Altitude		Pressure			Density			Temperature			
Geom ft	Pressure ft	P lb/ft^2	δ P/P_o	$\frac{q}{M^2}$ 0.7 P lb/ft^2	ρ Slug/ft^3	σ ρ/ρ_0 ($\rho_0=\rho_{S.L.}$)	$\sqrt{\sigma}$	T (°R)	t (°F)	θ T/T_0	t_c (°C)
0	0	2116.22 + 0	1.00000 + 0	1481.35 + 0	0.237689 − 2	1.0000 + 0	1.0000 + 0	518.670	59.000	1.00000	15.000
1000	1000	2040.86	9.64389 − 1	1428.60	0.230812	9.7107 − 1	9.8543 − 1	515.104	55.434	0.99312	13.019
2000	2000	1967.69	9.29816	1377.38	0.224088	9.4278	9.7097	511.538	51.868	0.98625	11.038
3000	3000	1896.67	8.96256	1327.67	0.217516	9.1513	9.5662	507.973	48.303	0.97938	9.057
4000	4000	1827.75	8.63087	1279.42	0.211093	8.8811	9.4239	504.408	44.738	0.97256	7.077
5000	5000	1760.87	8.32085	1232.61	0.204817	8.6170	9.2828	500.843	41.173	0.96563	5.096
6000	6000	1696.00	8.01430	1187.20	0.198685	8.3590	9.1428	497.279	37.609	0.95876	3.116
7000	7000	1633.08	7.71698	1143.16	0.192695	8.1070	9.0039	493.715	34.045	0.95189	1.136
8000	8000	1572.07	7.42869	1100.45	0.186845	7.8609	8.8662	490.152	30.482	0.94502	− 0.844
9000	9000	1512.93	7.14921	1059.05	0.181133	7.6206	8.7296	486.588	26.918	0.93815	− 2.823
10000	10000	1455.60 + 0	6.87832 − 1	1018.92 + 0	0.175555 − 2	7.3859 − 1	8.5941 − 1	483.025	23.355	0.93128	− 4.803
11000	11000	1400.05	6.61584	9800.38 − 1	0.170110	7.1568	8.4598	479.463	19.793	0.92441	− 6.782
12000	12000	1346.24	6.36155	9423.69	0.164796	6.9333	8.3266	475.901	16.231	0.91754	− 8.761
13000	13000	1294.12	6.11525	9058.84	0.159610	6.7151	8.1946	472.339	12.669	0.91067	− 10.740
14000	14000	1243.65	5.87676	8705.55	0.154551	6.5022	8.0636	468.777	9.107	0.90381	− 12.718
15000	15000	1194.79	5.64587	8363.52	0.149616	6.2946	7.9338	465.216	5.546	0.89694	− 14.697
16000	16000	1147.50	5.42241	8032.50	0.144802	6.0921	7.8052	461.655	1.983	0.89007	− 16.675
17000	17000	1101.74	5.20619	7712.19	0.140109	5.8946	7.6776	458.095	− 1.575	0.88321	− 18.653
18000	18000	1057.48	4.99702	7402.34	0.135533	5.7021	7.5512	454.535	− 5.135	0.87635	− 20.631
19000	19000	1014.67	4.79472	7102.67	0.131072	5.5145	7.4259	450.975	− 8.695	0.86948	− 22.609
20000	20000	9732.75 − 1	4.59913 − 1	6812.93 − 1	0.126726 − 2	5.3316 − 1	7.3018 − 1	447.415	− 12.255	0.86262	− 24.586
21000	21000	9332.66	4.41007	6532.86	0.122491	5.1534	7.1787	443.858	− 15.814	0.85576	− 26.563
22000	22000	8946.02	4.22736	6262.21	0.118365	4.9798	7.0568	440.297	− 19.373	0.84890	− 28.540
23000	23000	8572.49	4.05086	6000.74	0.114347	4.8108	6.9360	436.739	− 22.931	0.84204	− 30.517
24000	24000	8211.72	3.88038	5748.21	0.110435	4.6462	6.8163	433.181	− 26.489	0.83518	− 32.494
25000	25000	7863.38	3.71577	5504.37	0.106626	4.4859	6.6977	429.623	− 30 047	0 82832	− 34.471
26000	26000	7527.14	3.55688	5269.00	0.102919	4.3300	6.5802	426.065	− 33.605	0 82146	− 36.447
27000	27000	7202.66	3.40356	5041.86	0.993112 − 3	4.1782	6.4639	422.508	− 37.162	0.81460	− 38.423
28000	28000	6889.64	3.25564	4822.75	0.958016	4.0305	6.3487	418.951	− 40.719	0.80774	− 40.399
29000	29000	6587.75	3.11298	4611.42	0.923880	3.8869	6.2345	415.395	− 44.275	0.80089	− 42.375
30000	30000	6296.69 − 1	2.97545 − 1	4407.68 − 1	0.890686 − 3	3.7473 − 1	6.1215 − 1	411.839	− 47.831	0.79403	− 44.351
31000	31000	6016.15	2.84288	4211.31	0.858416	3.6115	6.0096	408.283	− 51.387	0.78717	− 46.326
32000	32000	5745.85	2.71515	4022.10	0.827050	3.4795	5.8988	404.728	− 54.742	0.78032	− 48.301
33000	33000	5485.50	2.59213	3839.85	0.796572	3.3513	5.7891	401.173	− 58.497	0.77346	− 50.275
34000	34000	5234.80	2.47366	3664.36	0.766963	3.2267	5.6804	397.618	− 62.052	0.76661	− 52.251

Fig. 3.1.5 Standard atmospheric properties.

