

ORBITAL vs. SUBORBITAL BALLISTIX

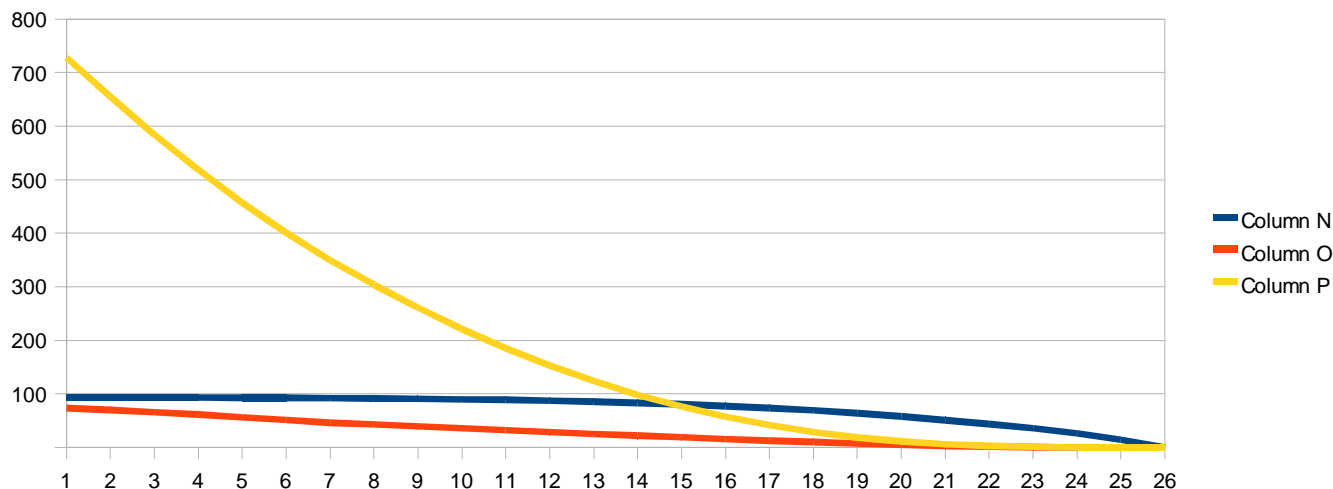
1	Mp	6000	Lb							Mpr	21.08	5.38			
2	Ms	35000	Lb							Apollo	31.25	1.43			
3	Mff	5000	Lb												
4	Mu	24000	Lb												
5	Vo	24000	ft/sec												
6	Vdd	1000	ft/sec												
7	<u>Eh</u>	61000	Btu/lb	550		Ep	prop.eff			P	36/4 (2H2+O2)/2H2				
8															
9	Muh1	Mu.Vu^2													
10		-Mu.Vu'^2													
11		/2g/788/Eh/Ep													
		(1000.Mu/g.l).(1+Gg/Ag)								XX	1000/(32.2.550)	0.06			
12	<u>Mup1</u>	<u>Muh1.Rp</u>	Lb												
13	<u>Mu1</u>	<u>Mup1+Mu</u>	Lb												
1	Muh2	Mu1.Vu^2													
2		-Mu1.Vu'^2													
3		/2g/788/Eh/Ep													
		(1000.Mu1/g.l).(1+Gg/Ag)													
4	<u>Mup2</u>	<u>Muh2.Rp</u>	Lb												
5	<u>M'2</u>	<u>Mup2+Mu</u>	Lb												
6															
7	Muh3	Mu2.Vu^2													
8		-Mu2.Vu'^2													
9		/2g/788/Eh/Ep													
		(1000.Mu2/g.l).(1+Gg/Ag)													
10	<u>Mup3</u>	<u>Muh3.Rp</u>	Lb												
11	<u>Mu3</u>	<u>Mup3+Mu</u>	Lb												
12		p1		32.2											
13	Vu(f/s)	Ep	Prr	Ag	Gg	Mu	Muh1	Mup1	Mu1	Muh2	Mup2	Mu2	Muh3	Mup3	Mu3
14	25000	1.00	9.0	2.6	0.0	24000	380	3420	27420	434	3907	27907	442	3976	27976
15	24000	1.00	9.0	2.5	0.2	27976	425	3823	31800	483	4346	32322	491	4417	32393
16	23000	1.00	9.0	2.4	0.8	32393	471	4239	36632	533	4793	37187	541	4866	37259
17	22000	1.00	9.0	2.3	1.6	37259	518	4659	41918	582	5241	42501	590	5314	42573
18	21000	1.00	9.0	2.2	2.8	42573	564	5076	47650	631	5681	48255	639	5753	48327
19	20000	1.00	9.0	2.1	4.2	48327	609	5481	53808	678	6103	54429	686	6173	54500
20	19000	1.00	9.0	2.0	5.7	54500	652	5865	60365	722	6496	60996	729	6563	61063
21	18000	1.00	9.0	1.9	7.5	61063	691	6216	67280	761	6849	67912	768	6913	67977
22	17000	1.00	9.0	1.8	9.3	67977	725	6525	74502	795	7151	75128	801	7211	75188
23	16000	0.99	9.0	1.7	11.2	75188	761	6849	82037	830	7473	82660	837	7529	82717
24	15000	0.99	9.0	1.6	13.2	82717	783	7049	89767	850	7650	90367	856	7701	90418
25	14000	0.99	8.0	1.5	15.2	90418	797	6378	96796	853	6828	97246	857	6859	97277
26	13000	0.99	7.0	1.4	17.1	97277	794	5560	102837	840	5878	103155	842	5896	103173
27	12000	0.99	6.0	1.3	19.1	103173	775	4651	107824	810	4861	108034	812	4870	108043
28	11000	0.99	5.0	1.2	20.9	108043	741	3707	111750	767	3834	111877	768	3838	111882
29	10000	0.99	4.0	1.1	22.7	111882	695	2780	114661	712	2849	114730	713	2850	114732
30	9000	0.99	4.0	1.0	24.4	114732	638	2552	117284	652	2608	117340	652	2610	117342
31	8000	0.99	4.0	0.9	25.9	117342	576	2304	119646	587	2349	119691	588	2350	119692
32	7000	0.99	4.0	0.9	27.3	119692	510	2039	121730	518	2073	121765	518	2074	121766
33	6000	0.99	4.0	0.8	28.6	121766	439	1757	123523	446	1783	123548	446	1783	123549
34	5000	0.99	4.0	0.8	29.7	123549	365	1461	125009	369	1478	125026	370	1478	125027
35	4000	0.99	5.0	0.7	30.6	125027	288	1441	126467	291	1457	126484	291	1457	126484
36	3000	0.98	6.0	0.6	31.3	126484	212	1269	127753	214	1282	127766	214	1282	127766
37	2000	0.95	7.0	0.5	31.8	127766	134	939	128705	135	945	128711	135	945	128711
38	1000	0.9	8.0	0.4	32.1	128711	51	407	129119	51	408	129120	51	408	129120
39	0	0.8	9.0	0.3	32.2	129120									

