NASA TECHNICAL
MEMORANDUM

NASA TM X-58060
May 1971

EXTREME-DENSITY PROFILES FOR SKYLAB COMMAND MODULE ENTRY CONSIDERATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NASA TM X-58060

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ABSTRACT

Two model atmospheres are presented: 3σ density envelopes for 30° N latitude for January and July for use in entry studies of the Skylab command module entry. The two model atmosphere studies are to be used in calculation of entry corridor lines, calculation of entry monitoring system tolerances, and calculation of guidance and navigation system dispersion angles.

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SUMMARY

Extreme-density dispersions (3σ) and extreme-density scale heights at an altitude of 90 kilometers, at 30° N latitude for January and July are used to construct model atmospheres (including pressure, temperature, density, speed of sound, viscosity, and eight other variables for altitudes extending from 0 to 120 kilometers). These extreme models, while at 30° N latitude, are inclusive of the 60° N latitude models and, therefore, are recommended for Skylab command module entry studies.

INTRODUCTION

Since both drag and heating rates of the entering Skylab command module are dependent upon atmospheric density, the success of the entry phase of a mission depends to a great extent on the density predicted at entry altitudes. Density is usually predicted by means of a model atmosphere in which the density-altitude schedule is specified in tabular form. Such a model atmosphere represents mean conditions. For example, the "U. S. Standard Atmosphere, 1962" (ref. 1) describes annual conditions at 45° N latitude. The structure of the lowest 120 kilometers of the earth atmosphere varies primarily as a function of altitude, season, latitude, and time of day, with the size of the variation being from largest to smallest, respectively. Thus, many important variations are ignored when the mean model atmosphere is used.

The "U. S. Standard Atmosphere Supplements, 1966" (ref. 2) provides the most realistic and up-to-date picture of density deviations from the "U. S. Standard Atmosphere, 1962" (ref. 1). These data include the mean and 95th percentile envelopes of density for annual conditions at 15° N latitude and for January and July at 30° N, 45° N, 60° N, and 75° N latitude. Nominal Skylab command module entry occurs at latitudes less than or equal to 50° N latitude. Unfortunately, the model atmospheres for 60° N latitude and 70° N latitude, which would suffice for the purpose of calculating entry corridor lines, monitoring system tolerances, and calculating guidance and navigation system dispersion angles, do not extend high enough in altitude. Since the majority of the entry corridor will occur in the $\pm 30°$ range, the 3σ density envelopes have been used to develop 30° N latitude January and July model atmospheres (tables I and II). These models also have greater density variability at 80 to 120 kilometers than the

60° N latitude January and July models which are given in reference 2. It is recommended that these two extreme-density models be used for calculation of extreme entry conditions for the Skylab command module.

CRITICAL DENSITY GRADIENTS

The Apollo command module starts sensing the atmosphere at a 0.05g acceleration (near 90 kilometers). The density at this altitude tends to remain constant (near-isopycnic level); however, the vertical density gradients in this region change greatly due to seasonal and day-to-day changes. The density gradient at 90 kilometers is important because the entry monitoring system determines the entry angle of the spacecraft from the deceleration rate after 0.05g. The magnitude of this vertical density gradient is expressed by the density scale height

$$H_\rho \equiv \frac{-1}{\frac{1}{\rho}\frac{\partial \rho}{\partial z}}$$

where ρ is density and z is geometric altitude. The quantity H_ρ (given in units of distance) indicates the vertical distance over which density decreases by a factor of e. Thus, a large scale height indicates an atmosphere decaying very slowly, and a small scale height indicates an atmosphere decaying very rapidly with height.

Day-to-day changes in the thermal structure of the atmosphere can result in larger vertical density gradients than those found in the mean monthly atmospheres as described in reference 2. Available density observations are not sufficiently numerous or accurate for estimating frequency distributions of vertical density gradients at various levels. However, rough estimates for the maximum and minimum vertical density gradients that are likely to occur at 90 kilometers can be made in a hydrostatically consistent atmosphere, provided limits are placed on the temperature and the vertical temperature gradient $\partial T/\partial z$. The relationship between these quantities is that of a nomogram from reference 3. A realistic maximum density gradient (minimum density scale height) based on a temperature of 160° K and $\partial T/\partial z = +10°$ K/km was calculated to be 3.699 kilometers, while 4.56 kilometers will occur more often ($\partial T/\partial z = 0$). Thus the 3σ summer model (table I) has a density scale height of 3.62 kilometers. The smallest density gradient (maximum density scale height) that can occur is 8.632 kilometers based on a temperature of 230° K and a superadiabatic temperature gradient, although 6.659 kilometers will occur at times ($\partial T/\partial z = 0$). Therefore 8.17 kilometers was chosen for the 3σ winter model (table II).

CALCULATION OF THE EXTREME MODELS

The two model atmospheres in tables I and II were calculated from density versus altitude information supplied in reference 2. These data consist of the 95-percent envelopes for each month, January and July, which were used as the basis for the 3σ models by adding one additional standard deviation. Next, the density data were integrated downward from 120 kilometers by using the hydrostatic equation as applied to falling sphere density data as described in reference 4. This procedure gives the necessary and sufficient temperature profiles for the models. Finally, the computer program described in reference 5 was used to calculate the two extreme model atmospheres with 13 variables as a function of altitude. Tables I and II each contain separate but equivalent models in separate scientific and engineering units.

CONCLUDING REMARKS

The two model atmospheres present 3σ density envelopes for 30° N latitude for January and 30° N latitude for July. The models are recommended for use in atmospheric entry studies for the Skylab command module, because these models are inclusive of the 60° N latitude for January and July model atmospheres as presented in the "U.S. Standard Atmosphere Supplements, 1966."

Manned Spacecraft Center
National Aeronautics and Space Administration
Houston, Texas, May 6, 1971
160-75-03-00-72

REFERENCES

1. COESA: U.S. Standard Atmosphere, 1962. U.S. Government Printing Office, Dec. 1962.

2. COESA: U.S. Standard Atmosphere Supplements, 1966. U.S. Government Printing Office, 1967.

3. Cole, Allen E.; and Kantor, Arthur J.: Horizontal and Vertical Distributions of Atmospheric Density, Up to 90 km. Air Force Surveys in Geophysics No. 157, June 1964.

4. Pitts, David E.; and Carter, Patricia C.: High-Altitude Atmospheric Measurements for the Reentries of Gemini 6 and Gemini 7. NASA TM X-58003, Nov. 1966.

5. Pitts, David E.: A Computer Program for Calculating Model Planetary Atmospheres, NASA TN D-4292, 1968.

TABLE I.- MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA

(a) Scientific units

CONSTRUCTION PARAMETERS — SKYLAB

SURFACE PRESSURE =	1013.50 MB	SURFACE TEMPERATURE =	304.60 K	SURFACE DENSITY =	1.16-03 GM/CC
BASE OF EXOSPHERE =	4000.00(KM)	MOLECULAR WEIGHT =	28.966	SURFACE GRAVITY =	980.660 CM/SEC/SEC
RADIUS OF EARTH =	6378.00(KM)	PERCENT NITROGEN =	78.080	PERCENT CO2 =	.030
PERCENT OXYGEN =	20.960	PERCENT ARGON =	.930	PERCENT NEON =	.000
PERCENT HYDROGEN =	.000	PERCENT HELIUM =	.000	PERCENT WATER =	.000
PERCENT CO =	.000	PERCENT SO2 =	.000		

TEMPERATURE AND MOLECULAR WEIGHT DISTRIBUTION

AT	1.00	GEOP KM	TEMPERATURE=	293.65 K	AND MOLECULAR	WEIGHT=	28.96600
AT	6.00	GEOP KM	TEMPERATURE=	266.15 K	AND MOLECULAR	WEIGHT=	28.96600
AT	10.00	GEOP KM	TEMPERATURE=	238.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	17.00	GEOP KM	TEMPERATURE=	220.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	21.00	GEOP KM	TEMPERATURE=	220.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	43.00	GEOM KM	TEMPERATURE=	271.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	46.00	GEOM KM	TEMPERATURE=	271.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	60.00	GEOM KM	TEMPERATURE=	257.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	80.00	GEOM KM	TEMPERATURE=	172.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	85.00	GEOM KM	TEMPERATURE=	150.00 K	AND MOLECULAR	WEIGHT=	28.95000
AT	88.00	GEOM KM	TEMPERATURE=	140.00 K	AND MOLECULAR	WEIGHT=	28.94500
AT	90.00	GEOM KM	TEMPERATURE=	155.00 K	AND MOLECULAR	WEIGHT=	28.94000
AT	95.00	GEOM KM	TEMPERATURE=	176.00 K	AND MOLECULAR	WEIGHT=	28.75000
AT	100.00	GEOM KM	TEMPERATURE=	190.00 K	AND MOLECULAR	WEIGHT=	28.23000
AT	105.00	GEOM KM	TEMPERATURE=	226.00 K	AND MOLECULAR	WEIGHT=	27.78000
AT	110.00	GEOM KM	TEMPERATURE=	270.00 K	AND MOLECULAR	WEIGHT=	27.39000
AT	115.00	GEOM KM	TEMPERATURE=	323.00 K	AND MOLECULAR	WEIGHT=	27.05000
AT	120.00	GEOM KM	TEMPERATURE=	379.61 K	AND MOLECULAR	WEIGHT=	26.76000

CALCULATED QUANTITIES

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS-COSITY (E+5)	PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
0	304.6	1.01+03	1.16-03	350.	29.0	13.12	2.41+19	7.05-08	1.95	8.92	472.	6.70+09	0.000
1	293.7	9.04+02	1.07-03	343.	29.0	12.65	2.23+19	7.62-08	1.89	8.60	463.	6.08+09	1.115+02
2	288.2	8.04+02	9.72-04	340.	29.0	10.06	2.02+19	8.40-08	1.85	8.44	459.	5.46+09	2.136+02
3	282.7	7.13+02	8.79-04	337.	29.0	9.87	1.83+19	9.29-08	1.82	8.28	455.	4.89+09	3.061+02
4	277.2	6.31+02	7.94-04	334.	29.0	9.68	1.65+19	1.03-07	1.78	8.12	450.	4.37+09	3.896+02
5	271.7	5.58+02	7.15-04	330.	29.0	9.49	1.49+19	1.14-07	1.75	7.96	446.	3.90+09	4.649+02
6	266.2	4.91+02	6.43-04	327.	29.0	9.30	1.34+19	1.27-07	1.71	7.81	441.	3.47+09	5.327+02
7	259.2	4.31+02	5.80-04	323.	29.0	9.57	1.21+19	1.41-07	1.67	7.60	435.	3.09+09	5.938+02
8	252.1	3.78+02	5.22-04	318.	29.0	9.32	1.08+19	1.57-07	1.63	7.40	429.	2.74+09	6.488+02
9	245.1	3.29+02	4.68-04	314.	29.0	9.06	9.73+18	1.75-07	1.59	7.20	423.	2.42+09	6.982+02
10	238.1	2.86+02	4.18-04	309.	29.0	8.81	8.70+18	1.95-07	1.54	6.99	417.	2.14+09	7.424+02
11	235.5	2.48+02	3.66-04	308.	29.0	7.50	7.62+18	2.23-07	1.53	6.92	415.	1.86+09	7.816+02
12	232.9	2.14+02	3.20-04	306.	29.0	7.40	6.66+18	2.55-07	1.51	6.84	413.	1.62+09	8.158+02
13	230.4	1.85+02	2.80-04	304.	29.0	7.32	5.81+18	2.92-07	1.50	6.77	410.	1.40+09	8.458+02
14	227.8	1.59+02	2.44-04	303.	29.0	7.24	5.07+18	3.35-07	1.49	6.70	408.	1.22+09	8.719+02
15	225.2	1.37+02	2.12-04	301.	29.0	7.16	4.41+18	3.85-07	1.47	6.62	406.	1.05+09	8.946+02

