

APPENDIX E

## Synch Run

## Accumulator Lattice

8 0 GEV KINETIC EXTRACTION ORBIT

7.92767 GEV KINETIC CENTRAL ENERGY.

8 MARCH 83 A. ANDO, DE JOHNSON

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*** BRHO = // 294.0796
*** B0 = // 16.8391978
*** SL = // 0.3048
*** BL1 = // 1.5240
*** BL2 = // 3.0480
*** BL3 = // 4.5720

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*** A10 DRF // 0.0
*** A20 DRF // 0.0

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*** LS DRF // 7.946495
*** L9* DRF // 7.84488
*** O1 DRF // 0.512413
*** O2 DRF // 0.960596
*** O3 DRF // 0.9042
*** OB3 DRF // 6.42366
*** O4 DRF // 3.2610
*** O5 DRF // 7.34776
*** O6 DRF // 4.18716
*** O7 DRF // 2.8476
*** OS7 DRF // 1.29304
*** OB7 DRF // 0.5080
*** O8 DRF // 1.2192
*** OB8 DRF // 0.5080
*** O9 DRF // 0.3048
*** OS9 DRF // 0.6096
*** OB9 DRF // 0.5080
*** O10 DRF // 0.5080
*** OB10 DRF // 0.2919
*** OS10 DRF // 0.2919
*** O11 DRF // 0.52102
*** O12 DRF // 0.2178
*** OS12 DRF // 0.2178
*** O13 DRF // 0.49722

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## SMALL APERTURE DIPOLES

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*** B3 MAG // BL1 0.0 BRHO BC $
*** B7 MAG // BL2 0.0 BRHO BC $
*** B8 MAG // BL3 0.0 BRHO BC $

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## LARGE APERTURE DIPOLES

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*** B9 MAG // BL3 0.0 BRHO BO $
*** B10 MAG // BL3 0.0 BRHO BO $

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SMALL APERTURE QUADRUPOLES  
HALF QUAD LENGTHS LISTED

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*** QF = // 96.6333
*** QD = // -97.4126
*** QT = // 103.8087
*** Q1 MAG // 0.32004 QT BRHO
*** Q2 MAG // 0.65828 -QT BRHO
*** Q3 MAG // 0.35052 QT BRHO
*** Q4 MAG // 0.2286 GF BRHO
*** Q5 MAG // 0.41402 GD BRHO
*** Q6 MAG // 0.35052 GF BRHO
*** Q7 MAG // 0.35052 GD BRHO
*** Q8 MAG // 0.2286 GF BRHO
*** Q9 MAG // 0.2286 GD BRHO

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## LARGE APERTURE QUADRUPOLES

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*** G10 = // 40.8765
*** GF1 = // 89.3989
*** GD1 = // -89.3989
*** Q10 MAG // 0.2286 G10 BRHO
*** Q11 MAG // 0.43688 GF1 BRHO
*** Q12 MAG // 0.3861 GD1 BRHO
*** Q13 MAG // 0.3861 GD1 BRHO
*** Q14 MAG // 0.32131 GF1 BRHO

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EXTENDED

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*** 57      CXTI      // SL      0.0      BRHO
*** 59      SXTI      // SL      0.0      BRHO
*** S10     SXTI      // SL      0.0      BRHO
*** S17     SXTI      // SL      0.0      BRHO

*** R/6     BML      // A10    LS    Q1    Q1    Q1    Q2    Q2    Q2    Q3    Q3    Q3    B3
*          // OB3   Q4    Q4    Q4    Q5    Q5    Q5    Q6    Q6    Q6    Q7    Q7
*          // O7    S7    OS7   R7    OB7   Q8    Q8    Q8    B8    OB8   Q9    Q9
*          // O9    S9    OS9   B9    OB9   Q10   Q10   Q10   B10   OB10  S10   OS10
*          // Q11   Q11   O11   Q12   Q12   Q12   S12   OS12  Q13   Q13   Q13   Q14
*          // Q14   Q14   LS*   A20
***          CYC     -3 // R/6

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POS	S(M)	NUX	NUY	BETA(X)	BETA(Y)	ETA(X)	ETA(Y)	ETA(S)	ALPHA(X)	ALPHA(Y)	DELTA(X)	DELTA(Y)
0	0.0600	0.00000	0.00000	7.56400	7.26661	.00155	0.00000	0.00000	0.00000	0.00000	-0.00000	0.00000
1 A10	0.0000	0.00000	0.00000	7.56400	7.26661	.00155	0.00000	0.00000	0.00000	0.00000	-0.00000	0.00000
2 LS	7.9465	12892	13211	15.91233	15.95660	.00155	0.00000	0.00000	-1.05037	-1.09356	-0.00000	0.00000
3 Q1	8.2665	13210	13519	16.01364	17.27175	.00152	0.00000	0.00000	.73785	-3.06516	-0.0017	0.00000
4 Q1	8.5866	13536	13795	14.99036	19.97577	.00144	0.00000	0.00000	2.42084	-5.48543	-0.0034	0.00000
5 Q1	9.0990	14129	14153	12.62959	26.00603	.00126	0.00000	0.00000	2.18633	-6.28294	-0.0034	0.00000
6 Q2	9.7548	15011	14516	11.68624	30.32147	.00113	0.00000	0.00000	-8.7585	0.3924	-0.0007	0.00000
7 Q2	10.4106	15831	14879	14.58755	25.91321	.00117	0.00000	0.00000	-3.96970	6.33876	0.0020	0.00000
8 Q2	11.3712	16641	15449	23.27416	15.20161	.00136	0.00000	0.00000	-5.07325	4.81223	0.0020	0.00000
9 Q3	11.7218	16887	16055	25.87297	12.59663	.00140	0.00000	0.00000	-2.23340	2.72664	0.0002	0.00000
10 Q3	12.0723	17099	16527	26.31581	11.26714	.00138	0.00000	0.00000	.98833	1.12096	-0.0015	0.00000
11 Q3	12.9765	17665	17927	24.58992	9.40373	.00124	0.00000	0.00000	9.2041	9.3987	-0.0015	0.00000
12 B3	14.5005	18708	20947	21.96209	6.94355	.06747	0.00000	.00203	80508	66827	0.8717	0.00000
13 QB3	20.9241	24525	39718	14.70581	6.95470	.62745	0.00000	.00203	32354	-6.7000	0.8717	0.00000
14 Q4	21.1527	24776	40227	14.31239	7.37561	.64194	0.00000	.00203	1.38758	-1.26974	0.3943	0.00000
15 Q4	21.3813	25037	40697	13.45148	8.12909	.64542	0.00000	.00203	2.35686	-1.95720	-0.0899	0.00000
16 Q4	24.6423	33229	44215	3.26194	27.21314	.61610	0.00000	.00203	76780	-3.89501	-0.0899	0.00000
17 Q5	25.0564	35408	44448	2.87570	28.90145	.62991	0.00000	.00203	18270	-1.0537	0.7605	0.00000
18 Q5	25.4704	37700	44680	2.94779	27.38111	.67966	0.00000	.00203	-36012	3.70775	1.6542	0.00000
19 Q5	32.8181	52344	69382	28.93029	1.97247	1.89516	0.00000	.00203	-3.17600	-2.4974	1.6542	0.00000
20 Q6	33.1687	52532	72031	29.99143	2.30008	1.91463	0.00000	.00203	.18953	-6.9745	-0.5472	0.00000
21 Q6	33.5192	52721	74184	28.67165	2.97688	1.85705	0.00000	.00203	3.52486	-1.25931	-2.7267	0.00000
22 Q6	37.7063	57374	81659	7.36233	28.75210	.71534	0.00000	.00203	1.56435	-4.89647	-2.7267	0.00000
23 Q7	38.0569	58180	81845	6.59770	31.04324	.63372	0.00000	.00203	64659	-1.55101	-1.9462	0.00000
24 Q7	38.4074	59043	82024	6.43097	30.86822	.57798	0.00000	.00203	-1.64448	2.04353	-1.2451	0.00000
25 Q7	41.2550	65273	83825	8.66271	20.58959	.22342	0.00000	.00203	-61925	1.56604	-1.2451	0.00000
26 S7	41.5598	65821	84066	9.05504	19.65051	.18547	0.00000	.00203	-66793	1.51493	-1.2451	0.00000
27 Q57	42.8528	67884	85228	11.04937	16.01312	.02448	0.00000	.00203	-87443	1.29812	-1.2451	0.00000
28 B7	45.9008	71351	89247	17.82159	9.29316	-.08779	0.00000	-.01127	-1.35874	.87293	.05047	0.00000
29 QB7	46.4088	71787	90159	19.24328	8.45519	-.06215	0.00000	-.01127	-1.43987	.77661	.05047	0.00000
30 Q8	46.6374	71974	90596	19.57382	8.25203	-.05012	0.00000	-.01127	.00223	.11716	.05469	0.00000
31 Q8	46.8660	72161	91036	19.24127	8.34682	-.03722	0.00000	-.01127	1.44418	-.53419	.05798	0.00000
32 Q8	48.0852	73270	93179	15.95816	9.87830	.03346	0.00000	-.01127	1.24866	-.72194	.05798	0.00000
33 B8	52.6572	79843	98624	7.94667	18.80195	.89057	0.00000	.08409	.52381	-1.16259	.32128	0.00000
34 QB8	53.1652	80894	99041	7.45586	20.01542	1.05379	0.00000	.08409	.44235	-1.22613	.32128	0.00000
35 Q9	53.3938	81386	99221	7.38952	20.23158	1.13658	0.00000	.08409	-.15046	.28603	.40409	0.00000
36 Q9	53.6224	81873	99403	7.59503	19.75689	1.23907	0.00000	.08409	-.75374	1.77849	.49391	0.00000
37 Q9	53.9272	82492	99655	8.07370	18.69230	1.38961	0.00000	.08409	-.81667	1.71427	.49391	0.00000
38 S9	54.2320	83075	99922	8.59072	17.66686	1.54016	0.00000	.08409	-.87961	1.65004	.49391	0.00000
39 Q55	54.8416	84137	1.00504	9.73986	15.73343	1.84124	0.00000	.08409	-1.00547	1.52159	.49391	0.00000
40 B9	59.4136	89014	1.08571	23.04733	5.63827	4.66875	0.00000	.91485	-1.93869	.61035	.75721	0.00000
41 QB9	59.9216	89350	1.10084	25.07033	5.08097	5.05342	0.00000	.91485	-2.04358	.48669	.75721	0.00000
42 Q10	60.1502	89493	1.10814	25.82923	4.90713	5.20797	0.00000	.91485	-1.26816	.27562	.59409	0.00000
43 Q10	60.3788	89633	1.11562	26.22433	4.82772	5.32471	0.00000	.91485	-.45599	.07259	.42664	0.00000
44 Q10	60.8868	89938	1.13244	26.69950	4.80771	5.54144	0.00000	.91485	-.47939	-.03319	.42664	0.00000
45 B10	65.4588	92410	1.25367	31.97419	9.12771	8.06492	0.00000	2.67987	-.68759	-.87912	.68995	0.00000
46 QB10	65.7507	92555	1.25862	32.37953	9.65749	8.26631	0.00000	2.67987	-.70103	-.93582	.68995	0.00000
47 S10	66.0555	92704	1.26350	32.81116	10.24601	8.47661	0.00000	2.67987	-.71507	-.99502	.68995	0.00000
48 Q10	66.3474	92844	1.26790	33.23255	10.84345	8.67801	0.00000	2.67987	-.72852	-1.05171	.68995	0.00000
49 Q11	66.7843	93056	1.27394	31.96215	12.47757	8.72598	0.00000	2.67987	3.57995	-2.76080	-.47140	0.00000

