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Application Of Trajectory Optimization Techniques To Upper Atmosphere Sampling Flights Using The F-15 Eagle Aircraft

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ABSTRACT

Possible contamination of the upper atmosphere from the by-products of an industrial society has created the need for regular sampling of high-altitude atmospheric components. Atmospheric sampling has been carried out by NASA for a number of years using U2 aircraft. These aircraft have insufficient flight altitude capability for monitoring the growth of some potential contaminants which may be generated by aerosol container usage. This report examines the increase in sampling altitude which could be obtained if the U2 flights were supplemented by flights using an available high-performance supersonic aircraft, the F-15 Eagle.

Altitude potential of an off-the-shelf F-15 aircraft is examined in this report. It is shown that the standard F-15 has a maximum altitude capability in excess of 100,000 feet for routine flight operation by NASA personnel. This altitude is well in excess of the minimum altitudes which must be achieved for monitoring the possible growth of suspected aerosol contaminants.

A companion report examines the maximum altitude capability of another high performance supersonic aircraft, the F4-C Phantom fighter. In that report it is shown that this older fighter aircraft has a maximum altitude capability in the vicinity of 95,000 feet. The F-15 fighter aircraft, therefore, has superior maximum altitude capability. However, final selection of a vehicle for the upper atmosphere mission must consider other factors including operational costs, reliability, and deployment.

PREFACE

This report was prepared under Purchase Request A-29485-B, "Application of Trajectory Optimization Techniques to Upper Atmosphere Sampling Flights Using the F-15 Eagle Aircraft." The study indicates that the F-15 aircraft can achieve altitudes in excess of 100,000 feet while satisfying realistic operational constraints.

Mr. William A. Page, Deputy Chief of the Stratospheric Projects Office, NASA Ames Research Center, acted as the government's technical monitor for the study. Mr. D. S. Hague served as Aerophysics Research Corporation's program manager and was assisted by his co-author Dr. A. W. Merz. The authors are indebted to Mr. Page for numerous comments and advice in completion of this study.

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ZOOM-CLIMB ALTITUDE MAXIMIZATION OF THE F-15 AIRCRAFT FOR STRATOSPHERIC SAMPLING MISSIONS

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1.0 SUMMARY

Some recent predictions indicate that byproducts of aerosol containers may lead to modification of the upper atmosphere chemical composition. NASA currently monitors atmospheric properties to 70,000 feet using U-2 aircraft. Testing is needed to about 100,000 feet for adequate monitoring of possible aerosol contaminants during the next decade. To study this problem the basic F-15 aircraft and a special lightened version of this aircraft based on the record breaking "Streak Eagle" No. 17 aircraft are analyzed to determine their maximum altitude ability in zoom-climb maneuvers. These trajectories satisfy realistic dynamic pressure and Mach number constraints. Maximum altitudes obtained for the F-15 aircraft are in excess of 100,000 feet, about 75 per cent of the theoretical energy height available. Sensitivities of the zoom-climb altitudes were found with respect to several variables including vehicle initial weight, stratospheric winds and the constraints. In a companion report, Reference 1, the zoom-climb capability of another high performance supersonic aircraft, the F-4C, has been examined. This older aircraft achieves significantly lower maximum altitudes than the F-15 studied in the present report.

The zoom-climb maneuver studied in this report originates from a high energy flight condition near the boundary of the aircraft's operational flight envelope. During the study there was some concern regarding the aircraft's ability to achieve this high energy flight condition and subsequently to perform the zoom-climb and return to base without the use of costly external fuel supplied either by drop tanks or aerial refuelling. Accordingly, an investigation of minimum fuel paths to the initial zoom-climb point was also undertaken.

This study revealed that the aircraft could achieve the desired flight condition using only internal fuel, provided that the subsonic segment of the mission was flown using Military Power. The supersonic segment could be flown using Maximum Afterburning Power, and this power level was essential for operation at the higher energy levels attained. The subsonic mission segment is flown in an outbound direction from base. This segment ends with a subsonic turn towards base and a near constant energy transfer to supersonic

flight conditions. The supersonic flight then proceeds towards base until the initial condiiton is met for the zoom-climb. The zoom and reentry follow with reentry at an altitude of 50,000 feet occurring directly over the base for operational safety and fuel conservation reasons. Sensitivity of the supersonic dash to maximum dynamic pressure was investigated as part of the study effort. It was found that fuel consumption in the acceleration was relatively insensitive to maximum dynamic pressure but that range covered increases with decreasing maximum dynamic pressure.

A summary of the range and weight variations during the nominal mission is presented in Table I. The recommended mission flight path is illustrated in elevation in Figure 1 and in the Mach-altitude plane in Figure 2. The fly-out portion of the mission is concerned with acquiring energy (altitude and Mach number) and position while minimizing fuel consumption, and the zoom-climb portion is concerned with maximizing the peak altitude. Both portions of the mission are subject to dynamic pressure limits. It should be noted that the propulsion system performance employed in the study is consistent with prototype versions of the F100-PW-100 turbofan engines which power the McDonnell F-15 fighter aircraft. Fuel consumption for these engines on the F-15 dynamic pressure limited maximum altitude mission is plotted as a function of nominal mission Mach number in Figure 3. The engine thrust is zero at altitudes above 80,000 feet where flameout occurs.

TABLE I. RANGE AND WEIGHT SUMMARY

Dynamic Pressure Limited, Subsonic Mil. Power - Supersonic A/B Power

	Vehicle Weight, Lbs.	Weight Change, Lbs.	Range Increment, N.M.
Initial Weight (Includes 11135 pounds of fuel)	37843	--	--
Take-off Allowance	37593	250	--
Subsonic Climb	36148	1445	(62.3)
Cruise	35848	300	(75.0)*
Turn	35748	100	--
Acquire Supersonic Condition	35608	140	4.0
Supersonic Dash	30795	4813	77.3
Zoom	30131	664	22.7
Return to 50,000 feet	30131	--	22.7
Return to Base	29531	600	--
Reserve	27531	--	--
Final Weight	27531	--	--
Minimum Weight (Empty)	26708	--	--
Unused Fuel	--	823	--
Totals:		11135	(10.6)

*Reserve factor of 10 nm in cruise places aircraft short of base at 50000 feet on return leg.

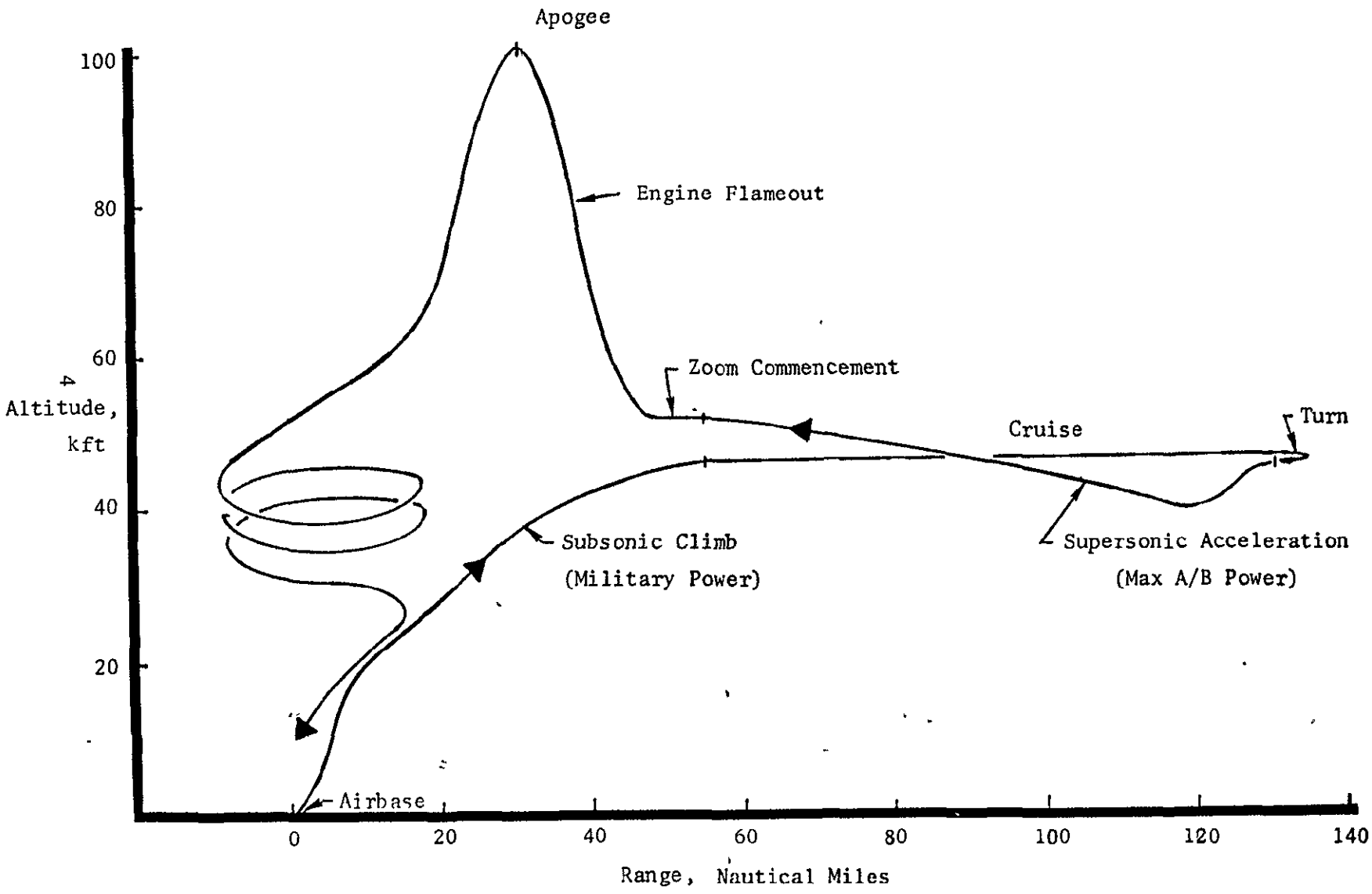

Fig. 1 - NOMINAL F-15 MISSION, RANGE AND ALTITUDE

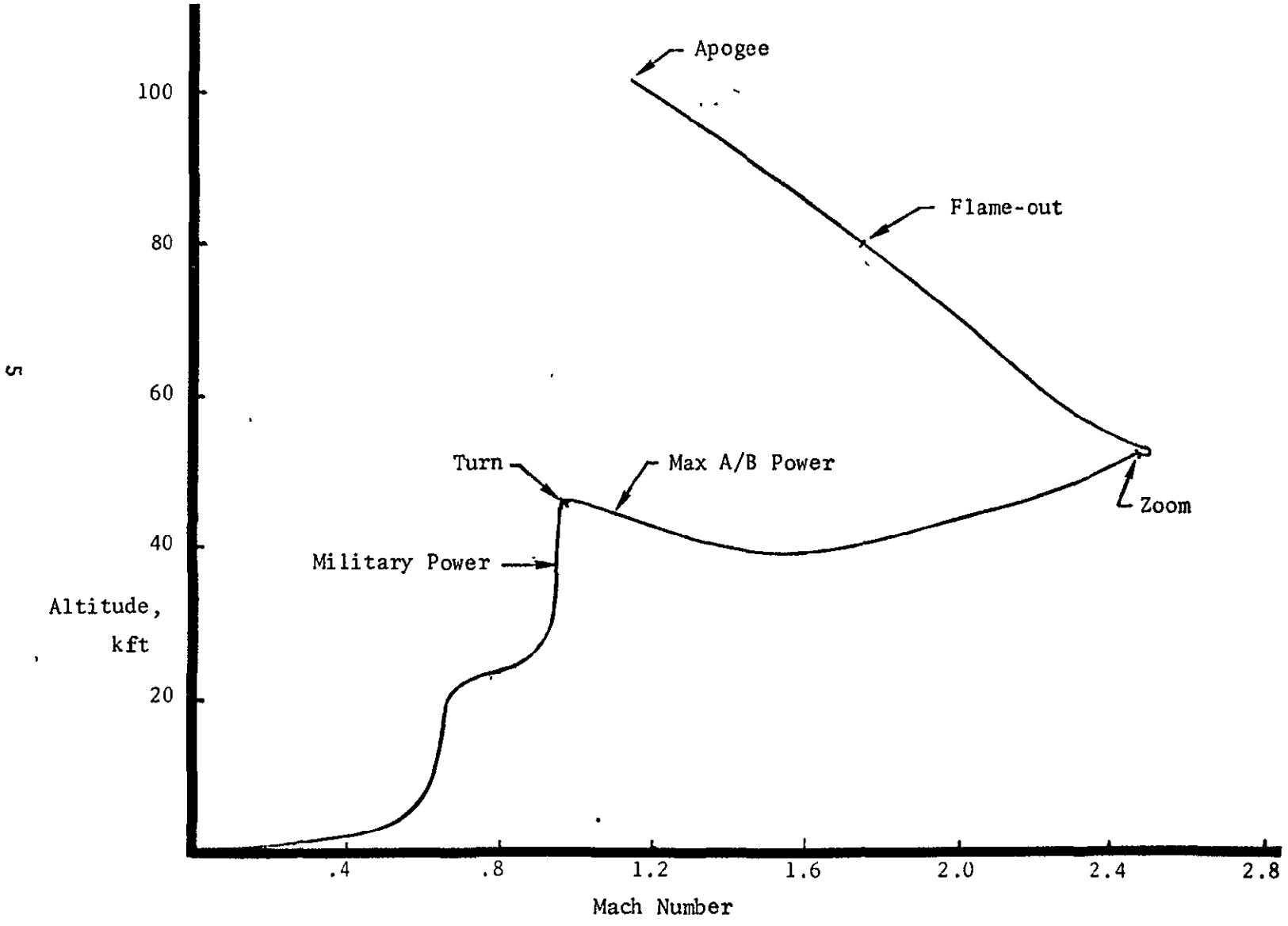

Fig. 2 - F-15 FLY-OUT AND ZOOM-CLIMB TRAJECTORIES

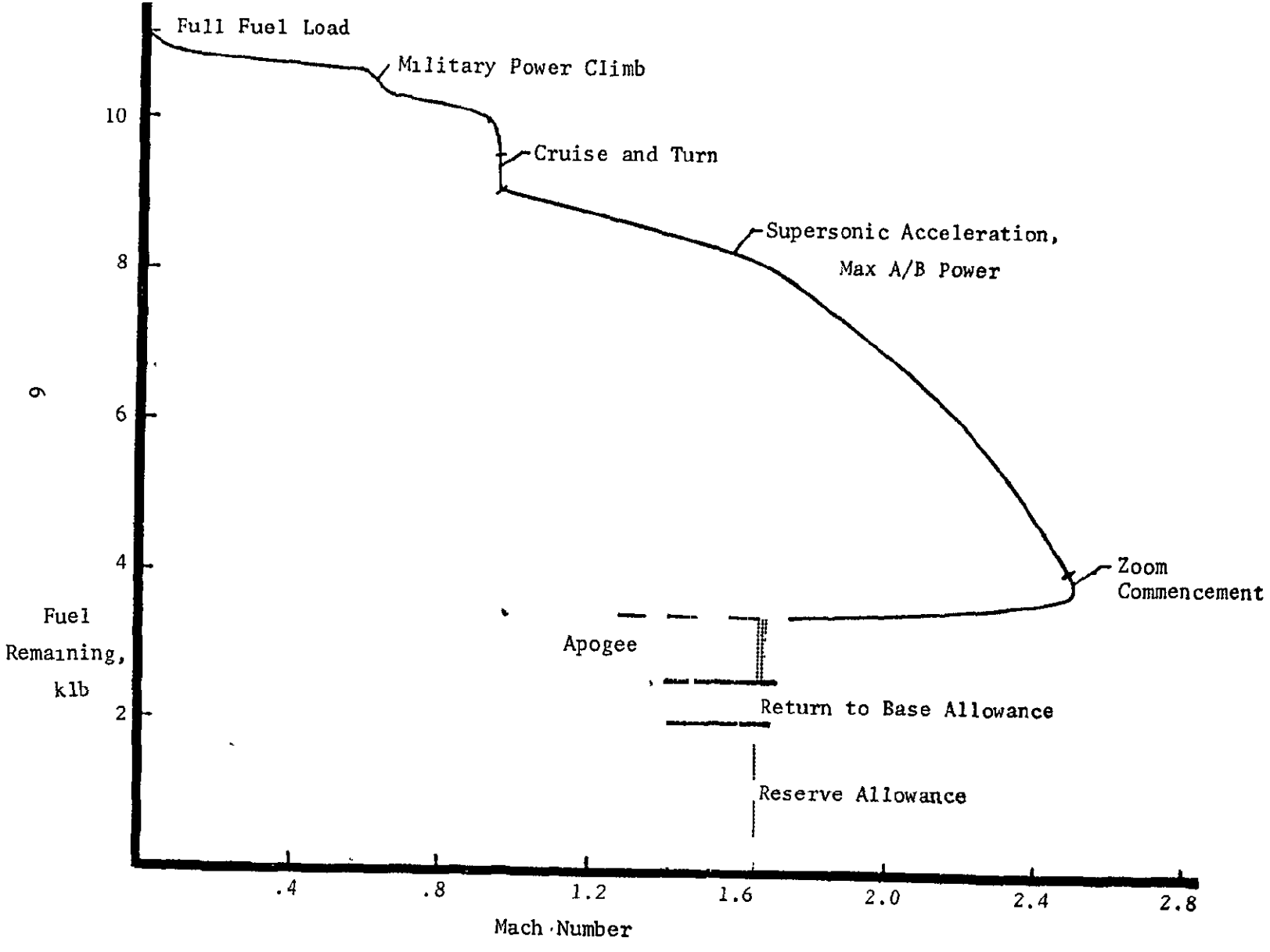

Fig. 3 - NOMINAL F-15 MISSION, MACH NUMBER AND FUEL CONSUMPTION

2.0 UPPER ATMOSPHERE CONTAMINATION PROCESSES

Possible contamination of the upper atmosphere from the by-products of an industrial society has created the need for regular global sampling of high-altitude atmospheric components. An example of this contamination process is given by the excessive use of chlorofluoromethanes (in refrigeration and aerosol pressure containers). This may lead to a modification of the ultraviolet radiation shielding properties of the upper atmosphere, with possible subsequent degradation of the environment. One of the dominant mechanisms involved in the predicted ozone layer depletion involves a catalytic breakdown by free chlorine, a by-product of chlorofluoromethanes which have diffused upward into the stratosphere, according to

$$Cl + O_3 \rightarrow ClO + O_2$$

and

$$ClO + O \rightarrow Cl + O_2$$

The present concentrations of chlorine and chlorine bearing compounds in the stratosphere are not well measured, and it is believed that widespread measurements obtained over a period of time will provide the data needed to study this problem. Figure 4 shows the future predicted variation with altitude of various chlorine species, Reference 2. Predicted changes in the density of ClO (a critical species for delineating the chemistry) over the next fifty years are very small, at altitudes below 70,000 feet, while the variations are expected to be much larger at altitudes above 90,000 feet.

