

## Booster Coordinates with 1,2,4,7 Sextupoles

Z. Parsa

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Collider Accelerator Department  
**Brookhaven National Laboratory**

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# *BOOSTER COORDINATES*

WITH  
1, 2, 4, 7 SEXTUPOLES

*Booster Technical Note*  
No. 27

Z. PARSA  
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*HIGH ENERGY FACILITIES*  
*Brookhaven National Laboratory*  
Upton, N.Y. 11973

## ABSTRACT

THIS NOTE UPDATES THE AGS-BOOSTER COORDINATES, [BST/TN 6], BY INCLUDING THE 1,2,4,7 SEXTUPOLES. IT DESCRIBES THE COORDINATES OF THE AGS - BOOSTER IN THE BOOSTER CENTERED FRAME OF REFERENCE WITH AXES IN THE NORTH (X) AND EAST (Y) DIRECTIONS. TRANSFORMATION FROM THE BOOSTER CENTERED FRAME TO THE AGS AND BNL GRIDS ARE DISCUSSED, AND THE COORDINATES OF THE MACHINE WITH RESPECT TO THESE FRAMES ARE GIVEN.

## I. INTRODUCTION

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This note updates the AGS-Booster [1] coordinates, by including the 1,2,4,7 sextupole configuration [2]. In sec. II we describe the Booster centered reference frame with axes in the North (X) and East (Y) directions, with the unit of length expressed in meters. In section III, the transformation from the Booster centered reference frame to the AGS and BNL grids are discussed, and the coordinates of the Booster with respect to these frames are tabulated.

Layout of the Booster lattice [3] showing relative position of magnets and the labling convention of the lattice and its superperiods are also included (see Figures 1-3).

## II. BOOSTER CENTERED COORDINATE SYSTEM

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The coordinates of the Booster lattice in the Booster centered coordinate system (with East (X) and North (Y) axes where the length is measured in meters) using Tape 5 of program SYNCH, were generated assuming that:

1. The magnets have sharp edges where the field becomes zero.
2. The values listed in Table I correspond to the coordinates of an on-axis point of the downstream end of that element when viewed in a clockwise direction.

We note that, the effect of the earth's curvature for the Booster is negligible.

### III. TRANSFER OF COORDINATES TO AGS AND BNL GRID

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We can use the following transformation from the Booster centered frame of reference to that of AGS and BNL grids assuming that the axes of the Booster centered coordinate system are parallel to those of 1) AGS and 2) BNL grids. Here X and Y are the x and y distances expressed in the Booster coordinate system, with E and N as the East and North coordinates and E0 and N0 are the the coordinates of the Booster in the 1) AGS [E(inch),N(inch)] and 2) BNL [E(feet),N(feet)] grids respectively:

#### 1. AGS GRID

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$$E(\text{inch}) = E0_{\text{AGS}}(\text{inch}) + X_{\text{BST}}(\text{inch})$$

$$N(\text{inch}) = N0_{\text{AGS}}(\text{inch}) + Y_{\text{BST}}(\text{inch})$$

$$E0_{\text{AGS}}(\text{inch}) = 1,148.88$$

$$N0_{\text{AGS}}(\text{inch}) = 15,459.36$$

#### 2. BNL GRID

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$$E(\text{feet}) = E0_{\text{BNL}}(\text{feet}) + X_{\text{BST}}(\text{feet})$$

$$N(\text{feet}) = N0_{\text{BNL}}(\text{feet}) + Y_{\text{BST}}(\text{feet})$$

$$E0_{\text{BNL}}(\text{feet}) = 98,517.19 \text{ feet, and}$$

$$N0_{\text{BNL}}(\text{feet}) = 102,438.28 \text{ feet .}$$

where the values for E0 and N0 were obtained from [4], (using the conversion factor of 2.54 cm/inch). Note that the origins of the two systems are different.

REFERENCES:

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1. Booster Coordinates Update, Booster Tech Note No. 6, Z. Parsa, (January 28, 1986).
2. Booster Parameters with Enlarged Q5, Booster Tech. Note No. 25, Z. Parsa, (April 17, 1986).
3. Booster Lattice with Enlarged Q5 and 1,2,4,7 Sextupole Configuration. Booster Tech. Note No.26, E. Courant and Z. Parsa, (April 21,1986).
4. M. Schhaeffler, January 27, 1986.
5. The coordinates of the Booster Injection, Ejection, etc. will be given in a subsequent note.

