5/20/71 SCIENCE DATA

Dick McCutcheon
C. D. Wende
S. M. Krimigis
T. P. A.

I. Experimenters tape format to be defined

Emphemeris data

0. spacecraft clock ≤ UT album, pg, snap.

✓1. R, λ, φ geocentric

✓2. x, y, z solar ecliptic
solar magnetospheric

✓3. ∠ sep sun - earth - probe

"No" → 4. B, L, B/B_0 (contingency) R, Λ

✓5. ~~spacecraft~~ v_x, v_y, v_z geocentric

✓6. spin period

✓7. spin axis ⓐ celestial
ⓑ solar ecliptic

✓8. yr, day, hr spin axis det.

✓9. Full O. A. ① eclipse ②

10. I. P. (analog)

ask for uncompressed 11. Data + Quality Flag.

2. 12. Housekeeping, from S/C.
Bus Voltages, Currents, temp.

13. Calibrate flag. - decode

I. C.D.W. will derive an algebraic form for R vs r. dark. to GM1, 2A, B, C., GM3 to correct 1st.

II. CALIBRATOR RESULTS.

a) → calc. disc. Cycles.

b) — option to apply or not

c) — apply corr. in Cycles.

j (E)

III. Responsibility to get NSSDC

IV. Correct adjacent solar stations

5/11/72 DISCRIMINATION LEVEL IMP-H FLIGHT UNIT (NEE' PROTO) FROM SMK VIZ. 3/4/72 MEMO

THRESHOLD	FINAL LEVEL (MEV)
A1	0.210
A2	0.437
A3	0.923
A4	~~2.5~~ 2.4
A5	4.50
A6	9.50
A7	21.0
A8 (MEVV)	180.0
B1	0.209 (.209)
B2	0.456
B3	0.826
B4	3.90
B5	7.70
B6	15.0
B7	25.0
C1	1.50
C2	3.00
C3	4.05
C4	7.30
C5	27.0

MK SAYS THAT PASSBANDS ARE CONSISTENT WITH DETECTOR THICKNESSES OF

D1 = 38.7 μ
D2 = 900 μ
D3 = 2700 μ

FOIL IS THE SAME ONE AS PROTO CALIB OF 3/18, 3/24, 3/30 1971, SEE MEMO S1P-750-71

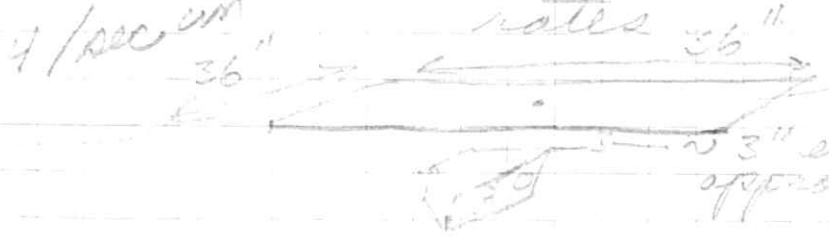
3/11/72 LOGIC TABLE FOR CPME-H FLIGHT UNIT

FINAL (FOR SPR 72)

CALIB ONLY

P1	$A1\ \overline{B1}\ \overline{A2}\ \overline{M}$	
P2	$A2\ \overline{B1}\ \overline{A3}\ \overline{M}$	
P3	$A3\ \overline{B1}\ \overline{M}$	
P4	$A1\ B1\ \overline{B4}\ \overline{C1}\ \overline{M}$	
P5	$A1\ B4\ \overline{B5}\ \overline{C1}\ \overline{M}$	
P6	$A1\ \overline{B5}\ \overline{M}$	
P7	$B4\ \overline{B5}\ C4\ \overline{M}$	
P8	$B3\ \overline{B4}\ C4\ \overline{M}$	
P9	$B3\ \overline{B4}\ C3\ \overline{C4}\ \overline{M}$	
P10	$B3\ C2\ \overline{C3}\ \overline{M}$	
P11	$B0\ \overline{B3}\ C1\ \overline{C2}$	
$\alpha 1$	$A4\ \overline{A5}\ \overline{B1}\ \overline{M}$	
$\alpha 2$	$A5\ \overline{B1}\ \overline{M}$	
$\alpha 3$	$A4\ B1\ \overline{B6}\ \overline{M}$	
$\alpha 4$ (REV)	$A0\ B6\ \overline{C1}\ \overline{M}$	$B6\ \overline{B7}\ \overline{C1}\ A0\ \overline{M}$
$\alpha 5$ (REV)		$B7\ \overline{C1}\ A2\ \overline{M}$
$\alpha 6$	$B6\ C5\ \overline{M}$	
$\alpha 7$	$B4\ \overline{B6}\ C5\ \overline{M}$	
Z1	$A6\ \overline{B1}\ \overline{M}$	
Z2	$A7\ \overline{B1}\ \overline{M}$	
Z3 (NEW)	$A8\ \overline{M}$	( )
E4	$B1\ \overline{A1}\ \overline{B5}\ \overline{C2}\ \overline{M}$	
E5	$B2\ \overline{A1}\ \overline{B5}\ \overline{C2}\ \overline{M}$	
E6	$B3\ \overline{A1}\ \overline{B5}\ \overline{C2}\ \overline{M}$	