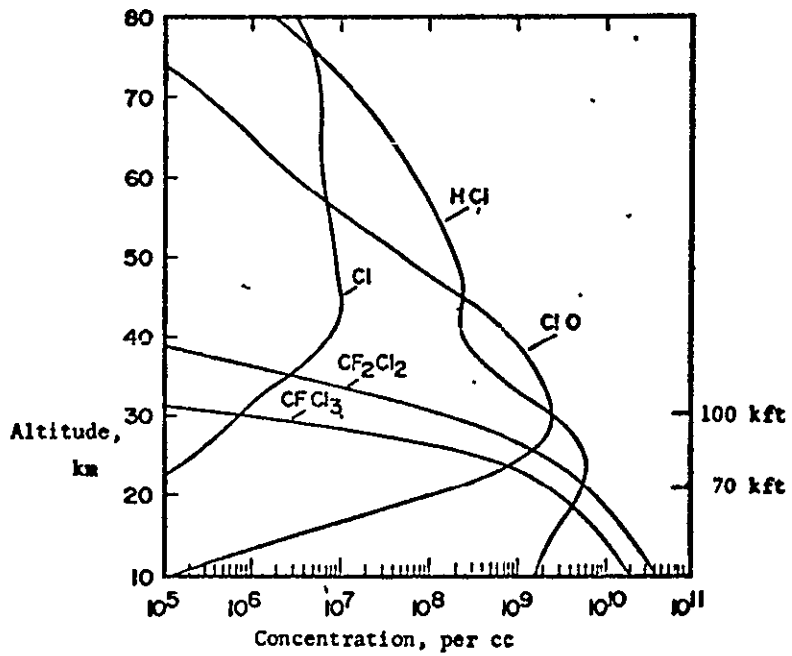

FIGURE 4. DISTRIBUTIONS OF CHLORINE SPECIES IN THE STRATOSPHERE, YEAR 2022

3.0 UPPER ATMOSPHERIC SAMPLING

For a number of years, NASA has carried out atmospheric sampling using U-2 aircraft. These aircraft, however, have altitude capability for monitoring variations only to 70,000 feet, and therefore an aircraft of higher altitude potential is obviously very desirable. An examination of candidate aircraft for this mission requires consideration of the following parameters:

a. Maximum altitude capability;

b. Aircraft availability;

c. Acquisition and operational costs;

d. World-wide maintenance ability; and

e. Suitablity of equipment bay for atmospheric sampling system.

This report concentrates on the first of these factors, maximum altitude capability.

A comparative study has suggested both the McDonnell-Douglas F-4C Phantom and the F-15 Eagle in a zoom-climb maneuver as prime contenders for the task of sampling the upper atmosphere. The high-altitude capablity of a lightened and specially modified Phantom was established by the time-to-climb records set by this vehicle in the early sixties. Some of these trajectories are shown in the Mach-altitude plane in Figure 5. They are compared to predicted minimum-time paths obtained by the USAF/NASA Atmospheric Trajectory Optimization Program, ATOP, References 3 and 4. This program is also the source of trajectories contained in the present report.

The predicted maximum altitude performance capablities of standard and near-standard F-15 aircraft are examined in this report to determine altitudes attainable under various flight conditions and trajectory constraints. The zoom-climb performance capability of the F-4C Phantom has been considered in Reference 5. The F-15 aircraft has proven high-altitude capability as a result of the time-to-climb records recently established by the "Streak Eagle" No. 17 aircraft, Reference 6. Furthermore, both aircraft have equipment bays which are large enough to accomodate the atmospheric sampling packages constructed by NASA Ames Research Center for use in U-2 aircraft. Figure 6 is a diagram of such a unit, which has a sample rate greater than one per second.

The present study has examined the altitude-potential of both of these aircraft using zoom-climb maneuvers obtained by the variational calculus option of the ATOP program. Of particular interest in routine flight operation is the sensitivity of maximum attainable altitude to the following variables:

1. Dynamic pressure at apogee, which must be high enough to permit adequate aerodynamic control of the aircraft as it passes over the top without placing an undue burden on the piloting function.

2. Maximum dynamic pressure, which must not be so high as to risk structural aircraft damage or to impact aircraft maintenance procedures

3. Normal acceleration, which peaks during the zoom maneuver, but which cannot be high enough to overstress either aircraft of pilot.

4. Miscellaneous, e.g.:

   a. Increased engine thrust;

   b. Stratospheric winds; and

   c. Initial aircraft weight.

The dynamics of the aircraft were modelled by treating the lift and drag as experimentally determined tabular functions of Mach number and angle-of-attack. The point-mass equations of motion also accounted for the dependence of the thrust on the Mach number and altitude (including engine flame-out points), the time-variation of mass, and the altitude-variation of the air properties and winds. A 1962 standard atmosphere was employed. The predicted performance would therefore be somewhat improved in northerly or southerly latitudes, but would degrade near the equator. The control was the angle-of-attack history, to be determined as a function of time so as to maximize the final altitude, subject to constraints on the in-flight and terminal dynamic pressures and a terminal flight path angle of zero. A complete discussion of the actual equations of motion employed is contained in Reference 1.

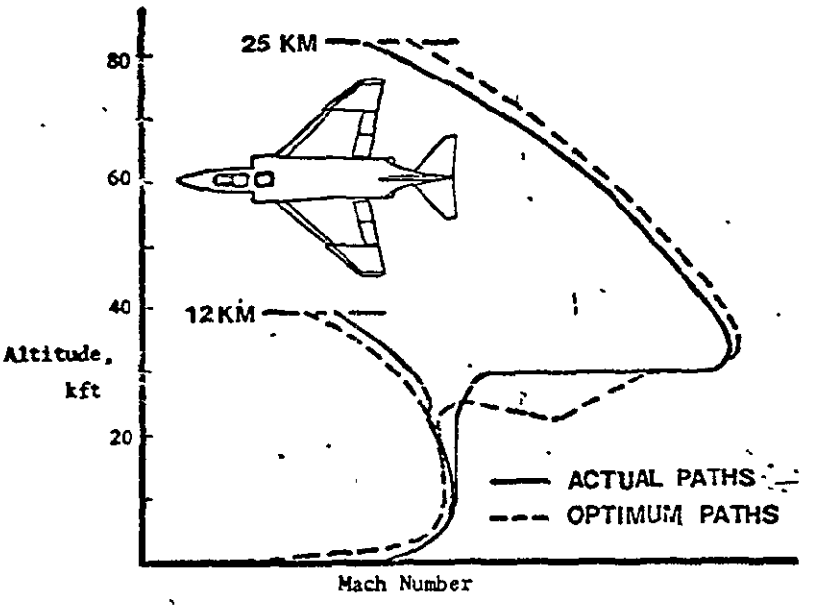

FIGURE 5. F-4B COMPUTED AND ACTUAL TIME-TO-CLIMB RECORD TRAJECTORIES

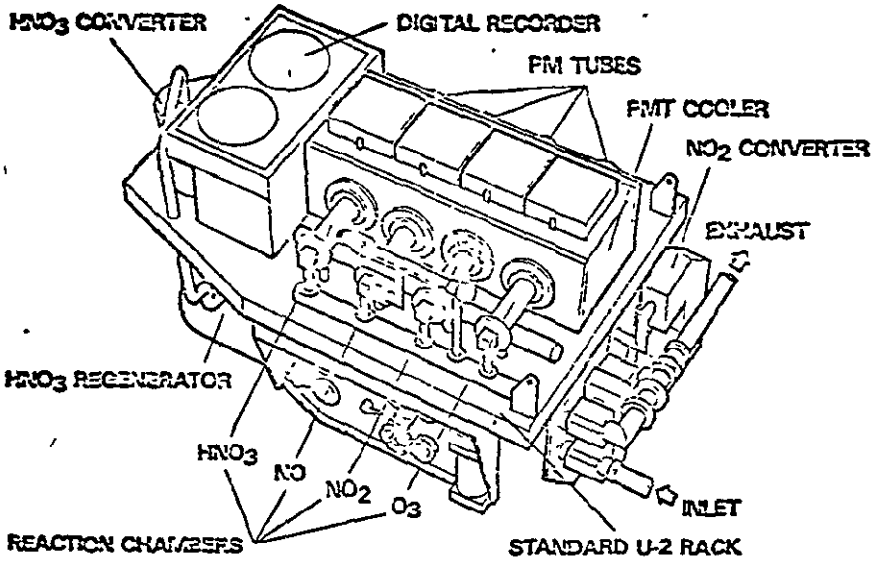

FIGURE 6. NASA AMES AIRBORNE STRATOSPHERIC IN-SITU GAS SAMPLER FOR NITROGEN SPECIES

4.0 F-15 EAGLE ZOOM-CLIMB PERFORMANCE CAPABILITY

F-15 aircraft maximum-altitude zoom-climb results were obtained in a similar manner to that employed in the F-4C studies of Reference 1. The nominal initial zoom-climb flight condition of this airplane was taken at the altitude of 51,500 feet and at Mach 2.48 which is slightly below the maximum-energy steady-state flight condition of the F-15 aircraft. Other constraints had to be introduced, however. For example, the dynamic pressure at the nominal initial flight condition is 983 p.s.f. Any tendency to dive from the initial zoom flight condition would increase the pressure above the upper limit of 1000 p.s.f. as used for routine flight operation by NASA. Thedynamic pressure limited zoom flight paths therefore bagan by climbing immediately. Now the F-15 has a maximum dynamic pressure limit well beyond this value. However, lower dynamic pressures do produce lower maintenance costs. For this reason the dynamic pressure limit of 1000 p.s.f. is imposed on the final F-15 trajectories. A typical unconstrained trajectory on the other hand first dives to very low altitudes, as in a trial case from Mach 2.45 and 60,000 feet altitude. This trajectory dove to about 40,000 feet while attaining a final altitude of 104,749 feet. This altitude was attained at the expense of a peak dynamic pressure of 1958 p.s.f. and a peak Mach number of 2.69. Both of these values lie well above allowable limits for the present study.

The Mach number and altitude history of the F-15 flight paths are shown in Figure 7 for the case of constrained peak dynamic pressure and with the final dynamic pressure equal to 20 p.s.f. The corresponding path for the F-4C from Reference 1 is also shown in this chart. The trajectories are separated, at the same Mach number,by an altitude difference of about 18,000 feet. However, the F-4C terminal point occurs at a lower Mach number then the F-15 terminal point,and the maximum altitudes of the two vehicles are thus closer than this figure.

The effects of variations in final pressure tailwinds and weight reduction are shown for the F-15 and F-4C in Figure 8. The nominal dynamic pressure limited zoom-climb performance of the F-15 was 101,368 feet. This was obtained from an initial condition of Mach 2.48 and 51,500 feet, and for extreme dynamic pressures of 994 p.s.f. and 20 p.s.f. The tail-wind distribution caused an increase of 1,565 feet (from 101,368 feet to 102,935 feet). This is a smaller effect than that found for the F-4C in Reference 1,for the F-15 altitude constraint kept the aircraft above 51,500 feet so that the wind velocity never exceeded 64 fps for a typical wind profile, Figure 9. Similarly a weight reduction of 3,417 pounds for the F-15 aircraft caused an increase in final altitude of 970 feet. Generally, the trade-off results for the parameters are similar in magnitude to those obtained for the F-4C, and the overall effect of changing aircraft from F-4C to F-15 is a final altitude increment of about 10,000 feet as described in more detail in Reference 5.

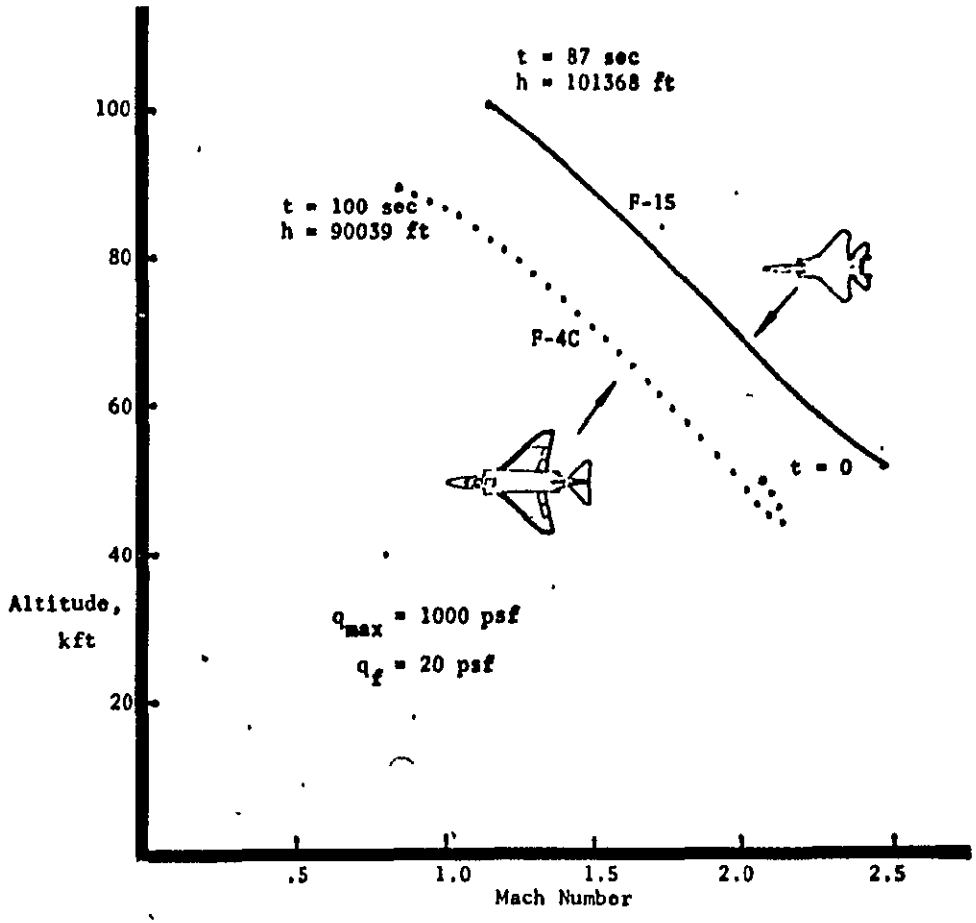

FIGURE 7. F-15 and F-4C MACH NUMBER AND ALTITUDE VARIATIONS DURING CONSTRAINED ZOOM-CLIMB MANEUVERS

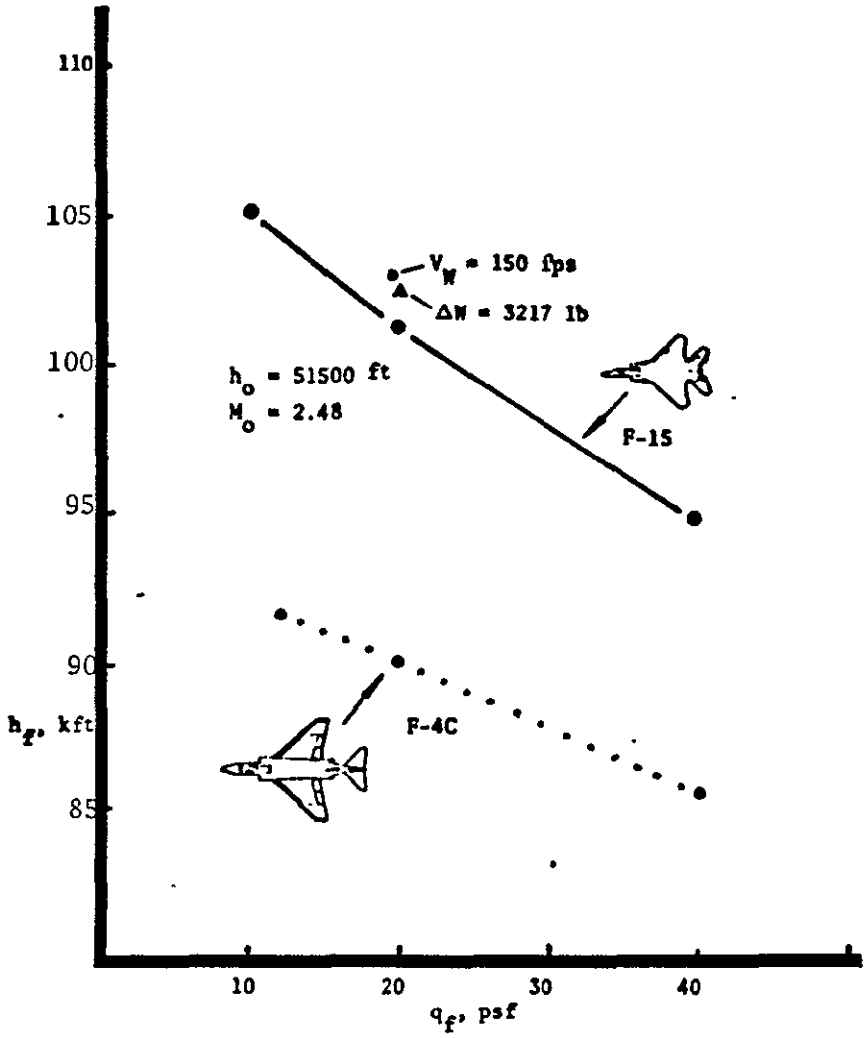

FIGURE 8. COMPONENT GAINS IN MAXIMUM ALTITUDE FOR F-15 AND F-4C (q_{max} = 1000 psf)