TABLE I. - MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA - Continued

(a) Scientific units - Continued

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS-COSITY (E+5)	MEAN PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
16	222.7	1.18+02	1.84-04	299.	29.0	7.08	3.83+18	4.43-07	1.46	6.55	403.	9.10+08	9.144+02
17	220.1	1.01+02	1.60-04	297.	29.0	7.00	3.33+18	5.11-07	1.44	6.48	401.	7.85+08	9.316+02
18	220.0	8.66+01	1.37-04	297.	29.0	6.50	2.85+18	5.96-07	1.44	6.48	401.	6.73+08	9.464+02
19	220.0	7.42+01	1.17-04	297.	29.0	6.48	2.44+18	6.95-07	1.44	6.48	401.	5.77+08	9.591+02
20	220.0	6.36+01	1.01-04	297.	29.0	6.48	2.09+18	8.11-07	1.44	6.48	401.	4.94+08	9.699+02
21	220.0	5.45+01	8.63-05	297.	29.0	6.48	1.79+18	9.47-07	1.44	6.48	401.	4.24+08	9.793+02
22	222.2	4.67+01	7.33-05	299.	29.0	6.15	1.52+18	1.11-06	1.45	6.55	403.	3.62+08	9.872+02
23	224.5	4.02+01	6.23-05	300.	29.0	6.19	1.30+18	1.31-06	1.47	6.62	405.	3.09+08	9.940+02
24	226.8	3.45+01	5.31-05	302.	29.0	6.26	1.10+18	1.54-06	1.48	6.69	407.	2.64+08	9.997+02
25	229.2	2.98+01	4.53-05	304.	29.0	6.33	9.41+17	1.80-06	1.49	6.76	409.	2.27+08	1.005+03
26	231.5	2.57+01	3.87-05	305.	29.0	6.39	8.04+17	2.11-06	1.51	6.83	411.	1.95+08	1.009+03
27	233.8	2.22+01	3.31-05	307.	29.0	6.46	6.88+17	2.47-06	1.52	6.90	413.	1.68+08	1.012+03
28	236.2	1.92+01	2.84-05	308.	29.0	6.52	5.90+17	2.88-06	1.53	6.97	415.	1.44+08	1.015+03
29	238.5	1.67+01	2.44-05	310.	29.0	6.59	5.07+17	3.35-06	1.55	7.04	418.	1.25+08	1.018+03
30	240.8	1.45+01	2.09-05	311.	29.0	6.66	4.36+17	3.90-06	1.56	7.11	420.	1.08+08	1.020+03
31	243.1	1.26+01	1.80-05	313.	29.0	6.72	3.75+17	4.53-06	1.57	7.19	422.	9.31+07	1.022+03
32	245.5	1.10+01	1.56-05	314.	29.0	6.79	3.23+17	5.25-06	1.59	7.26	424.	8.07+07	1.024+03
33	247.8	9.56+00	1.34-05	316.	29.0	6.86	2.79+17	6.08-06	1.60	7.33	426.	7.00+07	1.025+03
34	250.1	8.34+00	1.16-05	317.	29.0	6.92	2.42+17	7.03-06	1.62	7.40	428.	6.08+07	1.027+03
35	252.4	7.29+00	1.01-05	319.	29.0	6.99	2.09+17	8.12-06	1.63	7.47	430.	5.29+07	1.028+03
36	254.8	6.38+00	8.73-06	320.	29.0	7.06	1.82+17	9.36-06	1.64	7.54	432.	4.61+07	1.029+03
37	257.1	5.59+00	7.58-06	321.	29.0	7.12	1.58+17	1.08-05	1.66	7.61	433.	4.02+07	1.029+03
38	259.4	4.91+00	6.59-06	323.	29.0	7.19	1.37+17	1.24-05	1.67	7.68	435.	3.51+07	1.030+03
39	261.7	4.31+00	5.74-06	324.	29.0	7.26	1.19+17	1.42-05	1.69	7.75	437.	3.07+07	1.031+03
40	264.0	3.79+00	5.00-06	326.	29.0	7.32	1.04+17	1.63-05	1.70	7.83	439.	2.69+07	1.031+03
41	266.4	3.34+00	4.37-06	327.	29.0	7.39	9.08+16	1.87-05	1.71	7.90	441.	2.36+07	1.032+03
42	268.7	2.94+00	3.82-06	329.	29.0	7.46	7.94+16	2.14-05	1.73	7.97	443.	2.07+07	1.032+03
43	271.0	2.60+00	3.34-06	330.	29.0	7.52	6.95+16	2.45-05	1.74	8.04	445.	1.82+07	1.033+03
44	271.0	2.29+00	2.95-06	330.	29.0	8.04	6.13+16	2.77-05	1.74	8.04	445.	1.61+07	1.033+03
45	271.0	2.03+00	2.60-06	330.	29.0	8.04	5.42+16	3.14-05	1.74	8.04	445.	1.42+07	1.033+03
46	271.0	1.79+00	2.30-06	330.	29.0	8.05	4.78+16	3.55-05	1.74	8.05	445.	1.25+07	1.033+03
47	271.0	1.58+00	2.03-06	330.	29.0	8.05	4.22+16	4.02-05	1.74	8.05	445.	1.11+07	1.034+03
48	271.0	1.40+00	1.79-06	330.	29.0	8.05	3.73+16	4.55-05	1.74	8.05	445.	9.78+06	1.034+03
49	269.8	1.23+00	1.59-06	329.	29.0	8.31	3.31+16	5.13-05	1.74	8.02	444.	8.65+06	1.034+03
50	268.7	1.09+00	1.41-06	329.	29.0	8.27	2.93+16	5.79-05	1.73	7.99	443.	7.65+06	1.034+03
51	267.5	9.59-01	1.25-06	328.	29.0	8.24	2.60+16	6.54-05	1.72	7.96	442.	6.76+06	1.034+03
52	266.3	8.46-01	1.11-06	327.	29.0	8.21	2.30+16	7.38-05	1.71	7.92	441.	5.98+06	1.034+03
53	265.2	7.45-01	9.79-07	326.	29.0	8.17	2.04+16	8.34-05	1.71	7.89	440.	5.28+06	1.034+03
54	264.0	6.57-01	8.66-07	326.	29.0	8.14	1.80+16	9.43-05	1.70	7.86	439.	4.66+06	1.035+03
55	262.8	5.78-01	7.66-07	325.	29.0	8.11	1.59+16	1.07-04	1.69	7.83	438.	4.11+06	1.035+03
56	261.7	5.08-01	6.77-07	324.	29.0	8.07	1.41+16	1.21-04	1.68	7.79	437.	3.62+06	1.035+03
57	260.5	4.47-01	5.98-07	324.	29.0	8.04	1.24+16	1.37-04	1.68	7.76	436.	3.19+06	1.035+03
58	259.3	3.93-01	5.28-07	323.	29.0	8.01	1.10+16	1.55-04	1.67	7.73	435.	2.81+06	1.035+03
59	258.2	3.45-01	4.66-07	322.	29.0	7.97	9.68+15	1.75-04	1.66	7.70	434.	2.48+06	1.035+03
60	257.0	3.03-01	4.11-07	321.	29.0	7.94	8.54+15	1.99-04	1.66	7.66	433.	2.18+06	1.035+03
61	252.7	2.66-01	3.66-07	319.	29.0	8.64	7.61+15	2.23-04	1.63	7.54	430.	1.93+06	1.035+03
62	248.5	2.32-01	3.26-07	316.	29.0	8.50	6.78+15	2.51-04	1.61	7.41	426.	1.70+06	1.035+03
63	244.2	2.03-01	2.89-07	313.	29.0	8.35	6.02+15	2.82-04	1.58	7.29	422.	1.50+06	1.035+03
64	240.0	1.77-01	2.56-07	311.	29.0	8.21	5.33+15	3.19-04	1.56	7.17	419.	1.31+06	1.035+03
65	235.7	1.53-01	2.27-07	308.	29.0	8.07	4.72+15	3.60-04	1.53	7.04	415.	1.15+06	1.035+03
66	231.4	1.33-01	2.00-07	305.	29.0	7.92	4.16+15	4.08-04	1.51	6.92	411.	1.01+06	1.035+03
67	227.2	1.15-01	1.76-07	302.	29.0	7.78	3.66+15	4.64-04	1.48	6.79	408.	8.79+05	1.035+03
68	222.9	9.90-02	1.55-07	299.	29.0	7.64	3.22+15	5.28-04	1.46	6.67	404.	7.65+05	1.035+03
69	218.7	8.51-02	1.36-07	297.	29.0	7.49	2.82+15	6.02-04	1.43	6.54	400.	6.64+05	1.035+03
70	214.4	7.29-02	1.19-07	294.	29.0	7.35	2.46+15	6.89-04	1.41	6.41	396.	5.74+05	1.035+03
71	210.2	6.23-02	1.03-07	291.	29.0	7.21	2.15+15	7.91-04	1.39	6.29	392.	4.96+05	1.035+03
72	205.9	5.31-02	8.98-08	288.	29.0	7.06	1.87+15	9.10-04	1.36	6.16	388.	4.26+05	1.035+03
73	201.7	4.50-02	7.78-08	285.	29.0	6.92	1.62+15	1.05-03	1.34	6.04	384.	3.66+05	1.035+03

