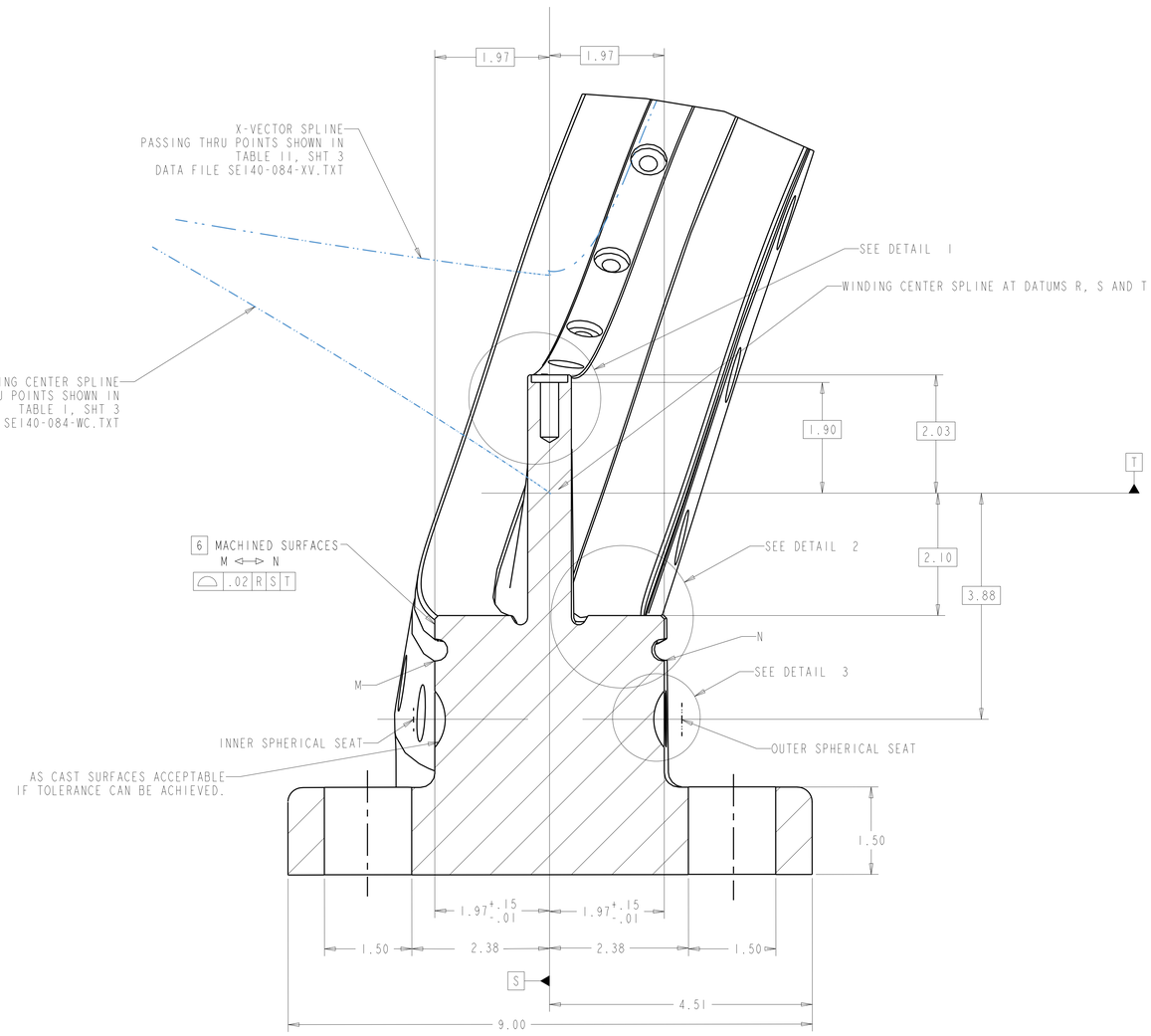
DETAIL 2
SCALE 2.0
VPI GROOVE TO BE MACHINED BY BALL END MILL OR DISC CUTTER IF SAME TOLERANCE CAN BE ACHIEVED.