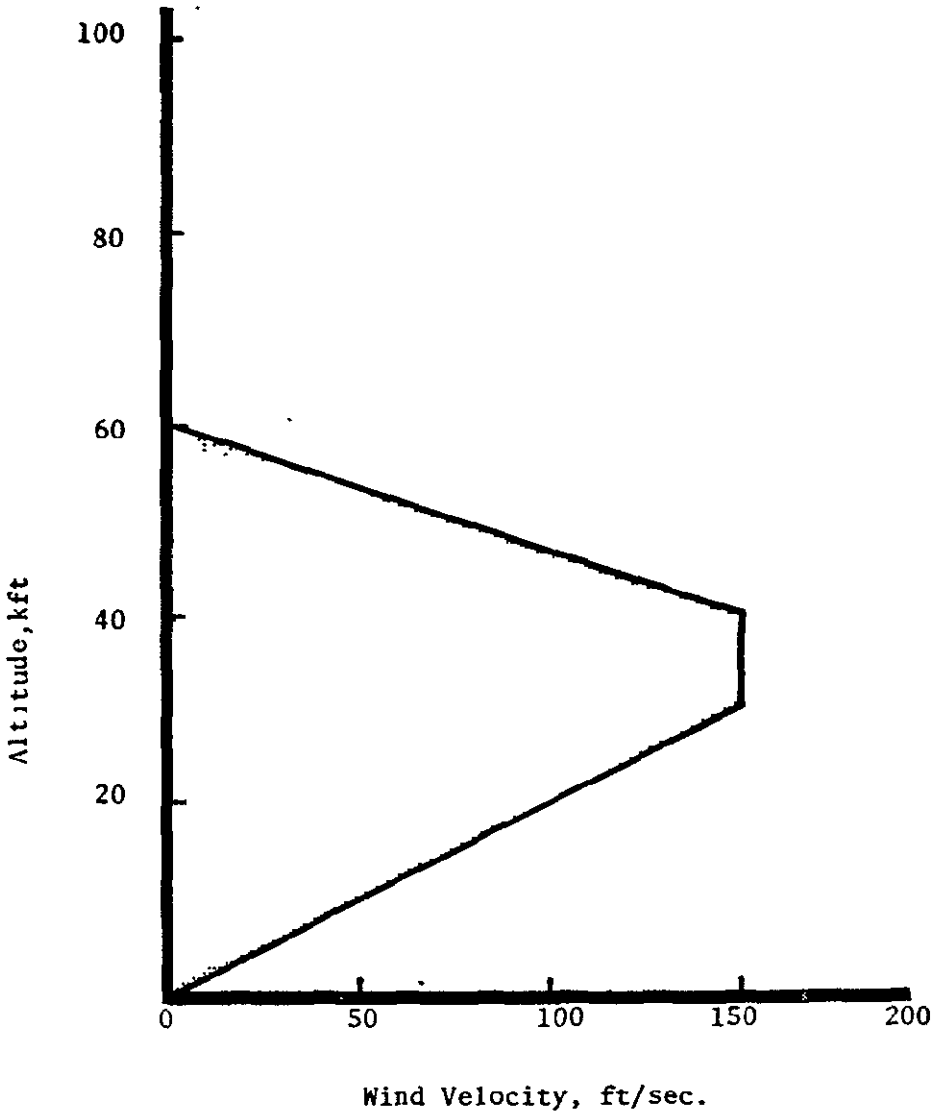

FIGURE 9. STRATOSPHERIC WIND PROFILE

5.0 ACQUISITION OF INITIAL ZOOM-CLIMB POINT

The initial zoom-climb point assumed in the previous section was Mach 2.48 at an altitude of 51,500 feet. This flight condition corresponds to a theoretical potential energy of 140,715 feet at zero velocity and is close to the F-15 flight envelope boundary. Achieving flight conditions close to the flight envelope can be costly in terms of fuel, time, and range. In this section, these costs are analyzed and some of the trade-offs between the cost elements are outlined.

5.1 Maximum Energy in Fixed Time, Maximum Power

A preliminary trajectory optimization calculation was performed to outline the fuel, time, and range costs associated with achieving the zoom-climb initial point. A final time of 350 seconds was employed. With a two-second integration step this relatively long airbreathing trajectory problem experienced convergence difficulties. A one-second integration step reduced but did not eliminate the convergence difficulties. Nevertheless, in this calculation the zoom-climb initial point energy was achieved in 325 seconds flight using 7,812 pounds of fuel over a range of 71.6 nm. In view of the convergence difficulties experienced, the piecewise optimization procedure of Reference 7 was employed to refine this answer.

Piecewise optimization was accomplished by breaking the trajectory into three sequential segments. Each segment was of 100-second duration, and energy was maximized in each segment. Table II presents the starting condition and the final conditions for each segmented arc together with the conditions at which the desired energy was achieved. With this basic sequence of trajectories, a flight time of 275 seconds, 7400 pounds of fuel, and 70 nm of range were required to achieve the initial zoom climb energy. Trajectory details associated with these paths are tabulated for reference in Appendix A as trajectories 1, 2, and 3. These trajectories are illustrated in the Mach-altitude plane in Figure 10.

5.2 Minimum Fuel to Given Energy, Maximum Power

In the previous section fuel requirements for maximum energy rate paths were defined. In this section the minimum fuel trajectories to achieve the energy levels of Table II are determined as a sequence of three optimal trajectories. The first two trajectories minimize the required 100 and 200 second energy levels of Table II. The last arc defines minimum fuel to the zoom commencement point. The resulting trajectories are presented in Figure 11 together with the maximum energy rate path reproduced from Figure 10.

It can be seen that the maximum power subsonic climb of the first segment occurs at a lower Mach number when the fuel minimization criterion replaces the maximum energy rate criterion. The termination of Segment 2 and the whole of Segment 3 are both higher when the minimum fuel criterion is employed. Table III presents a state summary for the minimum fuel trajectories. The fuel savings available are quite small, 438 pounds at the final zoom-climb energy level. This fuel saving has been achieved at a cost of an additional 31.2 seconds of flight time and 6.7 nm range increment. Details of these maximum power, minimum fuel paths are presented as trajectories 4, 5, and 6 in Appendix A.

5.3 Minimum Fuel to Given Energy on Subsonic Leg, Military Power

The paths obtained by sequential arc optimization using minimum fuel to a given set of energy levels are similar to the paths obtained by the method of Reference 8 where the quantity

$$\left|\frac{dE}{dW}\right| = \left|\frac{\dot{E}}{\dot{W}}\right| = \left|\frac{dE/dt}{dW/dt}\right|$$

is locally maximized at a given power setting. Johnson in Reference 9 has suggested that when throttle setting variations are considered, the throttle setting should be determined as a function of energy so that dE/dW is everywhere maximized. This approach is particularly significant to supersonic fighter fuel minimization where a wide range of possible power setting are possible during energy increasing flight. Detailed thrust and fuel flow variations with power setting for the F100-PW-100 engines which power the F-15 were not available to the present study. However, engine thrust and fuel flows were available for two power settings: maximum power and military power. The Johnson criterion of Reference 9 immediately suggests the use of military power for fuel minimization at the lower energy levels. Accordingly, minimum fuel paths to the first energy increment of Tables II and III were obtained using military power.

At the lower power setting, convergence problems were experienced when this problem was attacked as a single arc. Accordingly, a series of fuel minimization paths of 50-second duration each were sequentially solved until the desired energy level was attained. Table IV summarizes the state achieved at each sequential energy level using military power. Major differences occur between military and maximum power flight costs to the energy level of Table IV. Comparing these results with those of Table III at maximum power the following cost differences emerge:

	Maximum Power	Military Power	Differences
Fuel (Pounds)	2146.	1446.	-700.
Range (Nautical Miles)	13.2	62.2	+ 49.0
Time (Seconds)	111.1	450.0	+339.0

There is, therefore, a modest fuel saving, and a large range increment associated with military power flight in the subsonic portion of the mission. The maximum power setting has a much higher specific fuel consumption, but it is required for a much shorter flight time, as shown in the table above. The favorable effect of the 49 nm range increment will be discussed later. Trajectory details are included in Appendix A, as trajectories 7 to 15.

5.4 Dynamic Pressure Limited Supersonic Dash

The two supersonic dash segments of Table III achieve dynamic pressure levels approaching 1600 p.s.f. It is assumed that flights by NASA pilots will be limited to 1000 p.s.f. for maintenance and reliability considerations. The effect of this constraint is examined in this section and found to be small.

Minimum fuel paths to the last two energy levels of Table III were obtained in the presence of a dynamic pressure constraint of 1000 p.s.f. As in the prior sections of the study some convergence difficulties were experienced in the first trajectory optimization calculation, and the problem had to be solved in three segments. These path details are included in Appendix A as trajectories 16, 17, and 18. Table V presents a state summary for these dynamic pressure limited paths. Comparing Tables III and V, the difference between maximum power,free dynamic pressure paths, and military power subsonic climbs with constrained dynamic pressure supersonic dash paths can be obtained. The major differences are summarized below.

Cost	Max. Power q Free	Mil. Power Subsonic Max. Power q Limited Supersonic	Difference
Time (Secs.)	306.	695.	+389.
Range (N.M.)	76.3	139.9	+ 63.6
Fuel (Lbs.)	6981.	6957.	- 24.0

It can be seen that a major increase has occurred in the time to reach the supersonic zoom point. Range covered has increased,but fuel is practically unchanged.

TABLE II. STATE POINTS ON MAXIMUM ENERGY
IN FIXED TIME PATHS, MAXIMUM POWER

TIME, Sec.	MACH	ALTITUDE, ft.	ENERGY, ft.	TOTAL FUEL, lbs.	TOTAL RANGE, N.M.
0.	.224	500.0	1470.	0.0	0.0
100.	1.038	46188.0	61632.	2355.0	13.5
200.	2.235	35299.	108490.	4870.0	40.7
300.	2.607	48188.	146881.	8127.	79.9
275.	2.583	43959.	140884.	7419.	69.6

NOTE: Initial weight is 37837 pounds.

TABLE III. STATE POINTS ON MINIMUM FUEL TO GIVEN ENERGY PATHS, MAXIMUM POWER

TIME, SEC.	MACH	ALTITUDE FT.	ENERGY FT.	TOTAL FUEL, LBS.	TOTAL RANGE, N.M.	TOTAL FUEL SAVING, LBS.
0.0	.224	500.	1470.	0.0	0.0	0.0
111.1	1.067	45289.	61632.	2146.0	13.2	209.0
213.0	2.211	37430.	108490.	4515.0	41.0	355.0
306.2	2.486	51724.	141400.	6981.0	76.3	438.0

NOTE: Initial weight is 37837 pounds

TABLE IV. STATE POINTS ON MINIMUM FUEL TO ENERGY PATHS, MILITARY POWER

TIME, SEC.	MACH	ALTITUDE, FT.	ENERGY, FT.	TOTAL FUEL, LBS.	TOTAL RANGE, N.M.
0.0	.224	500.	1470.	0.0	0.0
50.	.614	6787.	14586.	331.	4.68
100.	.653	19722.	26805.	592.	10.51
150.	.853	24991.	36597.	800.	17.17
200.	.941	31833.	44929.	969.	24.57
250.	.944	37745.	50553.	1101.	32.09
300.	.956	41368.	54486.	1205.	39.59
350.	.955	44226.	57286.	1294.	47.13
400.	.962	46132.	59379.	1373.	54.67
450.	.948	47958.	60774.	1446.	62.21

TABLE V. DYNAMIC PRESSURE LIMITED, MAXIMUM POWER SUPERSONIC DASHES

TIME, SEC.	MACH	ALTITUDE, FT.	ENERGY, FT.	TOTAL FUEL, LBS.	TOTAL RANGE, N.M.
450.	1.038	46188.	61632.	1446.	62.21
551.	1.969	42825.	99056.	3968.	88.01
645.	2.350	48826.	128986.	5935.	120.57
695.	2.479	52186.	141418.	6957.	139.86

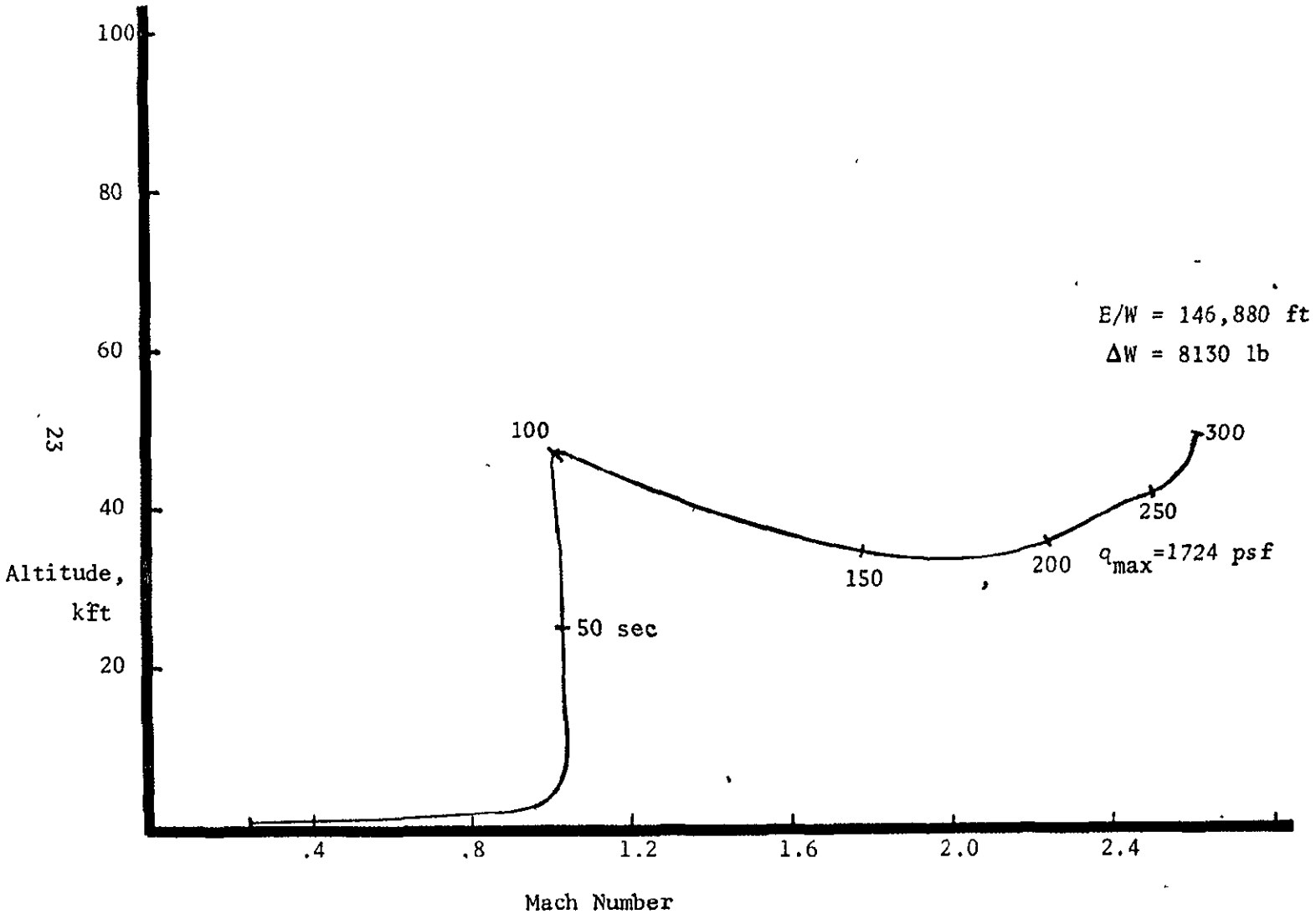

Fig. 10 - F-15 MAXIMUM ENERGY TRAJECTORIES IN FIXED TIME, FUEL-FREE

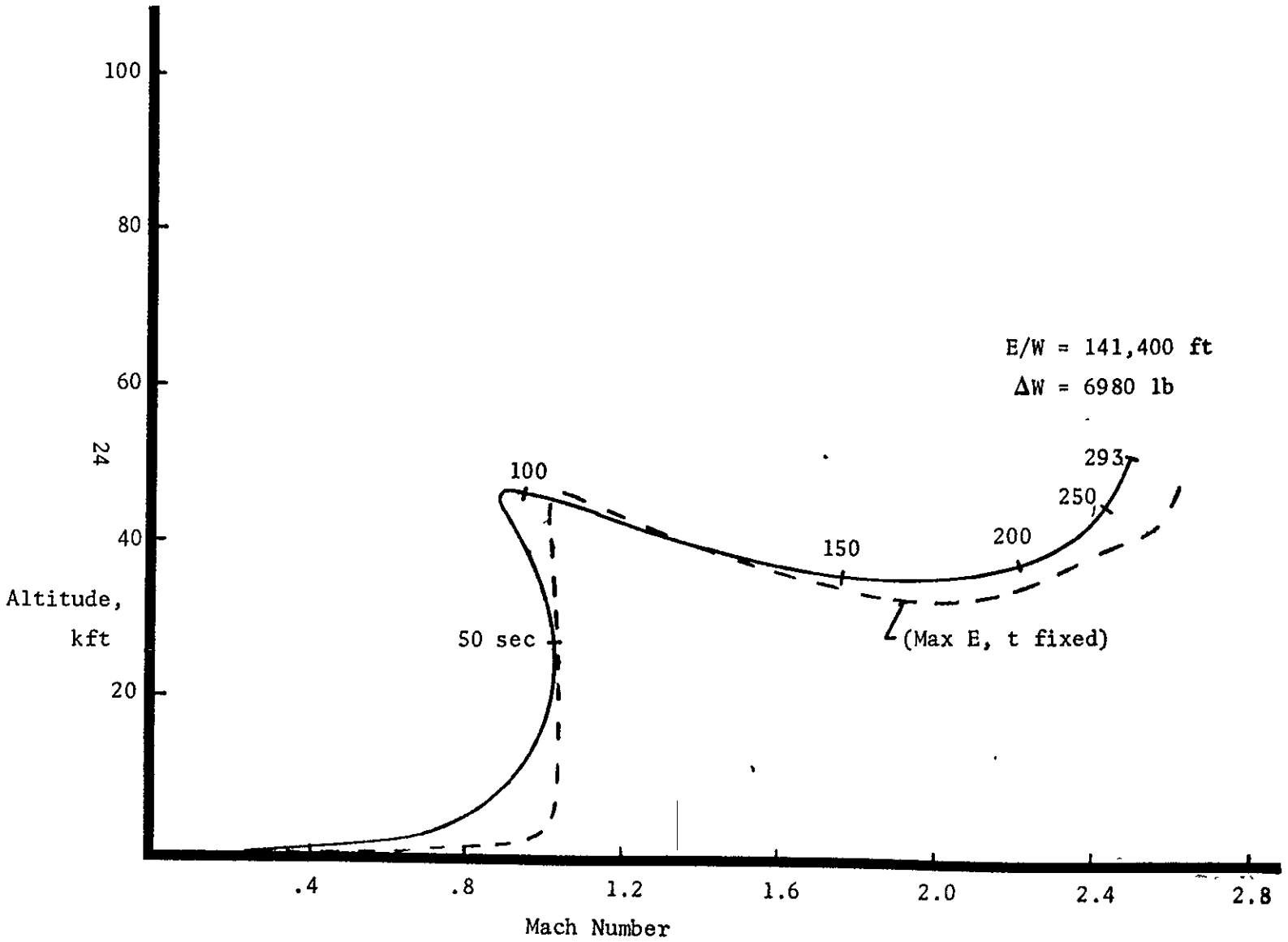

FIG. 11 - F-15 MINIMUM-FUEL TRAJECTORIES TO GIVEN ENERGY, TIME-FREE

6.0 RANGE CONSIDERATIONS AND MISSION PLANNING

It has been shown that acquisition of the zoom-climb commencement point requires an expenditure of 6957 pounds of fuel and a range of 140 nautical miles. The zoom-climb maneuver and return to 50,000 feet with engines out requires an additional 664 pounds of fuel and a further distance of 45 nautical miles. Thus, if the entire maneuver is performed in an outbound leg from base, the reentry point at 50000 feet would be 185 nautical miles from the take-off point.