6/14/75 Background Check run for UMP
Flight.
→ Find source of MES Elec.



solid angle subtended from detector

$$\iint d\Omega = \int d(\cos\theta)\, d\phi$$

approx by equal area circle

$$36 \times 36 = \pi r^2$$

$$r = \frac{36}{\sqrt{\pi}} \text{ in}$$

$$\Omega = 2\pi \int_0^{\theta_{max}} d(\cos\theta) = -2\pi (1 - \cos\theta_{max})$$

$$\cos\theta_{max} = \frac{3}{\sqrt{\left(\frac{36}{\pi}\right)^2 + 3^2}} \cong \frac{3}{\frac{36}{\sqrt{\pi}}} \sim \frac{\sqrt{\pi}}{12}$$

$$\cos\theta_{max} = \frac{1.47}{12.11.77} \sim .15$$

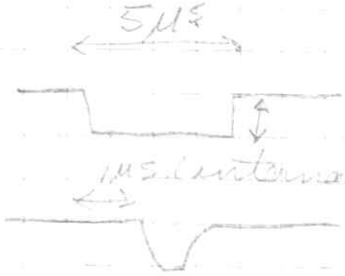
$$\frac{\Omega}{4\pi} = \frac{1 - \cos\theta_{max}}{2} = \frac{.85}{2} \sim \boxed{.425}$$

NOISE ⇒ NO REDUCTION

ROOM ~~XXX~~ ⇒ ~ 42% RED

C.R. ~ 85 +% RED

SHIELD RATE ~5 KC SINGLES
~5 μS PULSE WIDTH
(~2.5% accidentals)



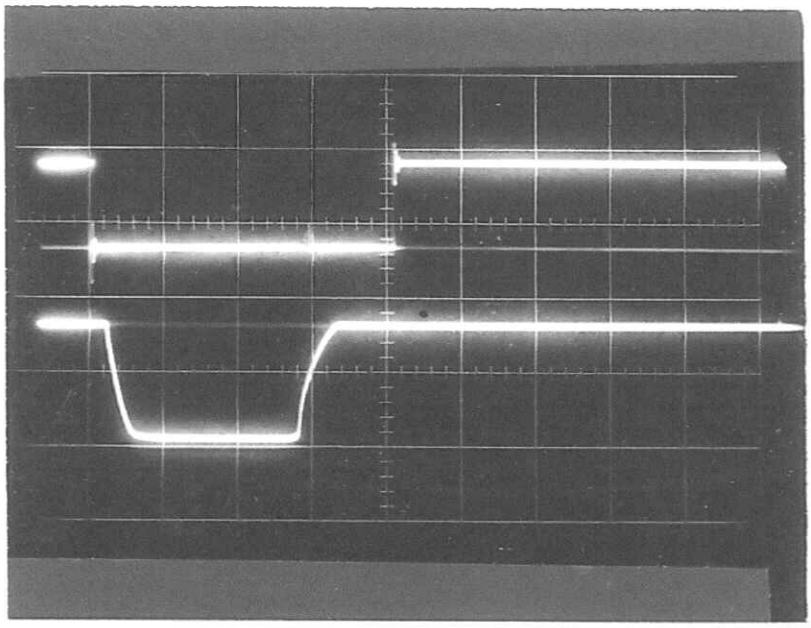
Test pulse input
to logic function
100% blanking

100 SEC RUNS.

664	M	raw
698	M	BLANKED
2011	S	raw
1969	S	Blanked
4200	c/sec	singles
2077	S	raw
1958	S	Blanked
749	M	blanked
834	M	raw
890	M	raw
809	M	Blanked
4790	c/sec	singles

INCREASE GAIN ON SHIELD PMT. (~1.5 or 1.6)

690	M	Blanked
791	M	raw
7500	c/SEC	
1381	M	Blanked (200 sec)
1622	M	raw (200 sec)
3923	S	raw (")
3583	S	Blanked
7700	c/sec	singles