DETAIL 3
SCALE 2.0

DATUM R = PLANE NORMAL TO WINDING CENTER
DATUM S = PLANE PASSING THRU WINDING CENTER AND X-VECTOR AT DATUM R
DATUM T = PLANE PASSING THRU WINDING CENTER ORTHOGONAL TO DATUM S





SECTION R-R
SCALE 1.0
APPLIES AT ALL POINTS ALONG WINDING CENTER

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UT-BATTELLE, LLC. Oak Ridge, Tennessee

NATIONAL COMPACT STELLARATOR EXPERIMENT

TWISTED RACETRACK WINDING FORM

VERSION NO.	PLANT	BLDG	FL	SHT	OF	TYPE	CLASS
13	X-10	5700	3	2	3	S	U

RELEASE LEVEL: Fabrication
SE140-084
REV 0

SE140-084

FOR GENERAL NOTES AND PARTS LIST, SEE SHEET 1

TABLE I
WINDING CENTER SPLINE CO-ORDINATE DATA FILE
(FILE SE140-084-WC.TXT)

Winding Center Coordinates

No.	X	Y	Z
1	0.000	-0.002	-10.953
2	2.888	0.000	-10.949
3	5.776	-0.001	-10.943
4	8.663	0.004	-10.941
5	11.551	0.022	-10.948
6	14.436	-0.064	-10.879
7	17.253	-0.559	-10.536
8	19.814	-1.656	-9.812
9	21.983	-3.261	-8.800
10	23.752	-5.211	-7.621
11	25.159	-7.389	-6.355
12	26.194	-9.738	-5.037
13	26.839	-12.205	-3.688
14	27.012	-14.732	-2.310
15	26.577	-17.184	-0.862
16	25.442	-19.264	0.767
17	23.707	-20.381	2.725
18	21.776	-19.871	4.754
19	20.163	-17.961	6.131
20	19.161	-15.315	6.616
21	18.513	-12.503	6.551
22	17.430	-9.840	6.500
23	15.490	-7.744	6.789
24	13.018	-6.372	7.327
25	10.303	-5.628	7.950
26	7.489	-5.400	8.544
27	4.650	-5.491	9.059
28	1.796	-5.531	9.490
29	-1.050	-5.228	9.856
30	-3.841	-4.581	10.216
31	-6.584	-3.789	10.646
32	-9.331	-3.046	11.134
33	-12.109	-2.381	11.559
34	-14.894	-1.656	11.781
35	-17.614	-0.692	11.762
36	-20.149	0.657	11.512
37	-22.263	2.438	10.737
38	-23.533	4.238	8.929
39	-23.706	5.254	6.268
40	-23.071	5.377	3.467
41	-22.027	4.851	0.834
42	-20.898	3.781	-1.596
43	-19.793	2.538	-3.956
44	-18.484	1.554	-6.330
45	-16.675	0.825	-8.448
46	-14.296	0.267	-9.966
47	-11.539	-0.018	-10.741
48	-8.663	-0.029	-10.966
49	-5.775	0.012	-10.976
50	-2.888	0.005	-10.959