From the range safety point of view, it would be desirable to have the reentry point over the base. This can be achieved if the subsonic climb is performed outbound from the base and a subsonic cruise out is added prior to a 180 degree turn back to base and the acceleration to supersonic flight condition. The supersonic dash and zoom then form the return leg of the mission and reentry is possible over the base itself.

It is calculated that a subsonic cruise requires four pounds of fuel per nautical mile. The subsonic 180 degree turn will consume 124 pounds of fuel and 61 seconds flight time in a 56 degree banked altitude. Combining these figures with the range constraint produces the mission profile of Table I, Section 1.0, and permits reentry directly over the base.

7.0 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

It has been shown that the F-15 Eagle aircraft can zoom to altitudes in excess of 100,000 feet while satisfying the following constraints:

a. On-board internal fuel limits

b. Acceptable maximum dynamic pressure limits imposed for aircraft maintenance requirements

c. Acceptable minimum dynamic pressure limits imposed for aircraft controllability

d. Return to base range requirements associated with mission safety and reliability

Constraints which might be imposed by accelerating supersonic flight over heavily populated regions was not considered in the present study. This problem should be examined in detail for each region of the earth where the upper atmosphere sampling mission is flown. It is possible that this constraint may significantly affect fuel requirements. The use of military power in the subsonic flight regime and maximum power in the supersonic flight regime is only an approximation to the true minimum fuel path. It is therefore recommended that more detailed fuel minimization studies be performed prior to detailed mission planning over densely populated regions.

The optimal trajectories of this report involve continuous control optimization by the variational calculus. It is recommended that selected results be parameterized in a form suitable for their execution during manned flight.

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APPENDIX A: FLIGHT TRAJECTORIES

ORIGINAL PAGE IS OF POOR QUALITY

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE FOMA87 STAGE 1 CYCLE 10 PASS 2 PAGE 153

FULL THROTTLE MAX ENERGY

	TIME	VR77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	250.0000	500.0000	0.	1770.016	0.	.2243112	46745.06
2	1.000000	286.3568	483.1028	-6.312324	1810.918	4.3934599E-02	.2569253	49604.97
3	2.000000	325.3702	440.2834	-9.346247	1847.818	9.3754016E-02	.2918766	50563.68
4	3.000000	365.6162	379.7156	-10.59349	1886.591	.1497001	.3279130	51580.23
5	4.000000	406.0800	308.8243	-10.24345	1926.963	.2120953	.3641131	52621.66
6	5.000000	446.8568	238.4408	-8.599138	1967.970	.2812620	.3996814	53651.31
7	6.000000	485.2669	176.9498	-6.618670	2008.804	.3572004	.4349188	55396.30
8	7.000000	524.5930	127.8678	-4.486499	2049.385	.4399103	.4700853	57131.72
9	8.000000	563.6507	95.13813	-2.502442	2089.444	.5293112	.5052071	58842.43
10	9.000000	602.9947	77.47690	-.5252825	2128.967	.6253224	.5402552	60522.33
11	10.000000	642.1237	83.22541	1.032170	2168.036	.7277827	.5753156	62167.36
12	11.00000	681.1466	104.2670	2.792539	2206.574	.8366115	.6103227	64112.10
13	12.00000	720.4480	149.5727	4.668643	2244.803	.9516476	.6456383	66035.95
14	13.00000	760.1279	220.3642	6.622837	2282.906	1.072972	.6814267	69537.53
15	14.00000	800.2056	322.6834	8.607703	2320.288	1.200261	.7175415	72187.32
16	15.00000	840.3769	460.1428	10.74546	2356.862	1.373355	.7539108	74765.48
17	16.00000	880.7242	635.3480	12.63238	2393.194	1.472011	.7905939	77263.57
18	17.00000	920.9263	846.5662	14.58639	2426.384	1.610068	.8272850	78535.72
19	18.00000	958.9523	1105.357	17.19556	2459.517	1.765123	.8630667	79269.54
20	19.00000	997.2513	1406.696	19.65808	2487.223	1.917967	.8976070	79611.84
21	20.00000	1032.400	1770.270	21.46787	2515.462	2.074036	.9304371	79513.90
22	21.00000	1064.424	2175.728	24.53160	2533.335	2.233329	.9606198	79055.01
23	22.00000	1092.289	2637.601	26.33430	2551.535	2.393569	.9873575	78430.81
24	23.00000	1116.104	3142.851	27.69586	2567.427	2.555220	1.010709	77706.37
25	24.00000	1135.941	3690.398	30.23391	2572.080	2.717738	1.030598	76868.53
26	25.00000	1151.537	4277.326	32.66267	2571.812	2.878724	1.046939	75915.56
27	26.00000	1163.565	4910.600	34.14602	2573.558	3.037533	1.060266	74604.95
28	27.00000	1172.603	5585.565	35.36021	2573.684	3.195134	1.071329	73603.64
29	28.00000	1180.084	6280.738	37.13595	2568.006	3.351363	1.080584	72324.97
30	29.00000	1185.042	7008.516	38.79885	2560.138	3.504772	1.088006	70950.43
31	30.00000	1186.180	7764.682	40.42244	2550.233	3.655197	1.093827	69487.72
32	31.00000	1189.565	8545.619	42.03415	2536.341	3.802318	1.098234	67941.86
33	32.00000	1189.833	9357.333	43.63265	2523.680	3.945811	1.101377	66316.38
34	33.00000	1187.904	10169.48	45.20583	2509.571	4.065434	1.103412	64695.97
35	34.00000	1185.565	11042.99	46.73089	2493.595	4.221107	1.104651	63279.01
36	35.00000	1182.362	11915.87	48.24375	2476.660	4.352669	1.105277	61812.21
37	36.00000	1177.477	12836.74	49.73510	2458.922	4.480039	1.105315	60297.00
38	37.00000	1173.879	13713.76	51.11593	2441.335	4.603217	1.104781	58737.19
39	38.00000	1168.664	14634.03	52.39130	2424.007	4.722445	1.103729	57139.61
40	39.00000	1162.881	15565.11	53.55602	2407.117	4.837804	1.102192	55509.62
41	40.00000	1156.579	16500.82	54.65891	2390.268	4.949615	1.100200	53852.05
42	41.00000	1150.706	17442.95	52.84259	2404.116	5.059976	1.098648	52210.66
43	42.00000	1144.951	18342.87	50.31710	2424.218	5.177108	1.096970	50631.19
44	43.00000	1137.960	19214.17	50.13128	2421.733	5.298593	1.095473	49120.35
45	44.00000	1133.958	20089.72	50.60706	2411.928	5.417821	1.093967	47605.39
46	45.00000	1123.219	20957.62	48.61774	2425.844	5.537049	1.092210	46383.59
47	46.00000	1123.268	21784.21	45.95790	2405.577	5.662646	1.091027	45231.02
48	47.00000	1119.035	22580.41	45.31203	2447.477	5.792434	1.090414	44135.32
49	48.00000	1114.235	23375.80	45.59910	2440.847	5.921255	1.089279	43021.43
50	49.00000	1109.139	24171.69	45.79650	2434.542	6.048867	1.087840	41893.36
51	50.00000	1103.706	24966.69	46.13476	2426.879	6.175351	1.086157	40754.07

TRAJECTORY NUMBER 1.

AI

E 1097624

CASE FOR407 STAGE 1 CYCLE 10 PASS 2 PAGE 154

FULL THROTTLE MAX ENERGY

	TIME	VCTTF	HGCTF	GAMTD	VITTF	RGTTN	AMACH	AMASF1
52	51.00000	1068.462	25761.87	46.22250	2421.060	6.300544	1.084066	39595.85
53	52.00000	1062.206	26548.26	44.78455	2428.317	6.426140	1.081937	38444.10
54	53.00000	1057.248	27297.84	42.32588	2444.026	6.555848	1.080347	37354.54
55	54.00000	1052.989	28010.67	39.92630	2458.784	6.690232	1.079327	36337.56
56	55.00000	1049.038	28694.31	38.96177	2462.417	6.827920	1.078563	35369.66
57	56.00000	1044.909	29369.98	38.74486	2460.333	6.965770	1.077639	34403.95
58	57.00000	1040.749	30048.64	38.68834	2456.885	7.103378	1.076493	33438.73
59	58.00000	1046.219	30707.45	38.43913	2454.550	7.240583	1.075026	32547.74
60	59.00000	1041.516	31366.81	38.23450	2451.727	7.377788	1.073364	31659.25
61	60.00000	1036.762	32014.62	36.69393	2458.156	7.515477	1.071594	30782.56
62	61.00000	1032.478	32632.93	35.53926	2461.996	7.655426	1.070161	29958.45
63	62.00000	1028.139	33240.77	35.14361	2460.594	7.796578	1.068620	29144.51
64	63.00000	1023.699	33839.13	34.63715	2459.754	7.937571	1.066912	28337.12
65	64.00000	1019.145	34427.02	34.09600	2459.000	8.078807	1.065074	27539.34
66	65.00000	1014.548	35004.19	33.55610	2458.110	8.220365	1.063120	26752.09
67	66.00000	1009.840	35570.42	32.95965	2457.435	8.362165	1.061046	25975.65
68	67.00000	1005.207	36124.72	32.33616	2456.816	8.504287	1.058865	25214.93
69	68.00000	1000.536	36667.60	31.68267	2456.295	8.646732	1.056192	24469.60
70	69.00000	995.8935	37198.70	31.01637	2455.812	8.789661	1.054437	23625.14
71	70.00000	991.2413	37713.77	30.30686	2455.546	8.932831	1.044766	22886.73
72	71.00000	986.7013	38217.22	29.53546	2455.619	9.076566	1.040221	22136.43
73	72.00000	982.2762	38706.70	28.77915	2455.644	9.220703	1.035820	21434.59
74	73.00000	977.8284	39182.22	27.94166	2456.037	9.365325	1.031560	20760.41
75	74.00000	973.4005	39642.49	27.07863	2456.615	9.510591	1.027492	20116.34
76	75.00000	969.0208	40088.07	26.26358	2456.976	9.656341	1.023603	19516.16
77	76.00000	964.7311	40519.22	25.40012	2457.628	9.802575	1.019932	19017.87
78	77.00000	960.4965	40934.92	24.48686	2458.613	9.949373	1.016543	18546.04
79	78.00000	956.0513	41335.63	23.66610	2459.189	10.09674	1.013406	18100.35
80	79.00000	951.2177	41723.23	22.90776	2459.741	10.24450	1.010476	17677.05
81	80.00000	946.1167	42097.12	22.10761	2460.487	10.39275	1.007790	17276.88
82	81.00000	941.2570	42457.39	21.27172	2461.481	10.54140	1.005352	16899.18
83	82.00000	936.1558	42803.55	20.47209	2462.459	10.69062	1.003182	16544.08
84	83.00000	930.2917	43136.60	19.66558	2463.571	10.84032	1.001256	16209.40
85	84.00000	923.7285	43455.42	18.75241	2465.211	10.99050	.9996372	15900.70
86	85.00000	916.5092	43758.61	17.78460	2467.210	11.14133	.9983746	15624.27
87	86.00000	908.6271	44046.16	16.87046	2469.214	11.29280	.9974706	15366.89
88	87.00000	900.0789	44319.17	15.97692	2471.324	11.44484	.9968991	15126.99
89	88.00000	890.8870	44576.93	14.98692	2473.911	11.59752	.9967061	14905.60
90	89.00000	881.1107	44817.94	13.94083	2476.877	11.75101	.9969464	14704.51
91	90.00000	870.7966	45041.77	12.86028	2480.166	11.90523	.9976447	14533.42
92	91.00000	859.9681	45247.78	11.76148	2483.778	12.06025	.9988558	14420.70
93	92.00000	848.6906	45435.66	10.64340	2487.729	12.21616	1.000604	14330.97
94	93.00000	837.0946	45605.31	9.474900	2492.098	12.37295	1.002926	14272.90
95	94.00000	825.2567	45755.02	8.222411	2496.949	12.53071	1.005866	14239.06
96	95.00000	813.2453	45883.59	6.928715	2502.212	12.68952	1.009472	14231.04
97	96.00000	801.3815	45990.63	5.614588	2507.845	12.84938	1.013745	14249.22
98	97.00000	789.6891	46075.38	4.268148	2513.863	13.01028	1.018709	14294.63
99	98.00000	778.1765	46137.22	2.900004	2520.250	13.17240	1.024379	14368.21
100	99.00000	767.0536	46175.84	1.565899	2526.978	13.33554	1.030760	14470.62
101	100.00000	756.4761	46188.35	.3176057	2534.089	13.50001	1.037885	14605.06

TRAJECTORY NUMBER 1.

FULL THROTTLE MAX ENERGY

	AMASS	ALPHA	TETAP	C_L	CD	ANZBTG	ESPEF	DYNPP
1	1176,000	-3.191780	41160,15	-.1754657	2,1014901E-02	.1268253	47321,95	73,19806
2	1175,151	-4.840182	41910,92	.1276918	1,9644604E-02	-.2801711	56534,41	96,08955
3	1174,286	-6.177598	42748,16	.2402998	2,3797244E-02	-.5660473	67065,38	124,2042
4	1173,405	-7.608845	43636,30	.2681714	2,5370218E-02	-.7668768	79044,00	157,1116
5	1172,505	-5.901669	44547,17	.3306744	3,0169771E-02	-1.126795	92377,48	194,2133
6	1171,587	-3.940004	45449,04	.3379286	3,0834257E-02	-1.573365	107059,6	234,6066
7	1170,646	-2.261913	46369,61	.2031027	2,7212701E-02	-1.415029	123430,0	278,4170
8	1169,674	-.9164818	47282,44	.2738911	2,5667905E-02	-1.543007	141708,9	325,8397
9	1168,673	.4687637	48174,10	.2270708	2,3038449E-02	-1.487383	162022,1	376,7935
10	1167,642	2.231319	51434,97	.2126923	2,2368815E-02	-1.591312	184359,2	431,1302
11	1166,583	3.696204	52873,11	.1642803	2,0656969E-02	-1.410247	208836,6	488,8370
12	1165,495	4.620980	54571,09	.1713287	2,0682519E-02	-1.640775	235333,0	549,7178
13	1164,364	6.341622	56950,72	.1606570	2,0201823E-02	-1.613915	264330,7	614,1693
14	1163,187	8.216467	59317,38	.1470583	2,0129399E-02	-1.753673	296034,9	682,3936
15	1161,963	10.14981	61632,51	.1387228	1,9946889E-02	-1.828874	330537,0	753,8456
16	1160,694	12.13180	63841,99	.1298780	1,9770986E-02	-1.883703	367903,1	828,0746
17	1159,382	13.74773	66057,63	.1141370	1,9520874E-02	-1.819900	408253,5	904,8473
18	1158,034	15.60491	67291,02	.1070773	1,9452358E-02	-1.857078	451262,8	983,2045
19	1156,677	18.23325	68091,64	.1108000	1,9604573E-02	-2.060822	496108,5	1060,315
20	1155,298	20.80013	68706,05	.1064154	2,0115047E-02	-2.116747	542544,1	1134,007
21	1153,972	22.32084	68882,77	9,6632553E-02	2,1815300E-02	-2.046627	589862,8	1202,488
22	1152,553	25.38225	68884,85	9,0187478E-02	2,4680919E-02	-2.012274	636371,2	1262,967
23	1151,193	27.12628	68868,41	8,5010049E-02	2,7934631E-02	-1.995362	681319,2	1311,698
24	1149,845	28.50169	68104,92	8,5305863E-02	3,1113653E-02	-2.037377	723886,2	1349,125
25	1148,510	30.98341	67250,61	8,0236187E-02	3,3840630E-02	-1.959882	763575,6	1374,922
26	1147,190	33.39861	66260,54	7,7148042E-02	3,6299909E-02	-1.907175	800461,4	1387,961
27	1145,889	34.85119	65206,55	7,5055761E-02	3,7957573E-02	-1.882765	834902,5	1389,988
28	1144,608	36.06629	64007,07	7,4211739E-02	3,9259851E-02	-1.835262	867294,1	1384,008
29	1143,347	37.83007	62876,89	7,4544848E-02	4,0341590E-02	-1.827587	898074,6	1371,646
30	1142,110	39.09982	61596,98	7,4841119E-02	4,1207147E-02	-1.810572	927340,5	1352,794
31	1140,898	41.13055	60255,85	7,5193510E-02	4,1886354E-02	-1.787530	955247,6	1328,510
32	1139,711	42.75282	58843,79	7,5606376E-02	4,2401688E-02	-1.763859	982091,5	1299,687
33	1138,552	44.34310	57361,96	7,6097617E-02	4,2742098E-02	-1.738275	1007902	1267,087
34	1137,421	45.94678	55917,62	7,7297635E-02	4,2939658E-02	-1.705952	1032880	1231,464
35	1136,316	47.47408	54758,56	7,7820903E-02	4,3066651E-02	-1.659121	1057389	1193,885
36	1135,236	48.99791	53555,02	7,8181015E-02	4,3118939E-02	-1.622622	1081619	1155,042
37	1134,182	50.50084	52309,65	7,9004089E-02	4,3119478E-02	-1.584825	1105579	1115,236
38	1133,154	51.85530	51025,34	7,7139763E-02	4,3074416E-02	-1.496153	1129253	1074,743
39	1132,154	53.09983	49707,67	7,4036618E-02	4,2979927E-02	-1.403461	1152647	1033,945
40	1131,181	54.23016	48360,89	7,2883815E-02	4,2883465E-02	-1.309349	1175750	993,1304
41	1130,237	55.32595	46986,68	7,2021886E-02	4,2675410E-02	-1.250643	1198557	952,5466
42	1129,321	51.71420	45631,54	-5,8705611E-02	4,2802977E-02	.8176597	1221086	914,1565
43	1128,433	49.92783	44324,05	-7,0583727E-02	4,2347780E-02	.9613928	1244061	878,2513
44	1127,572	50.58187	43075,85	5,6335519E-02	4,2524650E-02	-.8910290	1266303	845,5829
45	1126,737	51.12008	41816,31	6,0024943E-02	4,2185452E-02	-.9206011	1287485	812,2866
46	1125,926	47.12405	40778,43	-8,6010376E-02	4,1668703E-02	1,057442	1308784	780,7061
47	1125,135	40.60417	39802,67	-7,5881636E-02	4,1557668E-02	.8893985	1329662	752,2674
48	1124,363	45.75800	38877,88	5,6133367E-02	4,1843718E-02	-.7689182	1350391	726,3972
49	1123,611	46.20095	37936,65	6,8261038E-02	4,1478655E-02	-.8872819	1370509	700,6161
50	1122,878	46.30588	36984,14	6,0758947E-02	4,1442741E-02	-.7704455	1390312	675,2078
51	1122,164	46.87529	36023,18	-7,7806399E-02	4,0988212E-02	-.9317429	1409837	650,3069

TRAJECTORY NUMBER 1.