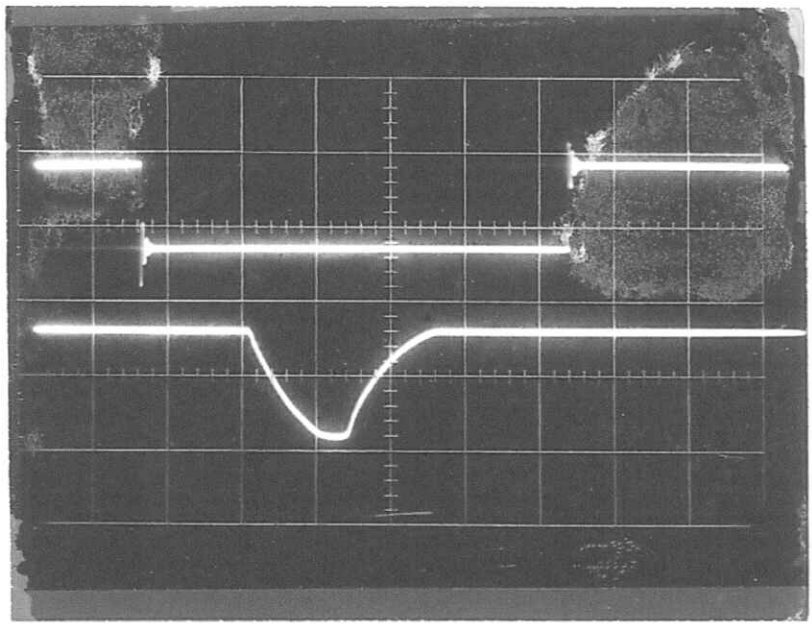


Blanking

5

2 μs/cm

1 volt/cm



Blanking

M

1 μs/cm

1 volt/cm

6 μs blanked

9/22/72 Thickness of Tungsten absorber

take ~ 140 MeV as penetration

= 1.4573 cm = 28.156 g/cm²
(GOLD at 19.32 gm/cm³

⇒ "effective density = 14 gm/cm³)

