PRECOOLER LATTICE

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- 6 Sep 1960
- 1-10-1960

PCB1 RJN

PRECOOLER LATTICE

APR 2 FEB 1991

C 7 0.47 M, 2 SUPERPERIODS, 2 20M STRAIGHTS WITH DISPERS

C 8 12 CELLS PER QUADRANT

C 4 MISSING DIPOLES IN C3, 2 MISSING DIPOLES IN C8

C TRIPLETS IN STRAIGHT SECTIONS

C

C SCALARS --- (BRHO, B0 VALUES FOR 4.5 GEV KINETIC ENERGY)

BRHO = 17.8681155

B0 = .730824538

RHO = 24.4492550

RHO1 = 1. / RHO

LB = 1.3716

LQ = .3048

LQL = .6096

B* = 10.

MUX = .25233

MUY = .25877

C GRADIENTS-- K=GRADIENT/BRHO

KF = .51580690

KO = -.51663032

K1 = .37166

K2 = -.39101

K3 = .52751

KO1 = -.34131

KF1 = .54540

K21 = -.36873

K22 = .38677

K23 = -.47085

KF9 = .31345

C DRIFT SPACES ---

O DRF .3048

OO DRF .77963

OOO DRF 4.13243

LL DRF 10.

L1 DRF 1.1159

L2 DRF 2.67062

L3 DRF .3048

C DIPOLE MAGNET ---

B MAG LB 0. 1. RHO1 \$

C

C LATTICE DEFINITIONS ---

.BB BML QD B 0 B 0

.BB9 BML Q5 B 0 B 06

.DF BML QD .BB QF

.FD BML QF .DB QD

.C BML .DF .FD

.DF1 BML QD1 .BB QF1

.FD1 BML QF1 .BB QD

.C1 BML .DF1 .FD1

.C3 BML QD OOO QF QF OOO QD

.C8 BML QD Q1 B 02 QF QF Q3 B 04 QD

.DF9 BML QD .BB9 QF9

.ARC BML .C1 .C .C3 .C .C .C .C .DF9

.S1 BML LL 1Q1 1Q1 0 1Q2 1Q2 L1 L2 1Q3 1Q3 L3 Q71

.S2 BML -1 LL 2Q1 2Q1 0 2Q2 2Q2 L1 L2 2Q3 2Q3 L3 QF9

.SPH BML .S1 .ARC .S2

.MM BML .C8 QD .BB9

.SS1 BML -1 .S1 .DF1 QF1 CC3R

.SS2 BML .C8 .DF9 .S2

C

P NORMAL CELLS ---

DO	SUB							
QF	MAG	LQ	KF	1.				
QD	MAG	LQ	KD	1.				
C	MM	.C						
	END							
CR	FITQ	DO	C	KF	KD	1	1MUX	MUY
CC3	REF	C						
CC3R	MM	.88	QD	.C	.C3			
	REF	CC3						
	CYC	.C						

C
P DISPERSION SUPPRESSOR ---

MF	SUB				
A1	=	-.27963			
A2	=	-.32936			
A3	=	-.32883			
D1	=	.77963	+	A1	
D4	=	.77963	+	A2	
D5	=	.77963	+	A3	
D2	=	1.9812	-	A1	
D3	=	1.9812	-	A2	
D6	=	.3048	-	A3	
O1	DRF	D1			
O2	DRF	D2			
O3	DRF	D3			
O4	DRF	D4			
O5	DRF	D5			
O6	DRF	D6			
TM	TRKB	0	16	MM	C

END
SOLV 2 2 MF TM 0 16
X 16

			0.	.0001
			0.	.0001
		1 -.47483	1.5	.01
		1 -.47483	.05	.01
O1	DRF	.5		
O2	DRF	2.26083		
O3	DRF	2.42483		
O4	DRF	.336		
O5	DRF	.52862		
O6	DRF	.55581		

C
P STRAIGHT SECTION NO. 1 --- WITH DISPERSION

SR1	SUB			
IQ1	MAG	LQL	K1	1.
IQ2	MAG	LQL	K2	1.
IQ3	MAG	LQL	K3	1.
QD1	MAG	LQL	KD1	1.
QF1	MAG	LQ	KF1	1.
T1	TRKB	0	21	.551 CR

END
BX2 = SOLV 5 1 SR1 T1 21 7000 -6
X 14

		0.	.001
		0.	.001
		0.	.000001
		0.	.001
		0.	.001

C) K1 K2 K3 KD1 KF1 1 -1.) .01

P STRAIGHT SECTION NO. 2 --- WITHOUT DISPERSION

SR2	SUB				
QF9	MAG	LQL	KF9	1.	
2Q3	MAG	LQL	K23	1.	
2Q2	MAG	LQL	K22	1.	
2Q1	MAG	LQL	K21	1.	
T2	TRKB	0 29 .552	C		

END
SOLV 4 1 SR2 T2 0 29

AX	29	0.	.JJ01
AY		0.	.0001
BX		B*	.01
BY		B*	.01
K21 K22 K23 KF9	1 -1.	1.	.01

C
C BETATRON FUNCTIONS THROUGH ONE QUADRANT, STARTING AT CENTER OF NO. 1 STRAIGHT

CYC
FIN
STOP

-2 .SPH

=====

R=75.47 M, 2 SUPERPERIODS, 2 20M STRAIGHTS WITH DISPERSION, 2 WITHOUT.
 8 1/2 CELLS PER QUADRANT
 4 MISSING DIPOLES IN C3, 2 MISSING DIPOLES IN C8
 TRIPLETS IN STRAIGHT SECTIONS

SCALARS --- (BRHO, B0 VALUES FOR 4.5 GEV KINETIC ENERGY)

***	BRHO	=	//	17.8681155	
***	B0	=	//	.730824538	
***	RHO	=	//	24.4492550	
***	RHO1	=	//	1.	/ RHO
***	LB	=	//	1.3716	
***	LQ	=	//	.3048	
***	LQL	=	//	.6096	
***	B*	=	//	10.	
***	MUX	=	//	.25233	
***	MUY	=	//	.25877	

GRADIENTS--- K=GRADIENT/BRHO

***	KF	=	//	.51580690	
***	KD	=	//	-.51663032	
***	K1	=	//	.37166	
***	K2	=	//	-.39101	
***	K3	=	//	.52751	
***	KD1	=	//	-.34131	
***	KF1	=	//	.54540	
***	K21	=	//	-.36673	
***	K22	=	//	.38677	
***	K23	=	//	-.47085	
***	KF9	=	//	.31345	

DRIFT SPACES ---

***	O	DRF	//	.3048	
***	OO	DRF	//	.77963	
***	OOD	DRF	//	4.13243	
***	LL	DRF	//	10.	
***	L1	DRF	//	1.1159	
***	L2	DRF	//	2.67062	
***	L3	DRF	//	.3048	

DIPOLE MAGNET ---

***	B	MAG	//	LB	O.	1.	RHO1	\$
-----	---	-----	----	----	----	----	------	----

LATTICE DEFINITIONS ---

***	.BB	BML	//	QO	B	O	B	O	
***	.BB9	BML	//	O5	B	O	B	O6	
***	.DF	BML	//	QO	.BB	QF			
***	.FD	BML	//	QF	.BB	QO			
***	.C	BML	//	.DF	.FD				
***	.DF1	BML	//	QD1	.BB	QF1			
***	.FD1	BML	//	QF1	.BB	QO			
***	.C1	BML	//	.DF1	.FD1				
***	.C3	BML	//	QO	QOQ	QF	QF	QOQ	QO
***	.C8	BML	//	QO	O1	B	O2	QF	JF
***	.DF9	BML	//	QO	.BB9	QF9			
***	.ARC	BML	//	.C1	.C	.C3	.C	.C	.C
***	.S1	BML	//	LL	1Q1	1Q1	O	1Q2	1Q2
***	.S2	BML	//	LL	2Q1	2Q1	O	2Q2	2Q2
***	.PH	BML	//	.S1	.ARC	.S2			
***	.M	BML	//	.C8	QO	.BB9			
***	.SS1	BML	//	.S1	.DF1	QF1	CC3R		
***	.SS2	BML	//	.C8	.DF9	.S2			

NORMAL CELLS ---

```

*** DO      SUB      0      0  //
*** QF      MAG      //      LQ      KF      1.
*** QD      MAG      //      LQ      KD      1.
*** C       MM      //      .C
***      END      0      0  //

```

```

***      FITQ      //      DO      C      KF      KD      1      140X      MUJ

```

PARAMETER REPLACEMENTS MADE BY FITTING

1 OF KF = .515806900E+00

1 OF KD = -.516630320E+00

```

*** CR      REF      //      C
*** CC3     MM      //      .BB      QD      .C      .C3
*** CC3R    REF      //      CC3
***      CYC      //      .C