21.11.13. ADUNF11,? TOTAL JOB CUS 888

21.11.13. ADUNF11,? ESTIMATED COST $ 50.43

FULL THROTTLE MAX ENERGY

	MACH	ALPHD	TETA	C_L	LD	ANZBTG	ESPEF	DYNPP
52	1121,470	46,41600	35047,09	5,2427955E-02	4,1126780F-02	-,6277538	1428961	625,7297
53	1120,797	43,63881	34079,11	-6,1417087E-02	4,0713307F-02	,5616296	1447735	602,1345
54	1120,142	40,81589	33165,01	-8,8501092E-02	4,0322111F-02	,8089865	1466270	580,7415
55	1119,506	38,71942	32313,05	-6,6155767E-02	4,0323210F-02	,5685100	1484405	561,5463
56	1118,887	39,00451	31502,92	6,1893430E-02	4,0295967E-02	-,6367223	1502028	543,6601
57	1118,285	39,20917	30695,36	6,3898899E-02	4,0154163F-02	-,6352784	1519278	526,6667
58	1117,699	39,50136	29884,80	8,3489574E-02	3,9869926E-02	-,7860601	1536166	509,8318
59	1117,129	38,86505	29069,08	5,4805412E-02	3,9906198F-02	-,5196811	1552625	493,2020
60	1116,575	39,03501	28257,36	8,2699859E-02	3,9505716F-02	-,7304431	1568692	477,0936
61	1116,036	35,22726	27457,80	-8,6230306E-02	3,9309423F-02	,6248736	1584356	461,5466
62	1115,511	36,24726	26705,48	7,5879964E-02	3,9115258F-02	-,6337663	1599591	447,3216
63	1115,001	35,70580	25963,73	6,4893677E-02	3,9051951F-02	-,5340382	1614450	433,5918
64	1114,505	35,17582	25229,68	6,3975559E-02	3,8865846F-02	-,5056275	1628697	420,2722
65	1114,023	34,66727	24505,84	6,5033962E-02	3,8624587F-02	-,5026980	1642950	407,4020
66	1113,554	34,17387	23793,16	6,9313811E-02	3,8345657E-02	-,5165634	1656615	394,9802
67	1113,099	33,50869	23091,92	6,3871508E-02	3,8150681F-02	-,4654264	1669884	382,9937
68	1112,657	32,95592	22406,74	6,9410304E-02	3,7839628E-02	-,4874782	1682771	371,4684
69	1112,228	32,29871	21700,82	6,7128532E-02	3,7299177F-02	-,4543838	1695306	358,7440
70	1111,814	31,66582	21012,60	7,3644461E-02	3,6673711F-02	-,4792942	1707527	346,6092
71	1111,412	30,90998	20345,93	6,8630294E-02	3,5998847F-02	-,4353697	1719446	335,1281
72	1111,024	30,10154	19702,57	6,8060477E-02	3,5310513F-02	-,4232759	1731072	324,3047
73	1110,648	29,48916	19082,89	7,7426716F-02	3,4619425E-02	-,4556439	1742410	314,1165
74	1110,283	28,80996	18486,31	6,5462723E-02	3,4027561E-02	-,3793509	1753455	304,5246
75	1109,930	27,77508	17910,94	7,0235237E-02	3,3353377F-02	-,4227886	1764215	295,5421
76	1109,588	27,05893	17363,02	8,4000874E-02	3,2829840E-02	-,4490253	1774691	287,1172
77	1109,256	26,08881	16835,93	7,5847093E-02	3,2291679E-02	-,3977985	1784929	279,2375
78	1108,931	25,22156	16311,45	7,9629389E-02	3,1857820F-02	-,4046785	1794955	271,9190
79	1108,615	24,76402	16107,97	,1664847	3,1615506F-02	-,5172737	1804751	265,1082
80	1108,306	23,88189	15722,52	9,6008773E-02	3,1161785F-02	-,4624216	1814334	258,7323
81	1108,005	23,19003	15355,97	,1671010	3,0865813F-02	-,4961129	1823716	252,7928
82	1107,709	22,23959	15008,00	9,8194900E-02	3,0493127F-02	-,4475830	1832904	247,2701
83	1107,421	21,71883	14678,98	,1702928	3,0297456F-02	-,5302145	1841899	242,1576
84	1107,138	20,75023	14367,22	,1676231	2,9990211E-02	-,4682340	1850711	237,4132
85	1106,861	19,73740	14075,81	9,9454281E-02	2,9750203F-02	-,4285882	1859355	233,0628
86	1106,589	18,76285	13807,96	9,9405360E-02	2,9577715E-02	-,4197680	1867838	229,1252
87	1106,321	18,08840	13559,42	,1783307	2,9533902F-02	-,4865006	1876159	225,5844
88	1106,058	17,12907	13328,57	,1733154	2,9440923F-02	-,4604913	1884328	222,4009
89	1105,799	15,95435	13116,50	9,8759778E-02	2,9348502F-02	-,3997351	1892363	219,5892
90	1105,543	14,98078	12925,03	,1712702	2,9396179E-02	-,4047126	1900269	217,1756
91	1105,291	13,77431	12763,93	9,4450360E-02	2,9439367F-02	-,3757350	1908055	215,1627
92	1105,041	12,73152	12661,69	9,8725537E-02	2,9636415F-02	-,3887420	1915753	213,5695
93	1104,793	11,54098	12579,86	9,2884556F-02	2,9823299F-02	-,3653343	1923385	212,3974
94	1104,546	10,29342	12521,72	8,6589116F-02	3,0083371F-02	-,3411962	1930965	211,6611
95	1104,300	8,840378	12485,57	7,1147651E-02	3,0397554F-02	-,2845884	1938505	211,3849
96	1104,054	7,588860	12472,92	7,3688039E-02	3,0880668F-02	-,2938016	1946005	211,5964
97	1103,808	6,173353	12484,07	6,5268624E-02	3,1488912F-02	-,2665623	1953467	212,3011
98	1103,562	4,788896	12519,96	6,2653559E-02	3,2188447F-02	-,2562650	1960895	213,5178
99	1103,314	3,356546	12581,39	5,7229304E-02	3,3007597F-02	-,2400511	1968294	215,2634
100	1103,065	2,115178	12668,93	6,7053990E-02	3,3889669E-02	-,2810063	1975669	217,5511
101	1102,810	-1,732516	12785,34	-8,5859378E-02	3,4979130E-02	,3007758	1982975	220,4370

TRAJECTORY NUMBER 1.

FULL THROTTLE MAX ENERGY

	TIME	VG77F	HGC7F	G4H7D	VI77F	RG77N	AMACH	AMASP1
1	0.	1004.751	46188.35	-.3176044	2534.089	0.	1.037885	14605.06
2	1.000000	998.4212	46111.63	-8.055882	2517.809	.1630820	1.027214	14442.36
3	2.000000	1004.608	45928.90	-12.30778	2519.963	.3242293	1.037737	14779.34
4	3.000000	1019.247	45696.30	-14.08303	2530.099	.4859406	1.052849	15252.05
5	4.000000	1034.405	45438.11	-14.88694	2542.991	.6491841	1.068609	15767.32
6	5.000000	1049.848	45166.89	-15.27803	2557.026	.8144027	1.084469	16306.37
7	6.000000	1064.697	44888.17	-15.11724	2572.116	.9818778	1.099786	16882.93
8	7.000000	1078.891	44613.60	-14.60135	2587.553	1.152054	1.114408	17501.41
9	8.000000	1093.141	44343.30	-14.25348	2602.676	1.324810	1.129210	18135.47
10	9.000000	1107.642	44074.59	-14.03212	2617.597	1.500064	1.144169	18787.50
11	10.00000	1122.249	43805.45	-13.93033	2632.337	1.677737	1.159278	19459.83
12	11.00000	1137.143	43533.56	-13.93684	2647.018	1.857829	1.174632	20157.86
13	12.00000	1152.201	43257.51	-13.97023	2661.828	2.040258	1.190197	20883.14
14	13.00000	1167.491	42977.44	-13.96965	2676.883	2.225106	1.205919	21583.73
15	14.00000	1182.587	42695.21	-13.76983	2692.446	2.412453	1.221585	22211.09
16	15.00000	1197.680	42415.09	-13.47145	2708.210	2.602460	1.237176	22840.51
17	16.00000	1212.923	42136.63	-13.26317	2723.874	2.795047	1.252922	23476.56
18	17.00000	1228.201	41858.49	-13.07096	2739.618	2.990213	1.268796	24120.51
19	18.00000	1243.701	41581.11	-12.87156	2755.464	3.188120	1.284756	24771.10
20	19.00000	1259.316	41304.21	-12.69893	2771.364	3.388526	1.300844	25429.49
21	20.00000	1275.028	41027.24	-12.55830	2787.316	3.591674	1.317075	26096.72
22	21.00000	1290.836	40749.87	-12.40491	2803.399	3.797400	1.333404	26772.53
23	22.00000	1306.690	40472.91	-12.21703	2819.619	4.005868	1.349781	27454.90
24	23.00000	1322.619	40196.73	-12.04618	2835.871	4.216996	1.366235	28143.93
25	24.00000	1338.698	39920.32	-11.94949	2852.080	4.430784	1.382844	28863.92
26	25.00000	1354.933	39642.45	-11.84911	2868.456	4.647233	1.399614	29652.56
27	26.00000	1371.290	39363.74	-11.76364	2884.917	4.866422	1.416511	30462.72
28	27.00000	1387.731	39083.56	-11.65285	2901.529	5.088352	1.433495	31283.15
29	28.00000	1404.211	38803.19	-11.53267	2918.206	5.312943	1.450518	32110.66
30	29.00000	1420.744	38521.42	-11.49955	2934.723	5.540354	1.467606	32947.80
31	30.00000	1437.807	38236.89	-11.49874	2951.268	5.770427	1.484808	33798.75
32	31.00000	1454.129	37949.27	-11.38524	2968.174	6.003159	1.502082	34661.27
33	32.00000	1470.765	37664.24	-11.04385	2985.577	6.238794	1.519267	35524.18
34	33.00000	1487.092	37367.89	-10.45115	3003.196	6.477492	1.536059	36369.47
35	34.00000	1502.985	37120.98	-9.831098	3020.522	6.719253	1.552549	37190.16
36	35.00000	1518.739	36870.33	-9.268982	3037.484	6.964077	1.568864	37990.63
37	36.00000	1534.360	36634.52	-8.854068	3053.902	7.211804	1.584990	38772.61
38	37.00000	1549.902	36401.13	-8.561671	3069.947	7.462191	1.601013	39548.29
39	38.00000	1565.240	36172.85	-8.298903	3085.768	7.715319	1.616877	40356.65
40	39.00000	1580.410	35949.56	-8.013113	3101.415	7.971187	1.631025	41114.35
41	40.00000	1595.321	35732.55	-7.695356	3116.868	8.229556	1.644791	41854.38
42	41.00000	1610.000	35522.16	-7.399532	3132.033	8.490664	1.658342	42583.10
43	42.00000	1624.448	35317.66	-7.133740	3146.920	8.754191	1.671696	43301.93
44	43.00000	1638.728	35118.64	-6.880570	3161.567	9.020297	1.684856	44011.26
45	44.00000	1652.783	34924.99	-6.635676	3175.984	9.288822	1.697822	44711.00
46	45.00000	1666.605	34736.61	-6.401361	3190.182	9.559766	1.710610	45401.43
47	46.00000	1680.324	34553.43	-6.165025	3204.190	9.833047	1.723230	46082.60
48	47.00000	1693.805	34375.85	-5.917084	3218.007	10.10875	1.735672	46753.17
49	48.00000	1707.101	34204.08	-5.685071	3231.605	10.38670	1.747950	47412.85
50	49.00000	1720.267	34036.97	-5.526114	3244.964	10.66692	1.760115	48064.88
51	50.00000	1733.225	33873.05	-5.349529	3258.184	10.94939	1.772126	48710.77

TRAJECTORY NUMBER 2.

FINAL THROTTLE MAX ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
52	51.00000	1746.009	33714.84	-5.062931	3271.265	11.23404	1.783886	49342.72
53	52.00000	1758.582	33563.46	-4.908414	3283.968	11.52094	1.795479	49960.50
54	53.00000	1770.955	33410.35	-4.740570	3296.563	11.80986	1.806954	50667.89
55	54.00000	1783.247	33271.42	-4.489442	3309.147	12.10096	1.818361	51428.78
56	55.00000	1795.391	33136.59	-4.108461	3321.604	12.39407	1.829567	52173.18
57	56.00000	1807.283	33013.58	-3.767389	3333.800	12.68936	1.840662	52896.30
58	57.00000	1818.980	32898.82	-3.478315	3345.828	12.98675	1.851715	53607.60
59	58.00000	1830.494	32791.01	-3.361177	3357.432	13.28606	1.862548	54301.22
60	59.00000	1841.962	32686.12	-3.094312	3369.107	13.58732	1.873348	54993.24
61	60.00000	1853.278	32592.45	-2.756022	3380.663	13.89051	1.884077	55663.59
62	61.00000	1864.371	32506.62	-2.551359	3391.888	14.19563	1.894637	56314.48
63	62.00000	1875.384	32428.84	-2.320556	3402.997	14.50261	1.905117	56953.07
64	63.00000	1886.189	32356.51	-1.922601	3414.062	14.81144	1.915551	57572.56
65	64.00000	1896.719	32297.62	-1.749846	3424.658	15.12213	1.925735	58158.58
66	65.00000	1907.206	32241.63	-1.543088	3435.229	15.43451	1.935900	58740.38
67	66.00000	1917.584	32190.97	-1.293153	3445.655	15.74874	1.946000	59299.87
68	67.00000	1927.748	32155.41	-1.035574	3455.932	16.06459	1.956014	59841.37
69	68.00000	1937.817	32127.32	-.5658226	3466.094	16.38212	1.965948	60355.64
70	69.00000	1947.621	32116.18	-8.3629352E-02	3475.941	16.70144	1.975837	60824.61
71	70.00000	1957.101	32119.80	.2463864	3485.415	17.02220	1.985487	61249.00
72	71.00000	1966.411	32133.78	.6125025	3494.684	17.34457	1.995054	61643.91
73	72.00000	1975.453	32163.78	1.167810	3503.599	17.66840	2.004493	62018.78
74	73.00000	1984.172	32212.28	1.562882	3512.139	17.99368	2.013729	62365.23
75	74.00000	1992.572	32270.52	1.789357	3520.483	18.32028	2.022813	62677.74
76	75.00000	2000.819	32336.71	2.011372	3528.642	18.64818	2.031798	62963.06
77	76.00000	2008.935	32411.12	2.245830	3536.611	18.97741	2.040688	63220.46
78	77.00000	2016.863	32490.27	2.490109	3544.381	19.30793	2.049483	63448.18
79	78.00000	2024.500	32586.36	2.732091	3551.955	19.63965	2.058180	63645.28
80	79.00000	2032.108	32687.19	2.966619	3559.344	19.97251	2.066785	63812.02
81	80.00000	2039.536	32796.50	3.189518	3566.554	20.30657	2.075301	63949.09
82	81.00000	2046.759	32914.13	3.411228	3573.588	20.64176	2.083715	64056.76
83	82.00000	2053.819	33040.08	3.632811	3580.446	20.97801	2.092049	64134.90
84	83.00000	2060.717	33174.43	3.856420	3587.128	21.31537	2.100367	64183.13
85	84.00000	2067.466	33317.30	4.081755	3593.645	21.65371	2.108583	64201.56
86	85.00000	2074.079	33468.74	4.305049	3600.016	21.99310	2.116752	64190.39
87	86.00000	2080.559	33628.60	4.519502	3606.249	22.33337	2.124877	64149.82
88	87.00000	2086.917	33796.39	4.711749	3612.373	22.67469	2.132960	64081.05
89	88.00000	2093.158	33970.86	4.852344	3618.447	23.01689	2.141011	63987.54
90	89.00000	2099.319	34149.19	4.878779	3624.603	23.36007	2.149047	63877.71
91	90.00000	2105.507	34328.49	4.935230	3630.705	23.70429	2.157092	63760.51
92	91.00000	2111.622	34511.23	4.986731	3636.760	24.04940	2.165131	63628.33
93	92.00000	2117.690	34693.88	4.888802	3642.968	24.39555	2.173136	63489.55
94	93.00000	2123.813	34872.55	4.804801	3649.230	24.74284	2.181193	63359.23
95	94.00000	2130.027	35050.13	4.771404	3655.477	25.09101	2.189307	63229.37
96	95.00000	2136.234	35228.92	4.738279	3661.736	25.44031	2.197439	63097.58
97	96.00000	2142.325	35369.12	3.542350	3669.131	25.79082	2.205322	62521.35
98	97.00000	2148.653	35463.12	1.309637	3677.187	26.14294	2.212984	62069.24
99	98.00000	2156.342	35490.32	-.7768790	3684.847	26.49659	2.220769	61851.90
100	99.00000	2164.896	35425.50	-2.715252	3692.052	26.85138	2.228511	61556.30
101	100.00000	2172.813	35298.55	-3.616701	3699.178	27.20704	2.235378	61040.02

TRAJECTORY NUMBER 2.