Table 1

	ELEMENT	X(M)	Y(M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S(OBBIT)
0							
1	QD	31.86063	-5.55399	2403.23542	15240.59914	99.89	0.000
2	S30	31.82006	-5.90257	2401.63829	15230.91226	100.33	.252
3	SEVV	31.77174	-6.09866	2399.73601	15219.25543	100.87	.552
4	BEND	31.18098	-8.42167	2376.47750	15127.79823	105.11	2.952
5	SEVV	30.94998	-9.08246	2367.38316	15101.78298	106.35	3.652
6	S70	30.54998	-9.36565	2363.48559	15090.63356	106.89	3.952
7	SXF	30.85098	-9.60342	2360.21325	15081.27270	107.33	4.204
8	QF	30.76786	-9.84118	2356.94091	15071.91185	107.78	4.456
9	QF	30.68475	-10.12438	2353.04334	15060.76245	108.32	4.756
10	SEVV	30.58575	-10.40157	2353.04334	15060.76245	108.32	4.756
11	BEND	29.50057	-12.30951	2314.25678	14974.73350	112.58	7.156
12	SEVV	29.60057	-12.30951	2314.25678	14974.73350	112.58	7.156
13	SEVV	29.25834	-12.92015	2300.78309	14950.69267	113.83	7.856
14	S70	29.25834	-12.92015	2300.78309	14950.69267	113.83	7.856
15	SXD	29.25834	-12.92015	2300.78309	14950.69267	113.83	7.856
16	S30	29.11167	-13.18185	2295.00866	14940.38946	114.36	8.156
17	QD	28.98853	-13.40157	2290.16053	14931.73906	114.81	8.408
18	QD	28.86538	-13.62129	2285.31241	14923.08865	115.26	8.659
19	QD	27.05644	-16.84894	2214.09435	14796.01572	121.91	12.359
20	QF	26.93330	-17.06866	2209.24623	14787.36552	122.36	12.611
21	QF	26.81016	-17.28839	2204.39811	14778.71491	122.82	12.863
22	QF	26.66349	-17.55009	2198.62367	14768.41170	123.35	13.163
23	S30	26.66349	-17.55009	2198.62367	14768.41170	123.35	13.163
24	SEVV	25.31383	-19.53095	2145.48798	14690.42495	127.65	15.563
25	BEND	25.31383	-19.53095	2145.48798	14690.42495	127.65	15.563
26	SEVV	25.31383	-19.53095	2145.48798	14690.42495	127.65	15.563
27	S70	24.87076	-20.07288	2128.04394	14669.08905	128.91	16.263
28	SXD	24.87076	-20.07288	2128.04394	14669.08905	128.91	16.263
29	S30	24.68088	-20.30514	2120.56809	14659.94509	129.44	16.563
30	QD	24.52145	-20.50014	2114.29149	14652.26797	129.90	16.815
31	QD	24.36203	-20.69514	2108.01490	14644.59086	130.35	17.067
32	S30	24.17214	-20.92739	2100.53995	14635.44690	130.88	17.367
33	SEVV	24.17214	-20.92739	2100.53995	14635.44690	130.88	17.367
34	BEND	22.49901	-22.64380	2034.66774	14567.87194	135.18	19.767
35	SEVV	22.49901	-22.64380	2034.66774	14567.87194	135.18	19.767
36	S100	21.74124	-23.29631	2004.183426	14542.18237	136.98	20.767
37	QF	21.55037	-23.46066	1997.31990	14535.71181	137.43	21.019
38	QF	21.35951	-23.62502	1989.80554	14529.24124	137.88	21.271
39	S370	18.55574	-26.73932	1879.42090	14434.18981	144.53	24.971
40	QD	18.36487	-26.80368	1871.90654	14427.1925	144.98	25.223
41	QD	18.17401	-26.86803	1864.39210	14421.24869	145.42	25.474
42	S30	17.94668	-26.93378	1855.44208	14413.54182	145.96	25.774
43	SEVV	17.94668	-26.93378	1855.44208	14413.54182	145.96	25.774
44	BEND	16.00092	-27.96357	1778.83742	14358.43189	150.22	28.174
45	SEVV	15.00092	-27.96357	1778.83742	14358.43189	150.22	28.174
46	S70	15.39922	-28.32128	1755.14844	14344.34879	151.47	28.974
47	SXF	15.39922	-28.32128	1755.14844	14344.34879	151.47	28.974
48	S30	15.14135	-28.47459	1744.59602	14338.31318	152.00	29.174
49	QF	14.92484	-28.60330	1736.47222	14333.24577	152.45	29.426
50	QF	14.70834	-28.73201	1727.94842	14328.17837	152.89	29.678
51	S30	14.45047	-28.88532	1717.79600	14322.14275	153.42	29.978
52	SEVV	14.45047	-28.88532	1717.79600	14322.14275	153.42	29.978
53	BEND	12.29120	-29.92597	1632.78539	14381.17236	157.67	32.378
54	SEVV	12.29120	-29.92597	1632.78539	14381.17236	157.67	32.378
55	S100	11.35595	-30.27995	1595.96453	14267.23579	159.44	33.378
56	QD	11.12038	-30.36912	1586.69028	14263.72552	159.89	33.630



Table 1

	ELEMENT	X (M)	Y (M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S (ORBIT)
57	OD	18.88462	-38.45828	1577.41603	1458.21523	168.33	33.882
58	S30	18.60424	-38.56447	1566.36978	1456.03425	168.87	34.182
59	SEV	18.60424	-38.56447	1566.36978	1456.03425	168.87	34.182
60	SEV	8.29787	-31.21436	1475.53627	14238.44811	165.11	36.582
61	SEV	8.29787	-31.21436	1475.53627	14238.44811	165.11	36.582
62	SXF	7.609931	-31.34471	1448.43922	14225.31640	166.35	37.282
63	SXF	7.609931	-31.34471	1448.43922	14225.31640	166.35	37.282
64	S30	7.31456	-31.40857	1423.89476	14223.11710	166.89	37.582
65	QF	7.06709	-31.44747	1427.1186	14221.27060	167.33	37.834
66	QF	6.81962	-31.49437	1417.36895	14219.42410	167.78	38.086
67	S30	6.52487	-31.55823	1405.76450	14217.22480	168.32	38.386
68	SEV	6.52487	-31.55823	1405.76450	14217.22480	168.32	38.386
69	SEV	4.13889	-31.78361	1311.86796	14207.80046	172.58	40.786
70	SEV	4.13889	-31.78361	1311.86796	14207.80046	172.58	40.786
71	S70	3.43955	-31.79855	1284.31115	14237.44661	173.83	41.486
72	SXD	3.43955	-31.79855	1284.31115	14237.44661	173.83	41.486
73	S30	3.13998	-31.80238	1272.50109	14207.29781	174.36	41.786
74	OD	2.88812	-31.80560	1262.58556	14207.17120	174.81	42.037
75	OD	2.63637	-31.80881	1252.67003	14207.04460	175.26	42.289
76	S370	-1.06333	-31.85805	1207.03261	14205.84878	181.91	45.989
77	QF	-1.31529	-31.85527	1207.03261	14205.84878	181.91	45.989
78	QF	-1.56714	-31.86248	1207.18155	14204.93157	182.82	46.493
79	S30	-1.86712	-31.86631	1207.37149	14204.78078	183.35	46.793
80	SEV	-1.86712	-31.86631	1207.37149	14204.78078	183.35	46.793
81	BEND	-4.25742	-31.68791	981.26494	14211.80461	187.65	49.193
82	SEV	-4.25742	-31.68791	981.26494	14211.80461	187.65	49.193
83	S70	-4.94828	-31.57516	954.06568	14216.24329	188.91	49.893
84	SXD	-4.94828	-31.57516	954.06568	14216.24329	188.91	49.893
85	S30	-5.24437	-31.52805	942.08886	14218.14558	189.44	50.193
86	OD	-5.49295	-31.48628	932.62198	14219.74272	189.90	50.445
87	OD	-5.74454	-31.44571	922.83511	14221.33985	190.35	50.697
88	S30	-6.03762	-31.39739	911.17828	14223.24215	190.88	50.997
89	SEV	-6.03762	-31.39739	911.17828	14223.24215	190.88	50.997
90	BEND	-8.36054	-30.80563	819.72110	14246.50072	195.18	53.397
91	SEV	-8.36054	-30.80563	819.72110	14246.50072	195.18	53.397
92	SEV	-9.30462	-30.47563	782.55643	14259.49266	195.98	54.397
93	QF	-9.54238	-30.39391	773.09558	14262.76501	197.43	54.649
94	QF	-9.780015	-30.31840	763.03473	14266.03735	197.88	54.901
95	S370	-13.27289	-29.08941	626.32546	14314.10754	204.53	58.601
96	OD	-13.51065	-29.00629	616.96461	14317.37988	204.98	58.852
97	OD	-13.74842	-28.92318	607.60376	14320.65223	205.42	59.104
98	S30	-14.03161	-28.82418	596.45436	14324.54981	205.96	59.404
99	SEV	-14.03161	-28.82418	596.45436	14324.54981	205.96	59.404
100	BEND	-16.21675	-27.83900	510.42544	14353.33643	210.22	61.804
101	SEV	-16.21675	-27.83900	510.42544	14353.33643	210.22	61.804
102	S70	-16.82738	-27.49677	486.58462	14376.81014	211.47	62.504
103	SXF	-17.82738	-27.49677	486.58462	14376.81014	211.47	62.504
104	S30	-17.08908	-27.35810	476.80142	14382.58458	212.00	62.804
105	QF	-17.30880	-27.22695	467.43102	14387.43271	212.45	63.056
106	QF	-17.52852	-27.10301	458.78062	14392.28084	212.89	63.308
107	S30	-17.79023	-26.95714	448.47741	14398.05528	213.42	63.608
108	SEV	-17.79023	-26.95714	448.47741	14398.05528	213.42	63.608
109	BEND	-19.77189	-25.95714	370.49070	14451.13143	217.67	66.008
110	SEV	-19.77189	-25.95714	370.49070	14451.13143	217.67	66.008
111	S100	-20.54528	-24.97453	340.20085	14476.10994	219.44	67.008
112	OD	-20.74027	-24.81510	332.33374	14482.38754	219.89	67.260