⇒ use 1.4573 cm gold as equiv. thickness

9/13/72 GM TUBE CALCULATIONS

GM-1 LND 704 .3 mg/cm² MICA 22.5° ½ Δ

GM-2A
2B } LND 705 1.5 mg/cm² MICA 22.5° ½ Δ
2C

GM-2 LND 715 1.5 mg/cm² MICA 10° x 40°
2.32 mg/cm² Be FULL

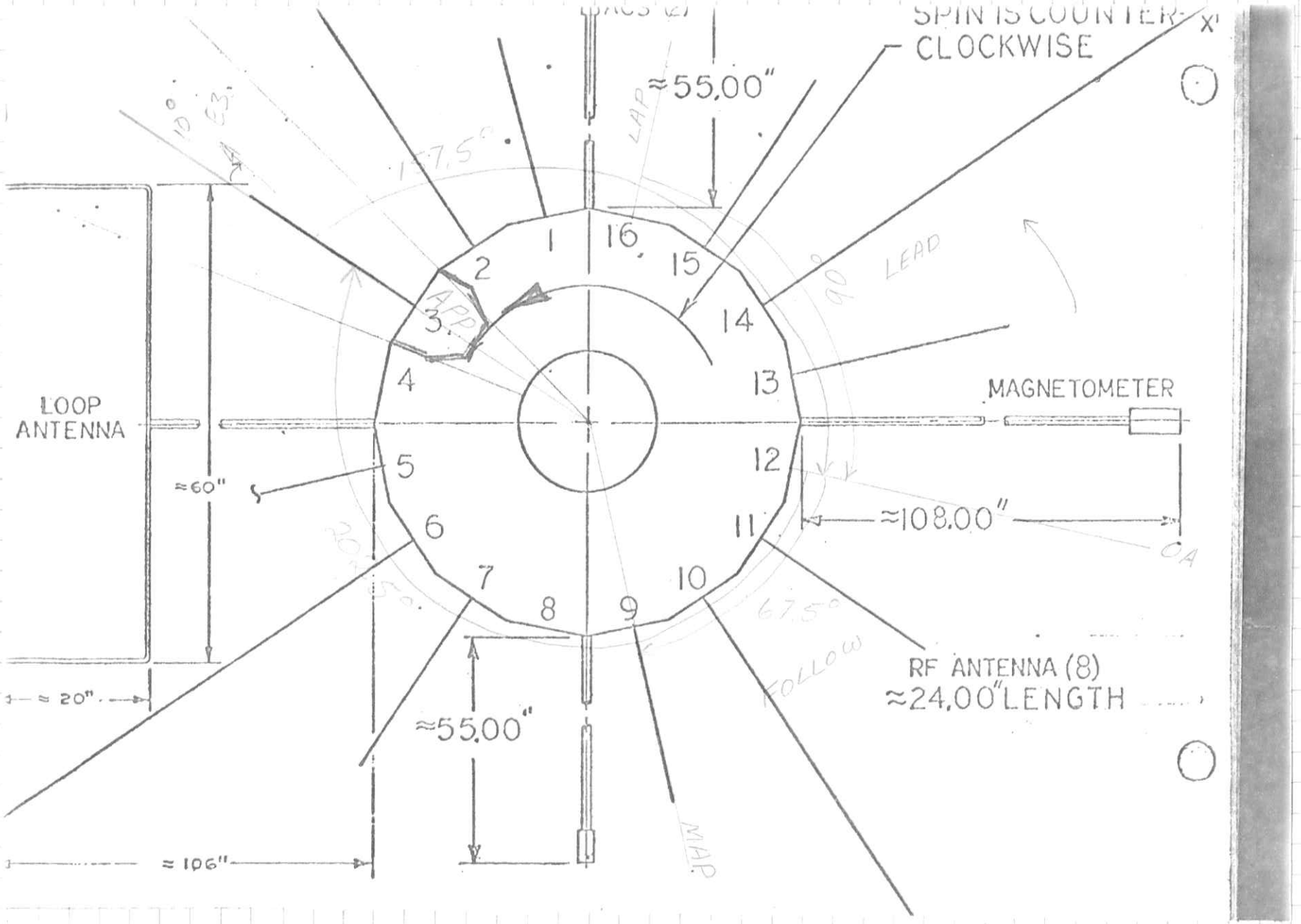
QUESTIONS -

① SENSITIVE AREAS?

② WINDOW THICKNESSES? (α's, PROTONS)

③ ANG. RESP. CURVES?

④ SUN SHIELD ARRANGEMENT


SPIN IS COUNTER-CLOCKWISE
X'
≈55.00"
LAP
22.5°
LEAD
MAGNETOMETER
LOOP ANTENNA
≈60"
≈108.00"
OA
RF ANTENNA (8)
≈24.00" LENGTH
≈55.00"
≈ 20"
≈ 106"
FOLLOW
MAP
APD
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

9/13/76 O.A. SUN PULSE TIMES

E. Pol. 25 = 5490

CONCLUSION SECTOR 5 = SOLAK SECTOR

SECTOR	φ		
1	180°	π	190°
2	225°	5π/4	235°
3	270°	3π/2	280°
4	315°	7π/4	325°
5	0°	0	10°
6	45°	π/4	55°
7	90°	π/2	100°
8	135°	3π/4	145°

E1
E2A
E4
P6.A1, P1, A8

E3

FLIGHT TELESCOPE PARAMETERS APP-1-10

FOIL 12.68×10^{-6} INCHES
$= 3.475 \times 10^{-5}$ CM
$= 3.3475$ MICRONS (± 0.01 MICRONS)

LEVELS (REC. 9/28/72 ETR REVIEW)

	(MEV)		(MEV)		
A0	.170	B0	.196	C0	.323
A1	.210	B1	.206	C1	1.49
A2	.440	B2	.445	C2	2.38
A3	.925	B3	.209	C3	3.15
A4	2.33	B4	3.89	C4	6.95
A5	4.48	B5	7.51	C5	25.7
A6	9.48	B6	14.8		
A7	21.2				
A8	180.1				