Viscosity		RN "K" Factory			Speed of sound					
μ Slug / ft-sec	ν ft^2 / sec	K_{PPS} $RN/\ell V_{FPS}$ 1 / ft-FPS	K_{KT} $RN/\ell V_{KT}$ 1 / ft-kt	K_M $RN/\ell M$ 1 / ft-Mach	C_S ft / sec	C_{se} $C_S\sqrt{\sigma}$ ft / sec	C_S mph	C_{se} $C_S\sqrt{\sigma}$ mph	C_S kt	C_{se} $C_S\sqrt{\sigma}$ kt
0.37372 - 6	0.15723 - 3	6.360 + 3	1.073 + 4	7.101 + 6	1116.45	1116.45 + 0	761.22	761.22 + 0	661.48	661.48 + 0
0.37172	0.16105	6.209	1.048	6.908	1112.61	1096.39	758.59	747.54	659.20	649.60
0.36971	0.16499	6.061	1.023	6.720	1108.75	1076.56	755.96	734.02	656.92	637.84
0.36770	0.16905	5.916	9.984 + 3	6.536	1104.88	1056.95	753.33	720.65	654.62	626.23
0.36568	0.17323	5.773	9.743	6.356	1100.99	1037.57	750.68	707.43	652.32	614.74
0.36366	0.17755	5.632	9.506	6.179	1097.10	1018.41	748.02	694.37	650.01	603.39
0.36162	0.18201	5.494	9.273	6.006	1093.19	9994.76 - 1	745.35	681.46	647.70	592.17
0.35958	0.18661	5.359	9.045	5.837	1089.26	9807.61	742.68	668.70	645.37	581.09
0.35754	0.19136	5.226	8.820	5.672	1085.32	9622.67	739.99	656.09	643.04	570.13
0.35549	0.19626	5.095	8.600	5.510	1081.37	9439.92	737.30	643.63	640.70	559.30
0.35343 - 6	0.20132 - 3	4.967 + 3	8.384 + 3	5.352 + 6	1077.40	9259.36 - 1	734.59	631.32 + 0	638.35	548.60 + 0
0.35136	0.20655	4.841	8.172	5.197	1073.42	9080.96	731.88	619.16	635.99	538.03
0.34928	0.21195	4.718	7.963	5.046	1069.43	8904.73	729.16	607.14	633.62	527.59
0.34720	0.21753	4.597	7.759	4.898	1065.42	8730.65	726.42	595.27	631.25	517.28
0.34512	0.22330	4.478	7.558	4.753	1061.40	8558.71	723.68	583.55	628.86	507.09
0.34302	0.22927	4.362	7.362	4.612	1057.36	8388.90	720.92	571.97	626.47	497.03
0.34092	0.23544	4.247	7.169	4.474	1053.30	8221.21	718.16	560.54	624.07	487.09
0.33881	0.24182	4.135	6.980	4.339	1049.23	8055.63	715.39	549.25	621.65	477.28
0.33669	0.24842	4.025	6.794	4.207	1045.15	7892.14	712.60	538.10	619.23	467.60
0.33457	0.25525	3.918	6.612	4.078	1041.05	7730.74	709.80	527.10	616.80	458.03
0.33244 - 6	0.26233 - 3	3.812 + 3	6.434 + 3	3.953 + 6	1036.93	7571.42 - 1	707.00	516.23 + 0	614.37	448.60 + 0
0.33030	0.26965	3.709	6.259	3.830	1032.80	7414.16	704.18	505.51	611.92	439.28
0.32815	0.27723	3.607	6.088	3.710	1028.65	7253.96	701.35	494.93	609.46	430.08
0.32599	0.28509	3.508	5.920	3.594	1024.48	7105.80	698.51	484.49	606.99	421.01
0.32383	0.29323	3.410	5.756	3.479	1020.30	6954.67	695.66	474.18	604.51	412.05
0.32166	0.30167	3.315	5.595	3.368	1016.10	6805.56	692.80	464.02	602.03	403.22
0.31948	0.31042	3.221	5.437	3.260	1011.89	6658.47	689.92	453.99	599.53	394.50
0.31730	0.31950	3.130	5.283	3.154	1007.65	6513.37	687.04	444.09	597.02	385.91