POS	S(M)	NUX	NUY	BETAX(M)	BETAY(M)	ETAX(M)	ETAY(M)	ETAS(M)	ALPHAX	ALPHAY	DETAX	DETAI
50 011	67.2212	93289	1.27893	27.21571	15.85680	8.27009	0.00000	2.67987	7.07349	-5.12314	-1.60552	0.00000
51 011	67.7422	93641	1.28341	20.35389	21.66177	7.43358	0.00000	2.67987	6.09649	-6.01840	-1.60552	0.00000
52 012	68.1283	93977	1.28601	16.72287	25.45541	6.97807	0.00000	2.67987	3.44951	-3.65826	-7.6292	0.00000
53 012	68.5144	94370	1.28833	14.86405	27.14243	6.84000	0.00000	2.67987	1.43734	-6.4493	.04497	0.00000
54 012	68.7322	94608	1.28960	14.24773	27.42584	6.84979	0.00000	2.67987	1.39242	-6.65629	.04497	0.00000
55 S12	69.0370	94959	1.29135	13.41807	27.83076	6.86350	0.00000	2.67987	1.32955	-6.7219	.04497	0.00000
56 OS12	69.2548	95223	1.29259	12.84871	28.12604	6.87329	0.00000	2.67987	1.28462	-6.8356	.04497	0.00000
57 013	69.6409	95712	1.29479	12.44883	27.39026	7.04712	0.00000	2.67987	-2.23333	2.56037	.85885	0.00000
58 013	70.0270	96195	1.29715	13.22005	24.29020	7.54152	0.00000	2.67987	-1.79422	5.34713	1.71180	0.00000
59 013	70.5242	96756	1.30081	15.08319	19.27399	8.39266	0.00000	2.67987	-1.95291	4.74139	1.71180	0.00000
60 014	70.8455	97084	1.30366	15.87623	16.90129	8.80845	0.00000	2.67987	-4.8935	2.72016	.86951	0.00000
61 014	71.1668	97407	1.30681	15.69904	15.70432	8.94851	0.00000	2.67987	1.03500	1.04401	.00000	0.00000
62 LS*	79.0117	1.10180	1.43524	7.57960	7.51415	8.94851	0.00000	2.67987	-0.00000	.00000	.00000	0.00000
63 A20	79.0117	1.10180	1.43524	7.57960	7.51415	8.94851	0.00000	2.67987	-0.00000	.00000	.00000	0.00000
64 REFL	158.0234	2.20361	2.87048	7.56400	7.26661	.00155	0.00000	5.35974	.00000	.00000	.00000	0.00000

CIRCUMFERENCE = 474.0703 M      THETX = 6.28318533 RAD      NUX = 6.61082      DNUX/(DP/P) = -8.47593  
 RADIUS = 75.4506 M      THETY( 63) = 0.00000000 RAD      NUY = 8.61144      DNUY/(DP/P) = -12.88242  
 (DS/S)/(DP/P) = 0.339174      TGAM = ( 5.42986, 0.00000)

MAXJMA --- BETX( 48) = 33.23255      BETY( 23) = 31.04324      ETAX( 63) = 8.94851      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 17) = 2.87570      BETY( 19) = 1.97247      ETAX( 28) = -0.08779      ETAY( 64) = 0.00000

\*\*\* PAGE //

## SEXTUPOLE CORRECTIONS

```
*** KS7   = // 35.7175
*** KS9   = // -219.5244
*** KS10  = // 134.7943
*** KS12  = // -170.5021

*** S7   SOTP // SL      KS7   BRHO
*** S9   SOTP // SL      KS9   BRHO
*** S10  SOTP // SL      KS10  BRHO
*** S12  SOTP // SL      KS12  BRHO

***      CYC  -3 // R/6
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PUG	S(M)	NUX	NUY	BETAX(N)	BETAY(M)	ETAX(M)	ETAY(M)	ETAS(M)	ALPHAX	ALPHAY	DETX	DETY
0	0.0000	0.0000	0.0000	7.54400	7.26851	00155	0.00000	0.00000	0.00000	0.00000	-0.00000	0.00000
1 A10	0.0000	0.0000	0.0000	7.54400	7.26851	00155	0.00000	0.00000	0.00000	0.00000	-0.00000	0.00000
2 L5	7.9465	12892	13211	15.91233	15.93660	00155	0.00000	0.00000	-1.05057	-1.09356	-0.00000	0.00000
3 G1	8.2665	13210	13519	16.01364	17.27175	00152	0.00000	0.00000	7.3785	-3.06516	-0.0017	0.00000
4 G1	8.5866	13536	13795	14.99036	19.97577	00144	0.00000	0.00000	2.42084	-5.48543	-0.0034	0.00000
5 Q1	9.0990	14129	14153	12.62959	26.00603	00126	0.00000	0.00000	2.18633	-6.28294	-0.0034	0.00000
6 Q2	9.7548	15011	14316	11.68624	30.32147	00113	0.00000	0.00000	-6.7585	0.33924	-0.0007	0.00000
7 Q2	10.4106	15831	14879	14.58755	25.91321	00117	0.00000	0.00000	-3.86970	6.33875	0.0020	0.00000
8 Q2	11.3712	16661	15649	23.27416	15.20161	00136	0.00000	0.00000	-5.07325	4.81223	0.0020	0.00000
9 Q3	11.7218	16887	16055	25.87297	12.59663	00140	0.00000	0.00000	-2.23340	2.72664	0.0002	0.00000
10 Q3	12.0723	17099	16527	26.31581	11.26714	00138	0.00000	0.00000	98833	1.12096	-0.0015	0.00000
11 Q3	12.9765	17665	17927	24.58992	9.40373	00124	0.00000	0.00000	92041	93987	-0.0015	0.00000
12 B3	14.5005	18708	20947	21.96209	6.94355	06747	0.00000	0.0203	80608	66827	0.0000	0.00000
13 Q3	20.9241	24525	39718	14.70581	6.95470	62745	0.00000	0.0203	32354	67000	0.0000	0.00000
14 Q4	21.1527	24776	40227	14.31239	7.39561	64194	0.00000	0.0203	1.38758	-1.26974	0.3943	0.00000
15 Q4	21.3813	25037	40697	13.45148	8.12909	64542	0.00000	0.0203	2.35686	-1.95720	-0.0099	0.00000
16 Q4	24.6423	33229	44215	3.26194	27.21314	61610	0.00000	0.0203	76780	-1.95720	-0.0099	0.00000
17 Q5	25.0564	35408	44448	2.87570	28.90145	62991	0.00000	0.0203	18270	-1.0537	0.7605	0.00000
18 Q5	25.4704	37700	44680	2.94779	27.38111	67966	0.00000	0.0203	-36012	3.70775	1.6542	0.00000
19 Q5	32.8181	52344	69382	28.93029	1.97247	1.89516	0.00000	0.0203	-3.17600	-2.4974	1.6542	0.00000
20 Q6	33.1687	52532	72031	29.99143	2.30008	1.91463	0.00000	0.0203	1.8953	-6.9745	-0.0547	0.00000
21 Q6	33.5192	52721	74184	28.67165	2.97588	1.85705	0.00000	0.0203	3.52486	-1.25931	-0.0099	0.00000
22 Q6	37.7063	57374	81659	7.36233	28.75210	71534	0.00000	0.0203	1.56435	-4.89647	-0.0000	0.00000
23 Q7	38.0569	58180	81845	6.59770	31.04324	63372	0.00000	0.0203	64659	-1.55101	-1.9462	0.00000
24 Q7	38.4074	59043	82024	6.43097	30.86822	57798	0.00000	0.0203	-1.6448	2.04353	-1.2451	0.00000
25 Q7	41.2550	65273	83825	8.66271	20.58959	22342	0.00000	0.0203	-6.1925	1.56604	-1.2451	0.00000
26 S7	41.5598	65821	84066	9.05504	19.65051	18547	0.00000	0.0203	-6.6793	1.51493	-1.2451	0.00000
27 Q7	42.8528	67884	85228	11.04937	16.01312	02448	0.00000	0.0203	-8.7443	1.29812	-1.2451	0.00000
28 Q7	45.9008	71351	89247	17.82159	9.29316	0.08779	0.00000	-0.1127	-1.35874	8.7293	0.05047	0.00000
29 Q7	46.4088	71787	90159	19.24328	8.45519	-0.06215	0.00000	-0.1127	-1.43987	7.7661	0.05047	0.00000
30 Q8	46.6374	71974	90596	19.57382	8.25203	-0.05012	0.00000	-0.1127	0.0223	1.1716	0.05469	0.00000
31 Q8	46.8660	72161	91036	19.24127	8.34682	-0.03722	0.00000	-0.1127	1.44418	-0.5319	0.05798	0.00000
32 Q8	48.0852	73270	93179	15.95816	9.87830	0.03345	0.00000	-0.1127	1.24866	-0.72194	0.05798	0.00000
33 Q8	52.6572	79843	98624	7.94667	18.80195	89057	0.00000	0.08409	52381	-1.16259	0.32128	0.00000
34 Q8E	53.1652	80894	99041	7.45586	20.01542	1.05379	0.00000	0.08409	44235	-1.22613	0.32128	0.00000
35 Q9	53.3938	81386	99221	7.38952	20.23158	1.13658	0.00000	0.08409	-1.5046	2.8603	0.4049	0.00000
36 Q9	53.6224	81873	99403	7.59503	19.75689	1.23907	0.00000	0.08409	-7.5374	1.77849	0.49391	0.00000
37 Q9	53.9272	82492	99655	8.07370	18.69230	1.38961	0.00000	0.08409	-8.1667	1.71427	0.49391	0.00000
38 Q9	54.2320	83075	99922	8.59072	17.66686	1.54016	0.00000	0.08409	-8.7961	1.65004	0.49391	0.00000
39 Q9	54.8416	84137	1.00504	9.73986	15.73343	1.84124	0.00000	0.08409	-1.00547	1.52159	0.49391	0.00000
40 Q9	59.4136	89014	1.08571	23.04733	5.63827	4.66875	0.00000	0.91485	-1.93869	6.1035	0.75721	0.00000
41 Q9	59.9216	89350	1.10084	25.07033	5.03097	5.05342	0.00000	0.91485	-2.04358	4.8669	0.75721	0.00000
42 Q10	60.1502	89493	1.10814	25.82923	4.90713	5.20797	0.00000	0.91485	-1.26816	2.7562	0.59409	0.00000
43 Q10	60.3788	89633	1.11562	26.22433	4.82772	5.32471	0.00000	0.91485	-4.5599	0.7259	0.42664	0.00000
44 Q10	60.8868	89938	1.13244	26.69950	4.80771	5.54144	0.00000	0.91485	-4.7939	-0.03319	0.42664	0.00000
45 B10	65.4588	92410	1.25367	31.97419	9.12771	8.06492	0.00000	2.67987	-6.8759	-8.7912	0.68995	0.00000
46 B10	65.7507	92555	1.25862	32.37953	9.65749	8.26631	0.00000	2.67987	-7.0103	-9.3582	0.68995	0.00000
47 S10	66.0555	92704	1.26350	32.81116	10.24601	8.47661	0.00000	2.67987	-7.1507	-9.9502	0.68995	0.00000
48 Q10	66.3474	92844	1.26790	33.23255	10.84345	8.67801	0.00000	2.67987	-7.2852	-1.05171	0.68995	0.00000
49 Q11	66.7843	93056	1.27394	31.96215	12.47757	8.72598	0.00000	2.67987	3.57995	-2.76080	-4.7140	0.00000

	S(M)	NUX	NUY	BETAX	DELTAX(D)	DELTA(M)	TAY(D)	ETAS	ALFA	AL			
50 Q11	67.2212	93289	1.27893	27.21571	15.85680	8.27009	0.00000	2.67987	7.07349	-5.12314	-1.60552	0.00000	
51 Q11	67.7422	93641	1.28341	20.35389	21.66177	7.43358	0.00000	2.67987	5.09649	-6.01840	-1.60552	0.00000	
52 Q12	68.1283	93977	1.28601	16.72287	25.45541	6.97807	0.00000	2.67987	3.44951	-3.65826	-7.6292	0.00000	
53 Q12	68.5144	94370	1.28833	14.86405	27.14243	6.84000	0.00000	2.67987	1.43734	-6.4493	-0.4497	0.00000	
54 Q12	68.7322	94608	1.28960	14.24773	27.42584	6.84979	0.00000	2.67987	1.39242	-6.5629	-0.4497	0.00000	
55 S12	69.0370	94959	1.29135	13.41807	27.83076	6.86350	0.00000	2.67987	1.32955	-6.7219	-0.4497	0.00000	
56 OS12	69.2548	95223	1.29259	12.84871	28.12604	6.87329	0.00000	2.67987	1.28462	-6.8356	-0.4497	0.00000	
57 Q13	69.6409	95712	1.29479	12.44883	27.39026	7.04712	0.00000	2.67987	-2.3333	-2.56037	-8.5885	0.00000	
58 Q13	70.0270	96195	1.29715	13.22005	24.29020	7.54152	0.00000	2.67987	-1.79422	5.34713	1.71180	0.00000	
59 Q13	70.5242	96756	1.30081	15.08319	19.27399	8.39266	0.00000	2.67987	-1.95291	4.74139	1.71180	0.00000	
60 Q14	70.8455	97084	1.30366	15.87623	16.90129	8.80845	0.00000	2.67987	-4.8935	2.72016	8.6751	0.00000	
61 Q14	71.1668	97407	1.30681	15.69904	15.70432	8.94851	0.00000	2.67987	1.03500	1.04401	0.0000	0.00000	
62 LS*	79.0117	1.10180	1.43524	7.57960	7.51415	8.94851	0.00000	2.67987	-0.0000	0.0000	0.0000	0.00000	
63 A20	79.0117	1.10180	1.43524	7.57960	7.51415	8.94851	0.00000	2.67987	-0.0000	0.0000	0.0000	0.00000	
64 REFL	158.0234	2.20361	2.87048	7.56400	7.26651	0.0155	0.00000	5.35974	0.0000	0.0000	0.0000	0.00000	

CIRCUMFERENCE = 474.0703 M      THETA = 6.28318533 RAD      NUX = 6.61082      DNUX/(DP/P) = 89856  
 RADIUS = 75.4506 M      THETA( 63) = 0.00000000 RAD      NUY = 8.61144      DNUY/(DP/P) = 33310  
 (DS/S)/(DP/P) = 0.339174      TGAM = ( 5.42986, 0.00000)

MAXIMA --- BETX( 48) = 33.23255      BETY( 29) = 31.04324      ETAX( 63) = 8.94851      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 17) = 2.87570      BETY( 19) = 1.97247      ETAX( 28) = -0.08779      ETAY( 64) = 0.00000

\*\*\* PAGE //



INJECTION ORBIT  
B.00920 GEV KINETIC