FULL THROTTLE MAX ENERGY

	AMASS	ALPHD	TETDP	C_L	CD	ANZDTG	ESPEF	DYNPP
1	1102,814	-10,31972	12785,34	-1,050445	,3313382	4,126061	1982974	220,4370
2	1102,564	-17,10206	12646,83	-,6768840	,1242373	2,529134	1970204	216,7219
3	1102,312	-13,76306	12946,36	-8,903750?E-02	3,4970551E-02	,3168178	1974563	223,1273
4	1102,053	-13,66303	13364,06	5,304126?E-02	3,7235641E-02	-,2401906	1961955	232,2439
5	1101,785	-12,94785	13818,91	,1449132	4,0429980E-02	-,7192091	1989395	242,2232
6	1101,509	-13,03413	14292,81	,1589061	4,2028188E-02	-,7243531	1996753	252,7256
7	1101,222	-11,62141	14795,60	,2756065	5,1911072E-02	-1,288705	2003547	263,4053
8	1100,925	-11,09235	15326,95	,2454322	5,0418901E-02	-1,197681	2009967	274,0331
9	1100,618	-11,51752	15866,13	,2168806	4,9170137E-02	-1,104846	2016913	285,0240
10	1100,299	-11,53686	16415,23	,1900615	4,8954192E-02	-1,052549	20242A3	296,4135
11	1099,960	-11,70947	16976,14	,1746960	4,8512911E-02	-,9697541	2032012	308,2388
12	1099,627	-11,94661	17553,22	,1547704	4,8349181E-02	-,9201725	2040136	320,6029
13	1099,272	-12,00338	18137,57	,1541684	4,8567480E-02	-,9308399	2048584	333,5337
14	1098,906	-12,00227	18708,29	,1529829	4,8820455E-02	-,9615183	2057307	347,0250
15	1098,527	-11,42981	19342,79	,1790342	5,0321602E-02	-1,164023	2066129	360,9431
16	1098,138	-11,30019	19982,84	,1650236	4,9746488E-02	-1,118566	2075160	375,2125
17	1097,739	-11,36965	20553,37	,1493206	4,9036316E-02	-1,055926	2084653	389,9883
18	1097,328	-11,18062	21175,34	,1486369	4,9032225E-02	-1,092616	2094541	405,2935
19	1096,906	-11,10149	21807,49	,1406080	4,8709232E-02	-1,076299	2104793	421,1087
20	1096,472	-11,00287	22451,05	,1331870	4,8404486E-02	-1,061501	2115454	437,4825
21	1096,027	-11,02947	23107,03	,1250519	4,8105607E-02	-1,038112	2126530	454,4534
22	1095,571	-10,87763	23775,03	,1247387	4,8154648E-02	-1,075665	2137964	472,0186
23	1095,103	-10,73299	24453,07	,1219242	4,8119024E-02	-1,092854	2149720	490,1407
24	1094,623	-10,60681	25141,40	,1138113	4,7894424E-02	-1,062325	2161852	508,8479
25	1094,131	-10,79676	25863,22	,1022286	4,7534431E-02	-,9956632	2174430	528,2398
26	1093,625	-10,65978	26651,86	,1043862	4,7654581E-02	-1,054422	2187431	548,3775
27	1093,106	-10,75585	27421,65	9,412963?E-02	4,7653812E-02	-,9922102	2200836	569,2443
28	1092,573	-10,54603	28203,99	9,253359?E-02	4,7698926E-02	-1,075453	2214577	590,8496
29	1092,026	-10,60040	28996,87	9,026429?E-02	4,7815784E-02	-1,027020	2228637	613,1432
30	1091,464	-10,76070	29802,72	7,905470?E-02	4,7881431E-02	-,9503208	2243013	636,2013
31	1090,888	-10,70905	30625,54	7,822654?E-02	4,7901960E-02	-,9658573	2257718	660,1489
32	1090,297	-10,52631	31463,25	8,705737?E-02	4,7980131E-02	-1,108417	2272729	684,9548
33	1089,691	-9,031290	32305,18	,1005609	4,8103211E-02	-1,318359	2287962	710,3471
34	1089,070	-9,110660	33133,70	,1123540	4,8867476E-02	-1,518770	2303183	735,8113
35	1088,435	-8,710111	33982,30	,1011513	4,8398466E-02	-1,420919	2318658	761,2190
36	1087,786	-8,513707	34735,04	9,702243?E-02	4,8397138E-02	-1,424037	2334520	786,6889
37	1087,123	-8,151709	35513,22	8,071130?E-02	4,8178761E-02	-1,223031	2350697	812,2192
38	1086,447	-7,844841	36279,37	7,664019?E-02	4,8139955E-02	-1,201594	2367168	838,0402
39	1085,757	-7,741165	36945,78	7,202639?E-02	4,8056828E-02	-1,180690	2383801	864,1273
40	1085,054	-7,406907	37569,83	7,410258?E-02	4,8028324E-02	-1,234562	2400502	888,7627
41	1084,338	-7,699409	38177,04	7,281555?E-02	4,7980246E-02	-1,247933	2417250	913,2451
42	1083,609	-6,888102	38774,74	6,869245?E-02	4,7891156E-02	-1,211328	2434058	937,7128
43	1082,867	-6,539110	39364,16	6,503805?E-02	4,7807576E-02	-1,197810	2450927	962,1939
44	1082,113	-6,809964	39945,67	6,309943?E-02	4,7724046E-02	-1,192953	2467839	986,6851
45	1081,347	-6,187715	40519,19	6,197652?E-02	4,7634811E-02	-1,188037	2484786	1011,172
46	1080,569	-5,879249	41084,90	5,992689?E-02	4,7500689E-02	-1,179305	2501778	1035,656
47	1079,779	-5,741665	41642,82	5,912582?E-02	4,7302586E-02	-1,192281	2518820	1060,131
48	1078,978	-5,492365	42191,77	5,633665?E-02	4,7265413E-02	-1,204782	2535892	1084,542
49	1078,165	-5,207135	42731,41	5,545569?E-02	4,7105246E-02	-1,174924	2553015	1108,877
50	1077,340	-5,261709	43264,47	4,969040?E-02	4,6890399E-02	-1,084521	2570242	1133,238
51	1076,505	-4,889901	43792,57	5,304062?E-02	4,6852867E-02	-1,177517	2587468	1157,635

TRAJECTORY NUMBER 2.

FULL THROTTLE MAX ENERGY

	AMASS	ALPHA	TETAP	CL	CD	ANZHTG	ESPEF	DYNPR
52	1075,658	-4,687906	48309,06	5,7193473E-02	4,6846343F-02	=1,290338	2604568	1181,787
53	1074,801	-4,750685	48913,35	4,2765408E-02	4,6735196E-02	=1,005277	2621694	1205,716
54	1073,933	-4,755409	45373,95	5,1805176E-02	4,9521933F-02	=1,225058	2638838	1229,723
55	1073,051	-4,727185	45964,03	5,0089331E-02	4,6364974E-02	=1,210966	2656152	1253,641
56	1072,157	-3,916479	46537,31	5,8835632E-02	4,8885399E-02	=1,435127	2673431	1277,149
57	1071,249	-3,806332	47089,13	4,8557844E-02	4,6169324F-02	=1,221552	2690887	1300,117
58	1070,330	-3,655089	47627,69	5,0316445E-02	4,6031945F-02	=1,285541	2708573	1322,828
59	1069,398	-3,575471	48149,75	3,5013377E-02	4,6254706F-02	=,9015467	2726141	1345,079
60	1068,455	-2,632900	48648,17	5,4308836E-02	4,6945890F-02	=1,431228	2743848	1367,371
61	1067,499	-2,601038	49165,84	4,5620390E-02	4,5806034F-02	=1,232048	2761761	1389,105
62	1066,532	-2,537047	49645,86	4,1412684F-02	4,5800977F-02	=1,152553	2779640	1410,325
63	1065,554	-1,988961	50114,02	4,4658917E-02	4,5611828F-02	=1,249360	2797609	1431,254
64	1064,566	-1,338644	50564,43	5,2354299E-02	4,5455247E-02	=1,470480	2815778	1451,696
65	1063,566	-1,288817	50986,71	3,1728836E-02	4,5671556F-02	=,9012662	2833795	1471,180
66	1062,557	-1,067269	51404,31	4,6607729E-02	4,5227727F-02	=1,356925	2851953	1490,618
67	1061,538	-1,012520	51802,49	3,8548381E-02	4,5275637E-02	=1,154129	2870232	1509,457
68	1060,509	-,9041771	52165,20	4,3467757E-02	4,5066868F-02	=1,305866	2888586	1527,825
69	1059,472	7,298228E-02	52504,84	5,1261915E-02	4,4892656F-02	=1,541412	2907150	1545,452
70	1058,425	,5184681	52866,70	4,8455109E-02	4,4765055F-02	=1,479221	2925840	1561,779
71	1057,371	,6073010	53152,96	3,8054835E-02	4,4795921E-02	=1,221467	2944465	1576,808
72	1056,310	1,207805	53415,51	4,6794921E-02	4,4582119F-02	=1,461514	2963174	1591,015
73	1055,243	1,437102	53632,56	5,2685307E-02	4,4557887F-02	=1,644435	2981955	1603,876
74	1054,169	1,633286	53796,44	3,8248136E-02	4,4511496F-02	=1,233241	3000688	1615,060
75	1053,089	2,132089	53955,37	3,7198770E-02	4,4443585E-02	=1,210607	3019330	1625,283
76	1052,004	2,355277	54054,40	3,7223556E-02	4,4364561F-02	=1,219241	3037951	1634,736
77	1050,915	2,402146	54153,02	3,7477633F-02	4,4283239F-02	=1,237269	3056559	1643,399
78	1049,821	2,404161	54230,01	3,7575648E-02	4,4206255E-02	=1,244318	3075154	1651,218
79	1048,724	3,407963	54284,80	3,7133581E-02	4,4134039F-02	=1,236703	3093730	1658,165
80	1047,623	3,397891	54317,76	3,6697118E-02	4,4062850F-02	=1,225749	3112283	1664,249
81	1046,520	3,510769	54329,50	3,8260537E-02	4,3990388F-02	=1,220212	3130815	1669,491
82	1045,415	3,733004	54320,38	3,8087351E-02	4,3917175F-02	=1,219061	3149330	1673,904
83	1044,308	3,954048	54290,39	3,8018689E-02	4,3843612F-02	=1,220532	3167828	1677,485
84	1043,200	4,179621	54239,35	3,8391648E-02	4,3769352F-02	=1,224175	3186310	1680,230
85	1042,092	4,405582	54167,43	3,8012492E-02	4,3670591F-02	=1,225763	3204806	1682,146
86	1040,983	4,629831	54074,51	3,7621129E-02	4,3573195F-02	=1,221632	3223337	1683,251
87	1039,875	4,847588	53961,17	3,7300770E-02	4,3477865F-02	=1,208510	3241903	1683,550
88	1038,768	5,091114	53828,35	3,8302429E-02	4,3383985F-02	=1,176127	3260500	1683,101
89	1037,663	5,060287	53678,82	3,1886567E-02	4,3294781F-02	=1,100787	3279127	1681,999
90	1036,559	4,941329	53519,05	2,8679696E-02	4,3212211F-02	=,9353010	3297779	1680,502
91	1035,457	5,153705	53355,81	3,2030813E-02	4,3096829E-02	=1,105132	3316472	1678,874
92	1034,357	5,097367	53183,38	2,8037722E-02	4,3006475F-02	=,9796280	3335202	1676,897
93	1033,259	4,811540	53008,51	2,1405953E-02	4,3037622E-02	=,7781897	3353865	1674,805
94	1032,164	4,870287	52832,01	2,6875752E-02	4,2806727F-02	=,9478499	3372600	1673,046
95	1031,071	4,832884	52677,69	2,6385511F-02	4,2704916F-02	=,9273464	3391445	1671,390
96	1029,981	4,813960	52513,97	2,6740310E-02	4,2602252E-02	=,9382935	3410329	1669,761
97	1028,895	1,462361	51969,30	-4,2923627E-02	4,2538954E-02	1,242471	3428538	1668,040
98	1027,820	-1,383285	51521,97	-6,5482237E-02	4,3245459E-02	1,969068	3445547	1672,961
99	1026,750	-2,653865	51218,63	-3,7474004E-02	4,2457449F-02	1,093265	3461941	1684,205
100	1025,684	-3,778115	50861,94	-4,7426495E-02	4,2392941E-02	1,425557	3477443	1701,179
101	1024,625	-3,640210	50334,46	2,3107008E-02	4,2479340F-02	=,8463785	3490557	1722,048

TRAJECTORY NUMBER 2.

ORIGINAL PAGE IS OF POOR QUALITY

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

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FULL THROTTLE MAX ENERGY

	TIME	VC77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	2192.873	35208.55	-3.616700	3699.179	0.	2.235379	61039.99
2	1.000000	2170.713	35223.37	-.5304886	3699.222	.3563942	2.232870	61055.42
3	2.000000	2171.801	35248.28	1.678420	3700.056	.7131109	2.234334	61005.02
4	3.000000	2174.820	35340.11	2.080893	3702.162	1.069828	2.239277	60978.10
5	4.000000	2178.448	35467.85	3.672431	3705.169	1.426867	2.243307	61120.22
6	5.000000	2182.212	35614.16	3.932651	3708.671	1.784228	2.248673	61504.09
7	6.000000	2186.363	35760.32	3.925348	3712.830	2.142316	2.254476	62123.96
8	7.000000	2191.179	35912.67	3.840245	3717.694	2.501048	2.260913	62990.57
9	8.000000	2196.000	36057.43	3.720353	3723.404	2.860666	2.268161	64134.86
10	9.000000	2202.902	36198.22	3.634140	3729.795	3.221414	2.275640	64417.27
11	10.000000	2209.335	36337.04	3.581643	3736.198	3.583129	2.282192	64357.05
12	11.00000	2215.882	36470.27	3.530413	3742.564	3.945891	2.288707	64295.22
13	12.00000	2221.912	36609.03	3.480591	3748.890	4.309783	2.295185	64231.73
14	13.00000	2228.147	36744.10	3.434204	3755.177	4.674641	2.301624	64174.19
15	14.00000	2234.364	36877.01	3.398996	3761.425	5.040548	2.308036	64138.67
16	15.00000	2240.529	37009.49	3.400141	3767.607	5.407503	2.314415	64100.47
17	16.00000	2246.650	37143.12	3.431919	3773.706	5.775425	2.320738	64053.66
18	17.00000	2252.702	37278.60	3.474901	3779.725	6.144395	2.326990	63995.34
19	18.00000	2258.681	37415.24	3.521766	3785.666	6.514252	2.333165	63924.31
20	19.00000	2264.583	37556.11	3.569905	3791.529	6.885076	2.339262	63840.14
21	20.00000	2270.406	37698.27	3.618929	3797.312	7.256867	2.345277	63742.55
22	21.00000	2276.148	37842.73	3.667859	3803.013	7.629626	2.351208	63631.36
23	22.00000	2281.807	37988.05	3.713913	3808.634	8.003191	2.357055	63506.60
24	23.00000	2287.385	38136.21	3.750054	3814.182	8.377723	2.362816	63368.98
25	24.00000	2292.880	38288.32	3.759794	3819.681	8.753143	2.368497	63220.79
26	25.00000	2298.321	38438.47	3.733963	3825.153	9.129448	2.374112	63066.87
27	26.00000	2303.713	38587.54	3.695635	3830.594	9.506641	2.379682	62911.70
28	27.00000	2309.064	38735.75	3.679532	3835.971	9.884801	2.385210	62754.86
29	28.00000	2314.356	38883.72	3.652230	3841.301	10.26377	2.390677	62593.45
30	29.00000	2319.604	39030.46	3.611699	3846.599	10.64362	2.396098	62431.36
31	30.00000	2324.739	39175.51	3.538843	3851.816	11.02436	2.401402	62028.86
32	31.00000	2329.230	39315.66	3.331047	3856.517	11.40591	2.406041	61221.97
33	32.00000	2333.305	39445.45	3.054580	3860.848	11.78826	2.410250	60705.77
34	33.00000	2337.438	39565.79	2.886021	3865.130	12.17142	2.414520	60401.83
35	34.00000	2341.563	39681.26	2.764248	3869.389	12.55522	2.418811	60294.38
36	35.00000	2345.868	39792.03	2.667182	3873.746	12.93983	2.423228	60373.25
37	36.00000	2350.364	39899.76	2.588295	3878.297	13.32508	2.427861	60640.51
38	37.00000	2354.869	40002.26	2.359718	3882.979	13.71122	2.432526	61072.98
39	38.00000	2359.682	40094.13	2.144469	3887.935	14.09809	2.437497	61047.99
40	39.00000	2364.778	40180.51	2.065206	3893.085	14.48584	2.442762	61047.66
41	40.00000	2369.904	40263.11	2.033554	3898.235	14.87448	2.448057	61050.84
42	41.00000	2374.979	40348.54	1.991480	3903.338	15.26393	2.453298	61052.44
43	42.00000	2380.007	40430.02	1.936206	3908.403	15.65426	2.458493	61054.84
44	43.00000	2385.010	40509.57	1.895944	3913.433	16.04540	2.463660	61059.00
45	44.00000	2389.991	40587.94	1.865865	3918.416	16.43734	2.468785	61062.32
46	45.00000	2394.890	40665.51	1.857672	3923.344	16.83010	2.473866	61063.77
47	46.00000	2399.760	40743.51	1.874148	3928.201	17.22373	2.478887	61059.40
48	47.00000	2404.539	40822.61	1.901450	3932.980	17.61810	2.483834	61046.79
49	48.00000	2409.253	40903.17	1.935373	3937.678	18.01319	2.488700	61024.71
50	49.00000	2413.880	40985.41	1.974157	3942.292	18.40908	2.493482	60992.35
51	50.00000	2418.495	41069.53	2.016989	3946.819	18.80570	2.498177	60949.04

TRAJECTORY NUMBER 3.