```

POS	S(M)	NUX	NUY	BETAX(M)	BETAY(M)	ETAX(M)	ETAY(M)	ETAS(M)	ALPHAX	ALPHAY	DETAX	DETAY
0	0.	0.	0.	2.76720	15.81971	.68564	0.	0.	.00000	.00302	.00549	0.
1 QD	.3048	.01719	.00312	2.93626	15.07601	.70384	0.	-0.	-.56353	2.39696	.11445	0.
2 QD	1.0844	.05331	.01250	4.08770	11.61048	.79307	0.	-0.	-.91337	2.04814	.11445	0.
3 B	2.4560	.09331	.03716	7.43523	6.80609	.98844	0.	.04962	-1.52351	1.44911	.17057	0.
4 0	2.7608	.09945	.04477	8.40870	5.96503	1.04043	0.	.04962	-1.66528	1.31028	.17057	0.
5 B	4.1324	.11974	.09548	13.81779	3.21441	1.31272	0.	.11529	-2.28043	.69197	.22668	0.
6 0	4.4372	.12309	.11157	15.24963	2.83533	1.38181	0.	.11529	-2.41720	.55174	.22668	0.
7 QF	4.7420	.12617	.12939	15.99839	2.66961	1.41738	0.	.11529	.00000	.00058	.00576	0.
8 QF	5.0468	.12925	.14720	15.24963	2.83459	1.38529	0.	.11529	2.41720	-.55047	-.21544	0.
9 QD	5.8265	.13852	.18452	11.75333	3.97232	1.21733	0.	.11529	2.06736	-.90885	-.21544	0.
10 B	7.1981	.16279	.22547	6.92841	7.31384	.96045	0.	.17603	1.45222	-1.52354	-.15933	0.
11 0	7.5029	.17027	.23170	6.08483	8.28479	.91188	0.	.17603	1.31545	-1.66195	-.15933	0.
12 B	8.8745	.21958	.25227	3.32148	13.66490	.73193	0.	.22179	.70030	-2.25438	-.10321	0.
13 0	9.1793	.23514	.25565	2.93626	15.08052	.70047	0.	.22179	.56353	-2.35005	-.10321	0.
14 QD	9.4841	.25233	.25877	2.76720	15.81971	.68564	0.	.22179	-.00000	.00302	.00549	0.

```

CIRCUMFERENCE = 9.4841 4      THETX = .22439948 RAD      NUX = .25233      DNUX/(DP/P) = -.30599
RADIUS = 1.5094 M      THETY( 14) = 0.      RAD      NUY = .25877      DNUY/(DP/P) = -.31681
(DS/S)/(DP/P) = .0233857      TGAM = ( 6.53920, 0. )

```

```

MAXIMA --- BETX( 7) = 15.99839      BETY( 14) = 15.81971      ETAX( 7) = 1.41738      ETAY( 14) = 0.
MINIMA --- BETX( 1) = 2.76720      BETY( 7) = 2.66961      ETAX( 14) = .68564      ETAY( 14) = 0.

```

DISPERSION SUPPRESSOR ---

*** HF SUB 0 0 //

```

*** A1 = // -.27963
*** A2 = // -.32936
*** A3 = // -.32883
*** D1 = // .77963 + A1
*** D4 = // .77963 + A2
*** D5 = // .77963 + A3
*** D2 = // 1.9812 - A1
*** D3 = // 1.9812 - A2
*** D6 = // .3048 - A3
*** 01 DRF // 01
*** 02 DRF // 02
*** 03 DRF // 03
*** 04 DRF // 04
*** 05 DRF // 05
*** 06 DRF // 06
*** TM TRKB 0 16 // .MM C 0 16

```

*** END 0 0 //

*** SOLV 2 2 // HF TM 0 16

```

* // X 16 0. .0001
* // DX 0. .0001
* // A2 1 -.47483 1.5 .01
* // A3 1 -.47483 .05 .01

```

--- SOLV --- BETA-FUNCTION FITTING

INITIAL VALUES OF VARIABLES

```

1 A2 -.32936000E+00
2 A3 -.32883000E+00

```

POS	S	QX	BX	AX	GX	X	DX	QY	BY	AY	GY	Y	OY
0	-0.	0.	2.7672	.0000	.3614	.685637	.005488	0.	15.8197	.0339	.0632	0.	0.
1 QD	.3048	.01719	2.9363	-.5635	.4487	.733843	.114453	.00312	15.0760	2.3973	.4474	0.	0.
2 01	.8048	.04172	3.6120	-.7879	.4487	.761069	.114453	.00865	12.7909	2.1733	.4474	0.	0.
3 B	2.1764	.08696	6.6155	-1.4030	.4487	.956433	.170567	.03100	7.6401	1.5761	.4560	0.	0.
4 02	4.4372	.12309	15.2531	-2.4175	.4487	1.342057	.170567	.11159	2.8444	.5451	.4560	0.	0.
5 QF	4.7420	.12617	16.0019	.0002	.0625	1.351604	-.042818	.12933	2.6829	-.0069	.3728	0.	0.
6 QF	5.0468	.12925	15.2528	2.4180	.4489	1.316153	-.254159	.14764	2.8530	-.5633	.4605	0.	0.
7 03	7.3574	.16660	6.4755	1.3808	.4489	.728914	-.254159	.22793	7.9006	-1.6243	.4605	0.	0.
8 B	8.7290	.21286	3.5332	.7655	.4489	.418956	-.198044	.24938	13.1909	-2.2267	.4517	0.	0.
9 04	9.1793	.23519	2.9349	.5634	.4489	.329783	-.198044	.25443	15.2677	-2.4303	.4517	0.	0.
10 QD	9.4841	.25238	2.7659	-.0000	.3615	.276881	-.150469	.25750	16.0413	-.0027	.0623	0.	0.
11 QD	9.7889	.26958	2.9349	-.5634	.4489	.237321	-.110145	.26057	15.2910	2.4251	.4500	0.	0.
12 05	10.2397	.29193	3.5341	-.7657	.4489	.187668	-.110145	.26563	13.1960	2.2222	.4500	0.	0.
13 B	11.6113	.33818	6.4771	-1.3811	.4489	.075136	-.054030	.28705	7.9146	1.6222	.4588	0.	0.
14 0	11.9161	.34521	7.3607	-1.5179	.4489	.358668	-.054030	.29358	6.9684	1.4423	.4588	0.	0.
15 B	13.2877	.36816	12.3660	-2.1332	.4489	.023062	.002084	.33682	3.7497	.8506	.4542	0.	0.
16 06	13.9213	.37550	15.2496	-2.4177	.4489	.024383	.002084	.36789	2.8454	.5665	.4642	0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	X	16	.0243828	0.	.0243828	.0001000
2	DX	16	.002084	0.	.0020845	.0001000

 * D506 M1 TS *
 * VERSION 1.75 *
 * DATA BLOCK NO. 1 *

 1 A2 1 -.329360 .010000 -.4748E+00 .1500E+01
 2 A3 1 -.328830 .010000 -.4748E+00 .5000E-01

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.2994324E+05	1	.316	0.	1 1 A2 1	-.32936E+00	.10000E-01	-.10211E+01	.19396E-01
				2 2 A3 1	-.32883E+00	.10000E-01	-.45964E+00	.42543E-01

 *** 1****PRINTOUT .00000 .00000 .00000 .00000 .00000 .00000 .00000

 *** 2****MINIMIZE .00000 1.00000 .00000 .00000 .00000 .00000 .00000

 START SIMPLEX MINIMIZATION CONVERGENCE CRITERION -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E+01
 SIMPLEX MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.3524549E-01	43	.417	.78E+00	1 1 A2 1	-.44462E+00	.10322E-01	-.18183E+01	.32559E-01
				2 2 A3 1	-.25205E+00	.11545E-01	-.15162E+00	.30893E-01

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000
 START MIGRAD MINIMIZATION. CONVERGENCE CRITERIA -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-04
 OR EDM .LT. .10E+01 AND FRACTIONAL CHANGE IN VARIANCE MATRIX .LT. .40E-01
 MIGRAD MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.1291384E-05	69	.480	.10E-03	1 1 A2 1	-.44363E+00	.77704E-02	-.18225E+01	.87837E-04
				2 2 A3 1	-.25101E+00	.95047E-02	-.14761E+00	-.74153E-04