```
*** DJ' = // 00930  
*** V PVEC //  
*** INJ FXPT 2 -3 // V R/6 1  
*
```

DP

LATI THE LIBR ORBIT BET FUN DS OF  
 INITIAL REFERENCE RAY DEFINED BY V  
 X = 0.00000000 DX = 0.00000000 Y = 0.00000000 DY = 0.00000000 DS = 0.00000000 DP/P = 00930000 1.00000000  
 3

7X7 MATRIX FOR INJ

26824382	8.69314725	0.00000000	0.00000000	0.00000000	-0.15380901	0.00079763
-0.10675596	26824382	0.00000000	0.00000000	0.00000000	-0.02243921	0.00011637
0.00000000	0.00000000	0.71018489	-5.07291413	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.97770270	0.71018489	0.00000000	0.00000000	0.00000000
0.02243921	0.15380901	0.00000000	0.00000000	1.00000000	-5.47427891	-0.04757677
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000

EIGENVALUES OF THE 4X4 SUBMATRIX

X ... LMD1 = ( 26824382 96335105 ), C(1) = 1.00000000, MU(1) = 1.29922675 RAD, Q(1) = 62033508  
 I/LMD1 = ( 26824382 -96335105 ), C(2) = 1.00000000, MU(2) = -1.29922675 RAD, Q(2) = 37966492

Y ... LMD3 = ( 71018489 70401522 ), C(3) = 1.00000000, MU(3) = 0.78103554 RAD, Q(3) = 37291700  
 I/LMD3 = ( 71018489 -70401522 ), C(4) = 1.00000000, MU(4) = -0.78103554 RAD, Q(4) = 62708300

EIGENVALUE = ( 26824382, 96335105 ), EIGENVECTOR = ( 3.00397442, -0.00000000 )  
 ( 0.00000000, -0.33289232 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( 26824382, -96335105 ), EIGENVECTOR = ( 3.00397442, 0.00000000 )  
 ( 0.00000000, -0.33289232 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( 71018489, 70401522 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.68434129, 0.00000000 )  
 ( 0.00000000, -0.37253087 )

EIGENVALUE = ( 71018489, -70401522 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.68434129, 0.00000000 )  
 ( 0.00000000, -0.37253087 )

	X	DX	Y	DY	DS	DP/P
EQ ORBIT	-0.00088124	0.00000000	0.00000000	0.00000000	0.00000000	00930000 1.00000000
ETA ORBIT	-0.21019162	-0.00000000	0.00000000	0.00000000	0.00000000	1.00000000 0.00000000

EIGENVECTORS 1 AND 3 IN POLAR COORDINATES

POS	X1	X3	DX1	DX3	Y1	Y3	DY1	DY3
0	3.003974	-0.000000	1.570796	0.000000	0.000000	0.000000	0.000000	0.000000
	0.000000	0.000000	0.000000	2.684341	0.000000	0.000000	372531	-1.570796

STATION PKS	FUNCTIONS (M)	UP GX	INJ GY	BX (M)	BY (M)	AX	AY	EX (M)	EXI	EY (M)	EYP	XCD (MM)	DXCU (MM)	YCU (MM)	DYCU (MM)	
0		0.00	0.000	0.000	9.0239	7.2057	0.0000	0.0000	-2102	-0000	0.0000	0.0000	-8812	0.0000	0.0000	0.0000
1	A10	0.00	0.000	0.000	9.0239	7.2057	0.0000	0.0000	-2102	-0000	0.0000	0.0000	-8812	0.0000	0.0000	0.0000
2	LS	7.95	115	133	14.0216	15.9492	-8806	-1.1028	-2102	-0000	0.0000	0.0000	-8812	0.0000	0.0000	0.0000
3	Q1	8.27	118	136	14.0160	17.2853	8979	-3.0587	-2065	0233	0.0000	0.0000	-8655	0981	0.0000	0.0000
4	Q1	8.59	121	139	14.8994	19.9790	2.5493	-5.4582	-1954	0458	0.0000	0.0000	-8189	1926	0.0000	0.0000
5	01	9.10	127	142	12.4189	25.9774	2.2914	-6.2479	-1719	0458	0.0000	0.0000	-7202	1926	0.0000	0.0000
6	02	9.75	136	146	11.2940	30.2896	-4911	0.0057	-1542	0090	0.0000	0.0000	-6455	0379	0.0000	0.0000
7	02	10.41	145	149	13.8403	25.9638	-3.5842	6.2561	-1599	-0265	0.0000	0.0000	-6692	-1.1110	0.0000	0.0000
8	02	11.37	154	157	21.6493	15.3711	-4.5452	4.7711	-1853	-0265	0.0000	0.0000	-7758	-1.1110	0.0000	0.0000
9	03	11.72	156	161	23.9492	12.7925	-1.9222	2.6906	-1906	-0034	0.0000	0.0000	-7978	-0.0142	0.0000	0.0000
10	03	12.07	159	166	24.2677	11.4897	1.0266	1.0793	-1877	0197	0.0000	0.0000	-7857	0832	0.0000	0.0000
11	03	12.98	165	179	22.4805	9.6519	9.500	9089	-1699	0197	0.0000	0.0000	-7104	0832	0.0000	0.0000
12	03	14.50	176	208	19.7863	7.2965	8212	6566	-0740	1062	0.0000	0.0000	0285	8878	0.0000	0.0000
13	0B3	20.92	243	387	12.7277	6.5444	2776	-	6085	1062	0.0000	0.0000	5.7315	8878	0.0000	0.0000
14	04	21.15	245	392	12.3913	7.3627	1.1857	-1.1928	6276	0606	0.0000	0.0000	5.8852	4549	0.0000	0.0000
15	04	21.38	248	397	11.6558	8.0575	2.0135	-1.8639	6361	0140	0.0000	0.0000	5.9389	0143	0.0000	0.0000
16	04	24.64	339	433	3.1350	26.1187	5995	-3.6746	6816	0140	0.0000	0.0000	5.9854	0143	0.0000	0.0000
17	05	25.06	361	436	2.8752	27.7000	0397	-0.7228	7066	1070	0.0000	0.0000	6.1606	8356	0.0000	0.0000
18	05	25.47	384	438	3.0667	26.2348	-5.109	3.5451	7111	2061	0.0000	0.0000	6.6839	1.7042	0.0000	0.0000
19	05	32.82	515	684	32.7759	2.0593	-3.5324	-2549	2.2853	2061	0.0000	0.0000	19.2060	1.7042	0.0000	0.0000
20	06	33.17	516	709	33.9429	2.3906	2.476	-7030	2.3119	-0549	0.0000	0.0000	19.4165	-1.5070	0.0000	0.0000
21	06	33.52	518	730	32.4378	3.0715	3.9884	-1.2651	2.2471	-3137	0.0000	0.0000	18.8530	-2.6979	0.0000	0.0000
22	06	37.71	559	804	8.1757	28.5098	1.8060	-4.8102	9336	-3137	0.0000	0.0000	7.5563	-2.6979	0.0000	0.0000
23	07	38.06	567	806	7.2744	30.7603	7999	-1.5240	8416	-2128	0.0000	0.0000	6.7572	-1.8774	0.0000	0.0000
24	07	38.41	575	808	7.0239	30.5894	-0.754	2.0048	7834	-1203	0.0000	0.0000	6.2314	-1.1328	0.0000	0.0000
25	07	41.25	634	826	8.6144	20.5023	-4831	1.5375	4407	-1203	0.0000	0.0000	3.0057	-1.1328	0.0000	0.0000
26	S7	41.56	640	828	8.9220	19.5809	-5259	1.4855	4041	-1204	0.0000	0.0000	2.6604	-1.1329	0.0000	0.0000
27	0S7	42.85	661	840	10.5211	16.0131	-7109	1.2737	2484	-1204	0.0000	0.0000	1.1955	-1.1329	0.0000	0.0000
28	B7	45.90	698	880	16.1477	9.4111	-1.1448	8603	1461	0530	0.0000	0.0000	2044	4793	0.0000	0.0000
29	0B7	46.41	703	889	17.3478	8.5847	-1.2175	7663	1731	0530	0.0000	0.0000	4479	4793	0.0000	0.0000
30	08	46.64	705	893	17.6121	8.3870	0.679	1036	1837	0397	0.0000	0.0000	5534	4420	0.0000	0.0000
31	08	46.87	707	897	17.2864	8.4889	1.3487	-5520	1912	0258	0.0000	0.0000	6494	3972	0.0000	0.0000
32	08	48.09	720	919	14.2402	10.0634	1.1498	-7394	2226	0258	0.0000	0.0000	1.1337	3972	0.0000	0.0000
33	08	52.66	794	972	7.1832	19.1305	4128	-1.1790	9292	2866	0.0000	0.0000	8.4140	2.8228	0.0000	0.0000
34	0B8	53.17	805	976	6.8059	20.3606	3300	-1.2425	1.0748	2866	0.0000	0.0000	9.8480	2.8228	0.0000	0.0000
35	09	53.39	811	978	6.7792	20.5816	-2.1228	2819	1.1496	3691	0.0000	0.0000	10.5797	3.5880	0.0000	0.0000
36	09	53.62	816	980	7.0026	20.1060	-7702	1.7870	1.2440	4580	0.0000	0.0000	11.4931	4.4149	0.0000	0.0000
37	09	53.93	823	982	7.4933	19.0360	-8396	1.7235	1.3836	4580	0.0000	0.0000	12.8388	4.4149	0.0000	0.0000
38	S9	54.23	829	985	8.0335	17.9878	-9334	1.7147	1.5238	4624	0.0000	0.0000	14.1876	4.4355	0.0000	0.0000
39	0S9	54.84	840	990	9.2580	15.9787	-1.0753	1.5812	1.8057	4624	0.0000	0.0000	16.8914	4.4355	0.0000	0.0000
40	09	59.42	889	1.072	23.8158	5.4921	-2.1286	6241	4.4932	7223	0.0000	0.0000	42.4612	6.8573	0.0000	0.0000
41	0B9	59.93	893	1.087	26.0383	4.9233	-2.2465	4956	4.8602	7223	0.0000	0.0000	45.9447	6.8573	0.0000	0.0000
42	010	60.16	894	1.095	26.8861	4.7443	-1.4513	2889	5.0079	5684	0.0000	0.0000	47.3451	5.3879	0.0000	0.0000
43	010	60.39	895	1.103	27.3598	4.6577	-6.143	0906	5.1198	4104	0.0000	0.0000	48.4051	3.8798	0.0000	0.0000
44	010	60.90	898	1.120	27.9970	4.6215	-6.399	-0.194	5.3283	4104	0.0000	0.0000	50.3760	3.8798	0.0000	0.0000
45	010	65.48	921	1.246	34.9220	9.0280	-8680	-9126	7.7893	6705	0.0000	0.0000	73.4742	6.3024	0.0000	0.0000
46	0B10	65.78	923	1.251	35.4330	9.5781	-8827	-9719	7.9850	6705	0.0000	0.0000	75.3138	6.3024	0.0000	0.0000
47	S10	66.08	924	1.256	35.8605	10.2217	-5188	-1.1414	8.1764	5855	0.0000	0.0000	77.1734	5.8997	0.0000	0.0000
48	0S10	66.37	925	1.260	36.1663	10.9072	-5291	-1.2072	8.3473	5855	0.0000	0.0000	78.8955	5.8997	0.0000	0.0000
49	011	66.81	927	1.266	34.5786	12.6845	4.0946	-2.9386	8.3642	-5088	0.0000	0.0000	79.1914	-4.5516	0.0000	0.0000

PBS	S (M)	GX	GY	BX (M)	BY (M)	AX	AY	EX (M)	EXP	EY (M)	EYP	XCU (MM)	DXCU (MM)	YCU (MM)	SYCU (MM)
50 G11	67.25	929	1.271	29 2765	16 2440	7.7941	-5.3577	7.9062	-1.5744	0.0000	0.0000	74 9566	-14 7424	0.0000	0.0000
51 D11	67.77	933	1.275	21 7273	22 3234	6.6952	-6.3105	7.0659	-1.5744	0.0000	0.0000	67 2755	-14 7424	0.0000	0.0000
52 G12	68.15	936	1.278	17 7138	26 3275	3.8634	-3.9148	6.6323	-0.7871	0.0000	0.0000	63 0567	-7 1923	0.0000	0.0000
53 G12	68.54	940	1.280	15 5846	28 1845	1.7357	-0.8262	6.4743	-0.0350	0.0000	0.0000	61 6799	0337	0.0000	0.0000
54 D12	68.76	942	1.281	14 8408	28 5473	1.6796	-0.8393	6.4667	-0.0350	0.0000	0.0000	61 6872	0337	0.0000	0.0000
55 S12	69.06	945	1.283	13 8872	28 9693	1.4514	-0.5440	6.4666	0.0345	0.0000	0.0000	61 7483	3669	0.0000	0.0000
56 D512	69.28	948	1.284	13 2656	29 2084	1.4027	-0.3538	6.4741	0.0345	0.0000	0.0000	61 8282	3669	0.0000	0.0000
57 G13	69.67	953	1.286	12 7874	28 3381	-0.1477	2.7783	6.6318	0.7865	0.0000	0.0000	63 3642	7.6192	0.0000	0.0000
58 G13	70.05	957	1.289	13 4975	23 0511	-1.7248	5.6189	7.0851	1.5736	0.0000	0.0000	67 7559	15.2150	0.0000	0.0000
59 D13	70.55	963	1.292	15 2656	19 7849	-1.8712	4.9724	7.8676	1.5736	0.0000	0.0000	75 3211	15.2150	0.0000	0.0000
60 G14	70.87	966	1.295	16 0256	17 2759	-0.3998	2.9069	8.2505	0.7991	0.0000	0.0000	79 0165	7.7273	0.0000	0.0000
61 G14	71.19	969	1.298	15 7924	15 9667	1.1211	1.2064	8.3794	-0.0000	0.0000	0.0000	80 2611	-0.0000	0.0000	0.0000
62 LS*	79.04	1.103	1.438	6.9975	6.5028	0.0000	0.0000	8.3794	-0.0000	0.0000	0.0000	80 2611	-0.0000	0.0000	0.0000
63 A20	79.04	1.103	1.438	6.9975	6.5028	0.0000	0.0000	8.3794	-0.0000	0.0000	0.0000	80 2611	-0.0000	0.0000	0.0000
64 REFL	158.07	2.207	2.876	9 0239	7 2057	0.0000	0.0000	-2.102	0.0000	0.0000	0.0000	-8812	0.0000	0.0000	0.0000

CIRCUMFERENCE = 474.2191 M      THETX = 6.28318533 RAD      NUX = 6.62034      DNUX/(DP/P) = 2.04842  
 RADIUS = 75.4743 M      THETY( 63) = 0.00000000 RAD      NUZ = 8.62708      DNUZ/(DP/P) = 2.1319  
 (DS/S)/(DP/P) = 0.0346612      TGAM = ( 5.37129, 0.00000)

MAXIMA --- BETX( 48) = 36.16635      BETY( 23) = 30.76032      ETAX( 61) = 8.37941      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 17) = 2.87519      BETY( 19) = 2.05926      ETAX( 2) = -2.1019      ETAY( 64) = 0.00000

\*\*\* PAGE 77

STACKING ORBIT  
7.94214 GEV KINETIC