70 keV 27 KeV 63.3 KeV

52 keV 27 KeV

5/30/74

Summary of changes between IMP H & J

1. Spin rate — accumulation time of declared data

2. Sectoring

   E3 replaces E1 on S1 subcom

   E1 replaces E3 on S2 subcom

   Z2 replaces P8 on S4

   A3 replaces A6 on S4

   E3 duty cycle is increased

3. Passband of P#6 is changed into Z4 — medium channel

4. New passbands, geometric factors for Telescope channels

5. New R vs r curves.

SILICON

ELEMENT	ATOMIC NUMBER	ATOMS/ MOLECULE	ATOMIC WEIGHT	ADJUSTED IONIZATION POTENTIAL
SI	14	1	28.086	170.0

DENSITY = 2.3300 GM/CM3

PROTON ENERGY MEV	ENERGY LOSS MEV/ GM/CM2	ENERGY LOSS MEV/CM	PROTON RANGE MG/CM2	PROTON RANGE MM	PROTON PATH LENGTH MG/CM2	PROTON PATH LENGTH MM	PATH LENGTH STRAGGLING MG/CM2	PATH LENGTH STRAGGLING MM	PATH LENGTH STRAGGLING PERCENT	MULTIPLE SCATTERING PERCENT	PROBABILITY OF INELASTIC NUCLEAR INTERACTION
.10	432.01	1006.6	.28403	.00122	.28803	.00124	.01119	.00005	3.884	1.387	0.
.15	382.61	891.48	.40657	.00174	.41094	.00176	.01483	.00006	3.609	1.063	0.
.20	350.19	815.95	.54234	.00233	.54750	.00235	.01863	.00008	3.402	.9426	0.
.30	303.29	706.67	.84784	.00364	.85507	.00367	.02635	.00011	3.082	.8457	0.
.40	270.91	631.21	1.1950	.00513	1.2046	.00517	.03431	.00015	2.848	.7972	0.
.50	245.55	572.14	1.5804	.00678	1.5925	.00683	.04256	.00018	2.672	.7622	0.
.60	223.98	521.87	2.0045	.00860	2.0193	.00867	.05120	.00022	2.539	.7334	0.
.70	206.41	480.94	2.4667	.01059	2.4843	.01066	.06050	.00026	2.435	.7068	0.
.80	191.79	446.87	2.9664	.01273	2.9869	.01282	.07024	.00030	2.352	.6872	0.
.90	184.06	428.86	3.4952	.01500	3.5187	.01510	.08017	.00034	2.278	.6683	0.
1.00	176.32	410.82	4.0476	.01737	4.0741	.01749	.09023	.00039	2.215	.6513	0.
1.20	157.68	367.40	5.2423	.02250	5.2751	.02264	.11201	.00048	2.123	.6219	0.
1.40	142.82	332.78	6.5707	.02820	6.6101	.02837	.13643	.00059	2.064	.5962	0.
1.60	131.14	305.57	8.0263	.03445	8.0727	.03465	.16301	.00070	2.019	.5747	0.
1.80	121.22	282.43	9.6124	.04125	9.6661	.04149	.19170	.00082	1.983	.5562	0.
2.00	112.90	263.05	11.311	.04854	11.372	.04881	.22218	.00095	1.954	.5404	.00001
2.20	105.76	246.43	13.135	.05637	13.204	.05667	.25443	.00109	1.927	.5263	.00001
2.40	99.598	232.06	15.078	.06471	15.156	.06505	.28837	.00124	1.903	.5141	.00002
2.60	94.156	219.38	17.137	.07355	17.223	.07392	.32395	.00139	1.881	.5033	.00002
2.80	89.340	208.16	19.308	.08287	19.404	.08328	.36115	.00155	1.861	.4936	.00003
3.00	85.060	198.19	21.593	.09267	21.698	.09312	.39992	.00172	1.843	.4851	.00004
3.20	81.227	189.26	23.989	.10296	24.104	.10345	.44019	.00189	1.826	.4771	.00005
3.40	77.769	181.20	26.495	.11371	26.620	.11425	.48193	.00207	1.810	.4701	.00006
3.60	74.628	173.88	29.110	.12494	29.246	.12552	.52510	.00225	1.795	.4634	.00007
3.80	71.761	167.20	31.837	.13664	31.983	.13727	.56969	.00245	1.781	.4574	.00008
4.00	69.132	161.08	34.663	.14877	34.820	.14944	.61566	.00264	1.768	.4520	.00010
4.20	66.710	155.43	37.599	.16137	37.760	.16209	.66299	.00285	1.755	.4469	.00011
4.40	64.472	150.22	40.638	.17441	40.818	.17519	.71168	.00305	1.744	.4421	.00013
4.60	62.397	145.38	43.777	.18788	43.969	.18871	.76170	.00327	1.732	.4377	.00015
4.80	60.466	140.89	47.026	.20183	47.231	.20271	.81303	.00349	1.721	.4337	.00017