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000

 *** 3****END RETURN .00000 .00000 .00000 .00000 .00000 .00000 .00000

FINAL VALUES OF VARIABLES

1 A2 -.44362628E+00
 2 A3 -.25100953E+00

POS	S	QX	BX	AX	GX	X	DX	QV	BY	AV	GV	V	DV
0	-0.	0.	2.7672	.0000	.3614	.685637	.005488	0.	15.8197	.0038	.0632 0.	0.	0.
1 QD	.3048	.01719	2.9363	-.5635	.4487	.703843	.114453	.00312	15.0760	2.3970	.4474 0.	0.	0.
2 01	.8048	.04172	3.6120	-.7879	.4487	.761069	.114453	.00885	12.7900	2.1733	.4474 0.	0.	0.
3 B	2.1764	.08596	6.6155	-1.4030	.4487	.956433	.170567	.03100	7.6401	1.5761	.4560 0.	0.	0.
4 02	4.4372	.12309	15.2531	-2.4175	.4487	1.342057	.170567	.11159	2.8444	.5451	.4560 0.	0.	0.
5 QF	4.7420	.12617	16.0019	.0002	.0625	1.361604	-.042818	.12933	2.6829	-.0059	.3728 0.	0.	0.
6 QF	5.0468	.12925	15.2528	2.4180	.4489	1.316163	-.254159	.14704	2.8930	-.5603	.4675 0.	0.	0.
7 03	7.4717	.16947	6.1658	1.3295	.4489	.699872	-.254159	.23018	8.2770	-1.6769	.4605 0.	0.	0.
8 B	8.8433	.21813	3.3642	.7142	.4489	.389914	-.198044	.25073	13.7111	-2.2781	.4514 0.	0.	0.
9 04	9.1793	.23519	2.9349	.5634	.4489	.323371	-.198044	.25442	15.2930	-2.4258	.4514 0.	0.	0.
10 QD	9.4841	.25238	2.7659	-.0000	.3615	.270314	-.151437	.25749	16.0461	-.0016	.0623 0.	0.	0.
11 0D	9.7889	.26958	2.9349	-.5634	.4489	.230284	-.112229	.26057	15.2949	2.4268	.4504 0.	0.	0.
12 05	10.3175	.29538	3.6560	-.8007	.4489	.170957	-.112229	.26657	12.8550	2.1887	.4504 0.	0.	0.
13 B	11.6891	.34006	6.6948	-1.4160	.4489	.055567	-.056115	.28863	7.6674	1.5875	.4591 0.	0.	0.
14 0	11.9939	.34686	7.5997	-1.5528	.4489	.038456	-.056115	.29537	6.7422	1.4476	.4591 0.	0.	0.

15 B	13.3655	.36914	12.7007	-2.1692	.4489	.000000	-0.000000	.34015	3.6201	.4252	.4643 0.	0.
16 06	13.9213	.37550	15.2496	-2.4177	.4489	.000000	-0.000000	.36785	2.9462	.5571	.4643 0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	X	16	.0000001	0.	.0000001	.0001000
2	DX	16	-.0000001	0.	-.0000001	.0001000

FCN = SUM((ERROR/TOL.)**2) / 2 = .1291384E-05

*** 01	DRF	//	.5
*** 02	DRF	//	2.26093
*** 03	DRF	//	2.42483
*** 04	DRF	//	.336
*** 05	DRF	//	.52862
*** 06	DRF	//	.55581

STRAIGHT SECTION NO. 1 --- WITH DISPERSION

```

*** 1 SUB 0 0 //
*** IQ1 MAG // LQL K1 1.
*** IQ2 MAG // LQL K2 1.
*** IQ3 MAG // LQL K3 1.
*** QD1 MAG // LQL KD1 1.
*** QF1 MAG // LQ KF1 1.
*** T1 TRKB 0 21 // .551 CR
* //
* //
*** END 0 0 //

```

```

*** BX2 = // 4.
*** SOLV 5 1 // SR1 T1 21 7300 -6
* // X 14 0. .001
* // BX BX2 .001
* // WAIST 21 0. .000001
* // BX B* .001
* // BY B* .001
* // K1 K2 K3 KD1 KF1 1 -1. 1. .01

```

--- SOLV --- BETA-FUNCTION FITTING

INITIAL VALUES OF VARIABLES

```

1 K1 .37166000E+00
2 K2 -.39101000E+00
3 K3 .52751000E+00
4 KD1 -.34131000E+00
5 KF1 .54540000E+00

```

POS	S	QX	BX	AX	GX	X	DX	QY	BY	AY	GY	Y	DY
0	-0.	0.	2.7672	-0.0000	.3614	.685637	-.005488	0.	15.8197	-.0038	.0632	0.	0.
1 CC3R	23.4054	.62777	15.2493	-2.4162	.4484	1.459033	.377524	.62528	2.8548	.5322	.4495	0.	0.
2 QF1	23.7102	.63086	15.9543	.1427	.0640	1.536325	.127497	.64290	2.7089	-.0454	.3699	0.	0.
3 QF1	24.0150	.63396	15.0812	2.6731	.5401	1.536101	-.128964	.66036	2.9121	-.6324	.4807	0.	0.
4 0	24.3198	.63736	13.5018	2.5085	.5401	1.496793	-.128964	.67593	3.3422	-.7733	.4807	0.	0.
5 B	25.6914	.65891	7.6391	1.7681	.5401	1.358461	-.072849	.72397	6.3695	-1.4247	.4757	0.	0.
6 0	25.9962	.66573	6.6115	1.6034	.5401	1.336257	-.072849	.73110	7.2821	-1.5597	.4757	0.	0.
7 B	27.3678	.71367	3.2303	.8630	.5401	1.274852	-.0616735	.75410	12.4532	-2.1945	.4670	0.	0.
8 00	28.1474	.76076	2.2130	.4419	.5401	1.261805	-.0616735	.76285	16.1589	-2.5585	.4670	0.	0.
9 QD1	28.7570	.80705	2.1296	-.2994	.5117	1.332257	.250312	.76854	17.2232	.8971	.1038	0.	0.
10 QD1	29.3666	.84662	3.0063	-1.1990	.8109	1.573478	.549444	.77463	14.1740	3.9015	1.1445	0.	0.
11 L3	29.6714	.86097	3.8125	-1.4462	.8109	1.740949	.549444	.77836	11.9320	3.5527	1.1445	0.	0.
12 IQ3	30.2810	.88267	4.9365	-.2756	.2180	1.897185	-.045260	.78759	9.9254	-.1010	.1018	0.	0.
13 IQ3	30.8906	.90287	4.4000	1.0974	.5010	1.687553	-.631236	.79571	12.1818	-3.8392	1.2921	0.	0.
14 L2	33.5612	1.07282	2.1116	-.2405	.5010	.001762	-.631236	.81556	41.9135	-7.2899	1.2921	0.	0.
15 L1	34.6771	1.14260	3.2722	-.7995	.5010	-.702634	-.631236	.81911	59.7820	-9.7317	1.2921	0.	0.
16 IQ2	35.2867	1.16718	5.0385	-2.2370	1.1916	-1.148492	-.849220	.82067	61.6095	5.8405	.5775	0.	0.
17 IQ2	35.8963	1.18174	9.2707	-5.0387	2.8465	-1.763260	-1.192100	.82244	46.7921	17.2373	6.3713	0.	0.
18 0	36.2011	1.18623	12.6068	-5.9063	2.8465	-2.126612	-1.192100	.82350	36.8762	15.2953	6.3713	0.	0.
19 IQ1	36.8107	1.19243	18.5103	-3.3279	.6524	-2.691529	-.639922	.82692	24.2736	6.3213	1.6874	0.	0.
20 IQ1	37.4203	1.19736	19.9948	1.0059	1.0066	-2.888909	-.000374	.83143	20.0033	1.8032	1.003	0.	0.
21 LL	47.4203	1.32287	9.9390	-0.0003	1.0066	-2.892709	-.000374	.95666	9.9693	.0002	1.003	0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	X	14	.0017618	0.	.0017618	.0010000

2	BX	14	2.1115826	4.0000000	-1.8884174	.0010000
3	AX	21	-.0002700	0.	-.0002700	.0000001
4	DX	21	-.0003740	0.	-.0003740	.0000001
5	AY	21	.0001622	0.	.0001622	.0000001
6	BX	21	9.9389724	10.0000000	-.0610276	.0010000
7	BY	21	9.9693102	10.0000000	-.0306898	.0010000

FCN = SUM (ERRCR/TOL.)*21/ 7 = .3587748E+07

 * 0506 41N4TS *
 * VERSION 5 *
 * DATA BLOCK NO. 1 *

 1 K1 1 .371660 .010000 -.1000E+01 .1000E+01
 2 K2 1 -.391010 .010000 -.1000E+01 .1000E+01
 3 K3 1 .527510 .010000 -.1000E+01 .1000E+01
 4 KD1 1 -.341310 .010000 -.1000E+01 .1000E+01
 5 KF1 1 .545400 .010000 -.1000E+01 .1000E+01