```
*** DP      =      //      00165  
*** V      PVEC   //  
*** STK    EXPT  2  -3 // V    R/6      1      DP  
**
```

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CALCULATION OF THE EQUILIBRIUM ORBIT AND BETATRON FUNCTIONS OF STK  
 INITIAL REFERENCE RAY DEFINED BY V

X = 0.00000000 DX = 0.00000000 Y = 0.00000000 DY = 0.00000000 DS = 0.00000000 DP/P = 00165000 1.00000000

4X4 MATRIX FOR STK

28561963	7.47013149	0.00000000	0.00000000	0.00000000	-02038452	00001813
-12294582	28561963	0.00000000	0.00000000	0.00000000	-00350820	00000312
0.00000000	0.00000000	.68819753	-5.27775387	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	.09973640	.68819753	0.00000000	0.00000000	0.00000000
.00350820	.02038452	0.00000000	0.00000000	1.00000000	-5.38532999	-00876629
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000

EIGENVALUES OF THE 4X4 SUBMATRIX

X: LMD1 = ( 28561963 .95834306 ), C(1) = 1.00000000, MU(1) = 1.28114340 RAD, Q(1) = 61170091  
 1/LMD1 = ( 28561963 -.95834306 ), C(2) = 1.00000000, MU(2) = -1.28114340 RAD, Q(2) = 38829909  
 Y: LMD3 = ( .68819753 .72552337 ), C(3) = 1.00000000, MU(3) = .81179458 RAD, Q(3) = 38760336  
 1/LMD3 = ( .68819753 -.72552337 ), C(4) = 1.00000000, MU(4) = -.81179458 RAD, Q(4) = 61239664

EIGENVALUE = ( 28561963, .95834306 ), EIGENVECTOR = ( 2.79192419, -.00000000 )  
 ( 0.00000000, .35817591 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( 28561963, -.95834306 ), EIGENVECTOR = ( 2.79192419, .00000000 )  
 ( 0.00000000, -.35817591 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( .68819753, .72552337 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.69711127, 0.00000000 )  
 ( 0.00000000, -.37076705 )

EIGENVALUE = ( .68819753, -.72552337 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.69711127, 0.00000000 )  
 ( 0.00000000, .37076705 )

	X	DX	Y	DY	DS	DP/P
EQ ORBIT	-.00002178	0.00000000	0.00000000	0.00000000	0.00000000	00165000 1.00000000
ETA ORBIT	-.02853455	.00000000	0.00000000	0.00000000	0.00000000	1.00000000 0.00000000

EIGENVECTORS 1 AND 3 IN POLAR COORDINATES

FOR	X1 X3		DX1 DX3		Y1 Y3		DY1 DY3	
0	2.791924	-0.000000	.358176	1.570796	0.000000	0.000000	0.000000	0.000000
	0.000000	0.000000	0.000000	0.000000	2.697111	0.000000	.370767	-1.570796



RELATION FUNCTIONS OF STR																
POS	S	QX	QY	BX	BY	AX	AY	EX	FX	FX	FX	YCU	DXCU	YCU	DXCU	BYCU
	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(MM)	(MM)	(MM)	(MM)	(MM)
0	0.00	0.000	0.000	7.7948	7.2744	0.0000	0.0000	-0.285	0.000	0.0000	0.0000	-0.218	0.0000	0.0000	0.0000	0.0000
1 A10	0.00	0.000	0.000	7.7948	7.2744	0.0000	0.0000	-0.285	0.000	0.0000	0.0000	-0.218	0.0000	0.0000	0.0000	0.0000
2 LS	7.95	127	132	15.8959	15.9551	-1.0195	-1.0924	-0.285	0.000	0.0000	0.0000	-0.214	0.0000	0.0000	0.0000	0.0000
3 Q1	8.27	130	135	15.9789	17.2684	-4.7632	-3.0604	-0.280	0.000	0.0000	0.0000	-0.214	0.0000	0.0000	0.0000	0.0000
4 Q1	8.59	133	138	14.9422	19.9679	2.4370	-5.4757	-0.265	0.000	0.0000	0.0000	-0.202	0.0000	0.0000	0.0000	0.0000
5 Q1	9.10	139	141	12.5667	25.9869	2.1991	-6.2708	-0.233	0.000	0.0000	0.0000	-0.178	0.0000	0.0000	0.0000	0.0000
6 Q2	9.75	148	145	11.5949	30.2960	-1.6432	0.0357	-0.208	0.000	0.0000	0.0000	-0.159	0.0000	0.0000	0.0000	0.0000
7 Q2	10.41	156	149	14.4297	25.9025	-3.8956	6.3216	-0.216	0.000	0.0000	0.0000	-0.165	0.0000	0.0000	0.0000	0.0000
8 Q2	11.37	164	156	22.9482	15.2167	-4.9724	4.8025	-0.251	0.000	0.0000	0.0000	-0.191	0.0000	0.0000	0.0000	0.0000
9 Q3	11.72	167	160	25.4906	12.6174	-2.1760	-2.7195	-0.258	0.000	0.0000	0.0000	-0.197	0.0000	0.0000	0.0000	0.0000
10 Q3	12.07	169	165	25.9118	11.2926	0.9919	1.1144	-0.254	0.000	0.0000	0.0000	-0.194	0.0000	0.0000	0.0000	0.0000
11 Q3	12.98	175	179	24.1806	9.4396	0.9227	0.9349	-0.229	0.000	0.0000	0.0000	-0.175	0.0000	0.0000	0.0000	0.0000
12 B3	14.50	185	209	21.5495	6.9903	0.0622	0.6661	-0.476	0.000	0.0000	0.0000	-0.952	0.0000	0.0000	0.0000	0.0000
13 Q3	20.92	245	396	14.3518	6.9348	3.143	-1.6606	-0.251	0.000	0.0000	0.0000	1.0325	0.0000	0.0000	0.0000	0.0000
14 Q4	21.15	247	401	13.9691	7.3910	1.3504	-1.2586	-0.402	0.000	0.0000	0.0000	1.0569	0.0000	0.0000	0.0000	0.0000
15 Q4	21.38	250	405	13.1311	8.1189	2.2943	-1.9435	-0.444	0.000	0.0000	0.0000	1.0633	0.0000	0.0000	0.0000	0.0000
16 Q4	24.64	333	441	3.2403	27.0518	0.7387	-3.8624	-0.258	0.000	0.0000	0.0000	1.0236	0.0000	0.0000	0.0000	0.0000
17 Q5	25.06	335	443	2.8758	28.7248	1.5884	-1.1017	-0.413	0.000	0.0000	0.0000	1.0477	0.0000	0.0000	0.0000	0.0000
18 Q5	25.47	338	445	2.9680	27.2140	-1.3853	3.4816	-0.431	0.000	0.0000	0.0000	1.1315	0.0000	0.0000	0.0000	0.0000
19 Q5	32.82	522	692	2.95216	1.9849	-3.2285	-2.480	1.9517	0.000	0.0000	0.0000	3.1702	0.0000	0.0000	0.0000	0.0000
20 Q6	33.17	524	718	30.5975	2.3111	2.005	-1.6952	1.9722	0.000	0.0000	0.0000	3.2031	0.0000	0.0000	0.0000	0.0000
21 Q6	33.52	525	740	29.2480	2.9860	3.5976	-1.2561	1.9136	0.000	0.0000	0.0000	3.1074	0.0000	0.0000	0.0000	0.0000
22 Q6	37.71	571	814	7.4784	28.6395	1.6016	-4.8706	1.7474	0.000	0.0000	0.0000	1.2053	0.0000	0.0000	0.0000	0.0000
23 Q7	38.06	579	816	6.6924	30.9189	0.6713	-1.5440	0.6643	0.000	0.0000	0.0000	1.0696	0.0000	0.0000	0.0000	0.0000
24 Q7	38.41	588	818	6.5116	30.7461	-1.1485	2.0303	0.6883	0.000	0.0000	0.0000	0.9775	0.0000	0.0000	0.0000	0.0000