0.31510	0.32891	3.040	5.131	3.051	1003.40	6370.27	684.14	434.34	594.50	377.43
0.31290	0.33868	2.953	4.983	2.950	999.14	6229.14	681.23	424.71	591.97	369.07
0.31069 - 6	0.34882 - 3	2.867 + 3	4.839 + 3	2.852 + 6	994.85	6089.97 - 1	678.31	415.23 + 0	589.43	360.82 + 0
0.30847	0.35935	2.783	4.697	2.756	990.55	5952.77	675.37	405.87	586.88	352.69
0.30625	0.37029	2.701	4.558	2.663	986.22	5817.50	672.43	396.65	584.32	344.68
0.30401	0.38165	2.620	4.422	2.573	981.88	5684.17	669.47	387.56	581.75	336.78
0.30177	0.39346	2.542	4.290	2.484	977.52	5552.77	666.49	378.60	579.17	328.99

Fig. 3.1.5 (continued)

Altitude		Pressure			Density			Temperature			
Geom ft	Pressure ft	P lb/ft^2	δ P/P_o	$\frac{q}{M^2}$ 0.7 P lb/ft^2	ρ Slug/ft^3	σ ρ/ρ_0 ($\rho_0=\rho_{S.L.}$)	$\sqrt{\sigma}$	T (°R)	t (°F)	θ T/T_0	t_c (°C)
35000	35000	4993.49	2.35963	3495.44	0.738206	3.1058	5.5729	394.064	- 65.606	0.75976	- 54.226
36000	36000	4761.28	2.24990	3332.90	0.710284	2.9883	5.4665	390.510	- 69.160	0.75291	- 56.200
36152	36152	4726.80 - 1	2.23361 - 1	3308.76 - 1	0.706117 - 3	2.9708 - 1	5.4505 - 1	389.970	- 69.700	0.75187	- 56.500
37000	37000	4536.63	2.14469	3177.04	0.678007	2.8525	5.3409	389.970	- 69.700	0.75187	- 56.500
38000	38000	4326.40	2.04440	3028.48	0.646302	2.7191	5.2145	389.970	- 69.700	0.75187	- 56.500
39000	39000	4124.10	1.94881	2886.87	0.616082	2.5920	5.0911	389.970	- 69.700	0.75187	- 56.500
40000	40000	3931.29 - 1	1.85770 - 1	2751.90 - 1	0.587278 - 3	2.4708 - 1	4.9707 - 1	389.970	- 69.700	0.75187	- 56.500
41000	41000	3747.50	1.77085	2623.25	0.559823	2.3553	4.8531	389.970	- 69.700	0.75187	- 56.500
42000	42000	3572.33	1.68807	2500.63	0.533655	2.2452	4.7383	389.970	- 69.700	0.75187	- 56.500
43000	43000	3405.36	1.60917	2383.75	0.508711	2.1402	4.6263	389.970	- 69.700	0.75187	- 56.500
44000	44000	3246.20	1.53397	2272.34	0.484936	2.0402	4.5169	389.970	- 69.700	0.75187	- 56.500
45000	45000	3094.50	1.46228	2166.15	0.462274	1.9449	4.4101	389.970	- 69.700	0.75187	- 56.500
46000	46000	2949.90	1.39395	2064.93	0.440673	1.8540	4.3058	389.970	- 69.700	0.75187	- 56.500
47000	47000	2812.08	1.32882	1968.45	0.420084	1.7674	4.2040	389.970	- 69.700	0.75187	- 56.500
48000	48000	2680.70	1.26674	1876.49	0.400458	1.6848	4.1046	389.970	- 69.700	0.75187	- 56.500
49000	49000	2555.47	1.20757	1783.83	0.381751	1.6061	4.0076	389.970	- 69.700	0.75187	- 56.500
50000	50000	2436.11 - 1	1.15116 - 1	1705.27 - 1	0.363919 - 3	1.5311 - 1	3.9129 - 1	389.970	- 69.700	0.75187	- 56.500
51000	51000	2322.33	1.09740	1625.63	0.346922	1.4956	3.8204	389.970	- 69.700	0.75187	- 56.500