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.3987748E+07	1	.596	0.	1 1 K1 1	.37166E+00	.1000E-01	.38083E+00	.10772E-01
				2 2 K2 1	-.39101E+00	.1000E-01	-.40173E+00	.10865E-01
				3 3 K3 1	.52751E+00	.1000E-01	.55567E+00	.11772E-01
				4 4 KD1 1	-.34131E+00	.1000E-01	-.34831E+00	.10639E-01
				5 5 KF1 1	.54540E+00	.1000E-01	.57687E+00	.11931E-01

*** 1****PRINTOUT 0. .00000 .00000 .00000 .00000 .00000 .00000

*** 2****MINIMIZE 7000.00000 .00000 .00000 .00000 .00000 .00000 .00000

START SIMPLEX MINIMIZATION CONVERGENCE CRITERION -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-05

SIMPLEX MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.5108051E+06	2689	11.275	.12E-05	1 1 K1 1	.37169E+00	.43754E-06	.38083E+00	.46181E-09
				2 2 K2 1	-.39103E+00	.25911E-05	-.40175E+00	.27671E-08
				3 3 K3 1	.52777E+00	.73586E-06	.55598E+00	.85124E-09
				4 4 KD1 1	-.34144E+00	.13483E-05	-.34845E+00	.14111E-08
				5 5 KF1 1	.54547E+00	.18476E-05	.57694E+00	.21676E-08

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000

START MIGRAD MINIMIZATION.

CONVERGENCE CRITERIA -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-10

OR EDM .LT. .10E-05 AND FRACTIONAL CHANGE IN VARIANCE MATRIX .LT. .40E-01

MIGRAD FAILS TO FIND IMPROVEMENT

MIGRAD TERMINATED WITHOUT CONVERGENCE

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.5108051E+06	2702	11.329	.19E-05	1 1 K1 1	.37169E+00	.69662E-07	.38083E+00	.10261E-10
				2 2 K2 1	-.39103E+00	.26009E-07	-.40175E+00	-.10816E-10
				3 3 K3 1	.52777E+00	.32867E-07	.55598E+00	-.27377E-10
				4 4 KD1 1	-.34144E+00	.18109E-07	-.34845E+00	.99793E-12
				5 5 KF1 1	.54547E+00	.36478E-07	.57694E+00	-.23784E-10

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000

START SIMPLEX MINIMIZATION

CONVERGENCE CRITERION -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-05

SIMPLEX MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.5108051E+06	2830	11.833	.53E-06	1 1 K1 1	.37169E+00	.27106E-07	.38083E+00	.14861E-10
				2 2 K2 1	-.39103E+00	.25930E-08	-.40175E+00	.16769E-11
				3 3 K3 1	.52777E+00	.10799E-07	.55598E+00	.10274E-10
				4 4 KD1 1	-.34144E+00	.13723E-07	-.34845E+00	.11710E-10
				5 5 KF1 1	.54547E+00	.10486E-07	.57694E+00	.60396E-11

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000

START MIGRAD MINIMIZATION.

CONVERGENCE CRITERIA -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-13
OR EDM .LT. .10E-05 AND FRACTIONAL CHANGE IN VARIANCE MATRIX .LT. .40E-01

MIGRAD FAILS TO FIND IMPROVEMENT

MIGRAD TERMINATED WITHOUT CONVERGENCE

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN. VALUE	INT. STEP SIZE
.5108043E+06	3236	13.423	.44E-05	1 1 K1	.371700E+00	.52283E-05	.3006E+00	-.63615E-08
				2 2 K2	-.39104E+00	.47431E-05	-.40170E+00	.18599E-08
				3 3 K3	.52775E+00	.12330E-04	.55595E+00	.16270E-07
				4 4 KD1	-.34143E+00	.75811E-05	-.34843E+00	-.78567E-08
				5 5 KFI	.54545E+00	.53341E-05	.57693E+00	.69783E-08

ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000

*** 3****END RETURN .00000 .00000 .00000 .00000 .00000 .00000 .00000

FINAL VALUES OF VARIABLES

1	K1	.37170012E+00
2	K2	-.39103633E+00
3	K3	.52774913E+00
4	KD1	-.34142618E+00
5	KFI	.54545651E+00

PDS	S	QX	BX	AX	GX	X	DX	QY	BY	AY	GY	Y	DY
0	-0.	0.	2.7672	-.0000	.3614	.685637	-.005488	0.	15.8197	-.0338	.0632	0.	0.
1 CC3R	23.4054	.62777	15.2493	-2.4162	.4484	1.459033	.377524	.62528	2.8548	.5322	.4495	0.	0.
2 QF1	23.7102	.63086	15.9542	-.1430	.0640	1.536321	.127471	.64290	2.7089	-.0455	.3699	0.	0.
3 QF1	24.0150	.63396	15.0809	2.6736	.5403	1.536385	-.129015	.66036	2.9121	-.6325	.4808	0.	0.
4 0	24.3198	.63736	13.5012	2.5089	.5403	1.496761	-.129015	.67593	3.3424	-.7790	.4808	0.	0.
5 8	25.6914	.65891	7.6377	1.7682	.5403	1.358361	-.072900	.72397	6.3700	-1.4248	.4757	0.	0.
6 0	25.9962	.66574	6.6100	1.6036	.5403	1.336141	-.072900	.73109	7.2827	-1.5690	.4757	0.	0.
7 8	27.3678	.71369	3.2288	.8429	.5403	1.274667	-.016786	.75439	12.4544	-2.1947	.4671	0.	0.
8 00	28.1474	.76080	2.2118	.4416	.5403	1.261580	-.016786	.76284	16.1604	-2.5589	.4671	0.	0.
9 QD1	28.7570	.80712	2.1287	-.2997	.5120	1.332013	.250303	.76854	17.2241	.9684	.1339	0.	0.
10 QD1	29.3666	.84670	3.0060	-1.1997	.8115	1.573244	.549487	.77462	14.1728	3.9035	1.1457	0.	0.
11 L3	29.6714	.86105	3.8127	-1.4470	.8115	1.740727	.549487	.77835	11.8997	3.5543	1.1457	0.	0.
12 IQ3	30.2810	.88275	4.9374	-.2757	.2179	1.896930	-.045414	.78758	9.9217	-.1302	.1318	0.	0.
13 IQ3	30.8906	.90294	4.4004	1.0982	.5013	1.687151	-.631552	.79671	12.1773	-3.8387	1.2922	0.	0.
14 L2	33.5612	1.07297	2.1103	-.2406	.5013	.000515	-.631552	.81557	41.8966	-7.2995	1.2922	0.	0.
15 L1	34.6771	1.14278	3.2716	-.8000	.5013	-.744235	-.631552	.81912	59.7746	-8.7315	1.2922	0.	0.
16 IQ2	35.2867	1.16736	5.0386	-2.2378	1.1923	-1.150411	-.849965	.82068	61.6023	5.8799	.3775	0.	0.
17 IQ2	35.8963	1.18192	9.2723	-5.0404	2.8478	-1.765793	-1.193393	.82244	46.7861	17.2361	6.3712	0.	0.
18 0	36.2011	1.18640	12.6095	-5.9084	2.8478	-2.129539	-1.193393	.82361	36.8709	15.2041	6.3712	0.	0.
19 IQ1	36.8107	1.19261	18.5153	-3.3293	.6526	-2.695009	-.640420	.82693	24.2695	6.3205	1.6872	0.	0.
20 IQ1	37.4203	1.19754	20.0004	1.0062	.1006	-2.892487	-.000000	.83143	20.0001	1.3329	.1303	0.	0.
21 LL	47.4203	1.32303	9.9381	-.0000	.1006	-2.892488	-.000000	.93665	9.9723	.0000	.1303	0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	X	14	.0005147	0.	.0005147	.0010000
2	BX	14	2.1102833	4.0000000	-1.8897167	.7517000
3	AX	21	-.0000000	0.	-.0000000	.0000001
4	DX	21	-.0000000	0.	-.0000000	.0000001
5	AY	21	.0000000	0.	.0000000	.0000001
6	BX	21	9.9380841	10.0000000	-.0619159	.0010000
7	BY	21	9.9722997	10.0000000	-.0277003	.0010000