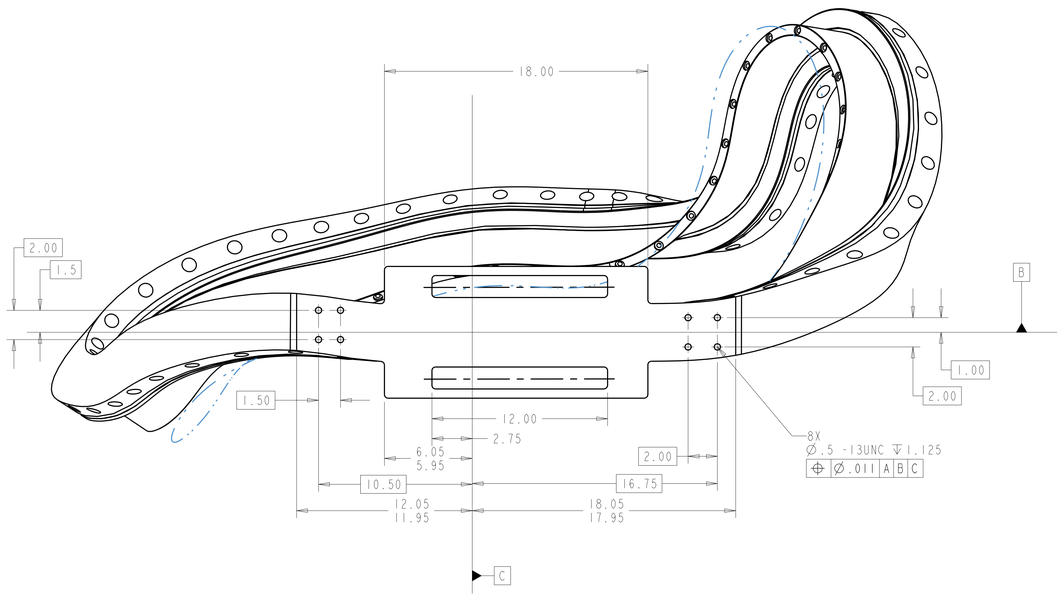
TABLE II
X VECTOR CURVE CO-ORDINATE DATA FILE
(FILE SE140-084-XV.TXT)

X-Vector Coordinates

No.	X	Y	Z
1	-0.005	0.002	-7.153
2	2.880	0.000	-7.162
3	5.768	-0.001	-7.171
4	8.670	0.003	-7.181
5	11.545	0.032	-7.194
6	14.215	-0.081	-7.188
7	16.558	-0.629	-7.118
8	18.649	-1.817	-6.951
9	20.438	-3.632	-6.678
10	21.871	-5.873	-6.314
11	22.921	-8.320	-5.874
12	23.624	-10.820	-5.366
13	23.986	-13.286	-4.781
14	23.970	-15.592	-4.096
15	23.555	-17.718	-3.238
16	22.605	-19.612	-2.016
17	20.776	-20.864	0.044
18	18.847	-20.336	2.076
19	17.351	-18.448	3.349
20	16.503	-15.879	3.705
21	16.113	-13.284	3.508
22	15.645	-10.814	3.291
23	14.531	-8.132	3.382
24	12.549	-5.559	3.892
25	9.886	-3.700	4.639
26	6.878	-3.032	5.357
27	4.013	-3.125	5.885
28	1.441	-3.170	6.280
29	-1.028	-2.869	6.672
30	-3.598	-2.165	7.198
31	-6.303	-1.199	7.943
32	-9.031	-0.243	8.835
33	-11.625	0.615	9.684
34	-14.017	1.487	10.335
35	-16.197	2.510	10.779
36	-18.017	3.723	10.948
37	-19.371	5.053	10.655
38	-20.339	6.547	9.443
39	-20.473	7.469	7.022
40	-19.770	7.259	4.400
41	-18.553	6.114	1.978
42	-17.280	4.385	-0.222
43	-16.198	2.810	-2.352
44	-15.119	1.848	-4.219
45	-13.938	1.312	-5.521
46	-12.606	0.928	-6.368
47	-10.923	0.558	-6.911
48	-8.573	0.174	-7.148
49	-5.802	-0.017	-7.146
50	-2.902	-0.010	-7.142

TABLE III
SPHERICAL SEAT LOCATION CO-ORDINATES
(FILE SE140-084-SS.TXT)