Trajectory;

40	<u>Vu(f/s)</u>	<u>Ep</u>	<u>Prr</u>	<u>Ag</u>	<u>Gg</u>	<u>TAN</u>	<u>Phi</u>	<u>COS</u>	<u>dT(s)</u>	<u>T(s)</u>	<u>dH(ft)</u>	<u>H(ft)</u>	<u>H(mi)</u>	<u>dL(mi)</u>	<u>L(mi)</u>
41	25000	1	9.0	2.0	.0	0.00	0	1.00	16	825	0	491350	93	73.5	728.4
42	24000	1	9.0	2.0	.2	0.01	1	0.99	16	810	95	491350	93	70.1	654.8
43	23000	1	9.0	2.0	.8	0.02	3	0.98	16	794	366	491255	93	66.0	584.7
44	22000	1	9.0	2.0	1.6	0.05	6	0.95	16	779	790	490889	93	61.4	518.7
45	21000	1	9.0	2.0	2.8	0.09	10	0.91	16	763	1346	490098	93	56.4	457.2
46	20000	1	9.0	2.0	4.2	0.13	15	0.87	16	748	2012	488752	93	51.2	400.8
47	19000	1	9.0	2.0	5.7	0.18	21	0.82	16	732	2771	486740	92	45.9	349.6
48	18000	1	9.0	1.9	7.5	0.23	27	0.77	16	716	3791	483969	92	42.8	303.7
49	17000	1	9.0	1.8	9.3	0.29	33	0.71	17	700	4986	480178	91	39.5	260.9
50	16000	0.99	9.0	1.7	11.2	0.35	40	0.65	18	683	6368	475192	90	36.1	221.4
51	15000	0.99	9.0	1.6	13.2	0.41	46	0.59	19	665	7950	468824	89	32.6	185.4
52	14000	0.99	8.0	1.5	15.2	0.47	52	0.53	21	645	9755	460874	87	29.0	152.8
53	13000	0.99	7.0	1.4	17.1	0.53	58	0.47	22	624	11808	451119	85	25.5	123.8
54	12000	0.99	6.0	1.3	19.1	0.59	63	0.41	24	602	14149	439311	83	22.1	98.2
55	11000	0.99	5.0	1.2	20.9	0.65	68	0.35	26	578	16829	425162	81	18.9	76.1
56	10000	0.99	4.0	1.1	22.7	0.71	72	0.29	28	553	19921	408333	77	15.7	57.3
57	9000	0.99	4.0	1.0	24.4	0.76	76	0.24	31	524	23528	388412	74	12.8	41.5
58	8000	0.99	4.0	0.9	25.9	0.81	79	0.19	35	493	27801	364884	69	10.2	28.7
59	7000	0.99	4.0	0.9	27.3	0.85	82	0.15	37	459	31032	337082	64	7.3	18.5
60	6000	0.99	4.0	0.8	28.6	0.89	84	0.11	41	422	36775	306050	58	5.3	11.2
61	5000	0.99	4.0	0.8	29.7	0.92	86	0.08	41	381	38161	269275	51	3.1	6.0
62	4000	0.99	5.0	0.7	30.6	0.95	88	0.05	44	339	42123	231114	44	1.7	2.9
63	3000	0.98	6.0	0.6	31.3	0.97	89	0.03	52	295	50280	188991	36	0.8	1.2
64	2000	0.95	7.0	0.5	31.8	0.99	90	0.01	62	243	61319	138711	26	0.3	0.3
65	1000	0.9	8.0	0.4	32.1	1.00	90	0.00	78	181	77392	77392	15	0.0	0.0
66	0	0.8	9.0	0.3	32.2	1.00	90	0.00	104	104	0	0	0	0.0	0.0

sec **825**
min **14**

ft **491350**
mi **93**



Column P =height (miles)
Column O =gradient (miles)
Column N =down range (miles)

Trajectory (takeoff-to-orbit: reversed) (kinetic model)