TABLE I.- MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA - Continued

(a) Scientific units - Concluded

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS-COSITY (E+5)	MEAN PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
74	197.4	3.81-02	6.72-08	282.	29.0	6.78	1.40+15	1.21-03	1.32	5.91	380.	3.13+05	1.035+03
75	193.2	3.21-02	5.79-08	279.	29.0	6.63	1.20+15	1.41-03	1.29	5.79	376.	2.66+05	1.035+03
76	189.0	2.70-02	4.97-08	276.	29.0	6.49	1.03+15	1.64-03	1.27	5.66	372.	2.26+05	1.035+03
77	184.7	2.26-02	4.26-08	273.	29.0	6.34	8.85+14	1.92-03	1.24	5.54	367.	1.91+05	1.035+03
78	180.5	1.88-02	3.63-08	269.	29.0	6.20	7.54+14	2.25-03	1.21	5.41	363.	1.61+05	1.035+03
79	176.2	1.56-02	3.08-08	266.	29.0	6.06	6.41+14	2.65-03	1.19	5.29	359.	1.35+05	1.035+03
80	172.0	1.29-02	2.61-08	263.	29.0	5.91	5.42+14	3.13-03	1.17	5.16	355.	1.13+05	1.035+03
81	167.6	1.06-02	2.20-08	260.	29.0	5.79	4.57+14	3.71-03	1.14	5.03	350.	9.42+04	1.035+03
82	163.2	8.65-03	1.85-08	256.	29.0	5.64	3.84+14	4.42-03	1.12	4.90	345.	7.81+04	1.035+03
83	158.6	7.04-03	1.54-08	253.	29.0	5.49	3.21+14	5.29-03	1.09	4.77	341.	6.44+04	1.035+03
84	154.4	5.69-03	1.28-08	249.	29.0	5.34	2.67+14	6.36-03	1.07	4.64	336.	5.28+04	1.035+03
85	150.0	4.57-03	1.06-08	246.	28.9	5.19	2.21+14	7.69-03	1.04	4.51	331.	4.31+04	1.035+03
86	146.7	3.65-03	8.67-09	243.	28.9	4.90	1.80+14	9.41-03	1.02	4.41	328.	3.48+04	1.035+03
87	143.3	2.91-03	7.06-09	240.	28.9	4.79	1.47+14	1.16-02	1.01	4.31	324.	2.80+04	1.035+03
88	140.0	2.30-03	5.71-09	237.	28.9	4.68	1.19+14	1.43-02	.99	4.21	320.	2.24+04	1.035+03
89	147.5	1.82-03	4.30-09	244.	28.9	3.62	8.96+13	1.90-02	1.03	4.44	328.	1.73+04	1.035+03
90	155.0	1.46-03	3.29-09	250.	28.9	3.81	6.84+13	2.48-02	1.07	4.67	337.	1.36+04	1.035+03
91	159.2	1.19-03	2.59-09	253.	28.9	4.24	5.39+13	3.15-02	1.09	4.81	342.	1.08+04	1.035+03
92	163.4	9.66-04	2.05-09	257.	28.9	4.36	4.28+13	3.97-02	1.12	4.94	346.	8.73+03	1.035+03
93	167.0	7.91-04	1.64-09	260.	28.8	4.48	3.42+13	4.97-02	1.14	5.08	351.	7.06+03	1.035+03
94	171.8	6.51-04	1.31-09	264.	28.8	4.60	2.75+13	6.19-02	1.16	5.21	355.	5.75+03	1.035+03
95	176.0	5.39-04	1.06-09	267.	28.7	4.72	2.22+13	7.66-02	1.19	5.35	360.	4.70+03	1.035+03
96	178.8	4.48-04	8.62-10	270.	28.6	4.93	1.81+13	9.37-02	1.21	5.45	364.	3.88+03	1.035+03
97	181.6	3.73-04	7.05-10	272.	28.5	5.03	1.49+13	1.14-01	1.22	5.56	367.	3.22+03	1.035+03
98	184.4	3.12-04	5.79-10	275.	28.4	5.12	1.23+13	1.38-01	1.24	5.67	371.	2.68+03	1.035+03
99	187.2	2.62-04	4.77-10	277.	28.3	5.22	1.02+13	1.67-01	1.25	5.78	374.	2.24+03	1.035+03
100	190.0	2.21-04	3.95-10	280.	28.2	5.32	8.43+12	2.02-01	1.27	5.89	377.	1.87+03	1.035+03
101	197.2	1.87-04	3.21-10	286.	28.1	4.92	6.87+12	2.47-01	1.31	6.13	385.	1.56+03	1.035+03
102	204.4	1.59-04	2.63-10	291.	28.0	5.12	5.65+12	3.01-01	1.36	6.38	393.	1.31+03	1.035+03
103	211.6	1.37-04	2.17-10	297.	27.9	5.32	4.68+12	3.63-01	1.40	6.63	400.	1.10+03	1.035+03
104	218.8	1.18-04	1.81-10	302.	27.9	5.52	3.90+12	4.35-01	1.44	6.88	408.	9.37+02	1.035+03
105	226.0	1.02-04	1.51-10	308.	27.8	5.72	3.28+12	5.18-01	1.48	7.13	415.	8.01+02	1.035+03
106	234.8	8.91-05	1.26-10	314.	27.7	5.71	2.75+12	6.18-01	1.53	7.43	424.	6.86+02	1.035+03
107	243.6	7.81-05	1.06-10	321.	27.6	5.94	2.32+12	7.31-01	1.58	7.73	432.	5.91+02	1.035+03
108	252.4	6.88-05	9.03-11	327.	27.5	6.17	1.97+12	8.60-01	1.63	8.04	441.	5.12+02	1.035+03
109	261.2	6.09-05	7.70-11	333.	27.5	6.41	1.69+12	1.01+00	1.68	8.34	449.	4.46+02	1.035+03
110	270.0	5.41-05	6.61-11	339.	27.4	6.64	1.45+12	1.17+00	1.74	8.65	457.	3.91+02	1.035+03
111	280.6	4.83-05	5.66-11	346.	27.3	6.60	1.25+12	1.36+00	1.80	9.02	466.	3.43+02	1.035+03
112	291.2	4.34-05	4.88-11	353.	27.2	6.87	1.08+12	1.57+00	1.87	9.39	476.	3.02+02	1.035+03
113	301.8	3.91-05	4.23-11	360.	27.2	7.14	9.37+11	1.81+00	1.94	9.75	485.	2.68+02	1.035+03
114	312.4	3.53-05	3.69-11	366.	27.1	7.41	8.19+11	2.07+00	1.98	10.12	494.	2.38+02	1.035+03
115	323.0	3.21-05	3.23-11	373.	27.0	7.68	7.19+11	2.36+00	2.02	10.49	503.	2.13+02	1.035+03
116	334.3	2.92-05	2.83-11	379.	27.0	7.81	6.32+11	2.69+00	2.06	10.89	512.	1.91+02	1.035+03
117	345.7	2.67-05	2.50-11	386.	26.9	8.09	5.59+11	3.04+00	2.10	11.29	521.	1.72+02	1.035+03
118	357.0	2.44-05	2.21-11	393.	26.9	8.38	4.96+11	3.42+00	2.14	11.69	530.	1.55+02	1.035+03
119	368.3	2.25-05	1.97-11	399.	26.8	8.66	4.42+11	3.84+00	2.19	12.09	539.	1.40+02	1.035+03
120	379.6	2.07-05	1.76-11	406.	26.8	8.95	3.95+11	4.30+00	2.23	12.48	548.	1.28+02	1.035+03

COLUMNAR MASS = 1035.254 GM/CC

COLUMNAR MASS FOR CO2 = .472 GM/CC

TABLE I.- MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA - Continued

(b) Engineering units

CONSTRUCTION PARAMETERS SKYLAB

SURFACE PRESSURE = 14.707 LB/SQ IN SURFACE TEMPERATURE = 548.3 R SURFACE DENSITY = 2.25-03 SLUG/CU FT

PER CENT CARBON DIOXIDE = .0 MOLECULAR WEIGHT = 28.97 SURFACE GRAVITY = 32.17 FT/SEC/SEC

CALCULATED QUANTITIES

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/ CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VIS- COSITY (E+5)	KINETIC VISC
.0000	548.3	1.47+01	2.25-03	1148.	7.2-02	.029	.043	6.8+23	1548.	2.3-07	4.07	1.8-04
.0033	528.6	1.31+01	2.08-03	1127.	7.2-02	.028	.042	6.3+23	1520.	2.5-07	3.94	1.9-04
.0066	518.7	1.17+01	1.89-03	1116.	7.2-02	.028	.033	5.7+23	1506.	2.8-07	3.87	2.1-04
.0098	508.8	1.04+01	1.71-03	1106.	7.2-02	.027	.032	5.2+23	1491.	3.0-07	3.79	2.2-04
.0131	498.9	9.16+00	1.54-03	1095.	7.2-02	.027	.032	4.7+23	1477.	3.4-07	3.72	2.4-04
.0164	489.0	8.09+00	1.39-03	1084.	7.2-02	.026	.031	4.2+23	1462.	3.7-07	3.65	2.6-04
.0197	479.1	7.13+00	1.25-03	1073.	7.2-02	.026	.031	3.8+23	1447.	4.2-07	3.58	2.9-04
.0230	466.5	6.26+00	1.13-03	1059.	7.2-02	.025	.031	3.4+23	1428.	4.6-07	3.49	3.1-04
.0262	453.9	5.48+00	1.01-03	1044.	7.2-02	.024	.031	3.1+23	1409.	5.1-07	3.40	3.4-04
.0295	441.2	4.78+00	9.09-04	1030.	7.2-02	.024	.030	2.8+23	1389.	5.7-07	3.31	3.6-04
.0328	428.6	4.15+00	8.13-04	1015.	7.2-02	.023	.029	2.5+23	1369.	6.4-07	3.23	4.0-04
.0361	423.9	3.59+00	7.12-04	1009.	7.2-02	.023	.025	2.2+23	1361.	7.3-07	3.19	4.5-04
.0394	419.2	3.11+00	6.22-04	1004.	7.2-02	.022	.024	1.9+23	1354.	8.4-07	3.16	5.1-04
.0427	414.6	2.68+00	5.43-04	998.	7.2-02	.022	.024	1.6+23	1346.	9.6-07	3.13	5.8-04
.0459	410.0	2.31+00	4.74-04	993.	7.2-02	.022	.024	1.4+23	1339.	1.1-06	3.10	6.6-04
.0492	405.4	1.99+00	4.12-04	987.	7.2-02	.022	.024	1.2+23	1331.	1.3-06	3.07	7.5-04
.0525	400.8	1.71+00	3.58-04	982.	7.2-02	.021	.023	1.1+23	1324.	1.5-06	3.04	8.5-04
.0558	396.2	1.47+00	3.11-04	976.	7.2-02	.021	.023	9.4+22	1316.	1.7-06	3.01	9.7-04
.0591	396.0	1.26+00	2.66-04	976.	7.2-02	.021	.021	8.1+22	1316.	2.0-06	3.01	1.1-03
.0623	396.0	1.08+00	2.28-04	976.	7.2-02	.021	.021	6.9+22	1316.	2.3-06	3.01	1.3-03
.0656	396.0	9.23-01	1.96-04	976.	7.2-02	.021	.021	5.9+22	1316.	2.7-06	3.01	1.5-03
.0689	396.0	7.91-01	1.68-04	976.	7.2-02	.021	.021	5.1+22	1316.	3.1-06	3.01	1.8-03
.0722	399.9	6.78-01	1.42-04	981.	7.2-02	.021	.020	4.3+22	1322.	3.7-06	3.04	2.1-03
.0755	404.1	5.83-01	1.21-04	986.	7.2-02	.022	.020	3.7+22	1329.	4.3-06	3.06	2.5-03
.0787	408.3	5.01-01	1.03-04	991.	7.2-02	.022	.021	3.1+22	1336.	5.1-06	3.09	3.0-03
.0820	412.5	4.32-01	8.79-05	996.	7.2-02	.022	.021	2.7+22	1343.	5.9-06	3.12	3.6-03
.0853	416.7	3.73-01	7.51-05	1001.	7.2-02	.022	.021	2.3+22	1350.	6.9-06	3.15	4.2-03
.0886	420.9	3.22-01	6.43-05	1006.	7.2-02	.023	.021	1.9+22	1356.	8.1-06	3.17	4.9-03
.0919	425.1	2.79-01	5.51-05	1011.	7.2-02	.023	.021	1.7+22	1363.	9.4-06	3.20	5.8-03
.0951	429.3	2.42-01	4.73-05	1016.	7.2-02	.023	.022	1.4+22	1370.	1.1-05	3.23	6.8-03
.0984	433.5	2.10-01	4.07-05	1021.	7.2-02	.023	.022	1.2+22	1377.	1.3-05	3.26	8.0-03
.1017	437.6	1.83-01	3.51-05	1026.	7.2-02	.024	.022	1.1+22	1383.	1.5-05	3.29	9.4-03
.1050	441.8	1.59-01	3.02-05	1031.	7.2-02	.024	.022	9.2+21	1390.	1.7-05	3.32	1.1-02
.1083	446.0	1.39-01	2.61-05	1035.	7.2-02	.024	.022	7.9+21	1396.	2.0-05	3.34	1.3-02
.1116	450.2	1.21-01	2.26-05	1040.	7.2-02	.024	.023	6.8+21	1403.	2.3-05	3.37	1.5-02