	Spherical Seat - Left			Spherical Seat - Right		
No.	X	Y	Z	X	Y	Z
1	0.000	-2.546	-14.830	0.000	2.534	-14.830
2	2.896	-2.540	-14.829	2.895	2.540	-14.820
3	5.782	-2.541	-14.823	5.784	2.539	-14.820
4	8.669	-2.535	-14.822	8.643	2.545	-14.820
5	11.561	-2.528	-14.821	11.554	2.552	-14.830
6	14.462	-2.578	-14.776	14.871	2.485	-14.720
7	17.351	-2.922	-14.525	18.699	1.961	-14.150
8	20.195	-3.682	-13.966	22.357	0.774	-12.830
9	23.112	-4.670	-13.071	25.377	-0.767	-10.740
10	26.112	-5.753	-11.576	27.514	-2.516	-7.921
11	28.713	-7.170	-9.326	28.632	-4.685	-4.896
12	30.448	-9.231	-6.815	29.044	-7.254	-2.351
13	31.399	-11.838	-4.449	29.111	-9.983	-0.310
14	31.647	-14.891	-2.240	28.880	-12.736	1.435
15	31.037	-18.108	0.011	28.160	-15.193	3.016
16	29.424	-20.916	2.476	26.980	-16.933	4.469
17	26.955	-22.421	5.332	26.145	-17.406	5.315
18	24.037	-21.668	8.381	25.203	-17.172	6.326
19	21.526	-18.866	10.470	24.275	-16.109	7.208
20	19.969	-15.302	11.182	23.531	-14.229	7.723
21	18.953	-12.144	11.153	22.786	-11.328	7.920
22	17.458	-10.028	11.134	21.046	-7.665	8.423
23	15.127	-9.340	11.128	17.946	-5.304	9.875
24	12.525	-9.556	10.663	14.531	-4.960	11.477
25	10.097	-9.730	10.103	11.349	-5.408	12.462
26	7.777	-9.738	10.156	8.384	-5.634	13.089
27	5.115	-9.828	10.634	5.417	-5.734	13.626
28	1.859	-9.869	11.128	2.420	-5.772	14.079
29	-1.606	-9.532	11.493	-0.540	-5.545	14.455
30	-4.817	-8.871	11.683	-3.351	-5.132	14.794
31	-7.660	-8.168	11.726	-6.089	-4.763	15.153
32	-10.363	-7.536	11.664	-8.940	-4.535	15.508
33	-13.194	-6.888	11.458	-12.076	-4.391	15.738
34	-16.213	-6.038	11.032	-15.482	-4.107	15.673
35	-19.299	-4.781	10.367	-18.951	-3.435	15.253
36	-22.242	-3.016	9.607	-22.436	-1.969	14.574
37	-24.450	-0.999	8.521	-25.831	0.672	13.116
38	-25.276	0.401	6.994	-28.026	3.567	9.861
39	-25.385	1.038	5.312	-28.315	5.164	5.756
40	-25.234	1.292	3.088	-27.455	5.728	1.995
41	-24.999	1.296	0.662	-26.021	5.873	-1.290
42	-24.547	0.926	-1.791	-24.417	5.439	-4.121
43	-23.594	-0.052	-4.542	-23.061	4.594	-6.524
44	-21.999	-1.158	-7.670	-21.524	3.693	-9.102
45	-19.520	-2.100	-10.651	-19.091	2.812	-11.870
46	-16.108	-2.845	-12.888	-15.739	2.104	-13.970
47	-12.195	-3.098	-14.146	-12.103	1.922	-14.910
48	-8.706	-2.772	-14.705	-8.802	2.300	-14.970
49	-5.736	-2.499	-14.875	-5.762	2.580	-14.830
50	-2.887	-2.520	-14.849	-2.861	2.560	-14.820



ALL POINT LOCATION IN TABLES
ARE BASIC DIMENSIONS TO DATUMS A, B, AND C

RELEASED FOR FABRICATION / INSTALLATION

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PROJECT NAME: NATIONAL COMPACT STELLARATOR EXPERIMENT

TWISTED RACETRACK WINDING FORM

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RELEASE LEVEL: Fabrication — SE140-084 — REV 0

SE140-084