Table 1

	ELEMENT	X (M)	Y (M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S (ORBIT)
113	QD	-20.93527	-24.65567	324.65562	14488.66414	220.33	67.512
114	S30	-21.16753	-24.46579	315.51266	14496.13998	220.87	67.812
115	SEV	-21.16753	-24.46579	315.51266	14496.13998	220.87	67.812
116	BEND	-22.88394	-22.79266	247.93765	14562.01103	225.11	70.212
117	SEV	-22.88394	-22.79266	247.93765	14562.01103	225.11	70.212
118	S70	-23.34070	-22.26222	229.95493	14582.89460	226.35	70.912
119	SXF	-23.34070	-22.26222	229.95493	14582.89460	226.35	70.912
120	S30	-23.53645	-22.03489	222.24806	14591.84470	226.89	71.212
121	QF	-23.70000	2.377749	14599.35905	14606.87341	227.33	71.464
122	QF	-23.86516	-21.65316	209.30692	14615.82351	228.32	72.016
123	S30	-24.06091	-21.42583	201.60004	14615.82351	228.32	72.016
124	SEV	-24.06091	-21.42583	201.60004	14615.82351	228.32	72.016
125	BEND	-25.46070	-19.48007	146.49006	14692.42813	232.58	74.416
126	SEV	-25.46070	-19.48007	146.49006	14692.42813	232.58	74.416
127	S70	-25.81842	-18.87837	132.40694	14716.11709	233.83	75.116
128	SXD	-25.81842	-18.87837	132.40694	14716.11709	233.83	75.116
129	S30	-25.57172	-16.62550	126.57132	14726.26051	234.35	75.415
130	QD	-26.10043	-18.40339	121.30391	14734.79331	234.81	75.667
131	QD	-26.22914	-18.18745	116.23550	14743.31711	235.26	75.919
132	S370	-28.11950	-15.00708	41.79714	14868.53022	241.91	79.619
133	QF	-28.24862	-14.79057	36.72973	14877.05402	242.36	79.871
134	QF	-28.37733	-14.57407	31.66233	14885.57782	242.82	80.123
135	S30	-28.53053	-14.31620	25.62570	14895.73023	243.35	80.423
136	SEV	-28.53053	-14.31620	25.62570	14895.73023	243.35	80.423
137	BEND	-29.57128	-12.15693	-15.34376	14900.74081	247.65	82.823
138	SEV	-29.57128	-12.15693	-15.34376	14900.74081	247.65	82.823
139	S70	-29.81908	-11.50225	-20.09397	15006.51540	248.91	83.523
140	SXD	-29.81908	-11.50225	-20.09397	15006.51540	248.91	83.523
141	S30	-29.92527	-11.22168	-23.28835	15017.56166	249.44	83.823
142	QD	-30.01443	-10.98611	-32.79063	15026.83591	249.90	84.075
143	QD	-30.10360	-10.75055	-36.30091	15036.11016	250.35	84.327
144	S30	-30.20979	-10.46997	-40.48189	15047.15641	250.88	84.627
145	SEV	-30.20979	-10.46997	-40.48189	15047.15641	250.88	84.627
146	BEND	-30.85968	-8.16280	-66.06796	15137.98994	255.18	87.027
147	SEV	-30.85968	-8.16280	-66.06796	15137.98994	255.18	87.027
148	S100	-31.04589	-7.18029	-73.39894	15176.67146	256.98	88.027
149	QF	-31.09279	-6.93282	-75.24543	15186.41436	257.43	88.279
150	QF	-31.13969	-6.68535	-77.09193	15196.15727	257.88	88.531
151	S370	-31.82805	-3.05006	-104.21656	15339.27889	264.92	92.231
152	QD	-31.87555	-2.80259	-106.06305	15349.02179	264.92	92.482
153	QD	-31.92245	-2.55552	-107.90954	15358.76470	265.42	92.734
154	S30	-31.97832	-2.26037	-110.10884	15370.36916	265.96	93.034
155	SEV	-31.97832	-2.26037	-110.10884	15370.36916	265.96	93.034
156	BEND	-32.21769	.12460	-119.53310	15464.26570	270.22	95.434
157	SEV	-32.21769	.12460	-119.53310	15464.26570	270.22	95.434
158	S70	-32.22663	.82455	-119.88494	15491.82251	271.47	96.134
159	SXF	-32.22663	.82455	-119.88494	15491.82251	271.47	96.134
160	S30	-32.23006	1.12452	-120.02572	15503.63257	272.00	96.434
161	QF	-32.23367	1.37638	-120.16322	15513.54810	272.45	96.686
162	QF	-32.23689	1.62823	-120.28892	15523.46363	272.89	96.938
163	S30	-32.24072	1.92821	-120.43371	15535.27369	273.42	97.238
164	SEV	-32.24072	1.92821	-120.43371	15535.27369	273.42	97.238
165	BEND	-32.06231	4.31851	-113.41581	15629.38023	277.67	99.638
166	SEV	-32.06231	4.31851	-113.41581	15629.38023	277.67	99.638
167	S100	-31.90125	5.30546	-107.07080	15668.23631	278.44	100.638
168	QD	-31.86068	5.55404	-105.47766	15678.02319	279.89	100.890