TABLE I.- MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA - Continued

(b) Engineering units - Continued

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/ CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VIS- COSITY (E+5)	KINETIC VISC
.1148	454.4	1.06-01	1.96-05	1045.	7.2-02	.025	.023	5.9+21	1409.	2.7-05	3.40	1.7-02
.1161	456.6	9.26-02	1.70-05	1050.	7.2-02	.025	.023	5.1+21	1416.	3.1-05	3.43	2.0-02
.1214	462.7	8.12-02	1.47-05	1055.	7.2-02	.025	.023	4.5+21	1422.	3.5-05	3.46	2.4-02
.1247	466.9	7.12-02	1.28-05	1059.	7.2-02	.025	.024	3.9+21	1429.	4.1-05	3.49	2.7-02
.1280	471.1	6.26-02	1.12-05	1064.	7.2-02	.025	.024	3.4+21	1435.	4.7-05	3.52	3.2-02
.1312	475.3	5.50-02	9.72-06	1069.	7.2-02	.026	.024	2.9+21	1441.	5.4-05	3.55	3.7-02
.1345	479.5	4.85-02	8.49-06	1073.	7.2-02	.026	.024	2.6+21	1448.	6.1-05	3.58	4.2-02
.1378	483.6	4.27-02	7.42-06	1078.	7.2-02	.026	.024	2.2+21	1454.	7.0-05	3.61	4.9-02
.1411	487.8	3.77-02	6.49-06	1083.	7.1-02	.026	.025	2.0+21	1460.	8.0-05	3.64	5.6-02
.1444	487.8	3.33-02	5.73-06	1083.	7.1-02	.026	.026	1.7+21	1460.	9.1-05	3.64	6.4-02
.1476	487.8	2.94-02	5.06-06	1083.	7.1-02	.026	.026	1.5+21	1460.	1.0-04	3.64	7.2-02
.1509	487.8	2.60-02	4.47-06	1083.	7.1-02	.026	.026	1.4+21	1460.	1.2-04	3.64	8.2-02
.1542	487.8	2.29-02	3.95-06	1083.	7.1-02	.026	.026	1.2+21	1460.	1.3-04	3.64	9.2-02
.1575	487.8	2.03-02	3.49-06	1083.	7.1-02	.026	.026	1.1+21	1460.	1.5-04	3.64	1.0-01
.1608	485.7	1.79-02	3.09-06	1080.	7.1-02	.026	.027	9.4+20	1457.	1.7-04	3.62	1.2-01
.1640	483.6	1.58-02	2.74-06	1078.	7.1-02	.026	.027	8.3+20	1454.	1.9-04	3.61	1.3-01
.1673	481.5	1.39-02	2.43-06	1076.	7.1-02	.026	.027	7.4+20	1451.	2.1-04	3.59	1.5-01
.1706	479.4	1.23-02	2.15-06	1073.	7.1-02	.026	.027	6.5+20	1448.	2.4-04	3.58	1.7-01
.1739	477.3	1.08-02	1.90-06	1071.	7.1-02	.026	.027	5.8+20	1444.	2.7-04	3.56	1.9-01
.1772	475.2	9.53-03	1.68-06	1069.	7.1-02	.026	.027	5.1+20	1441.	3.1-04	3.55	2.1-01
.1805	473.1	8.39-03	1.49-06	1066.	7.1-02	.026	.027	4.5+20	1438.	3.5-04	3.53	2.4-01
.1837	471.0	7.38-03	1.32-06	1064.	7.1-02	.026	.026	4.0+20	1435.	4.0-04	3.52	2.7-01
.1870	468.9	6.49-03	1.16-06	1062.	7.1-02	.025	.026	3.5+20	1432.	4.5-04	3.50	3.0-01
.1903	466.8	5.70-03	1.03-06	1059.	7.1-02	.025	.026	3.1+20	1428.	5.1-04	3.49	3.4-01
.1936	464.7	5.01-03	9.05-07	1057.	7.1-02	.025	.026	2.7+20	1425.	5.8-04	3.47	3.8-01
.1969	462.6	4.40-03	7.98-07	1054.	7.1-02	.025	.026	2.4+20	1422.	6.5-04	3.46	4.3-01
.2001	454.9	3.86-03	7.12-07	1046.	7.1-02	.025	.028	2.2+20	1410.	7.3-04	3.41	4.8-01
.2034	447.3	3.37-03	6.33-07	1037.	7.1-02	.024	.028	1.9+20	1398.	8.2-04	3.35	5.3-01
.2067	439.6	2.94-03	5.62-07	1028.	7.1-02	.024	.027	1.7+20	1386.	9.3-04	3.30	5.9-01
.2100	431.9	2.56-03	4.98-07	1019.	7.1-02	.024	.027	1.5+20	1374.	1.0-03	3.25	6.5-01
.2133	424.3	2.23-03	4.41-07	1010.	7.1-02	.023	.026	1.3+20	1362.	1.2-03	3.20	7.3-01
.2165	416.6	1.93-03	3.89-07	1001.	7.1-02	.023	.026	1.2+20	1349.	1.3-03	3.15	8.1-01
.2198	408.9	1.67-03	3.42-07	992.	7.1-02	.022	.026	1.0+20	1337.	1.5-03	3.10	9.1-01
.2231	401.3	1.44-03	3.01-07	982.	7.1-02	.022	.025	9.1+19	1324.	1.7-03	3.05	1.0+00
.2264	393.6	1.24-03	2.63-07	973.	7.1-02	.021	.025	8.0+19	1312.	2.0-03	3.00	1.1+00
.2297	386.0	1.06-03	2.30-07	963.	7.1-02	.021	.024	7.0+19	1299.	2.3-03	2.95	1.3+00
.2330	378.3	9.04-04	2.01-07	954.	7.1-02	.021	.024	6.1+19	1286.	2.6-03	2.90	1.4+00
.2362	370.7	7.70-04	1.74-07	944.	7.1-02	.020	.023	5.3+19	1273.	3.0-03	2.85	1.6+00
.2395	363.0	6.54-04	1.51-07	934.	7.1-02	.020	.023	4.6+19	1260.	3.4-03	2.80	1.9+00
.2428	355.4	5.53-04	1.31-07	925.	7.1-02	.019	.022	4.0+19	1246.	4.0-03	2.75	2.1+00
.2461	347.8	4.66-04	1.13-07	915.	7.1-02	.019	.022	3.4+19	1233.	4.6-03	2.70	2.4+00
.2494	340.1	3.91-04	9.66-08	904.	7.1-02	.019	.021	2.9+19	1219.	5.4-03	2.64	2.7+00
.2526	332.5	3.27-04	8.27-08	894.	7.1-02	.018	.021	2.5+19	1206.	6.3-03	2.59	3.1+00
.2559	324.9	2.73-04	7.05-08	884.	7.1-02	.018	.020	2.1+19	1192.	7.4-03	2.54	3.6+00
.2592	317.2	2.26-04	5.99-08	873.	7.1-02	.017	.020	1.8+19	1178.	8.7-03	2.49	4.2+00
.2625	309.6	1.87-04	5.07-08	863.	7.1-02	.017	.019	1.5+19	1163.	1.0-02	2.44	4.8+00
.2658	301.7	1.54-04	4.27-08	852.	7.1-02	.017	.019	1.3+19	1148.	1.2-02	2.38	5.6+00
.2690	293.8	1.26-04	3.59-08	841.	7.1-02	.016	.019	1.1+19	1133.	1.5-02	2.33	6.5+00
.2723	285.8	1.02-04	3.00-08	829.	7.1-02	.016	.018	9.1+18	1118.	1.7-02	2.28	7.6+00
.2756	277.9	8.25-05	2.49-08	818.	7.1-02	.015	.018	7.6+18	1102.	2.1-02	2.23	9.0+00
.2789	270.0	6.63-05	2.06-08	806.	7.1-02	.015	.017	6.3+18	1087.	2.5-02	2.18	1.1+01
.2822	264.0	5.30-05	1.69-08	797.	7.1-02	.014	.016	5.1+18	1075.	3.1-02	2.14	1.3+01
.2854	258.0	4.22-05	1.37-08	788.	7.1-02	.014	.016	4.2+18	1062.	3.8-02	2.10	1.5+01
.2887	252.0	3.33-05	1.11-08	779.	7.1-02	.014	.015	3.4+18	1050.	4.7-02	2.07	1.9+01
.2920	265.5	2.65-05	8.36-09	799.	7.0-02	.015	.012	2.5+18	1078.	6.2-02	2.15	2.6+01
.2953	279.0	2.12-05	6.39-09	820.	7.0-02	.015	.012	1.9+18	1105.	8.1-02	2.24	3.5+01
.2986	286.6	1.72-05	5.03-09	831.	7.0-02	.016	.014	1.5+18	1121.	1.0-01	2.28	4.5+01
.3019	294.1	1.40-05	3.99-09	843.	7.0-02	.016	.014	1.2+18	1136.	1.3-01	2.33	5.9+01