25 Q7	41.25	650	836	8.6298	20.5342	-1.5954	1.5559	0.2560	0.000	0.0000	0.0000	0.3948	0.0000	0.0000	0.0000	0.0000
26 S7	41.56	655	839	9.0073	19.6013	-1.6431	1.5048	0.2183	0.000	0.0000	0.0000	0.3325	0.0000	0.0000	0.0000	0.0000
27 Q7	42.85	676	850	10.9329	15.9881	-1.8461	1.2895	0.5883	0.000	0.0000	0.0000	0.679	0.0000	0.0000	0.0000	0.0000
28 B7	45.90	711	890	17.5075	9.3116	-1.3220	0.8677	-0.520	0.000	0.0000	0.0000	-1.1155	0.0000	0.0000	0.0000	0.0000
29 Q7	46.41	716	900	18.8911	8.4786	-1.4017	0.7721	-0.261	0.000	0.0000	0.0000	-0.731	0.0000	0.0000	0.0000	0.0000
30 Q8	46.64	717	904	19.2109	8.2776	0.0112	1.1120	-0.143	0.000	0.0000	0.0000	-0.534	0.0000	0.0000	0.0000	0.0000
31 Q8	46.87	719	908	18.8810	8.3750	1.4233	-1.5403	-0.022	0.000	0.0000	0.0000	-0.328	0.0000	0.0000	0.0000	0.0000
32 Q8	48.09	731	930	15.6486	9.9216	1.2279	-1.7283	0.626	0.000	0.0000	0.0000	0.789	0.0000	0.0000	0.0000	0.0000
33 B8	52.66	798	984	7.8236	18.9055	0.5036	-1.1696	0.8967	0.000	0.0000	0.0000	1.4733	0.0000	0.0000	0.0000	0.0000
34 Q8	53.17	808	988	7.3533	20.1261	0.4222	-1.2332	1.0572	0.000	0.0000	0.0000	1.7402	0.0000	0.0000	0.0000	0.0000
35 Q9	53.39	813	990	7.2943	20.3442	-1.1625	0.2849	1.1388	0.000	0.0000	0.0000	1.8756	0.0000	0.0000	0.0000	0.0000
36 Q9	53.62	818	992	7.5036	19.8686	-1.7585	1.7834	1.2400	0.000	0.0000	0.0000	2.0436	0.0000	0.0000	0.0000	0.0000
37 Q9	53.93	824	994	7.9855	18.8010	-1.8225	1.7193	1.3889	0.000	0.0000	0.0000	2.2904	0.0000	0.0000	0.0000	0.0000
38 S9	54.23	830	997	8.5078	17.7694	-1.8912	1.6649	1.5378	0.000	0.0000	0.0000	2.5373	0.0000	0.0000	0.0000	0.0000
39 Q9	54.84	841	1.002	9.6727	15.8184	-1.0197	1.5355	1.8360	0.000	0.0000	0.0000	3.0313	0.0000	0.0000	0.0000	0.0000
40 B9	59.42	890	1.083	23.2132	5.6229	-1.9730	0.6159	4.6425	0.000	0.0000	0.0000	7.6758	0.0000	0.0000	0.0000	0.0000
41 Q9	59.92	893	1.098	25.2722	5.0605	-2.0801	0.4913	5.0244	0.000	0.0000	0.0000	8.3078	0.0000	0.0000	0.0000	0.0000
42 Q10	60.15	895	1.106	26.0467	4.8844	-1.3001	0.2808	5.1779	0.000	0.0000	0.0000	8.5617	0.0000	0.0000	0.0000	0.0000
43 Q10	60.38	896	1.113	26.4552	4.8025	-1.4825	0.0784	5.2939	0.000	0.0000	0.0000	8.7536	0.0000	0.0000	0.0000	0.0000
44 Q10	60.89	899	1.130	26.9575	4.7769	-1.5061	-0.0280	5.5095	0.000	0.0000	0.0000	9.1099	0.0000	0.0000	0.0000	0.0000
45 B10	65.46	923	1.252	32.5035	9.0838	-1.7169	-0.8818	8.0242	0.000	0.0000	0.0000	13.2632	0.0000	0.0000	0.0000	0.0000
46 Q10	65.76	925	1.257	32.9260	9.6153	-1.7305	-0.9390	8.2248	0.000	0.0000	0.0000	13.5945	0.0000	0.0000	0.0000	0.0000
47 S10	66.06	926	1.262	33.3562	10.2118	-1.6806	-1.0182	8.4317	0.000	0.0000	0.0000	13.9385	0.0000	0.0000	0.0000	0.0000
48 Q10	66.35	928	1.266	33.7572	10.8232	-1.6934	-1.0764	8.6276	0.000	0.0000	0.0000	14.2659	0.0000	0.0000	0.0000	0.0000
49 Q11	66.79	930	1.273	32.4302	12.4784	3.6721	-2.7851	8.6697	0.000	0.0000	0.0000	14.3401	0.0000	0.0000	0.0000	0.0000

POS	S (M)	GX	GY	BX (M)	BY (M)	AX	AY	EX (M)	EXP	EY (M)	EYF	XCU (MM)	DXCU (MM)	YCU (MM)	EYU (MM)
50 011	67 23	.932	1.277	27.5050	15.8805	7.2030	-5.1517	8.2127	-1.6022	0.0000	0.0000	13.5876	-2.6443	0.0000	0.0000
51 011	67 75	.936	1.282	20.5996	21.7196	6.2041	-6.0553	7.3779	-1.6022	0.0000	0.0000	12.2099	-2.6443	0.0000	0.0000
52 012	68 13	.939	1.285	16.8993	25.5422	3.5240	-3.6960	6.9219	-1.7689	0.0000	0.0000	11.4585	-1.2628	0.0000	0.0000
53 012	68 52	.943	1.287	14.9917	27.2569	1.4912	-1.6778	6.7798	.0296	0.0000	0.0000	11.2274	.0614	0.0000	0.0000
54 012	68 74	.945	1.288	14.3523	27.5547	1.4444	-1.6895	6.7862	.0296	0.0000	0.0000	11.2409	.0614	0.0000	0.0000
55 S12	69 04	.949	1.290	13.5001	27.9631	1.3521	-1.6503	6.7973	.0430	0.0000	0.0000	11.2612	.0725	0.0000	0.0000
56 OS12	69 26	.951	1.291	12.9211	28.2488	1.3064	-1.6614	6.8066	.0430	0.0000	0.0000	11.2770	.0725	0.0000	0.0000
57 013	69 65	.956	1.293	12.5067	27.4928	-.2171	2.5899	6.9777	.8463	0.0000	0.0000	11.5613	1.4056	0.0000	0.0000
58 013	70 03	.961	1.296	13.2664	24.3686	-1.7805	5.3795	7.4651	1.6880	0.0000	0.0000	12.3706	2.8025	0.0000	0.0000
59 013	70 53	.966	1.299	15.1147	19.3228	-1.9368	4.7686	8.3043	1.6880	0.0000	0.0000	13.7641	2.8025	0.0000	0.0000
60 014	70 65	.970	1.302	15.8970	16.9338	-.4722	2.7438	8.7144	.8574	0.0000	0.0000	14.4448	1.4235	0.0000	0.0000
61 014	71 17	.973	1.305	15.7091	16.7221	1.0509	1.0663	8.8525	-.0000	0.0000	0.0000	14.6741	.0000	0.0000	0.0000
62 LS*	79 02	1.102	1.435	7.4647	7.3569	.0000	-.0000	8.8525	-.0000	0.0000	0.0000	14.6741	.0000	0.0000	0.0000
63 A20	79 02	1.102	1.435	7.4647	7.3569	.0000	-.0000	8.8525	-.0000	0.0000	0.0000	14.6741	.0000	0.0000	0.0000
64 REFL	158 03	2.204	2.871	7.7948	7.2744	.0000	-.0000	-.0285	-.0000	0.0000	0.0000	-.0218	0.0000	0.0000	0.0000

CIRCUMFERENCE = 474.0968 M      THETA = 6.28318533 RAD      NUX = 6.61170      DNUX/(DP/P) = 1.13607  
 RADIUS = 75.4549 M      THETA( 63) = 0.00000000 RAD      NUZ = 8.61240      DNUZ/(DP/P) = 31979  
 (DS/S)/(DP/P) = .0340780      TGAM = ( 5.41705, 0.00000)

MAXIMA --- BETX( 48) = 33.75723      BETY( 23) = 30.91887      ETAX( 61) = 8.85247      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 17) = 2.87575      BETY( 19) = 1.98486      ETAX( 28) = -.05199      ETAY( 64) = 0.00000

\*\*\* PAGE //

CORE  
7 06718 GEV KINETIC