Table 1

	ELEMENT	X (M)	Y (M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S (ORBIT)
169	OD	-31.82012	5.80263	-103.86053	15687.81006	280.33	101.142
170	S30	-31.77180	6.09871	-101.97825	15699.46689	280.87	101.442
171	SEXX	-31.77180	6.09871	-101.97825	15699.46689	280.87	101.442
172	BEND	-31.18103	8.42173	-78.71974	15790.92409	285.11	103.842
173	SEXX	-31.18103	8.42173	-78.71974	15790.92409	285.11	103.842
174	S70	-30.95004	9.08252	-69.62540	15816.93336	286.35	104.542
175	SXF	-30.95004	9.08252	-69.62540	15816.93336	286.35	104.542
176	S30	-30.85184	9.36571	-65.72783	15828.08076	286.89	104.842
177	QF	-30.76732	9.60348	-62.45549	15837.44962	287.33	105.094
178	QF	-30.68480	9.84124	-59.18315	15846.81047	287.78	105.346
179	S30	-30.58501	10.12444	-55.28557	15857.95987	288.32	105.646
180	SEXX	-30.58501	10.12444	-55.28557	15857.95987	288.32	105.646
181	BEND	-29.60053	12.30957	-16.49022	15943.98082	292.58	108.046
182	SEXX	-29.60053	12.30957	-16.49022	15943.98082	292.58	108.046
183	S70	-29.25840	12.92021	-3.02533	15968.02965	293.83	108.746
184	SXD	-29.25840	12.92021	-3.02533	15968.02965	293.83	108.746
185	S30	-29.11172	13.18191	2.74911	15978.33286	294.36	109.046
186	QD	-28.98858	13.40163	7.59723	15986.98326	294.81	109.297
187	QD	-28.86544	13.62135	12.44535	15995.63367	295.26	109.549
188	S370	-27.05650	16.84900	83.66341	16122.70060	301.91	113.249
189	QF	-26.93336	17.06872	88.51153	16131.35700	302.36	113.501
190	QF	-26.81022	17.28844	93.35965	16140.00741	302.82	113.753
191	S30	-26.66355	17.50815	99.13409	16150.31062	303.35	114.003
192	SEXX	-26.66355	17.50815	99.13409	16150.31062	303.35	114.003
193	BEND	-25.31389	19.53101	152.27018	16228.29737	307.65	116.453
194	SEXX	-25.31389	19.53101	152.27018	16228.29737	307.65	116.453
195	S70	-24.87082	20.07294	169.71382	16249.63327	308.91	117.153
196	SXD	-24.87082	20.07294	169.71382	16249.63327	308.91	117.153
197	S30	-24.68033	20.30520	177.18967	16256.77723	309.44	117.403
198	QD	-24.52151	20.50620	183.46627	16266.45435	309.90	117.705
199	QD	-24.36288	20.69520	189.74286	16274.13147	310.35	117.957
200	S30	-24.17220	20.92745	197.21671	16283.27542	310.88	118.257
201	SEXX	-24.17220	20.92745	197.21671	16283.27542	310.88	118.257
202	BEND	-22.49907	22.64386	263.00982	16350.85038	315.18	120.657
203	SEXX	-22.49907	22.64386	263.00982	16350.85038	315.18	120.657
204	S100	-21.74130	23.29337	292.93360	16376.53995	316.98	120.657
205	QF	-21.55043	23.46872	300.43786	16383.01052	317.43	121.909
206	QF	-21.35957	23.62808	307.95222	16389.48108	317.88	122.161
207	S370	-18.35580	26.03338	418.33686	16484.53251	324.53	125.861
208	QD	-18.36493	26.20373	425.85122	16491.00307	324.98	126.112
209	QD	-18.17487	26.36809	433.36558	16497.47363	325.42	126.364
210	S30	-17.94673	26.56384	442.31568	16505.18051	325.96	126.654
211	SEXX	-17.94673	26.56384	442.31568	16505.18051	325.96	126.654
212	BEND	-16.00098	27.95363	518.92034	16580.29043	330.22	129.084
213	SEXX	-16.00098	27.95363	518.92034	16580.29043	330.22	129.084
214	S70	-15.39968	28.32134	542.60932	16574.37353	331.47	129.764
215	SXF	-15.39968	28.32134	542.60932	16574.37353	331.47	129.764
216	S30	-15.14140	28.47465	552.76174	16580.40915	332.00	130.004
217	QF	-14.92490	28.60336	561.28554	16585.47555	332.44	130.316
218	QF	-14.70839	28.73207	569.80934	16590.54995	332.89	130.588
219	S30	-14.45052	28.88538	579.96176	16586.57957	333.42	130.868
220	SEXX	-14.45052	28.88538	579.96176	16586.57957	333.42	130.868
221	BEND	-12.29125	29.92693	664.97237	16637.54997	337.67	133.268
222	SEXX	-12.29125	29.92693	664.97237	16637.54997	337.67	133.268
223	S100	-11.35680	30.28001	701.79323	16651.48653	339.44	134.268
224	QD	-11.12044	30.36917	711.06748	16654.99680	339.89	134.520