TABLE I. - MODEL ATMOSPHERE FOR EARTH — 3σ SUMMER DATA - Concluded

(b) Engineering units - Concluded

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/ CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VIS- COSITY (E+5)	KINETIC VISC
.3051	301.7	1.15-05	3.18-09	854.	7.0-02	.017	.015	9.7+17	1151.	1.6-01	2.38	7.5+01
.3084	309.2	9.45-06	2.55-09	865.	7.0-02	.017	.015	7.8+17	1166.	2.0-01	2.43	9.6+01
.3117	316.8	7.82-06	2.06-09	876.	7.0-02	.018	.015	6.3+17	1181.	2.5-01	2.48	1.2+02
.3150	321.8	6.50-06	1.68-09	885.	7.0-02	.018	.016	5.1+17	1193.	3.1-01	2.52	1.5+02
.3183	326.9	5.42-06	1.37-09	893.	7.0-02	.018	.016	4.2+17	1204.	3.7-01	2.55	1.9+02
.3215	331.9	4.53-06	1.13-09	902.	7.0-02	.019	.017	3.5+17	1216.	4.5-01	2.59	2.3+02
.3248	337.0	3.81-06	9.28-10	910.	7.0-02	.019	.017	2.9+17	1227.	5.5-01	2.62	2.8+02
.3281	342.0	3.21-06	7.67-10	919.	7.0-02	.019	.017	2.4+17	1239.	6.6-01	2.66	3.5+02
.3314	355.0	2.72-06	6.24-10	938.	7.0-02	.020	.016	1.9+17	1264.	8.1-01	2.75	4.4+02
.3347	367.9	2.31-06	5.11-10	956.	7.0-02	.021	.017	1.6+17	1289.	9.9-01	2.83	5.5+02
.3379	380.9	1.98-06	4.22-10	974.	7.0-02	.022	.017	1.3+17	1314.	1.2+00	2.91	6.9+02
.3412	393.8	1.71-06	3.51-10	992.	7.0-02	.023	.018	1.1+17	1338.	1.4+00	3.00	8.6+02
.3445	406.8	1.48-06	2.94-10	1010.	7.0-02	.023	.019	9.3+16	1362.	1.7+00	3.08	1.1+03
.3478	422.6	1.29-06	2.46-10	1031.	7.0-02	.024	.019	7.8+16	1390.	2.0+00	3.19	1.3+03
.3511	438.5	1.13-06	2.07-10	1052.	7.0-02	.025	.019	6.6+16	1418.	2.4+00	3.29	1.6+03
.3543	454.3	9.98-07	1.75-10	1072.	7.0-02	.026	.020	5.6+16	1446.	2.8+00	3.40	1.9+03
.3576	470.2	8.84-07	1.50-10	1092.	7.0-02	.027	.021	4.8+16	1473.	3.3+00	3.51	2.4+03
.3609	486.0	7.86-07	1.26-10	1111.	7.0-02	.028	.022	4.1+16	1499.	3.8+00	3.63	2.8+03
.3642	505.1	7.01-07	1.10-10	1135.	7.0-02	.030	.022	3.5+16	1530.	4.5+00	3.77	3.4+03
.3675	524.2	6.29-07	9.48-11	1157.	7.0-02	.031	.023	3.1+16	1561.	5.2+00	3.91	4.1+03
.3708	543.3	5.67-07	8.22-11	1180.	7.0-02	.032	.023	2.7+16	1591.	5.9+00	4.05	4.9+03
.3740	562.3	5.13-07	7.16-11	1201.	7.0-02	.033	.024	2.3+16	1621.	6.8+00	4.13	5.8+03
.3773	581.4	4.65-07	6.27-11	1223.	7.0-02	.034	.025	2.0+16	1650.	7.8+00	4.21	6.7+03
.3806	601.8	4.24-07	5.51-11	1245.	7.0-02	.036	.026	1.8+16	1680.	8.8+00	4.30	7.8+03
.3839	622.2	3.87-07	4.85-11	1267.	7.0-02	.037	.027	1.6+16	1711.	1.0+01	4.39	9.1+03
.3872	642.6	3.55-07	4.30-11	1289.	7.0-02	.038	.027	1.4+16	1740.	1.1+01	4.48	1.0+04
.3904	662.9	3.26-07	3.82-11	1310.	7.0-02	.040	.028	1.3+16	1769.	1.3+01	4.56	1.2+04
.3937	683.3	3.01-07	3.41-11	1331.	7.0-02	.041	.029	1.1+16	1798.	1.4+01	4.65	1.4+04
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0

TABLE II.- MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA

(a) Scientific units

CONSTRUCTION PARAMETERS — SKYLAB

SURFACE PRESSURE =	1021.00 MB	SURFACE TEMPERATURE =	260.00 K	SURFACE DENSITY =	1.37-03 GM/CC
BASE OF EXOSPHERE =	4000.00(KM)	MOLECULAR WEIGHT =	28.966	SURFACE GRAVITY =	980.660 CM/SEC/SEC
RADIUS OF EARTH =	6378.00(KM)	PERCENT NITROGEN =	78.080	PERCENT CO2 =	.030
PERCENT OXYGEN =	20.960	PERCENT ARGON =	.930	PERCENT NEON =	.000
PERCENT HYDROGEN =	.000	PERCENT HELIUM =	.000	PERCENT WATER =	.000
PERCENT CO =	.000	PERCENT SO2 =	.000		

TEMPERATURE AND MOLECULAR WEIGHT DISTRIBUTION

AT	2.00	GEOP KM	TEMPERATURE=	256.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	12.00	GEOP KM	TEMPERATURE=	216.15 K	AND MOLECULAR	WEIGHT=	28.96600
AT	18.00	GEOM KM	TEMPERATURE=	196.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	22.00	GEOM KM	TEMPERATURE=	200.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	40.00	GEOM KM	TEMPERATURE=	238.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	48.00	GEOM KM	TEMPERATURE=	265.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	55.00	GEOM KM	TEMPERATURE=	265.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	72.00	GEOM KM	TEMPERATURE=	223.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	80.00	GEOM KM	TEMPERATURE=	235.00 K	AND MOLECULAR	WEIGHT=	28.96600
AT	85.00	GEOM KM	TEMPERATURE=	240.00 K	AND MOLECULAR	WEIGHT=	28.95000
AT	90.00	GEOM KM	TEMPERATURE=	218.00 K	AND MOLECULAR	WEIGHT=	28.94000
AT	95.00	GEOM KM	TEMPERATURE=	211.00 K	AND MOLECULAR	WEIGHT=	28.79000
AT	100.00	GEOM KM	TEMPERATURE=	219.00 K	AND MOLECULAR	WEIGHT=	28.34000
AT	105.00	GEOM KM	TEMPERATURE=	242.00 K	AND MOLECULAR	WEIGHT=	27.96000
AT	110.00	GEOM KM	TEMPERATURE=	253.00 K	AND MOLECULAR	WEIGHT=	27.63000
AT	115.00	GEOM KM	TEMPERATURE=	289.00 K	AND MOLECULAR	WEIGHT=	27.35000
AT	120.00	GEOM KM	TEMPERATURE=	333.22 K	AND MOLECULAR	WEIGHT=	27.12000
AT	140.00	GEOM KM	TEMPERATURE=	333.22 K	AND MOLECULAR	WEIGHT=	27.12000

CALCULATED QUANTITIES

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS-COSITY (E+5)	MEAN PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
0	260.0	1.02+03	1.37-03	323.	29.0	8.08	2.84+19	5.97-08	1.67	7.61	436.	7.30+09	0.000
1	258.0	8.95+02	1.21-03	322.	29.0	8.02	2.51+19	6.76-08	1.66	7.55	434.	6.42+09	1.286+02
2	256.0	7.84+02	1.07-03	321.	29.0	7.96	2.22+19	7.66-08	1.65	7.50	433.	5.65+09	2.421+02
3	252.0	6.85+02	9.47-04	318.	29.0	8.36	1.97+19	8.63-08	1.63	7.38	429.	4.97+09	3.426+02
4	248.0	5.98+02	8.39-04	316.	29.0	8.23	1.75+19	9.73-08	1.60	7.27	426.	4.37+09	4.317+02
5	244.1	5.20+02	7.43-04	313.	29.0	8.10	1.54+19	1.10-07	1.58	7.15	422.	3.84+09	5.107+02
6	240.1	4.52+02	6.56-04	311.	29.0	7.97	1.36+19	1.25-07	1.56	7.04	419.	3.36+09	5.804+02
7	236.1	3.92+02	5.78-04	308.	29.0	7.84	1.20+19	1.41-07	1.53	6.93	415.	2.94+09	6.420+02
8	232.1	3.39+02	5.08-04	305.	29.0	7.71	1.06+19	1.61-07	1.51	6.81	412.	2.56+09	6.962+02
9	228.2	2.92+02	4.46-04	303.	29.0	7.58	9.27+18	1.83-07	1.49	6.70	408.	2.23+09	7.437+02
10	224.2	2.51+02	3.90-04	300.	29.0	7.45	8.11+18	2.09-07	1.47	6.58	405.	1.93+09	7.855+02
11	220.2	2.15+02	3.41-04	298.	29.0	7.32	7.09+18	2.40-07	1.44	6.47	401.	1.67+09	8.219+02
12	216.2	1.84+02	2.97-04	295.	29.0	7.19	6.17+18	2.75-07	1.42	6.35	398.	1.45+09	8.537+02
13	212.9	1.57+02	2.57-04	293.	29.0	6.95	5.35+18	3.17-07	1.40	6.26	394.	1.24+09	8.814+02
14	209.5	1.34+02	2.23-04	290.	29.0	6.84	4.63+18	3.67-07	1.38	6.16	391.	1.07+09	9.053+02
15	206.1	1.14+02	1.92-04	288.	29.0	6.73	3.99+18	4.25-07	1.37	6.06	388.	9.13+08	9.260+02