PROTON ENERGY MEV	ENERGY LOSS MEV/ GM/CM2	ENERGY LOSS MEV/CM	PROTON RANGE GM/CM2	PROTON RANGE CM	PROTON PATH LENGTH GM/CM2	PROTON PATH LENGTH CM	PATH LENGTH STRAGGLING GM/CM2	PATH LENGTH STRAGGLING CM	PATH LENGTH STRAGGLING PERCENT	MULTIPLE SCATTERING PERCENT	PROBABILITY OF INELASTIC NUCLEAR INTERACTION
5.00	58.666	136.69	.05037	.02162	.05058	.02171	.00067	.00037	1.711	.4296	.00019
5.50	54.652	127.34	.05917	.02540	.05942	.02550	.00100	.00043	1.680	.4212	.00025
6.00	51.211	119.32	.06860	.02944	.06888	.02956	.00115	.00049	1.666	.4138	.00033
6.50	48.223	112.36	.07862	.03374	.07895	.03388	.00130	.00056	1.647	.4072	.00041
7.00	45.603	106.25	.08926	.03831	.08962	.03846	.00146	.00063	1.630	.4015	.00051
7.50	43.351	101.01	.10046	.04312	.10086	.04329	.00163	.00070	1.613	.3964	.00062
8.00	41.275	96.170	.11224	.04817	.11268	.04836	.00180	.00077	1.598	.3917	.00132
8.50	39.410	91.825	.12459	.05347	.12508	.05368	.00198	.00085	1.584	.3875	.00231
9.00	37.724	87.898	.13752	.05902	.13805	.05925	.00217	.00093	1.572	.3837	.00330
9.50	36.193	84.330	.15102	.06482	.15160	.06506	.00236	.00101	1.560	.3802	.00430
10.00	34.794	81.071	.16506	.07084	.16568	.07111	.00257	.00110	1.549	.3770	.00595
11.00	32.331	75.330	.19480	.08360	.19552	.08392	.00299	.00126	1.528	.3712	.00929
12.00	30.227	70.428	.22670	.09730	.22754	.09766	.00344	.00146	1.511	.3662	.01265
13.00	28.407	66.188	.26074	.11190	.26168	.11231	.00391	.00166	1.495	.3619	.01602
14.00	26.816	62.481	.29686	.12741	.29793	.12787	.00441	.00189	1.480	.3580	.02940
15.00	25.412	59.210	.33506	.14380	.33625	.14431	.00493	.00212	1.467	.3546	.02281
16.00	24.163	56.299	.37529	.16107	.37662	.16164	.00548	.00235	1.455	.3514	.02622
17.00	23.044	53.692	.41757	.17921	.41903	.17984	.00605	.00260	1.444	.3486	.02966
18.00	22.035	51.341	.46181	.19820	.46341	.19889	.00665	.00285	1.434	.3460	.03311
19.00	21.120	49.209	.50802	.21803	.50977	.21879	.00726	.00312	1.425	.3437	.03658
20.00	20.286	47.267	.55620	.23871	.55811	.23953	.00790	.00339	1.416	.3415	.04006
22.00	18.823	43.857	.65830	.28253	.66053	.28349	.00925	.00397	1.400	.3378	.04708
24.00	17.572	40.943	.76800	.32962	.77056	.33072	.01068	.00458	1.386	.3343	.05416
26.00	16.501	38.447	.88515	.37989	.88809	.38116	.01219	.00523	1.373	.3313	.05864
28.00	15.567	36.271	1.0096	.43332	1.0130	.43475	.01379	.00592	1.362	.3287	.06044
30.00	14.745	34.357	1.1413	.48982	1.1450	.49143	.01547	.00664	1.351	.3263	.06231
32.00	14.016	32.650	1.2800	.54936	1.2842	.55115	.01723	.00739	1.342	.3242	.06426
34.00	13.365	31.140	1.4257	.61191	1.4303	.61388	.01906	.00818	1.333	.3223	.06626
36.00	12.779	29.775	1.5784	.67742	1.5835	.67960	.02097	.00900	1.324	.3206	.06833
38.00	12.249	28.540	1.7378	.74583	1.7434	.74822	.02295	.00985	1.317	.3189	.07046
40.00	11.767	27.417	1.9039	.81713	1.9100	.81973	.02501	.01073	1.309	.3175	.07263
45.00	10.733	25.009	2.3480	1.0077	2.3558	1.0109	.03046	.01307	1.293	.3142	.07828
50.00	9.8896	23.043	2.8324	1.2156	2.8413	1.2194	.03634	.01560	1.279	.3115	.08416
55.00	9.1867	21.405	3.3558	1.4403	3.3663	1.4447	.04263	.01830	1.266	.3092	.09029
60.00	8.5919	20.019	3.9174	1.6813	3.9294	1.6869	.04932	.02117	1.255	.3072	.09672
65.00	8.0815	18.830	4.5160	1.9382	4.5298	1.9441	.05639	.02420	1.245	.3054	.10339
70.00	7.6385	17.798	5.1509	2.2107	5.1666	2.2174	.06383	.02740	1.236	.3039	.11029
75.00	7.2503	16.893	5.8211	2.4983	5.8397	2.5059	.07163	.03074	1.227	.3025	.11736
80.00	6.9071	16.093	6.5258	2.8006	6.5459	2.8092	.07978	.03424	1.219	.3012	.12464
90.00	6.3274	14.743	8.0360	3.4489	8.0601	3.4593	.09706	.04166	1.204	.2991	.13954