Table 1

ELEMENT	X (M)	Y (M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S (ORBIT)
225	OD	-10.88487	30.45834	720.34173	16658.50799	134.772
226	S30	-10.60430	30.56453	731.38798	16662.68807	135.072
227	SEV	-8.29713	31.21442	822.22149	16688.27422	137.472
228	BEND	-8.29713	31.21442	822.22149	16688.27422	137.472
229	SEV	-7.60937	31.34477	849.29855	16693.40592	138.172
230	S70	-7.60937	31.34477	849.29855	16693.40592	138.172
231	SXF	-7.31462	31.40063	860.90300	16695.60523	138.472
232	S30	-7.06715	31.44753	870.64591	16697.45172	138.772
233	OF	-6.81988	31.49443	880.38881	16699.29862	138.976
234	OF	-6.52492	31.55029	891.99326	16701.49753	139.276
235	S30	-6.52492	31.55029	891.99326	16701.49753	139.276
236	SEV	-4.13995	31.78967	985.88980	16710.92186	141.676
237	BEND	-4.13995	31.78967	985.88980	16710.92186	141.676
238	SEV	-3.44001	31.79861	1013.44661	16711.27372	142.376
239	S70	-3.44001	31.79861	1013.44661	16711.27372	142.376
240	SXD	-3.14003	31.80244	1035.25867	16711.42451	142.676
241	S30	-2.88818	31.80565	1035.17220	16711.55112	142.927
242	OD	-2.63632	31.80887	1045.08773	16711.67772	143.179
243	OD	1.06337	31.85611	1190.74515	16713.53754	146.879
244	S370	1.31523	31.85933	1200.66068	16713.66414	147.131
245	OF	1.56708	31.86254	1210.57621	16713.79075	147.383
246	OF	1.86706	31.86637	1222.38627	16713.94155	147.635
247	S30	1.86706	31.86637	1222.38627	16713.94155	147.635
248	SEV	4.25737	31.86879	1318.49282	16706.91772	147.883
249	BEND	4.25737	31.86879	1318.49282	16706.91772	147.883
250	SEV	4.94823	31.87522	1343.69208	16702.47903	150.083
251	S70	4.94823	31.87522	1343.69208	16702.47903	150.083
252	SXD	5.24431	31.52691	1355.34890	16700.57674	150.783
253	S30	5.49290	31.48634	1365.13578	16698.97908	151.083
254	OD	5.74148	31.44577	1374.92365	16697.38277	151.325
255	OD	6.03757	31.39745	1386.57548	16697.38277	151.567
256	S30	6.03757	31.39745	1386.57548	16697.38277	151.567
257	SEV	8.36058	30.80668	1478.03666	16695.48018	151.887
258	BEND	8.36058	30.80668	1478.03666	16695.48018	151.887
259	SEV	9.30456	30.47669	1524.56218	16672.22160	154.287
260	S100	9.54233	30.39357	1515.20133	16672.22160	154.287
261	OF	9.78009	30.31045	1533.92303	16659.22968	155.287
262	OF	13.27223	29.08947	1671.43230	16655.95731	155.539
263	S370	13.27223	29.08947	1671.43230	16655.95731	155.539
264	OD	13.51059	29.00635	1680.79315	16604.61478	155.791
265	OD	13.74836	28.92324	1690.15400	16601.34244	159.471
266	S30	14.03155	28.82424	1701.30340	16598.07009	159.742
267	SEV	16.21659	27.83906	1787.33232	16594.17251	159.994
268	BEND	16.21659	27.83906	1787.33232	16594.17251	160.294
269	SEV	16.82733	27.49683	1811.37314	16555.38599	162.694
270	S70	16.82733	27.49683	1811.37314	16555.38599	162.694
271	SXF	16.82733	27.49683	1811.37314	16541.91219	162.694
272	S30	17.06903	27.35015	1821.67635	16541.91219	163.394
273	OF	17.30875	27.22701	1830.32675	16536.13774	163.694
274	OF	17.52847	27.10387	1838.97715	16531.28961	163.946
275	S30	17.79017	26.95720	1849.28035	16526.44148	164.198
276	SEV	19.77103	25.60754	1927.26706	16520.66704	164.498
277	BEND	19.77103	25.60754	1927.26706	16520.66704	164.498
278	SEV	20.54552	24.97459	1957.26706	16467.53089	166.898
279	S100	20.54552	24.97459	1957.26706	16467.53089	166.898
280	OD	20.74022	24.81516	1965.42102	16436.33478	167.098