(I = SUM (ERROR/TOL.)*21/ 7 = .5108043E+06

STRAIGHT SECTION NO. 2 --- WITHOUT DISPERSION

*** SR2 SUB 0 0 //

*** QF9 MAG // LQL KF9 1.

*** 2Q3 MAG // LQL K23 1.

*** 2Q2 MAG // LQL K22 1.

*** 2Q1 MAG // LQL K21 1.

*** T2 TRKB 0 29 // .SS2 C

* //

* //

*** END 0 0 //

*** SOLV 4 1 // SR2 T2 0 29

* // AX 29 0. .0001

* // AY 0. .0001

* // BX 0. .01

* // BY 0. .01

* // K21 K22 K23 KF9 1 -1. 1. .01

--- SOLV --- BETA-FUNCTION FITTING

INITIAL VALUES OF VARIABLES

1 K21 -.36873000E+00

2 K22 .38677000E+00

3 K23 -.47085000E+00

4 KF9 .31345000E+00

POS	S	QX	BX	AX	GX	X	DX	QY	BY	AY	GY	Y	DY
0	-0.	0.	2.7672	.0000	.3614	.685637	.005488	0.	15.8197	.0038	.0632	0.	0.
1 QD	.3048	.01719	2.9363	-.5635	.4487	.703843	.114453	.00312	15.0760	2.3970	.4474	0.	0.
2 Q1	.8048	.04172	3.6120	-.7879	.4487	.761069	.114453	.00885	12.7905	2.1733	.4474	0.	0.
3 B	2.1764	.08696	6.6155	-1.4030	.4487	.956433	.170567	.03100	7.6401	1.5761	.4560	0.	0.
4 Q2	4.4372	.12309	15.2531	-2.4175	.4487	1.342057	.170567	.11159	2.8444	.5451	.4560	0.	0.
5 QF	4.7420	.12617	16.0019	.0002	.0625	1.361634	-.042818	.12933	2.6829	-.0069	.3728	0.	0.
6 QF	5.0468	.12925	15.2528	2.4180	.4489	1.316163	-.254159	.14704	2.8530	-.5603	.4605	0.	0.
7 Q3	7.4717	.16947	6.1658	1.3295	.4489	.699871	-.254159	.23018	8.2779	-1.6769	.4605	0.	0.
8 B	8.8433	.21813	3.3642	.7142	.4489	.389913	-.198044	.25073	13.7111	-2.2781	.4514	0.	0.
9 Q4	9.1793	.23519	2.9349	.5634	.4489	.323370	-.198044	.25442	15.2930	-2.4293	.4514	0.	0.
10 QD	9.4841	.25238	2.7659	-.0000	.3615	.270314	-.151487	.25749	16.0461	-.0016	.0623	0.	0.
11 QD	9.7889	.26958	2.9349	-.5634	.4489	.230284	-.112229	.26057	15.2949	2.4268	.4504	0.	0.
12 Q5	10.3175	.29538	3.6560	-.8007	.4489	.170957	-.112229	.26657	12.8550	2.1887	.4504	0.	0.
13 B	11.6891	.34006	6.6948	-1.4163	.4489	.055567	-.056115	.28863	7.6674	1.5875	.4591	0.	0.
14 Q	11.9939	.34686	7.5997	-1.5528	.4489	.038463	-.056115	.29537	6.7423	1.4476	.4591	0.	0.
15 B	13.3655	.36914	12.7007	-2.1682	.4489	-.000000	-.000000	.34015	3.6201	.8252	.4643	0.	0.
16 Q6	13.9213	.37553	15.2496	-2.4177	.4489	-.000000	-.000000	.36785	2.8462	.5671	.4643	0.	0.
17 QF9	14.5309	.38152	16.4256	.5640	.0802	-.000000	-.000000	.40436	2.6238	-.1892	.3946	0.	0.
18 QF9	15.1405	.38780	13.9787	3.2929	.8472	-.000001	-.000000	.43802	3.3416	-1.0347	.6196	0.	0.
19 L3	15.4453	.39154	12.0501	3.0346	.8472	-.000001	-.000000	.45125	4.0299	-1.2235	.6196	0.	0.
20 Q3	16.0549	.40043	10.4712	-.2754	.1038	-.000001	-.000000	.47251	4.9059	-.1285	.2072	0.	0.
21 Q3	16.6645	.40904	12.8574	-3.9445	1.2273	-.000001	-.000000	.49306	4.3080	1.0513	.4887	0.	0.
22 L2	19.3351	.42734	42.1454	-7.1222	1.2273	-.000002	-.000000	.66159	2.1781	-.2538	.4887	0.	0.
23 L1	20.4510	.43089	59.5691	-8.4918	1.2273	-.000002	-.000000	.72934	3.3530	-.7991	.4917	0.	0.
24 Q2	21.0606	.43246	61.2337	5.8933	.5835	-.000002	.000000	.75342	5.1193	-2.2354	1.1718	0.	0.
25 Q2	21.6702	.43423	46.5369	17.0495	6.2678	-.000002	.000001	.76780	9.3425	-5.0207	2.8052	0.	0.
26 Q	21.9750	.43540	36.7258	15.1390	6.2578	-.000002	.000001	.77226	12.6637	-5.8753	2.8052	0.	0.
27 Q1	22.5846	.43873	24.2394	6.2711	1.6637	-.000002	.000000	.77849	18.5290	-3.3023	.6425	0.	0.
28 Q1	23.1942	.44324	19.9988	1.0002	.1000	-.000001	-.000000	.78338	20.0000	1.0000	.1000	0.	0.
29 LL	33.1942	.56827	9.9972	-.0001	.1000	-.000002	-.000000	.90838	10.0000	.0000	.1000	0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	AX	29	-0.0000624	0.	-0.0000624	0.001000
2	AY	29	0.0000182	0.	0.0000182	0.001000
3	BX	29	9.9972342	10.0000000	-0.0027658	0.0100000
4	BY	29	10.0003394	10.0000000	0.0003394	0.0100000

FCN = SUM((ERROR/TOL.)**2) / 4 = .1250853E+00

 * 0506 MINUTS *
 * VERSION 1.75 *
 * DATA BLOCK NO. 1 *

 1 K21 1 -.368730 .010000 -.1000E+01 .1000E+01
 2 K22 1 .366770 .010000 -.1000E+01 .1000E+01
 3 K23 1 -.470850 .010000 -.1000E+01 .1000E+01
 4 KF9 1 .313450 .010000 -.1000E+01 .1000E+01

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.1250853E+00	1	13.531	0.	1 1 K21 1	-.36873E+00	.1000E-01	-.37764E+00	.10758E-01
				2 2 K22 1	.36677E+00	.1000E-01	.39713E+00	.10844E-01
				3 3 K23 1	-.47085E+00	.1000E-01	-.49025E+00	.11336E-01
				4 4 KF9 1	.31345E+00	.1000E-01	.31882E+00	.10531E-01

 *** 1****PRINTOUT 0. .00000 .00000 .00000 .00000 .00000 .00000

 *** 2****MINIMIZE 0. 1.00000 .00000 .00000 .00000 .00000 .00000

 START SIMPLEX MINIMIZATION CONVERGENCE CRITERION -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E+01
 SIMPLEX MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.1923699E-01	76	13.835	.26E+00	1 1 K21 1	-.36873E+00	.70181E-04	-.37764E+00	.38164E-04
				2 2 K22 1	.36677E+00	.13365E-04	.39712E+00	.72973E-05
				3 3 K23 1	-.47086E+00	.15713E-04	-.49026E+00	.10042E-04
				4 4 KF9 1	.31345E+00	.19871E-04	.31883E+00	.11365E-04

 START MIGRAD MINIMIZATION. ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000
 CONVERGENCE CRITERIA -- ESTIMATED DISTANCE TO MINIMUM (EDM) .LT. .10E-04
 OR EDM .LT. .10E+01 AND FRACTIONAL CHANGE IN VARIANCE MATRIX .LT. .40E-01
 MIGRAD MINIMIZATION HAS CONVERGED

FCN VALUE	CALLS	TIME	EDM	INT.EXT. PARAMETER	VALUE	ERROR	INTERN.VALUE	INT.STEP SIZE
.4868873E-11	162	14.185	.20E-09	1 1 K21 1	-.36873E+00	.10406E-03	-.37764E+00	-.85864E-09
				2 2 K22 1	.36677E+00	.56503E-04	.39712E+00	.31350E-09
				3 3 K23 1	-.47084E+00	.10031E-03	-.49025E+00	.88221E-09
				4 4 KF9 1	.31345E+00	.71421E-04	.31882E+00	-.50567E-09

 ERRORS CORRESPOND TO FUNCTION CHANGE OF 1.0000
 *** 3****END RETURN .00000 .00000 .00000 .00000 .00000 .00000

FINAL VALUES OF VARIABLES

1	K21	-.36872905E+00
2	K22	.36676555E+00
3	K23	-.47084357E+00
4	KF9	.31344513E+00

PDS	S	QX	BX	AX	GX	X	DX	QY	BY	AY	GY	Y	DY
0	-0.	0.	2.7672	.0000	.3514	.685637	.005488	0.	15.8197	.0.33	.0632	0.	0.
1 00	.3048	.01719	2.9363	-.5635	.4487	.703843	.114453	.003312	15.0760	2.3973	.4474	0.	0.
2 01	.8048	.04172	3.6120	-.7879	.4487	.761069	.114453	.00885	12.7909	2.1733	.4474	0.	0.
3 02	2.1764	.08596	6.6155	-1.4030	.4487	.956633	.170567	.03100	7.6401	1.5761	.4560	0.	0.
4 02	4.4372	.12309	15.2531	-2.4175	.4487	1.342057	.170567	.11159	2.8444	.5451	.4560	0.	0.