TABLE II. - MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA - Continued

(a) Scientific units - Continued

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS-COSITY (E+5)	PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
16	202.7	9.62+01	1.65-04	286.	29.0	6.62	3.44+18	4.94-07	1.35	5.96	385.	7.79+08	9.438+02
17	199.4	8.13+01	1.42-04	283.	29.0	6.51	2.95+18	5.75-07	1.33	5.87	382.	6.64+08	9.591+02
18	196.0	6.84+01	1.22-04	281.	29.0	6.40	2.53+18	6.72-07	1.31	5.77	379.	5.64+08	9.723+02
19	197.0	5.76+01	1.02-04	281.	29.0	5.63	2.12+18	8.02-07	1.31	5.80	379.	4.73+08	9.834+02
20	198.0	4.85+01	8.53-05	282.	29.0	5.66	1.77+18	9.58-07	1.32	5.83	380.	3.97+08	9.927+02
21	199.0	4.09+01	7.15-05	283.	29.0	5.70	1.49+18	1.14-06	1.33	5.86	381.	3.34+08	1.001+03
22	200.0	3.45+01	6.00-05	284.	29.0	5.73	1.25+18	1.36-06	1.33	5.89	382.	2.81+08	1.007+03
23	202.1	2.91+01	5.02-05	285.	29.0	5.61	1.04+18	1.63-06	1.34	5.96	384.	2.36+08	1.013+03
24	204.2	2.46+01	4.20-05	287.	29.0	5.67	8.74+17	1.94-06	1.36	6.02	386.	1.99+08	1.017+03
25	206.3	2.09+01	3.53-05	288.	29.0	5.73	7.33+17	2.32-06	1.37	6.09	388.	1.68+08	1.021+03
26	208.5	1.77+01	2.96-05	290.	29.0	5.79	6.16+17	2.76-06	1.38	6.15	390.	1.42+08	1.024+03
27	210.6	1.51+01	2.50-05	291.	29.0	5.85	5.19+17	3.27-06	1.39	6.22	392.	1.20+08	1.027+03
28	212.7	1.29+01	2.11-05	292.	29.0	5.91	4.38+17	3.88-06	1.40	6.28	394.	1.02+08	1.029+03
29	214.8	1.10+01	1.78-05	294.	29.0	5.97	3.70+17	4.59-06	1.41	6.34	396.	8.63+07	1.031+03
30	216.9	9.38+00	1.51-05	295.	29.0	6.03	3.13+17	5.42-06	1.42	6.41	398.	7.34+07	1.033+03
31	219.0	8.03+00	1.28-05	297.	29.0	6.09	2.66+17	6.39-06	1.44	6.47	400.	6.26+07	1.034+03
32	221.1	6.89+00	1.09-05	298.	29.0	6.15	2.26+17	7.53-06	1.45	6.54	402.	5.34+07	1.035+03
33	223.2	5.92+00	9.23-06	300.	29.0	6.21	1.92+17	8.85-06	1.46	6.60	404.	4.56+07	1.036+03
34	225.4	5.09+00	7.87-06	301.	29.0	6.28	1.64+17	1.04-05	1.47	6.67	406.	3.91+07	1.037+03
35	227.5	4.38+00	6.71-06	302.	29.0	6.34	1.40+17	1.22-05	1.48	6.73	408.	3.35+07	1.038+03
36	229.6	3.78+00	5.74-06	304.	29.0	6.40	1.19+17	1.42-05	1.50	6.80	410.	2.88+07	1.039+03
37	231.7	3.26+00	4.91-06	305.	29.0	6.46	1.02+17	1.66-05	1.51	6.86	412.	2.47+07	1.039+03
38	233.8	2.82+00	4.21-06	307.	29.0	6.52	8.75+16	1.94-05	1.52	6.92	413.	2.13+07	1.040+03
39	235.9	2.45+00	3.61-06	308.	29.0	6.58	7.51+16	2.26-05	1.53	6.99	415.	1.84+07	1.040+03
40	238.0	2.12+00	3.11-06	309.	29.0	6.64	6.46+16	2.63-05	1.54	7.05	417.	1.59+07	1.040+03
41	241.4	1.84+00	2.66-06	311.	29.0	6.50	5.53+16	3.07-05	1.56	7.16	420.	1.37+07	1.041+03
42	244.8	1.60+00	2.28-06	314.	29.0	6.60	4.75+16	3.58-05	1.58	7.26	423.	1.18+07	1.041+03
43	248.1	1.40+00	1.96-06	316.	29.0	6.69	4.08+16	4.16-05	1.60	7.36	426.	1.02+07	1.041+03
44	251.5	1.22+00	1.69-06	318.	29.0	6.78	3.52+16	4.82-05	1.62	7.46	429.	8.89+06	1.041+03
45	254.9	1.07+00	1.46-06	320.	29.0	6.88	3.04+16	5.59-05	1.64	7.57	432.	7.73+06	1.041+03
46	258.3	9.38-01	1.27-06	322.	29.0	6.97	2.63+16	6.45-05	1.66	7.67	434.	6.73+06	1.042+03
47	261.6	8.24-01	1.10-06	324.	29.0	7.06	2.28+16	7.44-05	1.68	7.77	437.	5.88+06	1.042+03
48	265.0	7.25-01	9.54-07	326.	29.0	7.16	1.98+16	8.57-05	1.71	7.87	440.	5.14+06	1.042+03
49	265.0	6.39-01	8.40-07	326.	29.0	7.88	1.75+16	9.73-05	1.71	7.88	440.	4.53+06	1.042+03
50	265.0	5.63-01	7.40-07	326.	29.0	7.88	1.54+16	1.10-04	1.71	7.88	440.	3.99+06	1.042+03
51	265.0	4.96-01	6.52-07	326.	29.0	7.88	1.35+16	1.25-04	1.71	7.88	440.	3.51+06	1.042+03
52	265.0	4.37-01	5.74-07	326.	29.0	7.88	1.19+16	1.42-04	1.71	7.88	440.	3.09+06	1.042+03
53	265.0	3.85-01	5.06-07	326.	29.0	7.89	1.05+16	1.62-04	1.71	7.89	440.	2.72+06	1.042+03
54	265.0	3.39-01	4.45-07	326.	29.0	7.89	9.26+15	1.83-04	1.71	7.89	440.	2.40+06	1.042+03
55	265.0	2.98-01	3.92-07	326.	29.0	7.89	8.16+15	2.08-04	1.71	7.89	440.	2.11+06	1.042+03
56	262.5	2.63-01	3.49-07	325.	29.0	8.44	7.25+15	2.34-04	1.69	7.82	438.	1.87+06	1.042+03
57	260.0	2.31-01	3.10-07	323.	29.0	8.37	6.44+15	2.64-04	1.67	7.75	436.	1.65+06	1.042+03
58	257.6	2.03-01	2.75-07	322.	29.0	8.29	5.71+15	2.97-04	1.66	7.68	434.	1.46+06	1.042+03
59	255.1	1.78-01	2.43-07	320.	29.0	8.21	5.06+15	3.36-04	1.64	7.61	432.	1.29+06	1.042+03
60	252.6	1.56-01	2.15-07	319.	29.0	8.13	4.48+15	3.80-04	1.63	7.53	430.	1.13+06	1.042+03
61	250.2	1.37-01	1.90-07	317.	29.0	8.06	3.96+15	4.29-04	1.62	7.46	428.	9.96+05	1.042+03
62	247.7	1.19-01	1.68-07	316.	29.0	7.98	3.49+15	4.86-04	1.60	7.39	425.	8.75+05	1.042+03
63	245.2	1.04-01	1.48-07	314.	29.0	7.90	3.08+15	5.52-04	1.59	7.32	423.	7.67+05	1.042+03
64	242.7	9.08-02	1.30-07	312.	29.0	7.83	2.71+15	6.27-04	1.57	7.25	421.	6.72+05	1.042+03
65	240.3	7.91-02	1.15-07	311.	29.0	7.75	2.38+15	7.12-04	1.56	7.18	419.	5.88+05	1.042+03
66	237.8	6.87-02	1.01-07	309.	29.0	7.67	2.09+15	8.11-04	1.54	7.11	417.	5.14+05	1.042+03
67	235.3	5.97-02	8.83-08	308.	29.0	7.59	1.84+15	9.25-04	1.53	7.03	415.	4.49+05	1.042+03
68	232.9	5.17-02	7.74-08	306.	29.0	7.52	1.61+15	1.06-03	1.51	6.96	413.	3.91+05	1.042+03
69	230.4	4.48-02	6.77-08	304.	29.0	7.44	1.41+15	1.21-03	1.50	6.89	410.	3.40+05	1.042+03
70	227.9	3.87-02	5.91-08	303.	29.0	7.36	1.23+15	1.38-03	1.49	6.82	408.	2.96+05	1.042+03
71	225.5	3.34-02	5.16-08	301.	29.0	7.28	1.07+15	1.58-03	1.47	6.75	406.	2.56+05	1.042+03
72	223.0	2.88-02	4.49-08	299.	29.0	7.21	9.35+14	1.82-03	1.46	6.68	404.	2.22+05	1.042+03
73	224.5	2.48-02	3.85-08	300.	29.0	6.43	8.00+14	2.12-03	1.47	6.72	405.	1.91+05	1.042+03

TABLE II.- MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA - Continued

(a) Scientific units - Concluded

HEIGHT (KM)	TEMP (K)	PRESSURE (MB)	DENSITY (GM/CC)	SPEED OF SOUND (M/SEC)	MOLECULAR WEIGHT	DENS SCALE (KM)	NUMBER DENSITY (PER CC)	MEAN FREE PATH (M)	VIS- COSITY (E+5)	MEAN PRES SCALE (KM)	MEAN PARTICLE VELOCITY (M/SEC)	COLL FREQ (PER SEC)	COLUMNAR MASS
74	226.0	2.14-02	3.29-08	301.	29.0	6.48	6.85+14	2.48-03	1.48	6.77	406.	1.64+05	1.043+03
75	227.5	1.84-02	2.82-08	302.	29.0	6.52	5.87+14	2.89-03	1.48	6.82	408.	1.41+05	1.043+03
76	229.0	1.59-02	2.42-08	303.	29.0	6.57	5.04+14	3.37-03	1.49	6.86	409.	1.21+05	1.043+03
77	230.5	1.38-02	2.08-08	304.	29.0	6.61	4.33+14	3.92-03	1.50	6.91	410.	1.05+05	1.043+03
78	232.0	1.19-02	1.79-08	305.	29.0	6.66	3.72+14	4.56-03	1.51	6.96	412.	9.03+04	1.043+03
79	233.5	1.03-02	1.54-08	306.	29.0	6.70	3.21+14	5.30-03	1.52	7.00	413.	7.80+04	1.043+03
80	235.0	8.97-03	1.33-08	307.	29.0	6.75	2.76+14	6.15-03	1.53	7.05	414.	6.74+04	1.043+03
81	236.0	7.78-03	1.15-08	308.	29.0	6.87	2.39+14	7.11-03	1.53	7.09	415.	5.84+04	1.043+03
82	237.0	6.76-03	9.94-09	309.	29.0	6.91	2.07+14	8.22-03	1.54	7.12	416.	5.06+04	1.043+03
83	238.0	5.88-03	8.60-09	309.	29.0	6.94	1.79+14	9.50-03	1.54	7.15	417.	4.39+04	1.043+03
84	239.0	5.11-03	7.45-09	310.	29.0	6.97	1.55+14	1.10-02	1.55	7.18	418.	3.81+04	1.043+03
85	240.0	4.45-03	6.45-09	311.	28.9	7.00	1.34+14	1.27-02	1.56	7.22	419.	3.31+04	1.043+03
86	235.6	3.87-03	5.72-09	308.	28.9	8.17	1.19+14	1.43-02	1.53	7.09	415.	2.91+04	1.043+03
87	231.2	3.35-03	5.05-09	305.	28.9	8.02	1.05+14	1.62-02	1.50	6.96	411.	2.54+04	1.043+03
88	226.8	2.90-03	4.45-09	302.	28.9	7.87	9.27+13	1.83-02	1.48	6.83	407.	2.22+04	1.043+03
89	222.4	2.50-03	3.92-09	299.	28.9	7.72	8.15+13	2.08-02	1.46	6.70	403.	1.94+04	1.043+03
90	218.0	2.15-03	3.44-09	296.	28.9	7.57	7.15+13	2.37-02	1.43	6.57	399.	1.68+04	1.043+03
91	216.6	1.85-03	2.97-09	295.	28.9	6.78	6.18+13	2.75-02	1.42	6.53	398.	1.45+04	1.043+03
92	215.2	1.59-03	2.56-09	295.	28.9	6.74	5.34+13	3.18-02	1.42	6.50	397.	1.25+04	1.043+03
93	213.8	1.36-03	2.20-09	294.	28.9	6.71	4.60+13	3.69-02	1.41	6.47	396.	1.07+04	1.043+03
94	212.4	1.16-03	1.90-09	293.	28.8	6.67	3.97+13	4.28-02	1.40	6.43	395.	9.23+03	1.043+03
95	211.0	9.96-04	1.63-09	292.	28.8	6.64	3.42+13	4.97-02	1.39	6.40	394.	7.93+03	1.043+03
96	212.6	8.52-04	1.38-09	294.	28.7	6.05	2.90+13	5.85-02	1.40	6.47	396.	6.77+03	1.043+03
97	214.2	7.31-04	1.17-09	295.	28.6	6.12	2.47+13	6.87-02	1.41	6.54	398.	5.79+03	1.043+03
98	215.8	6.28-04	9.98-10	297.	28.5	6.18	2.11+13	8.06-02	1.42	6.62	400.	4.97+03	1.043+03
99	217.4	5.40-04	8.49-10	298.	28.4	6.25	1.80+13	9.44-02	1.43	6.69	402.	4.26+03	1.043+03
100	219.0	4.66-04	7.25-10	300.	28.3	6.32	1.54+13	1.10-01	1.44	6.76	404.	3.67+03	1.043+03
101	223.6	4.02-04	6.11-10	304.	28.3	5.96	1.30+13	1.30-01	1.46	6.92	409.	3.14+03	1.043+03
102	228.2	3.49-04	5.18-10	307.	28.2	6.10	1.11+13	1.53-01	1.49	7.09	414.	2.70+03	1.043+03
103	232.8	3.03-04	4.40-10	311.	28.1	6.24	9.44+12	1.80-01	1.51	7.25	419.	2.33+03	1.043+03
104	237.4	2.65-04	3.76-10	314.	28.0	6.38	8.07+12	2.10-01	1.54	7.42	423.	2.01+03	1.043+03
105	242.0	2.32-04	3.22-10	317.	28.0	6.52	6.93+12	2.45-01	1.57	7.58	428.	1.75+03	1.043+03
106	244.2	2.03-04	2.79-10	319.	27.9	7.05	6.03+12	2.82-01	1.58	7.67	431.	1.53+03	1.043+03
107	246.4	1.78-04	2.42-10	321.	27.8	7.13	5.25+12	3.24-01	1.59	7.76	433.	1.34+03	1.043+03
108	248.6	1.57-04	2.11-10	323.	27.8	7.22	4.57+12	3.71-01	1.61	7.85	435.	1.17+03	1.043+03
109	250.8	1.38-04	1.84-10	325.	27.7	7.30	4.00+12	4.25-01	1.62	7.94	438.	1.03+03	1.043+03
110	253.0	1.22-04	1.60-10	327.	27.6	7.38	3.49+12	4.86-01	1.63	8.03	440.	9.06+02	1.043+03
111	260.2	1.08-04	1.38-10	331.	27.6	6.64	3.01+12	5.65-01	1.68	8.28	447.	7.91+02	1.043+03
112	267.4	9.59-05	1.19-10	336.	27.5	6.84	2.60+12	6.54-01	1.72	8.53	454.	6.94+02	1.043+03
113	274.6	8.54-05	1.03-10	341.	27.5	7.04	2.25+12	7.54-01	1.77	8.78	460.	6.10+02	1.043+03
114	281.8	7.63-05	8.93-11	346.	27.4	7.24	1.96+12	8.66-01	1.81	9.03	467.	5.39+02	1.043+03
115	289.0	6.84-05	7.79-11	351.	27.3	7.44	1.72+12	9.90-01	1.86	9.28	473.	4.78+02	1.043+03
116	297.8	6.16-05	6.79-11	356.	27.3	7.36	1.50+12	1.13+00	1.92	9.59	481.	4.24+02	1.043+03
117	306.7	5.56-05	5.94-11	362.	27.2	7.60	1.31+12	1.29+00	1.96	9.90	488.	3.77+02	1.043+03
118	315.5	5.03-05	5.21-11	367.	27.2	7.83	1.15+12	1.47+00	1.99	10.20	496.	3.37+02	1.043+03
119	324.4	4.57-05	4.60-11	373.	27.2	8.07	1.02+12	1.67+00	2.02	10.51	503.	3.02+02	1.043+03
120	333.2	4.16-05	4.07-11	378.	27.1	8.30	9.04+11	1.88+00	2.06	10.81	510.	2.71+02	1.043+03