Table 1

	ELEMENT	X (M)	Y (M)	E-AGS(IN)	N-AGS(IN)	ANGLE	S (ORBIT)
281	OD	28.93522	24.65573	1973.10014	15430.05819	40.33	168.402
282	S30	21.16747	24.46589	1982.24511	16422.58235	40.87	168.702
283	SEXV	21.16747	24.46589	1982.24511	16422.58235	40.87	168.702
284	BEND	22.88388	22.79272	2049.82011	16356.71129	45.11	171.102
285	SEXV	22.88388	22.79272	2049.82011	16356.71129	45.11	171.102
286	S70	23.34064	22.26228	2067.80283	16335.82772	46.35	171.802
287	SXF	23.34064	22.26228	2067.80283	16335.82772	46.35	171.802
288	OF	23.53639	22.03455	2075.50971	16325.87762	46.89	172.102
289	S30	23.70075	21.84408	2081.90027	16319.36327	47.33	172.354
290	OF	23.86510	21.65342	2088.45084	16311.84891	47.78	172.606
291	S30	24.06085	21.42589	2096.15772	16302.89881	48.32	172.906
292	SEXV	24.06085	21.42589	2096.15772	16302.89881	48.32	172.906
293	BEND	25.46065	19.48013	2151.26770	16226.29420	52.58	175.306
294	SEXV	25.46065	19.48013	2151.26770	16226.29420	52.58	175.306
295	S70	25.81036	18.87843	2165.35082	16202.60523	53.83	176.006
296	SXD	25.81036	18.87843	2165.35082	16202.60523	53.83	176.006
297	S30	26.97166	18.62056	2171.38644	16192.45281	54.36	176.306
298	OD	26.10038	18.40405	2176.45385	16183.92901	54.81	176.557
299	OD	26.22909	18.18755	2181.52126	16175.40522	55.26	176.809
300	S370	28.11985	15.00714	2255.96062	16050.19210	61.91	180.509
301	OF	28.24856	14.79063	2261.02803	16041.66830	62.36	180.761
302	OF	28.37727	14.57413	2266.09544	16033.14450	62.82	181.013
303	S30	28.53058	14.31626	2272.13106	16022.99209	63.35	181.313
304	SEXV	28.53058	14.31626	2272.13106	16022.99209	63.35	181.313
305	BEND	29.57123	12.15699	2313.10152	15937.98151	67.65	183.713
306	SEXV	29.57123	12.15699	2313.10152	15937.98151	67.65	183.713
307	S70	29.81982	11.50221	2322.85714	15912.20692	68.91	184.413
308	SXD	29.81982	11.50221	2322.85714	15912.20692	68.91	184.413
309	OD	29.92522	11.22174	2327.03011	15901.16067	69.44	184.713
310	OD	30.01438	10.98617	2330.54839	15891.88642	69.90	184.965
311	OD	30.10324	10.75061	2334.05867	15882.61217	70.35	185.217
312	S30	30.20974	10.47003	2338.23955	15871.56591	70.88	185.517
313	SEXV	30.20974	10.47003	2338.23955	15871.56591	70.88	185.517
314	BEND	30.85962	8.16286	2363.82572	15780.73238	75.18	187.917
315	SEXV	30.85962	8.16286	2363.82572	15780.73238	75.18	187.917
316	S100	31.04583	7.18035	2371.15670	15742.05087	76.98	188.917
317	OF	31.09273	6.93288	2373.00320	15722.56505	77.43	189.169
318	OF	31.13953	6.68541	2374.84959	15722.56505	77.88	189.421
319	S370	31.82800	3.005012	2401.97432	15579.44344	84.53	193.121
320	OD	31.87550	2.80265	2403.82001	15569.70053	84.98	193.372
321	OD	31.92240	2.55518	2405.66730	15559.95762	85.42	193.624
322	S30	31.97826	2.26043	2407.86660	15548.35317	85.96	193.874
323	SEXV	31.97826	2.26043	2407.86660	15548.35317	85.96	193.874
324	BEND	32.21764	-1.12455	2417.29006	15454.45663	90.22	196.324
325	SEXV	32.21764	-1.12455	2417.29006	15454.45663	90.22	196.324
326	S70	32.22657	-1.82449	2417.64270	15426.89982	91.47	197.824
327	SXF	32.22657	-1.82449	2417.64270	15426.89982	91.47	197.824
328	S30	32.23040	-1.12446	2417.79349	15415.09975	92.00	197.324
329	OF	32.23362	-1.37632	2417.92008	15405.17422	92.44	197.576
330	OF	32.23683	-1.62817	2418.04668	15395.25869	92.89	197.828
331	S30	32.24066	-1.92815	2418.19747	15383.44863	93.42	198.128
332	SEXV	32.24066	-1.92815	2418.19747	15383.44863	93.42	198.128
333	BEND	32.06226	-4.31845	2411.17357	15289.34209	97.67	200.528
334	SEXV	32.06226	-4.31845	2411.17357	15289.34209	97.67	200.528
335	S100	31.90120	-5.30540	2404.83256	15250.86001	99.44	201.528
336	OD	31.86063	-5.155399	2403.23542	15240.69914	99.89	201.780

Table 2

APEX	N(IN)	E(IN)	X(M)	Y(M)
1	15172.50940	2392.10750	31.57798	-7.28601
A1	15016.05128	2337.41334	30.18875	-11.26004
A2	14727.09392	2175.46711	26.07531	-18.59956
A4	14598.77793	2070.55952	23.41066	-21.85878
A5	14382.63583	1819.55050	17.09503	-27.34879
A7	14287.93082	1677.08292	13.41535	-35.50512
A8	14239.26782	1522.07224	9.47908	-30.99034
B1	14208.40552	1359.22841	5.34285	-31.77424
B2	14204.17689	1028.01087	-3.07008	-31.88165
B4	14230.87177	864.43221	-7.22497	-31.20360
B5	14340.18138	551.74332	-15.16727	-28.42714
B7	14421.21353	407.15988	-18.85969	-26.36892
B8	14421.21353	278.84412	-22.09891	-23.70025
C1	14526.12150	170.69486	-24.84590	-20.51412
C2	14651.71741	1.42441	-29.14537	-13.28201
C4	14936.44615	-57.24624	-30.63561	-9.34474
C5	15091.45695	-110.92531	-32.25225	-1.07927
C7	15410.90030	-121.04079	-32.25599	3.13125
C8	15582.63744	-94.24554	-31.57793	7.28614
D1	15785.21604	-39.65065	-30.18868	11.26017
D2	15982.67392	122.29683	-26.07521	18.59967
D4	16191.63055	227.20499	-23.41055	21.85889
D5	16319.94608	478.21498	-17.09348	27.34887
D7	16536.08705	620.68294	-13.41621	29.50016
D8	16620.78343	775.69388	-9.47893	30.99038
E1	16679.45374	938.53785	-5.34269	31.77425
E2	16710.31531	1269.75540	3.07024	31.88163
E4	16714.54246	1433.33395	7.22513	31.20357
E5	16687.84685	1746.02235	15.16742	28.42707
E7	16578.53585	1890.60543	18.83983	26.36883
E8	16497.50295	2018.92072	22.09903	23.70046
F1	16392.59450	2127.06942	24.84601	20.51401
F2	16265.99811	2296.33859	29.14545	13.28188
F4	15982.26962	2355.00856	30.63567	9.34460
F5	15827.25795	2416.68617	32.20228	1.07812
F7	15501.80585	2418.00091	32.25599	-3.13139
F8	15336.07678			