```
*** DP      =      //      -0.00590  
*** V      PVEC  //  
*** CORE  FXPT  2  -3 //      V      R76      1      DP  
***
```

CALCULATION OF THE EQUILIBRIUM ORBIT AND BETATRON FUNCTIONS OF CORE

INITIAL REFERENCE RAY DEFINED BY V

X = 0.00000000 DX = 0.00000000 Y = 0.00000000 DY = 0.00000000 DS = 0.00000000 DP/P = -0.00690000 1.00000000

2X2 MATRIX FOR CORE

28548057	6.43517268	0.00000000	0.00000000	0.00000000	0.06679535	0.0019826
-14273134	28548057	0.00000000	0.00000000	0.00000000	0.01334294	0.0003960
0.00000000	0.00000000	69555851	-5.15560016	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	10012382	69555851	0.00000000	0.00000000	0.00000000
-0.01334294	-0.06679535	0.00000000	0.00000000	1.00000000	-5.22016486	0.03847210
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000

EIGENVALUES OF THE 4X4 SUBMATRIX

X LMD1 = ( 28548057 95838450 ), C(1) = 1.00000000, MU(1) = 1.28128850 RAD, Q(1) = 61177020  
 1/LMD1 = ( 28548057 -95838450 ), C(2) = 1.00000000, MU(2) = -1.28128850 RAD, Q(2) = 38822980  
 Y LMD3 = ( 69555851 71846946 ), C(3) = 1.00000000, MU(3) = 80159936 RAD, Q(3) = 38273550  
 1/LMD3 = ( 69555851 -71846946 ), C(4) = 1.00000000, MU(4) = -80159936 RAD, Q(4) = 61726450

EIGENVALUE = ( 28548057, 95838450 ), EIGENVECTOR = ( 2.59125536, 0.00000000 )  
 ( -0.00000000, 0.38591334 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( 28548057, -95838450 ), EIGENVECTOR = ( 2.59125536, 0.00000000 )  
 ( -0.00000000, -0.38591334 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( 69555851, 71846946 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.67877020, 0.00000000 )  
 ( -0.00000000, -0.37330563 )

EIGENVALUE = ( 69555851, -71846946 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.67877020, 0.00000000 )  
 ( -0.00000000, 0.37330563 )

	X	DX	Y	DY	DS	DP/P	
EQ ORBIT	-0.00036225	0.00000000	0.00000000	0.00000000	0.00000000	-0.00690000	1.00000000
ETA ORBIT	0.09348290	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000

EIGENVECTORS 1 AND 3 IN POLAR COORDINATES

POS	X1	X3	DX1	DX3	Y1	Y3	DY1	DY3
0	2.591255	0.000000	1.385913	1.570796	0.000000	0.000000	0.000000	0.000000
	0.000000	0.000000	0.000000	0.000000	2.678770	0.000000	373306	-1.570796

DEFLECTION FUNCTIONS OF CORE													XC	DXC	YC	DYC
POS	S	QX	QY	BX	BY	AX	AY	EX	EXP	EY	EYP	(MM)	(MM)	(MM)	(MM)	
(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	(M)	
0	0.00	0.000	0.000	6.7146	7.1758	0.0000	0.0000	.0935	.0000	0.0000	0.0000	-3622	0.0000	0.0000	0.0000	
1 A10	0.00	0.000	0.000	6.7146	7.1758	0.0000	0.0000	.0935	.0000	0.0000	0.0000	-3622	0.0000	0.0000	0.0000	
2 LS	7.95	138	133	16.1190	15.9758	-1.1835	-1.1074	.0935	.0000	0.0000	0.0000	-3622	0.0000	0.0000	0.0000	
3 Q1	8.27	141	136	16.2936	17.3051	.6447	3.0765	.0918	-.0104	0.0000	0.0000	-3557	0.0000	0.0000	0.0000	
4 Q1	8.59	145	139	15.3136	20.0367	2.3800	-5.5421	.0867	-.0208	0.0000	0.0000	-3362	0.0000	0.0000	0.0000	
5 Q1	9.10	150	143	12.9888	26.1320	2.1570	-6.3532	.0761	-.0208	0.0000	0.0000	-2950	0.0000	0.0000	0.0000	
6 Q2	9.75	159	146	12.1482	30.4926	-.8106	.0466	.0680	-.0042	0.0000	0.0000	-2637	0.0000	0.0000	0.0000	
7 Q2	10.41	167	150	15.3387	26.0219	-4.2998	6.4193	.0704	.0118	0.0000	0.0000	-2733	0.0000	0.0000	0.0000	
8 Q2	11.37	175	157	24.7717	15.1860	-5.5202	4.8612	.0817	.0118	0.0000	0.0000	-3171	0.0000	0.0000	0.0000	
9 Q3	11.72	177	161	27.6176	12.5531	-2.4802	2.7591	.0841	.0014	0.0000	0.0000	-3261	0.0000	0.0000	0.0000	
10 Q3	12.07	179	166	28.1488	11.2038	.9868	1.1461	.0827	-.0091	0.0000	0.0000	-3209	0.0000	0.0000	0.0000	
11 Q3	12.98	184	180	26.4215	9.3000	.9234	.9594	.0745	-.0091	0.0000	0.0000	-2893	0.0000	0.0000	0.0000	
12 B3	14.50	194	211	23.7719	6.7953	.8167	.6780	.1276	.0788	0.0000	0.0000	-6977	0.0000	0.0000	0.0000	
13 QB3	20.92	247	403	16.1731	6.9484	.3662	-.7019	.6341	.0788	0.0000	0.0000	-4.3702	0.0000	0.0000	0.0000	
14 Q4	21.15	249	408	15.7332	7.4052	1.5471	-1.3076	.6465	.0300	0.0000	0.0000	-4.4628	0.0000	0.0000	0.0000	
15 Q4	21.38	252	413	14.7747	8.1580	2.6215	-2.0043	.6477	-.0193	0.0000	0.0000	-4.4783	0.0000	0.0000	0.0000	
16 Q4	24.64	328	448	3.3433	27.7703	.8840	-4.0099	.5846	-.0193	0.0000	0.0000	-4.1474	0.0000	0.0000	0.0000	
17 Q5	25.06	350	450	2.8710	29.5112	-.2784	-.1146	.5935	.0622	0.0000	0.0000	-4.2241	0.0000	0.0000	0.0000	
18 Q5	25.47	373	452	2.8645	27.9529	-.2623	3.8065	.6364	.1473	0.0000	0.0000	-4.5435	0.0000	0.0000	0.0000	
19 Q5	32.82	531	703	26.8640	1.9315	-3.0039	-.2651	1.7191	.1473	0.0000	0.0000	-12.4522	0.0000	0.0000	0.0000	
20 Q6	33.17	533	730	27.8812	2.2710	.1417	-.7166	1.7353	-.0551	0.0000	0.0000	-12.5747	0.0000	0.0000	0.0000	
21 Q6	33.52	535	751	26.6706	2.9636	3.2646	-1.2862	1.6807	-.2554	0.0000	0.0000	-12.1877	0.0000	0.0000	0.0000	
22 Q6	37.71	585	825	6.9951	29.4367	1.4344	-5.0363	.6115	-.2554	0.0000	0.0000	-4.5638	0.0000	0.0000	0.0000	
23 Q7	38.06	593	827	6.3068	31.7902	.5558	-1.5861	.5340	-.1881	0.0000	0.0000	-4.0150	0.0000	0.0000	0.0000	
24 Q7	38.41	602	829	6.1943	31.6002	-.2305	2.1205	.4787	-.1287	0.0000	0.0000	-3.6314	0.0000	0.0000	0.0000	