PROTON ENERGY MEV	ENERGY LOSS MEV/ GM/CM2	ENERGY LOSS MEV/CM	PROTON RANGE GM/CM2	PROTON RANGE CM	PROTON PATH LENGTH GM/CM2	PROTON PATH LENGTH CM	PATH LENGTH STRAGGLING GM/CM2	PATH LENGTH STRAGGLING CM	PATH LENGTH STRAGGLING PERCENT	MULTIPLE SCATTERING PERCENT	PROBABILITY OF INELASTIC NUCLEAR INTERACTION
100.00	5.8562	13.645	9.6757	4.1527	9.7046	4.1651	.11561	.04962	1.191	.2973	.13481
110.00	5.4655	12.735	11.440	4.9097	11.474	4.9243	.13535	.05809	1.180	.2957	.17045
120.00	5.1360	11.967	13.323	5.7180	13.362	5.7349	.15621	.06704	1.169	.2944	.18650
130.00	4.8544	11.311	15.321	6.5756	15.366	6.5946	.17814	.07646	1.159	.2932	.20206
140.00	4.6108	10.743	17.430	7.4806	17.481	7.5026	.20106	.08630	1.150	.2922	.21942
150.00	4.3981	10.247	19.645	8.4314	19.703	8.4560	.22496	.09656	1.142	.2913	.23608
160.00	4.2106	9.8107	21.963	9.4263	22.027	9.4587	.24979	.10720	1.134	.2905	.25209
170.00	4.0442	9.4230	24.380	10.464	24.451	10.496	.27546	.11823	1.127	.2897	.26987
180.00	3.8955	9.0764	26.893	11.542	26.971	11.574	.30197	.12960	1.120	.2890	.28697
190.00	3.7618	8.7649	29.499	12.661	29.584	12.697	.32926	.14131	1.113	.2884	.30413
200.00	3.6409	8.4833	32.194	13.817	32.287	13.857	.35731	.15335	1.107	.2878	.32129
210.00	3.5312	8.2276	34.976	15.011	35.077	15.054	.38607	.16569	1.101	.2873	.33845
220.00	3.4311	7.9944	37.841	16.241	37.950	16.288	.41552	.17833	1.095	.2868	.35564
230.00	3.3394	7.7808	40.788	17.505	40.905	17.554	.44562	.19125	1.090	.2863	.37280
240.00	3.2552	7.5846	43.813	18.804	43.943	18.858	.47635	.20444	1.084	.2859	.38991
250.00	3.1776	7.4037	46.914	20.135	47.048	20.192	.50769	.21789	1.079	.2854	.40691
260.00	3.1058	7.2365	50.088	21.497	50.232	21.559	.53959	.23159	1.074	.2850	.42379
270.00	3.0392	7.0814	53.335	22.890	53.487	22.956	.57205	.24552	1.070	.2847	.44054
280.00	2.9773	6.9372	56.650	24.313	56.812	24.380	.60504	.25967	1.065	.2843	.45712
290.00	2.9197	6.8028	60.033	25.765	60.204	25.838	.63854	.27405	1.061	.2840	.47351
300.00	2.8658	6.6773	63.480	27.245	63.661	27.322	.67252	.28864	1.056	.2836	.48969
310.00	2.8154	6.5599	66.992	28.752	67.182	28.833	.70697	.30342	1.052	.2833	.50565
320.00	2.7681	6.4498	70.564	30.285	70.764	30.371	.74187	.31840	1.048	.2830	.52139
330.00	2.7237	6.3463	74.196	31.844	74.406	31.934	.77721	.33356	1.045	.2827	.53690
340.00	2.6820	6.2490	77.886	33.427	78.107	33.522	.81295	.34891	1.041	.2824	.55214
350.00	2.6426	6.1573	81.632	35.035	81.863	35.134	.84910	.36442	1.037	.2822	.56712
360.00	2.6054	6.0707	85.433	36.666	85.674	36.770	.88563	.38010	1.034	.2818	.58184
370.00	2.5703	5.9889	89.287	38.320	89.539	38.429	.92253	.39594	1.030	.2815	.59628
380.00	2.5371	5.9114	93.192	39.997	93.455	40.109	.95979	.41193	1.027	.2813	.61045
390.00	2.5056	5.8380	97.148	41.694	97.421	41.810	.99739	.42807	1.024	.2810	.62433
400.00	2.4757	5.7683	101.15	43.413	101.44	43.535	1.0353	.44435	1.021	.2807	.63792
410.00	2.4473	5.7021	105.20	45.152	105.50	45.279	1.0736	.46076	1.018	.2805	.65118
420.00	2.4202	5.6391	109.30	46.911	109.61	47.042	1.1121	.47731	1.015	.2802	.66410
430.00	2.3945	5.5792	113.44	48.689	113.76	48.825	1.1510	.49399	1.012	.2800	.67668
440.00	2.3700	5.5220	117.63	50.485	117.96	50.627	1.1902	.51080	1.009	.2797	.68891
450.00	2.3466	5.4675	121.86	52.300	122.20	52.447	1.2296	.52772	1.006	.2795	.70079
460.00	2.3242	5.4154	126.13	54.133	126.48	54.285	1.2693	.54476	1.004	.2792	.71232
470.00	2.3029	5.3657	130.44	55.983	130.81	56.140	1.3092	.56191	1.001	.2790	.72352
480.00	2.2824	5.3181	134.79	57.850	135.17	58.012	1.3495	.57917	.9984	.2787	.73437
490.00	2.2629	5.2725	139.18	59.734	139.57	59.900	1.3899	.59653	.9959	.2785	.74489