COLUMNAR MASS = 1042.524 GM/CC

COLUMNAR MASS FOR CO2 = .475 GM/CC

TABLE II. - MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA - Continued

(b) Engineering units

CONSTRUCTION PARAMETERS — SKYLAB

SURFACE PRESSURE = 14.816 LB/SQ IN SURFACE TEMPERATURE = 468.0 R SURFACE DENSITY = 2.66-03 SLUG/CU FT

PER CENT CARBON DIOXIDE = .0 MOLECULAR WEIGHT = 28.97 SURFACE GRAVITY = 32.17 FT/SEC/SEC

CALCULATED QUANTITIES

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/ CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VIS- COSITY (E+5)	KINETIC VISC
.0000	468.0	1.48+01	2.66-03	1061.	8.6-02	.025	.027	8.1+23	1430.	2.0-07	3.50	1.3-04
.0033	464.4	1.30+01	2.35-03	1057.	8.5-02	.025	.026	7.1+23	1425.	2.2-07	3.47	1.5-04
.0066	460.8	1.14+01	2.07-03	1052.	8.5-02	.025	.026	6.3+23	1419.	2.5-07	3.45	1.7-04
.0098	453.6	9.94+00	1.84-03	1044.	8.5-02	.024	.027	5.6+23	1408.	2.8-07	3.40	1.8-04
.0131	446.5	8.67+00	1.63-03	1036.	8.5-02	.024	.027	4.9+23	1397.	3.2-07	3.35	2.1-04
.0164	439.3	7.55+00	1.44-03	1028.	8.5-02	.023	.027	4.4+23	1386.	3.6-07	3.30	2.3-04
.0197	432.1	6.56+00	1.27-03	1019.	8.5-02	.023	.026	3.9+23	1374.	4.1-07	3.25	2.6-04
.0230	425.0	5.68+00	1.12-03	1011.	8.5-02	.023	.026	3.4+23	1363.	4.6-07	3.20	2.9-04
.0262	417.8	4.91+00	9.87-04	1002.	8.5-02	.022	.025	3.0+23	1351.	5.3-07	3.15	3.2-04
.0295	410.7	4.24+00	8.66-04	994.	8.5-02	.022	.025	2.6+23	1340.	6.0-07	3.11	3.6-04
.0328	403.5	3.64+00	7.58-04	985.	8.5-02	.022	.024	2.3+23	1328.	6.9-07	3.06	4.0-04
.0361	396.4	3.13+00	6.62-04	976.	8.5-02	.021	.024	2.0+23	1316.	7.9-07	3.01	4.6-04
.0394	389.2	2.67+00	5.77-04	967.	8.5-02	.021	.024	1.7+23	1304.	9.0-07	2.97	5.2-04
.0427	383.1	2.28+00	5.00-04	960.	8.5-02	.021	.023	1.5+23	1294.	1.0-06	2.93	5.9-04
.0459	377.1	1.94+00	4.33-04	952.	8.5-02	.020	.022	1.3+23	1284.	1.2-06	2.89	6.7-04
.0492	371.0	1.65+00	3.73-04	945.	8.5-02	.020	.022	1.1+23	1273.	1.4-06	2.85	7.6-04
.0525	364.9	1.40+00	3.21-04	937.	8.5-02	.020	.022	9.7+22	1263.	1.6-06	2.81	8.8-04
.0558	358.9	1.18+00	2.76-04	929.	8.5-02	.019	.021	8.4+22	1252.	1.9-06	2.77	1.0-03
.0591	352.8	9.93-01	2.36-04	921.	8.5-02	.019	.021	7.2+22	1242.	2.2-06	2.73	1.2-03
.0623	354.6	8.35-01	1.98-04	923.	8.5-02	.019	.018	6.0+22	1245.	2.6-06	2.74	1.4-03
.0656	356.4	7.03-01	1.66-04	926.	8.5-02	.019	.019	5.0+22	1248.	3.1-06	2.76	1.7-03
.0689	358.2	5.93-01	1.39-04	928.	8.5-02	.019	.019	4.2+22	1251.	3.7-06	2.77	2.0-03
.0722	360.0	5.00-01	1.17-04	930.	8.5-02	.019	.019	3.5+22	1254.	4.5-06	2.78	2.4-03
.0755	363.8	4.23-01	9.75-05	935.	8.5-02	.020	.018	3.0+22	1261.	5.3-06	2.81	2.9-03
.0787	367.6	3.58-01	8.17-05	940.	8.5-02	.020	.019	2.5+22	1268.	6.4-06	2.83	3.5-03
.0820	371.4	3.03-01	6.85-05	945.	8.5-02	.020	.019	2.1+22	1274.	7.6-06	2.85	4.2-03
.0853	375.2	2.57-01	5.76-05	950.	8.5-02	.020	.019	1.7+22	1281.	9.0-06	2.88	5.0-03
.0886	379.0	2.19-01	4.85-05	955.	8.5-02	.020	.019	1.5+22	1287.	1.1-05	2.90	6.0-03
.0919	382.8	1.87-01	4.09-05	959.	8.5-02	.021	.019	1.2+22	1294.	1.3-05	2.93	7.2-03
.0951	386.6	1.59-01	3.46-05	964.	8.5-02	.021	.020	1.0+22	1300.	1.5-05	2.95	8.5-03
.0984	390.4	1.36-01	2.93-05	969.	8.5-02	.021	.020	8.9+21	1306.	1.8-05	2.98	1.0-02
.1017	394.2	1.17-01	2.48-05	974.	8.5-02	.021	.020	7.5+21	1313.	2.1-05	3.00	1.2-02
.1050	398.0	1.00-01	2.11-05	978.	8.5-02	.021	.020	6.4+21	1319.	2.5-05	3.02	1.4-02
.1083	401.8	8.58-02	1.79-05	983.	8.5-02	.022	.020	5.4+21	1325.	2.9-05	3.05	1.7-02
.1116	405.6	7.38-02	1.53-05	988.	8.5-02	.022	.021	4.6+21	1332.	3.4-05	3.07	2.0-02