25 Q7	41.25	665	847	8.8855	20.9340	-.7146	1.6252	.1122	-.1287	0.0000	0.0000	-1.1382	0.0000	0.0000	0.0000	
26 S7	41.56	670	849	9.3370	19.9592	-.7668	1.5729	.0730	-.1287	0.0000	0.0000	-.8714	0.0000	0.0000	0.0000	
27 OS7	42.85	690	860	11.6042	16.1825	-.9867	1.3479	-.0934	-.1287	0.0000	0.0000	-2607	0.0000	0.0000	0.0000	
28 B7	45.90	723	901	19.1536	9.2116	-1.5024	.9033	-.2165	.0475	0.0000	0.0000	1.0722	0.0000	0.0000	0.0000	
29 OB7	46.41	727	910	20.7239	8.3448	-1.5888	.8031	-.1924	.0475	0.0000	0.0000	.8994	0.0000	0.0000	0.0000	
30 Q8	46.64	728	914	21.0945	8.1289	-.0230	.1470	-.1799	.0617	0.0000	0.0000	.8140	0.0000	0.0000	0.0000	
31 Q8	46.87	730	919	20.7447	8.2089	1.5443	-.4990	-.1642	.0748	0.0000	0.0000	.7147	0.0000	0.0000	0.0000	
32 Q8	48.09	740	941	17.2216	9.6517	1.3454	-.6845	-.0731	.0748	0.0000	0.0000	.1501	0.0000	0.0000	0.0000	
33 B8	52.66	802	977	8.3864	18.2172	.6078	-1.1215	.8638	.3400	0.0000	0.0000	-6.0764	0.0000	0.0000	0.0000	
34 OB8	53.16	812	1.001	7.8111	19.3885	.5249	-1.1844	1.0365	.3400	0.0000	0.0000	-7.2412	0.0000	0.0000	0.0000	
35 Q9	53.39	817	1.003	7.7138	19.5943	-.0970	.2899	1.1236	.4228	0.0000	0.0000	-7.8300	0.0000	0.0000	0.0000	
36 Q9	53.62	821	1.005	7.9008	19.1266	-.7257	1.7442	1.2304	.5131	0.0000	0.0000	-8.5556	0.0000	0.0000	0.0000	
37 Q9	53.93	827	1.007	8.3611	18.0830	-.7846	1.6798	1.3868	.5131	0.0000	0.0000	-9.6195	0.0000	0.0000	0.0000	
38 S9	54.23	833	1.010	8.8512	17.0910	-.8230	1.5756	1.5426	.5096	0.0000	0.0000	-10.6815	0.0000	0.0000	0.0000	
39 OS9	54.84	843	1.016	9.9250	15.2457	-.9385	1.4514	1.8533	.5096	0.0000	0.0000	-12.8021	0.0000	0.0000	0.0000	
40 B9	59.41	892	1.098	22.2238	5.6755	-1.7947	.5767	4.7495	.7756	0.0000	0.0000	-32.6371	0.0000	0.0000	0.0000	
41 OB9	59.92	896	1.113	24.0962	5.1502	-1.8912	.4574	5.1434	.7756	0.0000	0.0000	-35.3349	0.0000	0.0000	0.0000	
42 Q10	60.14	897	1.120	24.7911	4.9901	-1.1396	.2446	5.3016	.6072	0.0000	0.0000	-36.4183	0.0000	0.0000	0.0000	
43 Q10	60.37	899	1.127	25.1337	4.9253	-.3547	.0390	5.4208	.4344	0.0000	0.0000	-37.2355	0.0000	0.0000	0.0000	
44 Q10	60.88	902	1.144	25.5056	4.9382	-.3775	-.0643	5.6414	.4344	0.0000	0.0000	-38.7509	0.0000	0.0000	0.0000	
45 B10	65.44	928	1.260	29.7616	9.4050	-.5795	-.8778	8.1905	.7001	0.0000	0.0000	-56.3225	0.0000	0.0000	0.0000	
46 OB10	65.73	930	1.265	30.1038	9.9335	-.5926	-.9327	8.3949	.7001	0.0000	0.0000	-57.7279	0.0000	0.0000	0.0000	
47 S10	66.04	931	1.270	30.5455	10.4936	-.8572	-.9037	8.6190	.7703	0.0000	0.0000	-59.2321	0.0000	0.0000	0.0000	
48 OS10	66.33	933	1.274	31.0507	11.0359	-.8738	-.9542	8.8438	.7703	0.0000	0.0000	-60.7076	0.0000	0.0000	0.0000	
49 Q11	66.77	935	1.280	30.0168	12.5927	3.1952	-2.6786	8.9183	-.4315	0.0000	0.0000	-61.1298	0.0000	0.0000	0.0000	

PDS	S (M)	GX	GY	BX (M)	BY (M)	AX	AY	FX (M)	FY (M)	EY (M)	EYP	XPD (MM)	DXCG (MM)	YCG (MM)	STCG (MM)
50 Q11	67.20	937	1.285	25.6794	15.5026	6.5318	-5.0407	8.4701	-1.6889	0.0000	0.0000	-57.997	11.1365	0.0000	0.0000
51 Q11	67.72	941	1.290	19.3346	21.6060	5.6458	-5.9059	7.6323	-1.6000	0.0000	0.0000	-52.1954	11.1365	0.0000	0.0000
52 Q12	68.11	945	1.292	15.9959	25.2987	3.1369	-3.5181	7.1831	-1.7298	0.0000	0.0000	-49.0583	5.1756	0.0000	0.0000
53 Q12	68.50	949	1.294	14.3433	26.8726	1.2093	-4.978	7.0649	1.147	0.0000	0.0000	-48.1685	-5.482	0.0000	0.0000
54 Q12	68.71	951	1.296	13.8247	27.0917	1.1719	-5.3079	7.0899	1.147	0.0000	0.0000	-48.2877	-5.482	0.0000	0.0000
55 S12	69.02	955	1.298	13.0914	27.4774	1.2324	-7.7583	7.1155	0.593	0.0000	0.0000	-48.4231	-3.401	0.0000	0.0000
56 OS12	69.24	958	1.299	12.5637	27.8104	1.1905	-7.7707	7.1271	0.533	0.0000	0.0000	-48.4972	-3.401	0.0000	0.0000
57 Q13	69.62	963	1.301	12.2270	27.1462	-3.3063	2.4672	7.3121	9.992	0.0000	0.0000	-49.7402	-6.1234	0.0000	0.0000
58 Q13	70.01	967	1.303	13.0493	24.1187	-1.8596	5.2618	7.8340	1.8070	0.0000	0.0000	-53.2617	-12.1873	0.0000	0.0000
59 Q13	70.51	973	1.307	14.9831	19.1801	-2.0295	4.6704	8.7325	1.8070	0.0000	0.0000	-59.3214	-12.1873	0.0000	0.0000
60 Q14	70.83	976	1.310	15.8280	16.8492	-5.671	2.6540	9.1719	9.180	0.0000	0.0000	-62.2818	-6.1912	0.0000	0.0000
61 Q14	71.15	980	1.313	15.6990	15.6742	9.663	-9.764	9.3199	-0.000	0.0000	0.0000	-63.2791	0.000	0.0000	0.0000
62 LS*	78.99	1.102	1.436	8.1182	8.0343	0.000	-0.000	9.3199	-0.000	0.0000	0.0000	-63.2791	0.000	0.0000	0.0000
63 A20	78.99	1.102	1.436	8.1182	8.0343	0.000	-0.000	9.3199	-0.000	0.0000	0.0000	-63.2791	0.000	0.0000	0.0000
64 REFL	157.99	2.204	2.872	6.7146	7.1758	0.000	-0.000	0.935	-0.000	0.0000	0.0000	-36.22	0.000	0.0000	0.0000

CIRCUMFERENCE = 473.9592 M      THETA = 6.28318533 RAD      NUX = 6.61177      DNUX/(DP/P) = -22134  
 RADIUS = 75.4330 M      THETA( 63) = 0.00000000 RAD      NUZ = 8.61726      DNUZ/(DP/P) = 32513  
 (DS/S)/(DP/P) = 0330498      TGM = ( 5.50067, 0.00000)

MAXIMA --- BETX( 48) = 31.05075      BETY( 23) = 31.79018      ETAX( 61) = 9.31994      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 18) = 2.86447      BETY( 19) = 1.93146      ETAX( 28) = -21650      ETAY( 64) = 0.00000

EXTRACTION ORBIT  
B. 0 GEV KINETIC