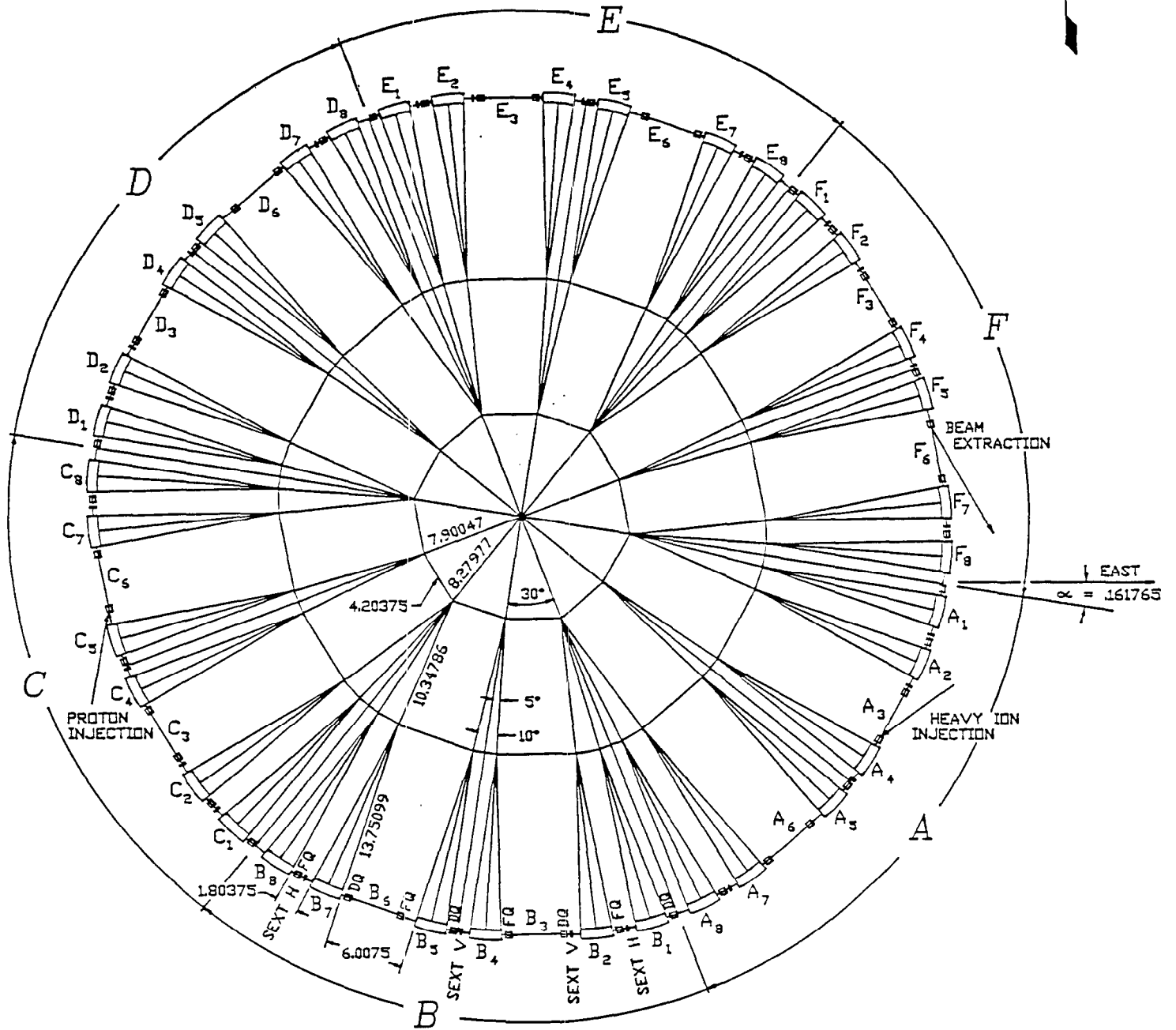


FIG. 1 Overall Layout of the AGS Booster

0 5  
 METERS  
 NOTE: ALL DIMENSIONS ARE IN METERS

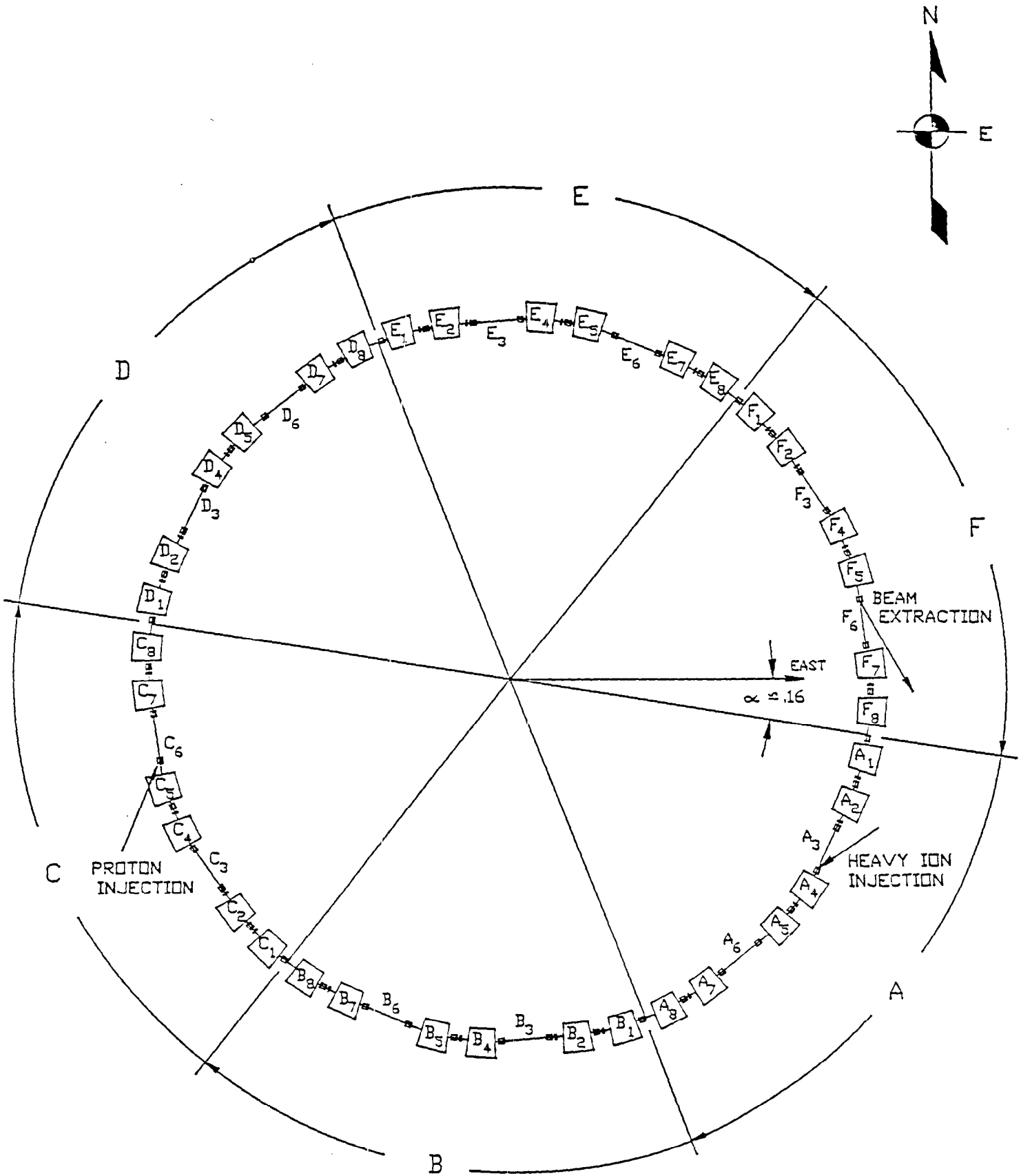


Fig.2 Layout of the AGS Booster showing the relative