5 QF	4.7420	.12617	16.0019	.0000	.0025	1.361674	-.042818	.12933	2.6429	-.0000	.3728	0.	0.
6 QF	5.0468	.12925	15.2528	2.4180	.4489	1.316163	-.254159	.14704	2.8533	-.5000	.4605	0.	0.
7 D3	7.4717	.16947	6.1658	1.3295	.4489	.699871	-.254159	.23018	3.2779	-1.6769	.4605	0.	0.
8 B	8.8433	.21813	3.3642	.7142	.4489	.389913	-.198044	.25573	13.7111	-2.2781	.4514	0.	0.
9 Q4	9.1793	.23519	2.9349	.5834	.4489	.323370	-.198044	.25442	15.2930	-2.4273	.4514	0.	0.
10 QD	9.4841	.25238	2.7659	-.0000	.3615	.270314	-.151447	.25749	16.0461	-.0000	.3623	0.	0.
11 QD	9.7889	.26958	2.9349	-.5634	.4489	.230284	-.112229	.26057	15.2949	2.4263	.4504	0.	0.
12 Q5	10.3175	.29538	3.6560	-.8007	.4489	.170957	-.112229	.26657	12.4550	2.1887	.4504	0.	0.
13 B	11.6891	.34006	6.6948	-1.4160	.4489	.055567	-.056115	.28863	7.6674	1.5075	.4591	0.	0.
14 Q	11.9939	.34686	7.5997	-1.5528	.4489	.038463	-.056115	.29537	6.7423	1.4475	.4591	0.	0.
15 B	13.3655	.36914	12.7007	-2.1682	.4489	-.000000	-.000000	.34015	3.6201	.8252	.4643	0.	0.
16 Q6	13.9213	.37550	15.2496	-2.4177	.4489	-.000000	-.000000	.36785	2.8462	.5671	.4643	0.	0.
17 QF9	14.5309	.38152	16.4256	.5639	.0802	-.000000	-.000000	.40436	2.6238	-.1882	.3946	0.	0.
18 QF9	15.1405	.38780	13.9788	3.2728	.8472	-.000001	-.000000	.43802	3.3416	-1.0347	.6196	0.	0.
19 L3	15.4453	.39154	12.0502	3.0346	.8472	-.000001	-.000000	.45125	4.0299	-1.2235	.6196	0.	0.
20 Q33	16.0549	.40043	10.4715	-.2954	.1038	-.000001	-.000000	.47251	4.9058	-.1285	.2072	0.	0.
21 Q33	16.6645	.40904	12.8576	-3.8446	1.2274	-.000001	-.000000	.49306	4.3087	1.0513	.4887	0.	0.
22 L2	19.3351	.42734	42.1463	-7.1224	1.2274	-.000002	-.000000	.66159	2.1781	-.2533	.4887	0.	0.
23 L1	20.4510	.43089	59.5704	-8.4920	1.2274	-.000002	-.000000	.72934	3.3530	-.7991	.4887	0.	0.
24 Q2	21.0606	.43245	61.2352	5.8932	.5835	-.000002	.000000	.75341	5.1193	-2.2358	1.1718	0.	0.
25 Q2	21.6702	.43423	46.5383	17.0497	6.2678	-.000002	.000001	.76780	9.3424	-5.0206	2.8052	0.	0.
26 Q	21.9750	.43540	36.7271	15.1392	6.2678	-.000002	.000001	.77226	12.6636	-5.8757	2.8052	0.	0.
27 Q1	22.5846	.43873	24.2405	6.2711	1.6636	-.000002	.000000	.77845	18.5288	-3.3522	.6425	0.	0.
28 Q1	23.1942	.44324	20.0000	1.0000	.1000	-.000001	-.000000	.78338	20.0000	1.0000	.1000	0.	0.
29 LL	33.1942	.56824	10.0000	-.0000	.1000	-.000002	-.000000	.90838	10.0000	-.0000	.1000	0.	0.

CONSTRAINT	FUNCTION	POSITION	VALUE	FIT VALUE	ERROR	TOLERANCE
1	AX	29	-.0000000	0.	-.0000000	.0001000
2	AY	29	-.0000000	0.	-.0000000	.0001000
3	RX	29	10.0000000	10.0000000	.0000000	.0100000
4	RY	29	10.0000000	10.0000000	.0000000	.0100000