```
*** DP      =  
*** V      PVEC  
*** EXT    FXPT    2  -3  //  .00825  
*          //      V    R/6    1  
          //
```

DP



CALCULATION OF THE EQUILIBRIUM ORBIT AND BETATRON FUNCTIONS OF EXT  
 INITIAL REFERENCE RAY DEFINED BY V

X = 0.00000000 DX = 0.00000000 Y = 0.00000000 DY = 0.00000000 DS = 0.00000000 DP/P = 00825000 1.00000000

7X7 MATRIX FOR EXT

.27141873	B.50707256	0.00000000	0.00000000	0.00000000	-.13191220	00060208
-.10888962	.27141873	0.00000000	0.00000000	0.00000000	-.01971485	00008978
0.00000000	0.00000000	.70581336	-5.11973196	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	.09801832	.70581336	0.00000000	0.00000000	0.00000000
.01971485	.13191220	0.00000000	0.00000000	1.00000000	-5.46449632	-.04241407
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	1.00000000

EIGENVALUES OF THE 4X4 SUBMATRIX

X... LMD1 = ( .27141873 .96246136 ), C(1) = 1.00000000, MU(1) = 1.29592953 RAD, G(1) = 61876077  
 1/LMD1 = ( .27141873 -.96246136 ), C(2) = 1.00000000, MU(2) = -1.29592953 RAD, G(2) = 38123923  
 Y... LMD3 = ( .70581336 .70839784 ), C(3) = 1.00000000, MU(3) = .78722567 RAD, G(3) = 37587257  
 1/LMD3 = ( .70581336 -.70839784 ), C(4) = 1.00000000, MU(4) = -.78722567 RAD, G(4) = 62412743

EIGENVALUE = ( .27141873, .96246136 ), EIGENVECTOR = ( 2.97302401, -.00000000 )  
 ( 0.00000000, .33635786 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( .27141873, -.96246136 ), EIGENVECTOR = ( 2.97302401, .00000000 )  
 ( 0.00000000, -.33635786 )  
 ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )

EIGENVALUE = ( .70581336, .70839784 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.68834497, .00000000 )  
 ( .00000000, -.37197607 )

EIGENVALUE = ( .70581336, -.70839784 ), EIGENVECTOR = ( 0.00000000, 0.00000000 )  
 ( 0.00000000, 0.00000000 )  
 ( 2.68834497, -.00000000 )  
 ( .00000000, .37197607 )

	X	DX	Y	DY	DS	DP/P
EQ ORBIT	-.00067869	0.00000000	0.00000000	0.00000000	0.00000000	.00825000 1.00000000
ETA ORBIT	-.18105351	-.00000000	0.00000000	0.00000000	0.00000000	1.00000000 0.00000000

MECHANICAL AND ELECTRICAL COORDINATES

PUB

X1  
X3

DX1  
DX3

Y1  
Y3

DY1  
DY3

0

2.973024 -0.000000  
0.000000 0.000000

.336358  
0.000000

1.570796  
0.000000

0.000000  
2.688545

0.000000  
0.000000

0.000000  
.371976

0.000000  
-1.570796

DEFLECTION FUNCTIONS OF EXT																			
POS		S	GY	BX	BY	AX	AY	EX	EXP	EY	EYP	XCU	YCU	ZCU	MYCU				
		(M)		(M)	(M)			(M)		(M)		(MM)	(MM)	(MM)	(MM)				
0		0.00	0.000	0.000	8.8389	7.2272	0.0000	0.0000	-1811	-0600	0.0000	0.0000	-6787	0.0000	0.0000				
1	A10	0.00	0.000	0.000	8.8389	7.2272	0.0000	0.0000	-1811	-0600	0.0000	0.0000	-6787	0.0000	0.0000				
2	LS	7.95	117	133	15.9831	15.9646	-8990	-1.0995	-1811	-0600	0.0000	0.0000	-6787	0.0000	0.0000				
3	Q1	8.27	120	134	15.9900	17.2790	8777	-3.0566	-1778	0201	0.0000	0.0000	-6666	0756	0.0000				
4	Q1	8.59	123	138	14.8861	19.9717	5301	-5.4573	-1683	0395	0.0000	0.0000	-6306	1485	0.0000				
5	Q1	9.10	129	142	12.4238	25.9692	2.2753	-6.2471	-1480	-0395	0.0000	0.0000	-5545	1485	0.0000				
6	Q2	9.75	138	146	11.3221	30.2772	-5.1119	0.1114	-1328	-0077	0.0000	0.0000	-4969	0293	0.0000				
7	Q2	10.41	147	149	13.9058	25.9422	-3.6234	6.2634	-1376	-0238	0.0000	0.0000	-5152	-0855	0.0000				
8	Q2	11.37	155	157	21.8045	15.3399	-4.5994	4.7738	-1593	-0238	0.0000	0.0000	-5973	-0855	0.0000				
9	Q3	11.72	158	161	24.1356	12.7591	-1.9555	2.6941	-1641	-0029	0.0000	0.0000	-6142	-0109	0.0000				
10	Q3	12.07	160	166	24.4683	11.4532	1.0200	1.0847	-1616	0170	0.0000	0.0000	-6049	0642	0.0000				
11	Q3	12.98	166	179	22.6920	9.6471	9446	9129	-1462	0170	0.0000	0.0000	-5468	0642	0.0000				
12	B3	14.50	178	208	20.0113	7.2437	8177	6578	-0544	1036	0.0000	0.0000	0946	7787	0.0000				
13	Q3	20.92	243	389	12.9472	6.9538	2820	-6.127	6113	1036	0.0000	0.0000	5.0966	7787	0.0000				
14	Q3	21.15	246	394	12.6048	7.3666	1.2073	-2.2034	6298	0577	0.0000	0.0000	5.2308	3934	0.0000				
15	Q4	21.38	249	398	11.8557	8.0667	2.0509	-1.8766	6377	0108	0.0000	0.0000	5.2750	0015	0.0000				
16	Q4	24.64	338	434	3.1496	26.2662	6.189	-3.7044	6730	0108	0.0000	0.0000	5.2808	0015	0.0000				
17	Q5	25.06	360	437	2.8751	27.8624	0.565	-0.782	6964	1028	0.0000	0.0000	5.4308	7266	0.0000				
18	Q5	25.47	383	439	3.0524	26.3909	-1.4928	3.5653	7589	2006	0.0000	0.0000	5.8881	1.4928	0.0000				
19	Q5	32.82	516	685	32.2786	2.0472	-3.4847	-2.5522	2.2325	2006	0.0000	0.0000	16.8568	1.4928	0.0000				
20	Q6	33.17	517	711	33.4309	2.3765	2415	-6.998	2.2581	-0549	0.0000	0.0000	17.0402	-4499	0.0000				
21	Q6	33.52	519	731	31.9489	3.0548	3.9296	-1.2610	2.1943	-3081	0.0000	0.0000	16.5435	-3746	0.0000				
22	Q6	37.71	561	806	8.0638	28.4810	1.7748	-4.8114	9042	-3081	0.0000	0.0000	6.6008	-2.3746	0.0000				
23	Q7	38.06	568	807	7.1799	30.7323	7809	-1.5251	8137	-2102	0.0000	0.0000	5.8966	-1.6574	0.0000				
24	Q7	38.41	576	809	6.9393	30.5620	-0.852	2.0042	7559	-1208	0.0000	0.0000	5.4311	-1.0073	0.0000				
25	Q7	41.25	636	827	8.6015	20.4789	-4.985	1.5367	4119	-1208	0.0000	0.0000	2.5627	-1.0073	0.0000				
26	S7	41.56	642	830	8.9187	19.5579	-5.420	1.4850	3751	-1208	0.0000	0.0000	2.2556	-1.0074	0.0000				
27	Q7	42.85	663	841	10.5629	15.9916	-7.296	1.2731	2188	-1208	0.0000	0.0000	9530	-1.0074	0.0000				
28	B7	45.90	700	881	16.3211	9.3944	-1.1695	8593	1155	0527	0.0000	0.0000	0687	4243	0.0000				
29	Q7	46.41	705	890	17.5468	8.5692	-1.2432	7.653	1422	0527	0.0000	0.0000	2843	4243	0.0000				
30	Q8	46.64	707	895	17.8191	8.3718	0.586	-1.030	1530	0417	0.0000	0.0000	3786	3996	0.0000				
31	Q8	46.87	709	899	17.4938	8.4739	1.3564	-5.522	1613	0300	0.0000	0.0000	4664	3680	0.0000				
32	Q8	48.09	721	920	14.4276	10.0494	1.1585	-1.7400	1978	0300	0.0000	0.0000	9151	3680	0.0000				
33	Q8	52.66	794	974	7.2767	19.1277	4.247	-1.1804	9241	2911	0.0000	0.0000	7.4493	5221	0.0000				
34	Q8	53.17	806	978	6.8870	20.3593	3423	-1.2440	1.0719	2911	0.0000	0.0000	8.7305	5221	0.0000				
35	Q9	53.39	811	980	6.8561	20.5806	-2.065	2819	1.1478	3736	0.0000	0.0000	9.3838	3.2014	0.0000				
36	Q9	53.62	816	981	7.0780	20.1047	-7.697	1.7885	1.2432	4626	0.0000	0.0000	10.1984	3.9357	0.0000				
37	Q9	53.93	823	984	7.5681	19.0339	-8.382	1.7248	1.3842	4626	0.0000	0.0000	11.3979	3.9357	0.0000				
38	Q9	54.23	829	986	8.1066	17.9868	-9.287	1.7099	1.5258	4665	0.0000	0.0000	12.6000	3.9519	0.0000				
39	Q9	54.84	840	992	9.3243	15.9831	-1.0688	1.5769	1.8102	4665	0.0000	0.0000	15.0091	3.9519	0.0000				
40	B9	59.42	889	1.073	23.7495	5.5174	-2.1077	6.250	4.5161	7268	0.0000	0.0000	37.7711	6.1029	0.0000				
41	Q9	59.93	893	1.089	25.9500	4.9475	-2.2241	4.969	4.8853	7268	0.0000	0.0000	40.8714	6.1029	0.0000				
42	Q10	60.16	894	1.096	26.7878	4.7681	-1.4304	2.896	5.0338	5717	0.0000	0.0000	42.1177	4.7944	0.0000				
43	Q10	60.39	895	1.104	27.2523	4.6813	-5.955	0.906	5.1464	4125	0.0000	0.0000	43.0608	4.4514	0.0000				
44	Q10	60.89	898	1.121	27.8702	4.6449	-6.207	-0.188	5.3560	4125	0.0000	0.0000	44.8141	3.4514	0.0000				
45	B10	65.48	922	1.247	34.5953	9.0192	-8.459	-9.062	7.8257	6730	0.0000	0.0000	65.3457	5.6031	0.0000				
46	Q10	65.77	923	1.252	35.0933	9.5654	-8.604	-9.652	8.0222	6730	0.0000	0.0000	66.9812	5.6031	0.0000				
47	S10	66.08	924	1.257	35.5208	10.2013	-5.411	-1.1224	8.2157	5970	0.0000	0.0000	68.6405	5.2843	0.0000				
48	Q10	66.37	926	1.261	35.8398	10.8754	-5.517	-1.1871	8.3900	5970	0.0000	0.0000	70.1829	5.2843	0.0000				
49	Q11	66.81	928	1.267	34.2876	12.6328	4.0373	-2.9125	8.4101	-5055	0.0000	0.0000	70.4597	-4.0235	0.0000				

POS	S (M)	GX	GY	BA (M)	BT (M)	CA	CT	EA (M)	EXE	EY (M)	EYP	XCD (MM)	DXD (MM)	YCD (MM)	YD (MM)
50 Q11	67.24	930	1.272	29.0478	16.1645	7.7143	-5.3205	7.9519	-1.5793	0.0000	0.0000	54.7010	13.1002	0.0000	0.0000
51 Q11	67.76	933	1.276	21.5747	22.2008	6.6290	-6.2651	7.1290	-1.5793	0.0000	0.0000	59.8752	13.1008	0.0000	0.0000
52 Q12	68.15	936	1.279	17.6032	26.1741	3.8176	-3.8790	6.6746	-1.7855	0.0000	0.0000	56.1297	-6.3736	0.0000	0.0000
53 Q12	68.54	940	1.281	15.5038	28.0094	1.7027	-1.8058	6.5185	-0.2668	0.0000	0.0000	54.9166	0.6559	0.0000	0.0000
54 Q12	68.75	942	1.282	14.7740	28.3632	1.6480	-1.8186	6.5127	-0.2668	0.0000	0.0000	54.9309	0.6559	0.0000	0.0000
55 S12	69.06	946	1.284	13.8340	28.7834	1.4383	-1.5590	6.5140	0.356	0.0000	0.0000	54.9913	3304	0.0000	0.0000
56 OS12	69.28	948	1.285	13.2180	29.0290	1.3900	-1.5689	6.5218	0.356	0.0000	0.0000	55.0633	3304	0.0000	0.0000
57 Q13	69.66	953	1.287	12.7482	28.1768	-1.1566	-2.7465	6.6813	0.7948	0.0000	0.0000	56.4340	6.7962	0.0000	0.0000
58 Q13	70.05	958	1.290	13.4648	24.9183	-1.7317	5.5755	7.1395	1.5896	0.0000	0.0000	60.3507	13.5685	0.0000	0.0000
59 O13	70.55	963	1.293	15.2603	19.6921	-1.8794	4.9353	7.9298	1.5896	0.0000	0.0000	67.0972	13.5685	0.0000	0.0000
60 Q14	70.87	967	1.296	16.0055	17.2047	-1.4090	2.8783	8.3165	0.8072	0.0000	0.0000	70.3922	6.8912	0.0000	0.0000
61 Q14	71.19	970	1.299	15.7781	15.9122	1.1119	1.1832	8.4467	-0.0000	0.0000	0.0000	71.5027	0.0000	0.0000	0.0000
62 LS*	79.03	1.103	1.437	7.0555	6.6303	0.0000	-1.0000	8.4467	-0.0000	0.0000	0.0000	71.5027	0.0000	0.0000	0.0000
63 A20	79.03	1.103	1.437	7.0555	6.6303	0.0000	-1.0000	8.4467	-0.0000	0.0000	0.0000	71.5027	0.0000	0.0000	0.0000
64 REFL	158.07	2.206	2.875	8.8389	7.2272	0.0000	-1.0000	-1.811	0.0000	0.0000	0.0000	-1.6787	0.0000	0.0000	0.0000

CIRCUMFERENCE = 474.2024 M      THETA = 6.28318533 RAD      NUX = 6.61876  
 RADIUS = 75.4717 M      THETA( 63) = 0.00000000 RAD      NUZ = 8.62413      DNUX/(DP/P) = 1.94317  
 (DS/S)/(DP/P) = 0.345932      TGAM = ( 5.37656, 0.00000)      DNUZ/(DP/P) = 2.3079

MAXIMA --- BETX( 48) = 35.83982      BETY( 23) = 30.73231      ETAX( 61) = 8.44668      ETAY( 64) = 0.00000  
 MINIMA --- BETX( 17) = 2.87511      BETY( 19) = 2.04719      ETAX( 2) = -1.8105      ETAY( 64) = 0.00000  
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