position of magnets (e.g. Dipole Apex locations) and labelling convention of the Booster Superperiods. (A to F, with the Beam in the Clockwise direction).



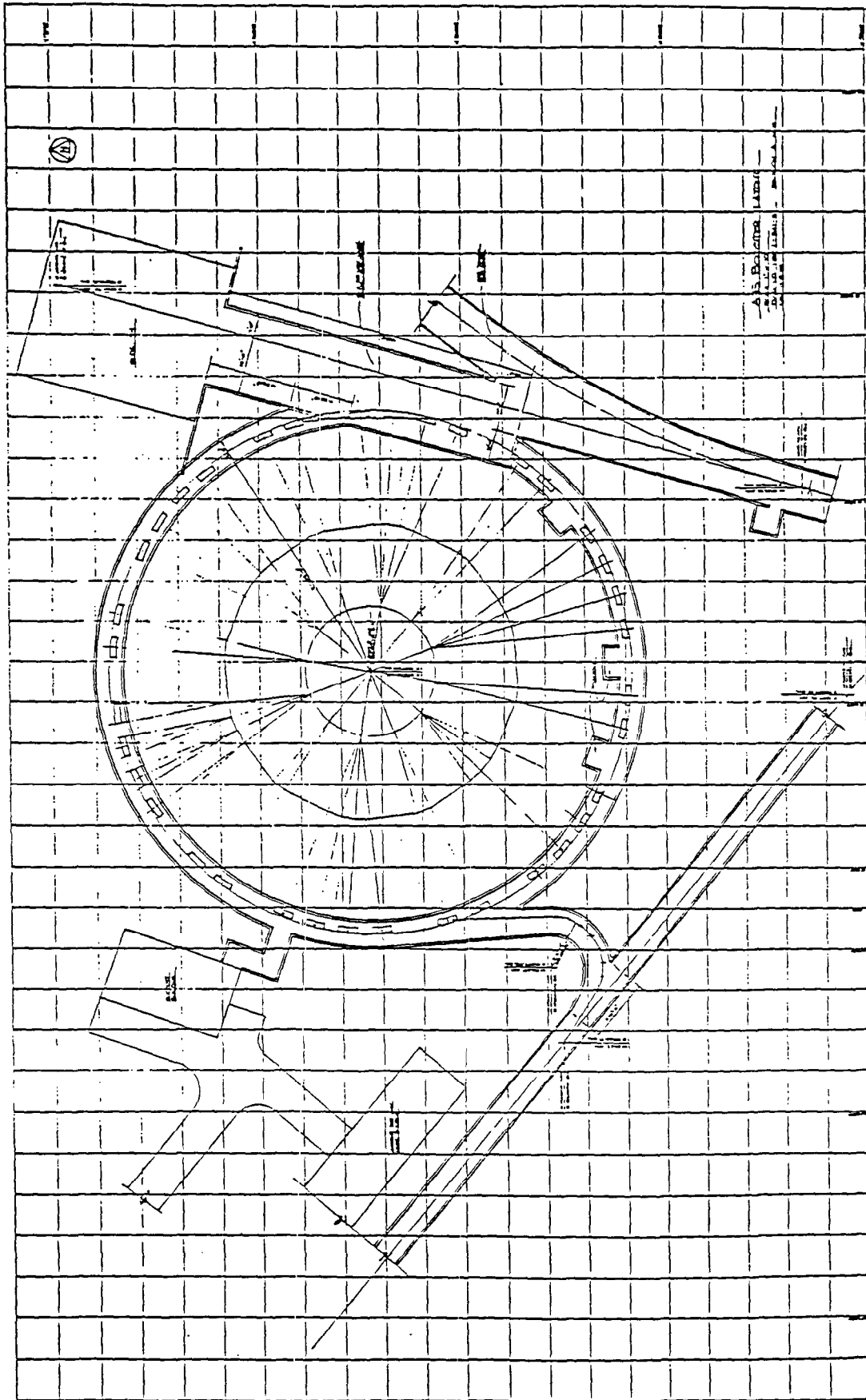


Fig. 3 Construction map of AGS Rooster