FCN = SUM(ERROR/TOL)**2 / 4 = .4868873E-11

BETATRON FUNCTIONS THROUGH ONE QUADRANT, STARTING AT CENTER OF NO. 1 STRAIGHT
 *** CYC -2 // .SPH

PDS	S(M)	NUX	NUY	DETAX(M)	DETAY(M)	ETAX(M)	ETAY(M)	ETASIN	ALPHA X	ALPHA Y	DL	DETAY
0	0.	0.	0.	9.93808	9.97230	-2.83249	0.	0.	0.	0.	.00000	0.
1 LL	10.0300	.12549	.12522	20.00039	20.00008	-2.84249	0.	-0.	-1.00623	-1.00278	.00000	0.
2 LQ1	10.6096	.13042	.12973	18.51525	24.26955	-2.65501	0.	-0.	3.32925	-0.32049	.64042	0.
3 LQ1	11.2192	.13663	.13305	12.60951	36.87089	-2.12954	0.	-0.	5.00843	-15.29413	1.19339	0.
4 0	11.5240	.14111	.13421	9.27230	46.78610	-1.76579	0.	-0.	5.04041	-17.23606	1.19339	0.
5 LQ2	12.1336	.15568	.13598	5.03864	61.60233	-1.15041	0.	-0.	2.23775	-5.47955	.84997	0.
6 LQ2	12.7432	.18025	.13754	3.27157	59.77460	-.70423	0.	-0.	.80004	8.73154	.63155	0.
7 L1	13.8591	.25006	.14109	2.11028	41.89662	.00051	0.	-0.	.24063	7.28959	.63155	0.
8 L2	16.5297	.42009	.15995	4.40345	12.17729	1.68715	0.	-0.	-1.09817	3.83866	.63155	0.
9 LQ3	17.1393	.44028	.16907	4.93741	9.92170	1.89693	0.	-0.	.27563	.10023	.04541	0.
10 LQ3	17.7489	.46199	.17830	3.81273	11.89966	1.74073	0.	-0.	1.44704	-3.55430	-.54949	0.
11 L3	18.0537	.47633	.18204	3.00600	14.17280	1.57324	0.	-0.	1.19971	-3.90350	-.54949	0.
12 QD1	18.6633	.51591	.18812	2.12875	17.22408	1.33201	0.	-0.	.25971	-.88838	-.25330	0.
13 QD1	19.2729	.56223	.19381	2.21178	16.16039	1.26158	0.	-0.	-.44163	2.55885	.01679	0.
14 00	20.0526	.60934	.20256	3.22880	12.45436	1.27467	0.	-0.	-.36247	2.19472	.31679	0.
15 8	21.4242	.65729	.22556	6.60999	7.28275	1.33614	0.	.07289	-1.60356	1.56984	.07290	0.
16 0	21.7290	.65412	.23269	7.63771	6.35997	1.35836	0.	.07289	-1.76925	1.42484	.07290	0.
17 8	23.1006	.68567	.28072	13.50123	3.34238	1.49676	0.	.15254	-2.50944	.77903	.12901	0.
18 0	23.4054	.68907	.29630	15.08088	2.91215	1.53609	0.	.15264	-2.67363	.63249	.12901	0.
19 QF1	23.7102	.69218	.31375	15.95417	2.70893	1.53632	0.	.15264	-.14296	.04546	-.12747	0.
20 QF1	24.0150	.69526	.33138	15.24934	2.85483	1.45903	0.	.15264	2.41520	-.53219	-.37752	0.
21 00	24.7946	.70453	.36863	11.75441	3.95786	1.16470	0.	.15264	2.06561	-.88263	-.37752	0.
22 8	26.1662	.72880	.40996	6.93098	7.20846	.68563	0.	.20419	1.45183	-1.48357	-.32141	0.
23 0	26.4710	.73627	.41629	6.38757	8.15410	.58766	0.	.20419	1.31520	-1.61892	-.32141	0.
24 8	27.8426	.78555	.43724	3.32431	13.39788	.18551	0.	.22553	.70049	-2.19818	-.26530	0.
25 0	28.1474	.80110	.44069	2.93896	14.77833	.10465	0.	.22553	.56380	-2.33085	-.26530	0.
26 QD	28.4522	.81827	.44387	2.76982	15.49595	.02566	0.	.22553	-.00004	.01424	-.25508	0.
27 QD	28.7570	.83544	.44705	2.93901	14.76152	-.05209	0.	.22553	-.56393	2.35664	-.25715	0.
28 00	29.5366	.87154	.45664	4.09084	11.35676	-.25257	0.	.22553	-.91352	2.01051	-.25715	0.
29 8	30.9082	.91151	.48186	7.43825	6.64974	-.56663	0.	.20218	-1.52828	1.41586	-.20103	0.
30 0	31.2130	.91764	.48966	8.41155	5.82861	-.62791	0.	.20218	-1.66495	1.27814	-.20103	0.
31 8	32.5846	.93793	.54143	13.81925	3.15966	-.86504	0.	.15994	-2.27572	.66467	-.14492	0.
32 0	32.8894	.94128	.55778	15.25063	2.79687	-.90921	0.	.15994	-2.41641	.52558	-.14492	0.
33 QF	33.1942	.94436	.57580	15.99885	2.64540	-.93133	0.	.15994	.00095	-.02070	.00034	0.
34 QF	33.4990	.94744	.59373	15.24951	2.82293	-.90900	0.	.15994	2.41313	-.57103	.14559	0.
35 00	34.2786	.95671	.63100	11.75195	3.99883	-.79550	0.	.15994	2.06306	-.93726	.14559	0.
36 8	35.6502	.98099	.67146	6.92567	7.43702	-.55744	0.	.12162	1.45250	-1.56550	.20171	0.
37 0	35.9550	.98847	.67759	6.08194	8.43446	-.49597	0.	.12162	1.31564	-1.70693	.20171	0.
38 8	37.3266	1.03782	.69777	3.31861	13.95592	-.18099	0.	.10226	.70009	-2.31230	.25782	0.
39 0	37.6314	1.05339	.70107	2.93355	15.40775	-.10240	0.	.10226	.56323	-2.45091	.25782	0.
40 QD	37.9362	1.07060	.70412	2.76457	16.16829	-.02566	0.	.10226	.00001	-.00425	.24778	0.
41 QD	38.2410	1.08780	.70717	2.93354	15.41277	.04985	0.	.10226	-.56320	2.44321	.24968	0.
42 000	42.3735	1.19377	.81233	15.25603	2.94177	1.08162	0.	.10226	-2.41373	.57463	.24968	0.
43 QF	42.6783	1.19685	.82951	16.00540	2.75610	1.13130	0.	.10226	-.00047	.01090	.37502	0.
44 QF	42.9831	1.19993	.84672	15.25659	2.92805	1.12599	0.	.10226	2.41784	-.55071	-.10321	0.
45 000	47.1155	1.30584	.95354	2.93626	15.08052	.70047	0.	.10226	.56353	-2.39005	-.10321	0.
46 QD	47.4203	1.32103	.95665	2.76720	15.81971	.68564	0.	.10226	.00000	.00382	.00549	0.
47 QD	47.7251	1.34022	.95977	2.93626	15.07601	.70384	0.	.10226	-.56353	2.39696	.11445	0.
48 00	48.5047	1.37634	.96916	4.08770	11.61048	.79307	0.	.10226	-.91337	2.04914	.11445	0.
49 8	49.8763	1.41634	.99381	7.43523	6.80609	.98344	0.	.15189	-1.52851	1.44911	.17057	0.

PUS	S(M)	NUX	NUY	BETAX(M)	BETAY(M)	BETAX(M)	BETAY(M)	BETASIN	ALP1AX	ALP1AY	BETAX	BETAY
50 0	50.1811	1.42248	1.06143	8.40870	5.96533	1.34543	0.	.15189	-1.64521	1.31029	.17057	0.
51 8	51.5527	1.44277	1.05213	13.81779	3.21441	1.31272	0.	.21755	-2.28043	.69197	.22668	0.
52 0	51.8575	1.44611	1.06823	15.24963	2.83533	1.38181	0.	.21755	-2.41720	.55174	.22668	0.
53 QF	52.1623	1.44920	1.08604	15.99839	2.66961	1.41737	0.	.21755	-.00000	.00058	.00576	0.
54 QF	52.4671	1.45228	1.10385	15.24963	2.83459	1.38529	0.	.21755	2.41720	-.55047	-.21544	0.
55 00	53.2468	1.46155	1.14117	11.75333	3.97232	1.21733	0.	.21755	2.06736	-.90885	-.21544	0.
55 8	54.6184	1.48582	1.18212	6.92841	7.31384	.96045	0.	.27829	1.45222	-1.52354	-.15933	0.
57 0	54.9232	1.49330	1.18836	6.08483	8.28478	.91188	0.	.27829	1.31545	-1.66195	-.15933	0.
58 8	56.2948	1.54261	1.20893	3.32148	13.66490	.73193	0.	.32405	.70030	-2.25438	-.10321	0.
59 0	56.5996	1.55817	1.21231	2.93626	15.08052	.70047	0.	.32405	.56353	-2.39005	-.10321	0.
60 Q0	56.9044	1.57536	1.21542	2.76720	15.81971	.68564	0.	.32405	-.00000	.00382	.00549	0.
61 Q0	57.2092	1.59255	1.21854	2.93626	15.07601	.70384	0.	.32405	-.56353	2.39696	.11445	0.
62 00	57.9888	1.62867	1.22793	4.08770	11.61048	.79307	0.	.32405	-.91337	2.04814	.11445	0.
63 8	59.3604	1.66867	1.25258	7.43523	6.80609	.98844	0.	.37368	-1.52851	1.44911	.17057	0.
64 0	59.6652	1.67481	1.26020	8.40870	5.96533	1.04043	0.	.37368	-1.66523	1.31028	.17057	0.
65 8	61.0368	1.69510	1.31090	13.81779	3.21441	1.31272	0.	.43934	-2.28043	.69197	.22668	0.
66 0	61.3416	1.69844	1.32700	15.24963	2.83533	1.38181	0.	.43934	-2.41720	.55174	.22668	0.
67 QF	61.6464	1.70153	1.34481	15.99839	2.66961	1.41738	0.	.43934	.00000	.00058	.00576	0.
68 QF	61.9512	1.70461	1.36262	15.24963	2.83459	1.38529	0.	.43934	2.41720	-.55047	-.21544	0.
69 00	62.7308	1.71388	1.39994	11.75333	3.97232	1.21733	0.	.43934	2.06736	-.90885	-.21544	0.
70 8	64.1024	1.73815	1.44089	6.92841	7.31384	.96045	0.	.50008	1.45222	-1.52354	-.15933	0.
71 0	64.4072	1.74563	1.44713	6.08483	8.28478	.91188	0.	.50008	1.31545	-1.66195	-.15933	0.
72 8	65.7788	1.79494	1.46770	3.32148	13.66490	.73193	0.	.54584	.70030	-2.25438	-.10321	0.
73 0	66.0836	1.81050	1.47108	2.93626	15.08052	.70047	0.	.54584	.56353	-2.39005	-.10321	0.
74 Q0	66.3884	1.82769	1.47419	2.76720	15.81971	.68564	0.	.54584	.00000	.00382	.00549	0.
75 Q0	66.6932	1.84488	1.47731	2.93626	15.07601	.70384	0.	.54584	-.56353	2.39696	.11445	0.
76 00	67.4729	1.88100	1.48670	4.08770	11.61048	.79307	0.	.54584	-.91337	2.04814	.11445	0.
77 8	68.8445	1.92100	1.51135	7.43523	6.80609	.98844	0.	.59547	-1.52851	1.44911	.17057	0.
78 0	69.1493	1.92714	1.51897	8.40870	5.96533	1.04043	0.	.59547	-1.66523	1.31028	.17057	0.
79 8	70.5209	1.94743	1.56967	13.81779	3.21441	1.31272	0.	.66113	-2.28043	.69197	.22668	0.
80 0	70.8257	1.95077	1.58577	15.24963	2.83533	1.38181	0.	.66113	-2.41720	.55174	.22668	0.
81 QF	71.1305	1.95386	1.60358	15.99839	2.66961	1.41738	0.	.66113	-.00000	.00058	.00576	0.
82 QF	71.4353	1.95694	1.62139	15.24963	2.83459	1.38529	0.	.66113	2.41720	-.55047	-.21544	0.
83 00	72.2149	1.96621	1.65871	11.75333	3.97232	1.21733	0.	.66113	2.06736	-.90885	-.21544	0.
84 8	73.5365	1.99048	1.69966	6.92841	7.31384	.96045	0.	.72188	1.45222	-1.52354	-.15933	0.
85 0	73.8913	1.99796	1.70590	6.08483	8.28478	.91188	0.	.72188	1.31545	-1.66195	-.15933	0.
86 8	75.2629	2.04727	1.72647	3.32148	13.66490	.73193	0.	.76764	.70030	-2.25438	-.10321	0.
87 0	75.5677	2.06283	1.72985	2.93626	15.08052	.70047	0.	.76764	.56353	-2.39005	-.10321	0.
88 Q0	75.8725	2.08002	1.73296	2.76720	15.81971	.68564	0.	.76764	-.00000	.00382	.00549	0.
89 Q0	76.1773	2.09721	1.73608	2.93626	15.07601	.70384	0.	.76764	-.56353	2.39696	.11445	0.
90 00	76.9569	2.13333	1.74547	4.08770	11.61048	.79307	0.	.76764	-.91337	2.04814	.11445	0.
91 8	78.3285	2.17333	1.77012	7.43523	6.80609	.98844	0.	.81726	-1.52851	1.44911	.17057	0.
92 0	78.6333	2.17947	1.77774	8.40870	5.96533	1.04043	0.	.81726	-1.66523	1.31028	.17057	0.
93 8	80.0049	2.19976	1.82344	13.81779	3.21441	1.31272	0.	.88292	-2.28043	.69197	.22668	0.
94 0	80.3097	2.20311	1.84454	15.24963	2.83533	1.38181	0.	.88292	-2.41720	.55174	.22668	0.
95 QF	80.6145	2.20619	1.86235	15.99839	2.66961	1.41738	0.	.88292	.00000	.00058	.00576	0.
95 QF	80.9193	2.20927	1.88016	15.24963	2.83459	1.38529	0.	.88292	2.41720	-.55047	-.21544	0.
97 00	81.6989	2.21854	1.91748	11.75333	3.97232	1.21733	0.	.86292	2.06736	-.90885	-.21544	0.
98 8	83.0705	2.24281	1.95843	6.92841	7.31384	.96045	0.	.94367	1.45222	-1.52354	-.15933	0.
99 0	83.3753	2.25029	1.96467	6.08483	8.28478	.91188	0.	.94367	1.31545	-1.66195	-.15933	0.