PROTON ENERGY MEV	ENERGY LOSS MEV/ GM/CM2	MEV/CM	PROTON RANGE GM/CM2	CM	PROTON PATH LENGTH GM/CM2	CM	PATH LENGTH STRAGGLING GM/CM2	CM	PERCENT	MULTIPLE SCATTERING PERCENT	PROBABILITY OF INELASTIC NUCLEAR INTERACTION
500.00	2.2442	5.2269	143.60	61.633	144.01	61.805	1.4006	.61400	.9934	.2783	.73507
510.00	2.2262	5.1871	148.07	63.548	148.48	63.725	1.4715	.63156	.9911	.2780	.74402
520.00	2.2090	5.1470	152.56	65.478	152.99	65.661	1.5127	.64922	.9888	.2778	.77445
530.00	2.1925	5.1065	157.10	67.423	157.53	67.611	1.5541	.66698	.9865	.2776	.78387
540.00	2.1766	5.0715	161.66	69.383	162.11	69.576	1.5956	.68482	.9843	.2773	.79257
550.00	2.1613	5.0359	166.26	71.356	166.72	71.554	1.6374	.70275	.9821	.2771	.80116
560.00	2.1467	5.0017	170.89	73.343	171.36	73.547	1.6794	.72077	.9800	.2769	.80945
570.00	2.1326	4.9689	175.55	75.344	176.04	75.553	1.7216	.73887	.9779	.2767	.81745
580.00	2.1190	4.9372	180.24	77.358	180.74	77.572	1.7639	.75705	.9759	.2764	.82516
590.00	2.1059	4.9067	184.96	79.384	185.48	79.604	1.8065	.77530	.9740	.2762	.83259
600.00	2.0933	4.8773	189.72	81.423	190.24	81.646	1.8492	.79364	.9720	.2760	.83974
620.00	2.0694	4.8217	199.30	85.536	199.85	85.773	1.9351	.83052	.9683	.2755	.85326
640.00	2.0471	4.7699	208.99	89.696	209.57	89.943	2.0217	.86763	.9647	.2751	.86577
660.00	2.0264	4.7215	218.79	93.899	219.39	94.158	2.1089	.90511	.9613	.2746	.87733
680.00	2.0070	4.6764	228.68	98.145	229.31	98.415	2.1967	.94279	.9580	.2741	.88799
700.00	1.9889	4.6341	238.66	102.43	239.32	102.71	2.2850	.98071	.9548	.2737	.89781
720.00	1.9719	4.5943	248.74	106.75	249.42	107.05	2.3739	1.0188	.9516	.2732	.90684
740.00	1.9560	4.5574	258.89	111.11	259.60	111.42	2.4633	1.0572	.9489	.2728	.91514
760.00	1.9410	4.5225	269.13	115.51	269.87	115.82	2.5532	1.0958	.9461	.2723	.92275
780.00	1.9269	4.4897	279.45	119.93	280.21	120.26	2.6435	1.1345	.9434	.2719	.92973
800.00	1.9137	4.4589	289.84	124.39	290.63	124.73	2.7342	1.1735	.9408	.2714	.93613
820.00	1.9012	4.4298	300.30	128.88	301.11	129.23	2.8254	1.2126	.9383	.2710	.94197
840.00	1.8894	4.4023	310.82	133.40	311.67	133.76	2.9170	1.2519	.9359	.2705	.94732
860.00	1.8783	4.3764	321.41	137.95	322.29	138.32	3.0089	1.2914	.9336	.2700	.95219
880.00	1.8678	4.3520	332.07	142.52	332.97	142.90	3.1013	1.3310	.9314	.2696	.95664
900.00	1.8579	4.3288	342.78	147.12	343.71	147.51	3.1940	1.3708	.9293	.2691	.96070
920.00	1.8485	4.3070	353.56	151.74	354.51	152.15	3.2870	1.4107	.9272	.2686	.96440
940.00	1.8396	4.2862	364.39	156.39	365.37	156.81	3.3804	1.4508	.9252	.2681	.96776
960.00	1.8312	4.2666	375.28	161.07	376.29	161.50	3.4741	1.4910	.9233	.2676	.97082
1000.00	1.8156	4.2303	397.32	170.52	398.38	170.98	3.6624	1.5718	.9193	.2661	.97613

THE ELECTRON DENSITY OF SILICON IS 3.003E 23 ELECTRONS PER GRAM

THE PROTON KINETIC ENERGY FOR MINIMUM IONIZATION IS 2.175 BEV, AND THE MINIMUM ENERGY LOSS IS 1.6758 MEV/GM/CM2