FULL THROTTLE MAX ENERGY

	TIME	VRTF	HGCTF	GAMTD	VITTF	RGTTN	AMACH	AMASF1
52	51.00000	2452.484	41155.68	2.063346	1951.256	19.20305	2.502783	60894.23
53	52.00000	2457.263	41244.64	2.112608	3955.602	19.60112	2.507297	60827.39
54	53.00000	2461.532	41330.67	2.163765	3959.856	19.99992	2.511717	60760.14
55	54.00000	2465.718	41427.65	2.215033	3964.016	20.39936	2.516041	60656.20
56	55.00000	2469.810	41522.92	2.266096	3968.084	20.79945	2.520268	60551.76
57	56.00000	2473.810	41620.40	2.311415	3972.059	21.20026	2.524399	60435.02
58	57.00000	2477.778	41720.06	2.359478	3975.981	21.60163	2.528436	60306.11
59	58.00000	2481.533	41821.97	2.410014	3979.729	22.00366	2.532377	60164.79
60	59.00000	2485.258	41926.28	2.463829	3983.420	22.40624	2.536221	60010.62
61	60.00000	2488.878	42033.12	2.521170	3987.010	22.80939	2.539964	59843.06
62	61.00000	2492.402	42142.65	2.581859	3990.497	23.21310	2.543605	59661.57
63	62.00000	2495.823	42255.00	2.645190	3993.877	23.61747	2.547138	59465.65
64	63.00000	2499.148	42370.26	2.709758	3997.151	24.02231	2.550562	59254.94
65	64.00000	2502.384	42488.46	2.773873	4000.315	24.42764	2.553875	59029.33
66	65.00000	2505.541	42609.55	2.837352	4003.369	24.83353	2.557074	58786.89
67	66.00000	2508.628	42733.52	2.900413	4006.312	25.23982	2.560159	58533.67
68	67.00000	2511.643	42860.38	2.961338	4009.144	25.64660	2.563129	58263.78
69	68.00000	2514.603	42989.62	3.016576	4011.866	26.05378	2.565980	57979.70
70	69.00000	2517.512	43121.72	3.066629	4014.480	26.46145	2.568717	57682.38
71	70.00000	2520.252	43255.87	3.114994	4016.986	26.86943	2.571340	57372.40
72	71.00000	2522.822	43392.25	3.163305	4019.381	27.27790	2.573850	57049.91
73	72.00000	2525.220	43530.85	3.210911	4021.665	27.68670	2.576245	56714.96
74	73.00000	2527.504	43671.61	3.256593	4023.836	28.09581	2.578522	56367.75
75	74.00000	2529.704	43814.40	3.296554	4025.896	28.50525	2.580680	56008.71
76	75.00000	2531.768	43959.01	3.334135	4027.846	28.91509	2.582719	55638.58
77	76.00000	2533.729	44105.16	3.369452	4029.688	29.32518	2.584641	55258.43
78	77.00000	2535.579	44252.67	3.392800	4031.420	29.73550	2.586449	54868.91
79	78.00000	2537.317	44401.50	3.419983	4033.043	30.14615	2.588142	54470.32
80	79.00000	2538.943	44551.56	3.444166	4034.555	30.55696	2.589717	54062.98
81	80.00000	2540.455	44702.98	3.464998	4035.957	30.96809	2.591176	53647.52
82	81.00000	2541.855	44854.73	3.483233	4037.249	31.37938	2.592519	53224.48
83	82.00000	2543.143	45007.61	3.499154	4038.432	31.79091	2.593746	52800.42
84	83.00000	2544.320	45161.21	3.513085	4039.555	32.20261	2.594910	52487.56
85	84.00000	2545.399	45315.46	3.525998	4040.662	32.61447	2.596056	52172.19
86	85.00000	2546.391	45470.30	3.539816	4041.751	33.02648	2.597184	51854.33
87	86.00000	2547.303	45625.97	3.556395	4042.817	33.43866	2.598291	51533.75
88	87.00000	2548.303	45782.87	3.577029	4043.857	33.85100	2.599376	51210.04
89	88.00000	2549.417	45940.04	3.602811	4044.865	34.26351	2.600434	50882.64
90	89.00000	2550.411	46098.95	3.635143	4045.837	34.67617	2.601461	50550.87
91	90.00000	2551.331	46258.52	3.676342	4046.768	35.08899	2.602452	50213.87
92	91.00000	2552.291	46422.29	3.730967	4047.638	35.50190	2.603403	49870.41
93	92.00000	2553.196	46587.83	3.807518	4048.441	35.91496	2.604306	49518.64
94	93.00000	2554.048	46757.62	3.923220	4049.145	36.32811	2.605155	49155.41
95	94.00000	2554.846	46934.00	4.113381	4049.694	36.74134	2.605938	48774.98
96	95.00000	2555.592	47120.58	4.379960	4050.026	37.15448	2.606606	48367.83
97	96.00000	2556.288	47319.01	4.623592	4050.172	37.56763	2.607071	47927.92
98	97.00000	2556.940	47526.91	4.824762	4050.179	37.98061	2.607348	47461.20
99	98.00000	2557.550	47744.34	5.076141	4049.974	38.39360	2.607492	46969.12
100	99.00000	2558.128	47971.77	5.311339	4049.686	38.80642	2.607387	46447.85
101	100.00000	2558.685	48187.91	4.328833	4050.200	39.21925	2.606640	45936.10

TRAJECTORY NUMBER 3.

FULL THROTTLE MAX ENERGY

	AMASS	ALPHD	TF77P	CL	CD	ANZBTG	ESPEF	DYNPP
1	1024.625	.2691182	50338.83	.1583703	5.3806149E-02	-5.247185	3490558	1722.045
2	1023.571	2.384880	50375.19	.1250553	4.8229781E-02	-4.167495	3488465	1724.331
3	1022.517	3.730850	50316.21	9.4104901E-02	4.4025426E-02	-3.163288	3487819	1724.551
4	1021.464	4.025786	50247.09	6.6166147E-02	4.2790059E-02	-2.055884	3497118	1723.105
5	1020.410	4.317241	50301.16	4.6299307E-02	4.2305657E-02	-1.603717	3509093	1720.372
6	1019.352	4.092401	50505.65	2.9621065E-02	4.2338236E-02	-1.057427	3521970	1716.606
7	1018.285	3.651638	50772.82	2.5405022E-02	4.2334669E-02	-.8981997	3535811	1713.163
8	1017.205	3.836116	51567.76	2.3184267E-02	4.2340442E-02	-.8536196	3550977	1710.795
9	1016.108	3.494579	52412.41	2.1885975E-02	4.2337050E-02	-.8141934	3567833	1709.902
10	1014.996	3.705644	52521.86	2.4745703E-02	4.2199170E-02	-.9085269	3586179	1709.633
11	1013.884	3.667532	52305.84	2.4806556E-02	4.2156598E-02	-.9107359	3604604	1708.097
12	1012.774	3.629508	52210.49	2.4817366E-02	4.2115860E-02	-.9113323	3622939	1706.610
13	1011.664	3.593719	52055.70	2.4870947E-02	4.2073956E-02	-.9133417	3641183	1705.168
14	1010.555	3.560003	51903.78	2.5021199E-02	4.2026755E-02	-.9185163	3659337	1703.767
15	1009.448	3.557323	51759.32	2.5529359E-02	4.1972358E-02	-.9373207	3677429	1702.401
16	1008.340	3.623476	51613.98	2.7453896E-02	4.1912005E-02	-.9982958	3695475	1700.997
17	1007.234	3.785301	51443.28	2.8074936E-02	4.1657176E-02	-1.018699	3713472	1699.392
18	1006.128	3.797732	51315.09	2.8345421E-02	4.1804391E-02	-1.027525	3731412	1697.510
19	1005.024	3.807915	51138.53	2.8407309E-02	4.1753212E-02	-1.029370	3749291	1695.321
20	1003.921	3.866900	50963.30	2.8459128E-02	4.1702710E-02	-1.030691	3767103	1692.814
21	1002.819	3.930386	50779.22	2.8503851E-02	4.1652896E-02	-1.031574	3784844	1689.987
22	1001.720	3.990262	50580.17	2.8501775E-02	4.1604033E-02	-1.030732	3802507	1686.835
23	1000.622	4.013231	50364.21	2.8363815E-02	4.1556720E-02	-1.025279	3820088	1683.365
24	999.5266	4.076203	50173.92	2.7875014E-02	4.1512469E-02	-1.008278	3837577	1679.596
25	998.1337	4.050783	49957.09	2.6563593E-02	4.1474625E-02	-.9604136	3854962	1675.594
26	997.3434	4.006274	49737.39	2.5225430E-02	4.1438119E-02	-.9200022	3872234	1671.487
27	996.2557	3.683761	49518.15	2.5403119E-02	4.1391675E-02	-.9204878	3889398	1667.394
28	995.1708	4.016525	49298.94	2.6796506E-02	4.1336490E-02	-.9681197	3906468	1663.303
29	994.0885	3.052843	49077.71	2.5183419E-02	4.1304423E-02	-.9135533	3923425	1659.138
30	993.0091	3.031969	48857.35	2.5489007E-02	4.1257773E-02	-.9233592	3940265	1655.001
31	991.9332	3.803731	48640.40	2.3163737E-02	4.1293005E-02	-.8469850	3956819	1650.831
32	990.8696	3.401500	47704.91	1.5007734E-02	4.1565693E-02	-.6119057	3971701	1646.131
33	989.8173	3.149372	47196.08	1.6494851E-02	4.1493336E-02	-.6289612	3985379	1641.661
34	988.7720	3.101073	46847.40	2.3401812E-02	4.1115158E-02	-.8483697	3998872	1638.017
35	987.7302	3.021138	46647.08	2.1730850E-02	4.1142771E-02	-.7941979	4012276	1634.781
36	986.6887	3.012066	46585.09	2.4596974E-02	4.0943749E-02	-.8852886	4025829	1632.078
37	985.6442	2.614104	46660.53	2.3792270E-02	4.0924794E-02	-.8599035	4039799	1629.896
38	984.5935	2.430162	46300.71	1.4119301E-02	4.1378505E-02	-.5524296	4053692	1628.155
39	983.5392	2.437702	46715.70	2.1806601E-02	4.0909079E-02	-.7978943	4067967	1627.641
40	982.4851	2.473363	46580.31	2.5603042E-02	4.0659688E-02	-.9199420	4082763	1627.933
41	981.4309	2.465214	46450.18	2.6108340E-02	4.0584652E-02	-.9372022	4097596	1628.389
42	980.3768	2.400987	46329.28	2.4069724E-02	4.0526244E-02	-.9018958	4112296	1628.851
43	979.3225	2.352385	46205.29	2.4801026E-02	4.0069906E-02	-.8970216	4126851	1629.387
44	978.2662	2.349026	46084.44	2.5876699E-02	4.0360435E-02	-.9333260	4141307	1630.023
45	977.2139	2.324358	45965.01	2.5742905E-02	4.0314050E-02	-.9302356	4155652	1630.682
46	976.1595	2.367143	45846.18	2.7262866E-02	4.0230143E-02	-.9805269	4169893	1631.331
47	975.1051	2.407513	45725.21	2.7813454E-02	4.0157309E-02	-.9993906	4184033	1631.854
48	974.0509	2.451563	45600.53	2.8106920E-02	4.0068124E-02	-1.009996	4198060	1632.180
49	972.9970	2.059230	45471.33	2.8298191E-02	4.0021073E-02	-1.017182	4211968	1632.275
50	971.9435	2.450478	45337.06	2.8448900E-02	3.9955547E-02	-1.022913	4225756	1632.115
51	970.8907	2.605111	45197.28	2.6561821E-02	3.9891337E-02	-1.027908	4239421	1631.683

TRAJECTORY NUMBER 3.

FULL THROTTLE MAX ENERGY

	ALPHAS	ALPHD	IF77p	CL	CD	ANZBTG	ESPFF	DYNPP
52	969.8387	2.663763	45051'63	2,8700651E-02	3,9628444E-02	-1,032272	4252962	1630,964
53	968.7678	2.722409	44899'76	2,8797130E-02	3,9767007E-02	-1,035727	4266376	1629,940
54	967.7382	2.782680	44741'02	2,8849865E-02	3,9707337E-02	-1,037569	4279661	1628,613
55	966.6900	2.840565	44576'48	2,8920690E-02	3,9649963E-02	-1,036557	4292814	1626,967
56	965.6435	2.893560	44415'02	2,8696904E-02	3,9595077E-02	-1,032347	4305828	1625,010
57	964.5980	[illegible]	44227'27	2,8886029E-02	3,9540115E-02	-1,031423	4318703	1622,752
58	963.5565	[illegible]	44003'27	2,8777480E-02	3,9485015E-02	-1,033776	4331439	1620,198
59	962.5164	3.066302	43852'84	2,8626118E-02	3,9430419E-02	-1,037733	4344035	1617,343
60	961.4788	3.131563	43655'71	2,9102748E-02	3,9376704E-02	-1,042382	4356491	1614,176
61	960.4440	3.200306	43451'50	2,9284463E-02	3,9324138E-02	-1,047130	4368602	1610,686
62	959.4122	3.272089	43239'88	2,9469042E-02	3,9272996E-02	-1,051406	4380965	1606,859
63	958.3837	3.345432	43024'53	2,9617485E-02	3,9223659E-02	-1,054429	4392977	1602,684
64	957.3557	3.418073	42793'23	2,9701937E-02	3,9176643E-02	-1,055138	4404832	1598,153
65	956.3375	3.482415	42557'92	2,9725270E-02	3,9131966E-02	-1,053633	4416523	1593,267
66	955.3202	3.559004	42314'69	2,9791954E-02	3,9088180E-02	-1,053269	4428046	1588,030
67	954.3073	3.629004	42063'57	2,9856701E-02	3,9045930E-02	-1,052591	4439397	1582,445
68	953.2939	3.693800	41804'65	2,9812033E-02	3,9006808E-02	-1,048162	4450569	1576,519
69	952.2753	3.748090	41536'31	2,9599962E-02	3,8971720E-02	-1,038240	4461551	1570,267
70	951.2967	3.807585	41265'16	2,9554253E-02	3,8935769E-02	-1,033388	4472340	1563,714
71	950.3033	3.856982	40985'62	2,9654910E-02	3,8849167E-02	-1,032957	4482936	1556,881
72	949.3154	3.912912	40695'72	2,9781717E-02	3,8803672E-02	-1,033126	4493335	1549,772
73	948.3332	3.966461	40407'51	2,9653807E-02	3,8830523E-02	-1,031356	4503532	1542,391
74	947.3560	4.016922	40109'14	2,9686449E-02	3,8799530E-02	-1,028145	4513519	1534,744
75	946.3867	4.066068	39804'91	2,9673956E-02	3,8771570E-02	-1,021785	4523289	1526,843
76	945.4227	[illegible]	39495'34	2,9639293E-02	3,8747089E-02	-1,011491	4532832	1518,709
77	944.4653	4.128103	39181'11	2,9634764E-02	3,8721426E-02	-1,006436	4542145	1510,369
78	943.5145	4.162761	38862'63	2,9757555E-02	3,8695331E-02	-1,005534	4551228	1501,842
79	942.5704	4.195465	38540'06	2,9856208E-02	3,8671102E-02	-1,003583	4560076	1493,135
80	941.6334	4.221852	38213'64	2,9842960E-02	3,8650234E-02	-,9979494	4568682	1484,256
81	940.7035	[illegible]	37883'75	2,9893322E-02	3,8629905E-02	-,9941756	4577041	1475,220
82	939.7808	4.362767	37551'74	2,9961730E-02	3,8610845E-02	-,9908100	4585148	1466,042
83	938.8654	4.289060	37219'40	3,0046927E-02	3,8593062E-02	-,9878261	4593003	1456,733
84	937.9564	4.307307	36971'87	3,0141608E-02	3,8575967E-02	-,9852437	4600728	1447,363
85	937.0528	4.326023	36723'06	3,0306212E-02	3,8557997E-02	-,9846703	4608431	1437,988
86	936.1507	4.340588	36472'97	3,0577762E-02	3,8538559E-02	-,9871580	4616111	1428,608
87	935.2620	4.377353	36221'45	3,0926704E-02	3,8518133E-02	-,9917868	4623767	1419,219
88	934.3756	[illegible]	35969'25	3,1132024E-02	3,8497085E-02	-,9978989	4631395	1409,806
89	933.4936	4.858500	35715'01	3,1795593E-02	3,8475429E-02	-1,005508	4638993	1400,355
90	932.6178	4.795305	35455'31	3,2344036E-02	3,8452787E-02	-1,015330	4646560	1390,845
91	931.7478	[illegible]	35196'56	3,3041255E-02	3,8428185E-02	-1,029124	4654094	1381,252
92	930.8837	[illegible]	34929'96	3,4019557E-02	3,8399544E-02	-1,050529	4661597	1371,541
93	930.0256	[illegible]	34660'23	3,5943515E-02	3,8362643E-02	-1,086793	4669079	1361,660
94	929.1737	[illegible]	34383'20	3,8165154E-02	3,8308594E-02	-1,152962	4676560	1351,523
95	928.3282	5.271989	34094'84	4,3067161E-02	3,8218250E-02	-1,281058	4684091	1340,971
96	927.4895	5.632507	33780'95	4,6540310E-02	3,8152459E-02	-1,367117	4691668	1329,730
97	926.6580	5.759925	33462'39	4,2642135E-02	3,8211022E-02	-1,246617	4699125	1317,639
98	925.8344	5.971388	33119'21	4,2435018E-02	3,8207290E-02	-1,235403	4706424	1304,874
99	925.0171	[illegible]	32759'56	4,7761701E-02	3,8120097E-02	-1,364002	4713702	1291,512
100	924.2176	6.131103	32382'31	3,4058853E+02	3,8344676E-02	-,9862671	4720689	1277,433
101	923.4151	3.053852	32020'93	-4,7875993E-02	3,8130267E-02	1,179751	4725747	1263,567