PJS	S(M)	NUX	NUY	BETAX(M)	BETAY(M)	ETAX(M)	ETAY(M)	ETAS(M)	ALPHAX	ALPHAY	L X	DETA
100 B	84.7469	2.29960	1.98524	3.32148	13.66490	.73193	0.	.98943	.70030	-2.25438	-.10321	0.
101 D	85.0517	2.31516	1.98862	2.93626	15.08052	.70347	0.	.98943	.56354	-2.39555	-.10321	0.
102 QD	85.3565	2.33235	1.99173	2.76720	15.81971	.63564	0.	.98943	.00000	.00382	.00549	0.
103 QD	85.6613	2.34954	1.99485	2.93626	15.07601	.70384	0.	.98943	-.56353	2.39596	.11445	0.
104 OI	86.1613	2.37407	2.00058	3.61198	12.79090	.76107	0.	.98943	-.78789	2.17325	.11445	0.
105 B	87.5329	2.41931	2.02274	6.61548	7.64013	.95643	0.	1.03726	-1.40304	1.57614	.17057	0.
106 D2	89.7938	2.45544	2.10332	15.25311	2.84436	1.34206	0.	1.03726	-2.41752	.54511	.17057	0.
107 QF	90.0986	2.45852	2.12106	16.00190	2.68288	1.36160	0.	1.03726	.00024	-.00693	-.04282	0.
108 QF	90.4034	2.46160	2.13877	15.25283	2.85304	1.31616	0.	1.03726	2.41795	-.46325	-.25416	0.
109 O3	92.8282	2.50183	2.22192	6.16584	8.27785	.69987	0.	1.03726	1.32953	-1.67694	-.25416	0.
110 B	94.1998	2.55049	2.24246	3.36416	13.71112	.38991	0.	1.06747	.71418	-2.27809	-.19804	0.
111 O4	94.5358	2.56754	2.24616	2.93490	15.29297	.32337	0.	1.06747	.56336	-2.42977	-.19804	0.
112 QD	94.8406	2.58473	2.24923	2.76588	16.04615	.27031	0.	1.06747	-.00000	-.00163	-.15149	0.
113 QD	95.1454	2.60193	2.25230	2.93491	15.29489	.23026	0.	1.06747	-.56338	2.42682	-.11223	0.
114 O5	95.6740	2.62773	2.25830	3.65597	12.85503	.17096	0.	1.06747	-.80066	2.18871	-.11223	0.
115 B	97.0456	2.67241	2.28036	6.69476	7.66739	.05557	0.	1.07347	-1.41601	1.58752	-.05611	0.
116 D	97.3504	2.67922	2.28711	7.59966	6.74229	.03846	0.	1.07347	-1.55283	1.44758	-.05611	0.
117 B	98.7220	2.70150	2.33188	12.70071	3.62005	-.00000	0.	1.07419	-2.16818	.82518	-.00000	0.
118 O6	99.2778	2.70785	2.35958	15.24957	2.84621	-.00000	0.	1.07419	-2.41766	.56710	-.00000	0.
119 QF9	99.8874	2.71387	2.39610	16.42563	2.62381	-.00000	0.	1.07419	.56393	-.18821	-.00000	0.
120 QF9	100.4970	2.72015	2.42975	13.97881	3.34161	-.00000	0.	1.07419	3.29291	-1.33466	.00000	0.
121 L3	100.8018	2.72389	2.44299	12.05022	4.02991	-.00000	0.	1.07419	3.03459	-1.22352	.00000	0.
122 QQ3	101.4114	2.73278	2.46424	10.47145	4.90581	-.00000	0.	1.07419	-.29544	-.12852	-.00000	0.
123 QQ3	102.0210	2.74139	2.48479	12.85765	4.30800	-.00000	0.	1.07419	-3.84460	1.05130	-.00000	0.
124 L2	104.6917	2.75969	2.65333	42.14633	2.17812	-.00000	0.	1.07419	-7.12240	-.25378	-.00000	0.
125 L1	105.8076	2.76324	2.72107	55.57044	3.35302	-.00000	0.	1.07419	-8.49201	-.79909	-.00000	0.
126 QQ2	106.4172	2.76481	2.74515	61.23519	5.11927	-.00000	0.	1.07419	5.89323	-2.23579	.00000	0.
127 QQ2	107.0268	2.76658	2.75953	46.53825	9.34238	-.00000	0.	1.07419	17.04955	-5.02064	.00000	0.
128 D	107.3316	2.76775	2.76399	36.72708	12.66357	-.00000	0.	1.07419	15.13924	-5.87565	.00000	0.
129 QQ1	107.9412	2.77108	2.77019	24.24052	18.52876	-.00000	0.	1.07419	6.27109	-3.30220	.00000	0.
130 QQ1	108.5508	2.77559	2.77511	20.00000	20.00000	-.00000	0.	1.07419	1.00000	1.00000	.00000	0.
131 LL	118.5508	2.90059	2.90011	10.00000	10.00000	-.00000	0.	1.07419	-.00000	.00000	.00000	0.
132 REFL	237.1015	5.80118	5.80022	9.93808	9.97230	-2.89249	0.	2.14838	-.00000	-.00000	-.00000	0.

CIRCUMFERENCE = 474.2030 M THETX = 6.28318532 RAD NUX = 11.60235 DNUX/(DP/P) = -17.50165
 RADIUS = 75.4718 M THETY(131) = 0. RAD NUY = 11.60045 DNUY/(DP/P) = -17.78450
 (DS/S)/(DP/P) = .0090610 TGAM = 1 10.50539, 0. 1

MAXIMA --- BETX(126) = 61.23519 BETY(5) = 61.60233 ETAX(132) = -2.89249 ETAY(132) = 0.
 MINIMA --- BETX(7) = 2.11028 BETY(124) = 2.17812 ETAX(117) = -.00000 ETAY(132) = 0.

***	FIN	0	0	// CORE USE SUMMARY	MAXIMUM	USED	UNUSED
				STORE (ELEMENT STORAGE)	9600 (LMAX)	3693	5907
				INFF (ELEMENT DEFINITIONS)	400 (MAX)	124	276

END OF SYNCH RUN PC81

SUPERPERIOD

STRAIGHT SECTION NO. 1

DISPERSION SUPPRESSOR AND STRAIGHT SECTION NO. 2

QUADRANT

DISPERSION ENHANCING EMPTY CELL