52000	52000	2213.87	1.04615	1549.71	0.330721	1.3914	3.7301	389.970	- 69.700	0.75187	- 56.500
53000	53000	2110.49	9.97295 - 2	1477.34	0.315277	1.3264	3.6420	389.970	- 69.700	0.75187	- 56.500
54000	54000	2011.95	9.50729	1408.36	0.300556	1.2645	3.5560	389.970	- 69.700	0.75187	- 56.500
55000	55000	1918.01	9.06341	1342.61	0.286524	1.2055	3.4720	389.970	- 69.700	0.75187	- 56.500
56000	56000	1828.47	8.64030	1279.93	0.273148	1.1492	3.3900	389.970	- 69.700	0.75187	- 56.500
57000	57000	1743.12	8.23691	1220.19	0.260397	1.0955	3.3099	389.970	- 69.700	0.75187	- 56.500
58000	58000	1661.76	7.85251	1163.23	0.248243	1.0444	3.2317	389.970	- 69.700	0.75187	- 56.500
59000	59000	1584.21	7.48603	1108.94	0.236658	9.9566 - 2	3.1554	389.970	- 69.700	0.75187	- 56.500
60000	60000	1510.28 - 1	7.13669 - 2	1057.19 - 1	0.225614 - 3	9.4920 - 2	3.0809 - 1	389.970	- 69.700	0.75187	- 56.500
61000	61000	1439.81	6.80368	1007.86	0.215086	9.0491	3.0082	389.970	- 69.700	0.75187	- 56.500
62000	62000	1372.63	6.48623	9608.39 - 2	0.205051	8.6269	2.9372	389.970	- 69.700	0.75187	- 56.500
63000	63000	1308.59	6.18363	9160.13	0.195485	8.2244	2.8678	389.970	- 69.700	0.75187	- 56.500
64000	64000	1247.55	5.89517	8732.62	0.186365	7.8407	2.8001	389.970	- 69.700	0.75187	- 56.500
65000	65000	1189.35	5.62019	8325.48	0.177673	7.4750	2.7340	389.970	- 69.700	0.75187	- 56.500
65824	65824	1143.45 - 1	5.40330 - 2	8004.18 - 2	0.170816 - 3	7.1865 - 2	2.6808 - 1	389.970	- 69.700	0.75187	- 56.500
66000	66000	1133.88	5.35807	7937.19	0.169344	7.1246	2.6692	390.066	- 69.604	0.75205	- 56.447
67000	67000	1081.05	5.10842	7567.37	0.161229	6.7832	2.6045	390.611	- 69.059	0.75310	- 56.144
68000	68000	1030.76	4.87076	7215.30	0.153513	6.4586	2.5414	391.156	- 68.514	0.75415	- 55.841
69000	69000	9828.71 - 2	4.64447	6880.10	0.146178	6.1500	2.4799	391.701	- 67.969	0.75520	- 55.536

Fig. 3.1.5 (continued)

Viscosity		RN "K" Factory			Speed of sound					
μ Slug / ft-sec	ν ft^2 / sec	K_{PPS} $RN/\ell V_{FPS}$ 1 / ft-FPS	K_{KT} $RN/\ell V_{KT}$ 1 / ft-kt	K_M $RN/\ell M$ 1 / ft-Mach	C_S ft / sec	C_{se} $C_S\sqrt{\sigma}$ ft / sec	C_S mph	C_{se} $C_S\sqrt{\sigma}$ mph	C_S kt	C_{se} $C_S\sqrt{\sigma}$ kt
0.29951	0.40573	2.465	4.160	2.398	973.14	5423.27	663.51	369.77	576.57	321.32
0.29725	0.41850	2.389	4.033	2.315	968.75	5295.67	660.51	361.07	573.97	313.76
0.29691 - 6	0.42048 - 3	2.378 + 3	4.014 + 3	2.302 + 6	968.08	5276.47 - 1	660.05	359.76 + 0	573.57	312.62 + 0
0.29691	0.43792	2.284	3.854	2.211	968.08	5170.37	660.05	352.53	573.57	306.34
0.29691	0.45940	2.177	3.674	2.107	968.08	5048.04	660.05	344.18	573.57	299.09
0.29691	0.48193	2.075	3.502	2.009	968.08	4928.61	660.05	336.04	573.57	292.01