TABLE II.- MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA - Continued

(b) Engineering units - Continued

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/ CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE (MIL.FT)	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VIS- COSITY (E+5)	KINETIC VISC
.1148	409.4	6.36-02	1.30-05	992.	8.5-02	.022	.021	4.0+21	1338.	4.0-05	3.10	2.4-02
.1181	413.2	5.49-02	1.11-05	997.	8.5-02	.022	.021	3.4+21	1344.	4.7-05	3.12	2.8-02
.1214	417.0	4.74-02	9.54-06	1001.	8.5-02	.023	.021	2.9+21	1350.	5.5-05	3.15	3.3-02
.1247	420.8	4.10-02	8.18-06	1006.	8.5-02	.023	.021	2.5+21	1356.	6.4-05	3.17	3.9-02
.1280	424.6	3.55-02	7.02-06	1010.	8.4-02	.023	.022	2.1+21	1362.	7.4-05	3.20	4.6-02
.1312	428.4	3.08-02	6.03-06	1015.	8.4-02	.023	.022	1.8+21	1368.	8.6-05	3.22	5.4-02
.1345	434.5	2.67-02	5.17-06	1022.	8.4-02	.023	.021	1.6+21	1378.	1.0-04	3.27	6.3-02
.1378	440.6	2.33-02	4.44-06	1029.	8.4-02	.024	.022	1.3+21	1388.	1.2-04	3.31	7.5-02
.1411	446.6	2.03-02	3.82-06	1036.	8.4-02	.024	.022	1.2+21	1397.	1.4-04	3.35	8.8-02
.1444	452.7	1.77-02	3.29-06	1043.	8.4-02	.024	.022	1.0+21	1407.	1.6-04	3.39	1.0-01
.1476	458.8	1.55-02	2.84-06	1050.	8.4-02	.025	.023	8.6+20	1416.	1.8-04	3.43	1.2-01
.1509	464.9	1.36-02	2.46-06	1057.	8.4-02	.025	.023	7.5+20	1426.	2.1-04	3.48	1.4-01
.1542	470.9	1.20-02	2.13-06	1064.	8.4-02	.025	.023	6.5+20	1435.	2.4-04	3.52	1.7-01
.1575	477.0	1.05-02	1.85-06	1071.	8.4-02	.026	.023	5.6+20	1444.	2.8-04	3.56	1.9-01
.1608	477.0	9.27-03	1.63-06	1071.	8.4-02	.026	.026	4.9+20	1444.	3.2-04	3.56	2.2-01
.1640	477.0	8.17-03	1.44-06	1071.	8.4-02	.026	.026	4.4+20	1444.	3.6-04	3.56	2.5-01
.1673	477.0	7.19-03	1.27-06	1071.	8.4-02	.026	.026	3.8+20	1444.	4.1-04	3.56	2.8-01
.1706	477.0	6.34-03	1.12-06	1071.	8.4-02	.026	.026	3.4+20	1444.	4.7-04	3.56	3.2-01
.1739	477.0	5.58-03	9.82-07	1071.	8.4-02	.026	.026	3.0+20	1444.	5.3-04	3.56	3.6-01
.1772	477.0	4.92-03	8.66-07	1071.	8.4-02	.026	.026	2.6+20	1444.	6.0-04	3.56	4.1-01
.1805	477.0	4.33-03	7.62-07	1071.	8.4-02	.026	.026	2.3+20	1444.	6.8-04	3.56	4.7-01
.1837	472.5	3.81-03	6.78-07	1066.	8.4-02	.026	.028	2.1+20	1437.	7.7-04	3.53	5.2-01
.1870	468.1	3.35-03	6.02-07	1061.	8.4-02	.025	.027	1.8+20	1430.	8.7-04	3.50	5.8-01
.1903	463.6	2.95-03	5.34-07	1056.	8.4-02	.025	.027	1.6+20	1424.	9.8-04	3.47	6.5-01
.1936	459.2	2.58-03	4.73-07	1051.	8.4-02	.025	.027	1.4+20	1417.	1.1-03	3.44	7.3-01
.1969	454.7	2.26-03	4.16-07	1045.	8.4-02	.025	.027	1.3+20	1410.	1.2-03	3.40	8.2-01
.2001	450.3	1.98-03	3.70-07	1040.	8.4-02	.024	.026	1.1+20	1403.	1.4-03	3.37	9.1-01
.2034	445.8	1.73-03	3.26-07	1035.	8.4-02	.024	.026	9.9+19	1396.	1.6-03	3.34	1.0+00
.2067	441.4	1.51-03	2.88-07	1030.	8.4-02	.024	.026	8.7+19	1389.	1.8-03	3.31	1.2+00
.2100	436.9	1.32-03	2.53-07	1025.	8.4-02	.024	.026	7.7+19	1382.	2.1-03	3.28	1.3+00
.2133	432.5	1.15-03	2.23-07	1020.	8.4-02	.024	.025	6.8+19	1375.	2.3-03	3.25	1.5+00
.2165	428.0	9.98-04	1.96-07	1014.	8.4-02	.023	.025	5.9+19	1368.	2.7-03	3.22	1.6+00
.2198	423.6	8.66-04	1.72-07	1009.	8.4-02	.023	.025	5.2+19	1361.	3.0-03	3.19	1.9+00
.2231	419.2	7.51-04	1.50-07	1004.	8.4-02	.023	.025	4.6+19	1354.	3.5-03	3.16	2.1+00
.2264	414.7	6.50-04	1.32-07	999.	8.4-02	.023	.024	4.0+19	1346.	4.0-03	3.13	2.4+00
.2297	410.3	5.62-04	1.15-07	993.	8.4-02	.022	.024	3.5+19	1339.	4.5-03	3.10	2.7+00
.2330	405.8	4.85-04	1.00-07	988.	8.4-02	.022	.024	3.0+19	1332.	5.2-03	3.08	3.1+00
.2362	401.4	4.17-04	8.73-08	982.	8.4-02	.022	.024	2.6+19	1325.	6.0-03	3.05	3.5+00
.2395	404.1	3.60-04	7.47-08	986.	8.4-02	.022	.021	2.3+19	1329.	7.0-03	3.06	4.1+00
.2428	406.8	3.10-04	6.40-08	989.	8.4-02	.022	.021	1.9+19	1334.	8.1-03	3.08	4.8+00
.2461	409.5	2.68-04	5.49-08	992.	8.4-02	.022	.021	1.7+19	1338.	9.5-03	3.10	5.7+00
.2494	412.2	2.31-04	4.71-08	996.	8.4-02	.023	.022	1.4+19	1342.	1.1-02	3.12	6.6+00
.2526	414.9	2.00-04	4.05-08	999.	8.3-02	.023	.022	1.2+19	1347.	1.3-02	3.13	7.8+00
.2559	417.6	1.73-04	3.48-08	1002.	8.3-02	.023	.022	1.1+19	1351.	1.5-02	3.15	9.1+00
.2592	420.3	1.50-04	3.00-08	1005.	8.3-02	.023	.022	9.1+18	1355.	1.7-02	3.17	1.1+01
.2625	423.0	1.30-04	2.58-08	1008.	8.3-02	.023	.022	7.8+18	1360.	2.0-02	3.19	1.2+01
.2658	424.8	1.13-04	2.23-08	1011.	8.3-02	.023	.023	6.8+18	1363.	2.3-02	3.20	1.4+01
.2690	426.6	9.81-05	1.93-08	1013.	8.3-02	.023	.023	5.9+18	1366.	2.7-02	3.21	1.7+01
.2723	428.4	8.53-05	1.67-08	1015.	8.3-02	.023	.023	5.1+18	1369.	3.1-02	3.22	1.9+01
.2756	430.2	7.42-05	1.45-08	1017.	8.3-02	.024	.023	4.4+18	1372.	3.6-02	3.24	2.2+01
.2789	432.0	6.46-05	1.25-08	1019.	8.3-02	.024	.023	3.8+18	1375.	4.2-02	3.25	2.6+01
.2822	424.1	5.61-05	1.11-08	1010.	8.3-02	.023	.027	3.4+18	1362.	4.7-02	3.20	2.9+01
.2854	416.2	4.87-05	9.82-09	1001.	8.3-02	.023	.026	3.0+18	1349.	5.3-02	3.14	3.2+01
.2887	408.2	4.21-05	8.65-09	991.	8.3-02	.022	.026	2.6+18	1336.	6.0-02	3.09	3.6+01
.2920	400.3	3.63-05	7.61-09	981.	8.3-02	.022	.025	2.3+18	1323.	6.8-02	3.04	4.0+01
.2953	392.4	3.12-05	6.68-09	972.	8.3-02	.022	.025	2.0+18	1310.	7.8-02	2.99	4.5+01
.2986	389.9	2.68-05	5.76-09	969.	8.3-02	.021	.022	1.8+18	1307.	9.0-02	2.97	5.2+01
.3019	387.4	2.30-05	4.97-09	967.	8.3-02	.021	.022	1.5+18	1303.	1.0-01	2.96	6.0+01

TABLE II. - MODEL ATMOSPHERE FOR EARTH — 3σ WINTER DATA - Concluded

(b) Engineering units - Concluded

HEIGHT (MIL.FT)	TEMP (R)	PRESSURE (LB/SQ IN)	DENSITY (SLUG/CU FT)	SPEED OF SOUND (FT/SEC)	SPECIFIC WEIGHT	PRES SCALE (MIL.FT)	DENS SCALE	NUMBER DENSITY (PER CU FT)	MEAN PARTICLE VELOCITY (FT/SEC)	MEAN FREE PATH (FT)	VISCOSITY (E+5)	KINETIC VISC
.3051	384.8	1.97-05	4.28-09	964.	8.3-02	.021	.022	1.3+18	1300.	1.2-01	2.94	6.9+01
.3084	382.3	1.69-05	3.69-09	961.	8.3-02	.021	.022	1.1+18	1296.	1.4-01	2.92	7.9+01
.3117	379.8	1.44-05	3.17-09	959.	8.3-02	.021	.022	9.7+17	1292.	1.6-01	2.91	9.2+01
.3150	382.7	1.24-05	2.69-09	964.	8.3-02	.021	.020	8.2+17	1299.	1.9-01	2.93	1.1+02
.3183	385.6	1.06-05	2.28-09	969.	8.3-02	.021	.020	7.0+17	1306.	2.3-01	2.94	1.3+02
.3215	388.4	9.11-06	1.94-09	974.	8.3-02	.022	.020	6.0+17	1313.	2.6-01	2.96	1.5+02
.3248	391.3	7.84-06	1.65-09	979.	8.3-02	.022	.021	5.1+17	1320.	3.1-01	2.98	1.8+02
.3281	394.2	6.76-06	1.41-09	984.	8.3-02	.022	.021	4.4+17	1327.	3.6-01	3.00	2.1+02
.3314	402.5	5.84-06	1.19-09	996.	8.3-02	.023	.020	3.7+17	1343.	4.3-01	3.05	2.6+02
.3347	410.8	5.06-06	1.01-09	1008.	8.3-02	.023	.020	3.1+17	1359.	5.0-01	3.11	3.1+02
.3379	419.0	4.40-06	8.56-10	1019.	8.3-02	.024	.020	2.7+17	1374.	5.9-01	3.16	3.7+02
.3412	427.3	3.84-06	7.30-10	1030.	8.3-02	.024	.021	2.3+17	1389.	6.9-01	3.22	4.4+02
.3445	435.6	3.36-06	6.25-10	1042.	8.3-02	.025	.021	2.0+17	1405.	8.0-01	3.27	5.2+02
.3478	439.6	2.95-06	5.42-10	1048.	8.3-02	.025	.023	1.7+17	1413.	9.2-01	3.30	6.1+02
.3511	443.5	2.59-06	4.71-10	1054.	8.3-02	.025	.023	1.5+17	1421.	1.1+00	3.33	7.1+02
.3543	447.5	2.28-06	4.10-10	1059.	8.3-02	.026	.024	1.3+17	1429.	1.2+00	3.35	8.2+02
.3576	451.4	2.01-06	3.57-10	1065.	8.3-02	.026	.024	1.1+17	1437.	1.4+00	3.38	9.5+02
.3609	455.4	1.77-06	3.11-10	1071.	8.3-02	.026	.024	9.9+16	1445.	1.6+00	3.41	1.1+03
.3642	460.4	1.57-06	2.67-10	1088.	8.3-02	.027	.022	8.5+16	1467.	1.9+00	3.50	1.3+03
.3675	481.3	1.39-06	2.30-10	1104.	8.3-02	.028	.022	7.4+16	1488.	2.1+00	3.59	1.6+03
.3708	494.3	1.24-06	2.00-10	1120.	8.3-02	.029	.023	6.4+16	1510.	2.5+00	3.69	1.9+03
.3740	507.2	1.11-06	1.73-10	1135.	8.3-02	.030	.024	5.6+16	1531.	2.8+00	3.78	2.2+03
.3773	520.2	9.93-07	1.51-10	1151.	8.3-02	.030	.024	4.9+16	1552.	3.2+00	3.88	2.6+03
.3806	536.1	8.93-07	1.32-10	1169.	8.2-02	.031	.024	4.2+16	1577.	3.7+00	4.00	3.0+03
.3839	552.1	8.06-07	1.15-10	1187.	8.2-02	.032	.025	3.7+16	1602.	4.2+00	4.09	3.5+03
.3872	568.0	7.30-07	1.01-10	1205.	8.2-02	.033	.026	3.3+16	1626.	4.8+00	4.16	4.1+03
.3904	583.9	6.63-07	8.93-11	1223.	8.2-02	.034	.026	2.9+16	1650.	5.5+00	4.22	4.7+03
.3937	599.8	6.03-07	7.91-11	1240.	8.2-02	.035	.027	2.6+16	1673.	6.2+00	4.29	5.4+03
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0
.0000	.0	0.00	0.00	0.	0.0	.000	.000	0.0	0.	0.0	.00	0.0