0.29691 - 6	0.50557 - 3	1.978 + 3	3.338 + 3	1.915 + 6	968.08	4812.01 - 1	660.05	328.09 + 0	573.57	285.10 + 0
0.29691	0.53036	1.885	3.182	1.825	968.08	4698.19	660.05	320.33	573.57	278.36
0.29691	0.55637	1.797	3.034	1.740	968.08	4587.07	660.05	312.75	573.57	271.78
0.29691	0.58365	1.713	2.892	1.659	968.08	4478.58	660.05	305.36	573.57	265.35
0.29691	0.61227	1.633	2.757	1.581	968.08	4372.67	660.05	298.14	573.57	259.07
0.29691	0.64228	1.557	2.628	1.507	968.08	4269.28	660.05	291.09	573.57	252.93
0.29691	0.67376	1.484	2.505	1.437	968.08	4168.34	660.05	284.21	573.57	246.97
0.29691	0.70679	1.415	2.388	1.370	968.08	4069.80	660.05	277.49	573.57	241.13
0.29691	0.74143	1.349	2.276	1.306	968.08	3973.59	660.05	270.93	573.57	235.43
0.29691	0.77776	1.286	2.170	1.245	968.08	3879.67	660.05	264.52	573.57	229.86
0.29691 - 6	0.81587 - 3	1.226 + 3	2.069 + 3	1.187 + 6	968.08	3767.98 - 1	660.05	258.27 + 0	573.57	224.43 + 0
0.29691	0.85584	1.168	1.972	1.131	968.08	3698.46	660.05	252.17	573.57	219.13
0.29691	0.89777	1.114	1.880	1.078	968.08	3611.07	660.05	246.21	573.57	213.95
0.29691	0.94174	1.062	1.792	1.028	968.08	3525.75	660.05	240.39	573.57	208.90
0.29691	0.98787	1.012	1.709	9.800 + 5	968.08	3442.45	660.05	234.71	573.57	203.96
0.29691	0.10362 - 2	9.650 + 2	1.629	9.342	968.08	3361.13	660.05	229.17	573.57	199.14
0.29691	0.10870	9.200	1.553	8.906	968.08	3261.74	660.05	223.75	573.57	194.44
0.29691	0.11402	8.770	1.480	8.490	968.08	3204.23	660.05	218.47	573.57	189.85
0.29691	0.11960	8.361	1.411	8.094	968.08	3128.55	660.05	213.31	573.57	185.36
0.29691	0.12546	7.791	1.345	7.716	968.08	3054.68	660.05	208.27	573.57	180.98
0.29691 - 6	0.13160 - 2	7.599 + 2	1.283 + 3	7.356 + 5	968.08	2982.55 - 1	660.05	203.36 + 0	573.57	176.71 + 0
0.29691	0.13804	7.244	1.223	7.013	968.08	2912.13	660.05	198.55	573.57	172.54
0.29691	0.14480	6.906	1.166	6.686	968.08	2843.39	660.05	193.87	573.57	168.47
0.29691	0.15188	6.584	1.111	6.374	968.08	2776.27	660.05	189.29	573.57	164.49
0.29691	0.15932	6.277	1.059	6.076	968.08	2710.74	660.05	184.82	573.57	160.61
0.29691	0.16711	5.984	1.010	5.793	968.08	2646.76	660.05	180.46	573.57	156.82
0.29691 - 6	0.17382 - 2	5.753 + 2	9.710 + 2	5.569 + 5	968.08	2595.19 - 1	660.05	176.94 + 0	573.57	153.76 + 0
0.29697	0.17537	5.702	9.625	5.521	968.20	2584.30	660.13	176.20	573.64	153.12
0.29732	0.18441	5.423	9.153	5.254	968.87	2523.38	660.59	172.05	574.04	149.51
0.29767	0.19390	5.157	8.704	5.000	969.55	2463.98	661.05	168.00	574.44	145.99
0.29801	0.20387	4.905	8.279	4.759	970.22	2406.07	661.52	164.05	574.84	142.56

Fig. 3.1.5 (continued)