TRAJECTORY NUMBER 3.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE [illegible] STAGE 1 CYCLE 10 PASS 2

FUEL UTILIZATION TO ENERGY

	TIME	VR77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	[illegible]	500.0000	0.	1776.016	0.	.2243112	48745.86
2	1.00000	290.7110	[illegible]	-3.018878	1810.363	4.4930590E-02	.2550303	49554.48
3	2.00000	324.3825	672.2586	-4.113349	1845.713	9.3592768E-02	.2874349	50402.64
4	3.00000	356.3916	697.7351	-4.019658	1881.602	.1491358	.3197123	51266.81
5	4.00000	392.1984	424.3278	-3.000635	1917.781	.2106442	.3518061	52126.20
6	5.00000	427.3560	406.6553	-1.289937	1953.320	.2780375	.3833580	52961.14
7	6.00000	461.6361	436.6778	.0255759	1987.802	.3511543	.4142413	54053.81
8	7.00000	495.6106	423.7275	3.335273	2020.987	.4209142	.4445670	55434.59
9	8.00000	528.4759	465.4630	6.005340	2052.536	.5139130	.4742979	56742.72
10	9.00000	561.0110	555.3019	8.730123	2082.263	.6026311	.5034255	57967.61
11	10.00000	592.2136	657.6695	11.81243	2109.181	.6962626	.5316103	59080.74
12	11.00000	622.3110	777.6036	14.75792	2133.764	.7930830	.5569461	60071.45
13	12.00000	651.6640	955.2684	17.65096	2155.914	.8941699	.5854408	60935.40
14	13.00000	679.5216	1177.194	20.30616	2175.909	.9976782	.6111155	62030.19
15	14.00000	706.8531	1124.780	23.26084	2193.304	1.103605	.6362641	63462.31
16	15.00000	733.5320	1730.228	25.91603	2209.462	1.211305	.6609687	64747.51
17	16.00000	759.6701	2171.087	28.04976	2223.676	1.320618	.6853078	65891.11
18	17.00000	785.1325	2155.903	30.82159	2236.879	1.431059	.7092573	66888.52
19	18.00000	810.8752	2870.942	33.27780	2247.678	1.542306	.7326872	67724.81
20	19.00000	[illegible]	3441.626	35.53454	2257.412	1.655876	.7556063	68394.04
21	20.00000	857.0023	3946.016	37.67785	2265.960	1.765526	.7780105	68698.21
22	21.00000	879.3571	4504.297	39.84607	2272.399	1.876934	.7997941	69227.53
23	22.00000	910.8816	4871.980	41.91104	2277.318	1.987617	.8206903	68589.45
24	23.00000	920.1167	5591.459	43.78043	2281.326	2.097414	.8404487	67799.09
25	24.00000	933.2735	6214.865	45.53946	2284.000	2.206081	.8590514	66870.33
26	25.00000	954.9132	6731.379	47.26491	2285.101	2.313540	.8764363	65805.68
27	26.00000	969.0368	7605.612	48.61231	2286.084	2.419547	.8925347	64609.36
28	27.00000	983.3108	8465.665	49.96326	2287.104	2.524345	.9072930	63243.23
29	28.00000	998.8604	9149.894	51.14448	2286.082	2.627773	.9205347	61749.90
30	29.00000	1001.632	9934.622	52.21794	2284.616	2.729669	.9322348	60191.97
31	30.00000	1012.795	10757.30	53.13971	2282.950	2.830198	.9425936	59008.10
32	31.00000	1019.710	11555.12	53.96527	2280.986	2.929430	.9519350	57631.62
33	32.00000	1025.335	12305.21	54.72344	2278.422	3.027057	.9602159	56623.32
34	33.00000	1029.839	13228.09	55.37786	2275.544	3.124193	.9674438	55382.76
35	34.00000	1033.138	14001.15	55.99673	2272.067	3.219802	.9736813	54111.73
36	35.00000	1035.363	14740.95	56.45918	2269.608	3.314362	.9769826	52811.88
37	36.00000	1038.569	15400.73	56.86019	2260.373	3.407954	.9833819	51483.57
38	37.00000	1030.810	15070.49	57.22108	2263.135	3.500600	.9869264	50127.71
39	38.00000	1036.654	17545.09	55.72558	2276.214	3.593850	.9901151	48771.05
40	39.00000	1030.120	18346.52	55.44563	2280.663	3.690090	.9929157	47435.91
41	40.00000	1030.520	19249.69	55.54039	2276.237	3.787404	.9947197	46065.61
42	41.00000	1032.142	20102.59	55.62539	2275.696	3.883415	.9958316	44686.81
43	42.00000	1029.230	20953.51	55.60969	2273.054	3.979024	.9963634	43447.26
44	43.00000	1025.751	21441.71	55.65953	2270.122	4.074309	.9963923	42188.02
45	44.00000	1022.034	22612.07	54.20609	2280.759	4.170321	.9961647	40929.68
46	45.00000	1016.383	23156.44	52.22891	2297.124	4.270685	.9959152	39706.17
47	46.00000	1010.955	24252.03	50.49642	2313.749	4.375002	.9957662	38524.72
48	47.00000	1011.004	25121.43	49.16279	2319.051	4.483828	.9956657	37378.79
49	48.00000	1007.630	25764.53	48.87522	2316.526	4.592576	.9950973	36227.69
50	49.00000	1003.617	26530.95	48.51163	2318.135	4.701728	.9941323	35075.08
51	50.00000	998.1767	27287.77	48.09742	2317.027	4.811201	.9927924	33924.45

TRAJECTORY NUMBER 4.

ORIGINAL PAGE IS OF POOR QUALITY

[illegible] UTILIZATION TO ENERGY

	[illegible]	[illegible]	[illegible]	[illegible]	VI77F	RG77H	AMACH	AMASF1
52	[illegible]	[illegible]	[illegible]	47.59428	2317.941	4.921154	.9910878	32778.69
53	[illegible]	[illegible]	[illegible]	45.93451	2327.433	5.032406	.9892197	31653.05
54	[illegible]	[illegible]	[illegible]	43.62560	2301.808	5.147523	.9876365	30583.17
55	[illegible]	[illegible]	[illegible]	42.33415	2347.899	5.260025	.9862196	29597.29
56	[illegible]	[illegible]	[illegible]	41.89045	2346.822	5.385495	.9846403	28796.86
57	[illegible]	[illegible]	[illegible]	41.05424	2349.497	5.505610	.9829019	28006.80
58	[illegible]	[illegible]	[illegible]	40.36545	2350.354	5.620370	.9810035	27227.64
59	[illegible]	[illegible]	[illegible]	39.65315	2351.200	5.707855	.9789732	26461.21
60	[illegible]	[illegible]	[illegible]	38.99625	2352.108	5.869065	.9768179	25708.04
61	[illegible]	[illegible]	[illegible]	38.17369	2352.757	5.992841	.9745550	24969.20
62	[illegible]	[illegible]	[illegible]	36.59762	2358.783	6.116744	.9722744	24250.76
63	[illegible]	[illegible]	[illegible]	35.24535	2363.331	6.242824	.9702627	23570.71
64	[illegible]	[illegible]	[illegible]	34.46747	2364.181	6.369872	.9683057	22909.95
65	[illegible]	[illegible]	[illegible]	33.67071	2364.696	6.497464	.9662685	22264.48
66	[illegible]	[illegible]	[illegible]	32.89765	2365.606	6.625741	.9623233	21654.10
67	[illegible]	[illegible]	[illegible]	32.06350	2366.491	6.754562	.9580873	21058.52
68	[illegible]	[illegible]	[illegible]	31.19392	2367.526	6.883947	.9539621	20483.93
69	[illegible]	[illegible]	[illegible]	30.29729	2368.470	7.014058	.9499695	19930.79
70	[illegible]	[illegible]	[illegible]	29.47108	2367.408	7.144814	.9460918	19398.17
71	[illegible]	[illegible]	[illegible]	28.69925	2369.801	7.276053	.9422679	18883.64
72	[illegible]	[illegible]	[illegible]	27.91362	2370.224	7.407696	.9385710	18387.03
73	[illegible]	[illegible]	[illegible]	27.17631	2370.375	7.539822	.9349339	17907.78
74	[illegible]	[illegible]	[illegible]	26.43742	2370.497	7.672271	.9313757	17480.39
75	[illegible]	[illegible]	[illegible]	25.65506	2370.858	7.805042	.9279853	17107.06
76	[illegible]	[illegible]	[illegible]	24.88079	2371.232	7.936297	.9247734	16748.69
77	[illegible]	[illegible]	[illegible]	24.10351	2371.662	8.071874	.9217324	16404.70
78	[illegible]	[illegible]	[illegible]	23.28405	2372.334	8.205855	.9168932	16075.59
79	[illegible]	[illegible]	[illegible]	22.31902	2373.292	8.340319	.9162954	15762.22
80	[illegible]	[illegible]	[illegible]	21.53120	2374.415	8.475266	.9139554	15464.90
81	[illegible]	[illegible]	[illegible]	20.61437	2375.776	8.610698	.9119003	15183.89
82	[illegible]	[illegible]	[illegible]	19.67714	2377.350	8.746693	.9101582	14919.70
83	[illegible]	[illegible]	[illegible]	18.66533	2378.523	8.883173	.9086447	14670.17
84	[illegible]	[illegible]	[illegible]	18.17822	2379.497	9.020055	.9073125	14432.55
85	[illegible]	[illegible]	[illegible]	17.44992	2380.666	9.157260	.9062135	14207.40
86	[illegible]	[illegible]	[illegible]	16.70570	2382.022	9.294549	.9053604	13994.80
87	[illegible]	[illegible]	[illegible]	15.82374	2383.975	9.433041	.9048472	13796.60
88	[illegible]	[illegible]	[illegible]	14.92572	2386.190	9.571777	.9047060	13614.43
89	[illegible]	[illegible]	44791.64	13.98651	2388.726	9.711078	.9049398	13447.69
90	[illegible]	[illegible]	[illegible]	12.82478	2391.654	9.851024	.9056668	13299.26
91	[illegible]	[illegible]	[illegible]	11.80531	2395.427	9.991776	.9069323	13202.48
92	[illegible]	[illegible]	[illegible]	10.84756	2399.426	10.13333	.9087871	13124.53
93	[illegible]	[illegible]	[illegible]	9.512869	2403.725	10.27570	.9112231	13064.60
94	[illegible]	[illegible]	[illegible]	8.361058	2408.415	10.41903	.9142606	13022.77
95	[illegible]	[illegible]	[illegible]	7.189864	2413.525	10.56333	.9179368	12999.93
96	[illegible]	[illegible]	[illegible]	6.056722	2418.963	10.70868	.9222290	12995.66
97	[illegible]	[illegible]	[illegible]	4.611818	2424.812	10.85499	.9271586	13010.13
98	[illegible]	[illegible]	[illegible]	3.874645	2430.926	11.00235	.9326635	13042.49
99	[illegible]	[illegible]	46076.38	2.859133	2437.377	11.15084	.9387152	13091.31
100	[illegible]	[illegible]	46113.65	1.855473	2444.216	11.30046	.9453537	13157.75
101	100.00000	[illegible]	46135.86	.9103189	2451.380	11.45129	.9525175	13240.39
102	[illegible]	[illegible]	46142.78	-5.4624527E-02	2458.919	11.60333	.9602303	13339.76

TRAJECTORY NUMBER 4.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

ORIGINAL PAGE IS OF POOR QUALITY

FUEL UTILIZATION TO ENERGY

	TIME	VE77D	HOL7E	GAL7D	VI77F	RG77N	AMACH	AMABF1
103	102,0100	932,6139	00139,23	-,9795990	2466,802	11,75658	,9684613	13455,65
104	113,0000	945,5925	46116,76	-1,877070	2475,020	11,91119	,9771885	13587,53
105	100,0000	950,0250	00072,33	-2,795618	2483,565	12,06710	,9864162	13735,78
106	115,0001	961,3312	00017,63	-3,693941	2492,437	12,22446	,9961370	13900,62
107	106,0100	974,2181	05947,56	-4,613247	2501,609	12,38319	1,006335	14125,98
108	107,0000	984,5773	05000,69	-5,556266	2511,085	12,54337	1,017046	14401,21
109	108,0100	995,7260	45756,69	-6,510692	2520,851	12,70508	1,028253	14700,87
110	109,0100	1000,769	45654,08	-7,524232	2530,843	12,86624	1,039969	15027,03
111	110,0000	1014,673	45109,17	-9,160004	2540,159	13,03278	1,052266	15385,82
112	111,0005	1021,714	45310,75	-11,36203	2546,885	13,19844	1,065727	15601,47
113	111,0100	1031,700	45106,75	-11,36203	2546,885	13,19844	1,065727	15601,47
114	111,0100	1031,700	45306,75	-11,36203	2546,885	13,19844	1,065727	15801,47
115	111,0055	1032,073	45209,22	-11,55520	2549,629	13,21263	1,066934	15839,96

TRAJECTORY NUMBER 4.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3,00 15 MAY 1972

FUEL UTILIZATION TO ENERGY

	AMASS	ALPHA	[illegible]	CL	CD	ANZH7G	ESPEF	DYNPP
1	1176,000	2,990021	41160,15	,2229512	2,2835376E-02	-,3438609	47321,95	73,19806
2	1175,151	1,677529	41207,16	,3005698	3,1076190E-02	-,6042122	56336,59	94,95149
3	1174,248	1,103449	42668,48	,3591941	3,4219694E-02	-,8110928	66503,08	120,3133
4	1173,411	[illegible]	43363,02	,3743745	3,4235094E-02	-,9871126	77699,28	148,9839
5	1172,516	2,232122	44115,69	,3799323	3,4266040E-02	-1,182224	90549,22	180,5494
6	1171,611	3,71[illegible]	44640,49	,3403473	3,2909230E-02	-1,339964	104469,5	214,5086
7	1170,656	5,001360	45799,99	,3360895	3,0720762E-02	-1,457019	119715,8	250,4803
8	1169,715	7,8[illegible]	47002,07	,3259253	2,9734755E-02	-1,616824	136435,3	288,3188
9	1168,774	9,086466	48100,07	,2867325	2,7344387E-02	-1,662654	154713,5	327,6751
10	1167,760	12,11862	49205,53	,2765970	2,5727431E-02	-1,739749	174573,3	368,2240
11	1166,773	15,42280	50171,94	,2736606	2,5607647E-02	-1,920895	195851,7	409,0876
12	1165,744	17,47361	51029,65	,2367515	2,3592187E-02	-1,634454	218664,3	449,9460
13	1164,699	20,6[illegible]	51775,03	,2557001	2,2960391E-02	-1,905463	242908,3	490,4440
14	1163,640	22,91606	52722,03	,2624406	2,1909519E-02	-1,654160	268560,4	530,1877
15	1162,556	25,76231	53904,13	,2051125	2,1635042E-02	-1,966024	295775,6	569,3559
16	1161,440	28,14423	55179,16	,1782509	2,1104220E-02	-1,876462	324044,6	607,7216
17	1160,321	[illegible]	56056,55	,1623896	2,0596467E-02	-1,823892	355113,6	645,1821
18	1159,170	32,16763	56900,23	,1514643	2,0255574E-02	-1,801755	387084,5	681,4428
19	1158,012	34,95789	57616,03	,1490336	2,0209494E-02	-1,862052	420397,6	715,9796
20	1156,836	36,90505	58103,28	,1364975	1,9803547E-02	-1,765968	455033,7	748,5163
21	1155,651	38,90565	58508,33	,1263753	1,9711019E-02	-1,731624	490847,4	778,8771
22	1154,456	41,[illegible]	58816,77	,1232797	1,9672607E-02	-1,750710	527671,0	806,6532
23	1153,268	43,65522	[illegible]	,1160904	1,9572194E-02	-1,702333	565164,8	831,0738
24	1152,05[illegible]	[illegible]	[illegible]	,1067672	1,9467275E-02	-1,611059	602941,4	851,5679
25	1150,927	46,[illegible]	56820,30	,1010822	1,9450760E-02	-1,558660	640802,7	868,0636
26	1149,782	[illegible]	[illegible]	9,6869925E-02	1,9521316E-02	-1,517965	678552,6	880,4244
27	1148,655	49,26953	54835,68	8,6063975E-02	1,9625990E-02	-1,371419	715975,0	888,5723
28	1147,551	[illegible]	53670,12	8,1527363E-02	2,0362658E-02	-1,304824	752612,5	892,5863
29	1146,472	51,75567	52635,12	7,9002540E-02	2,1110529E-02	-1,270505	788765,9	892,2598
30	1145,419	52,77243	51110,40	7,3079686E-02	2,1947732E-02	-1,182036	823692,0	887,7489
31	1144,396	53,63706	50268,91	6,7068339E-02	2,2764347E-02	-1,091369	857668,1	879,7131
32	1143,381	54,42958	49425,83	6,4353408E-02	2,3555180E-02	-1,026956	890944,8	869,0042
33	1142,393	55,17537	48532,02	6,2312231E-02	2,4524373E-02	-,9826360	923404,7	855,7536
34	1141,428	55,82438	47519,06	5,9511044E-02	2,5377767E-02	-,9264419	954995,8	840,1921
35	1140,401	56,35602	46612,46	5,5058309E-02	2,6124382E-02	-,8590273	985722,8	822,6585
36	1139,557	56,32830	45575,08	5,3609210E-02	2,6815754E-02	-,8098915	1015586	803,4673
37	1138,657	57,23110	44510,06	5,1710906E-02	2,7402774E-02	-,7640677	1044581	782,8752
38	1137,780	57,54709	43410,05	4,9063151E-02	2,7805616E-02	-,7126490	1072720	761,1488
39	1136,926	56,82950	42303,05	-4,7090691E-02	2,8334019E-02	,5034132	1100375	739,3597
40	1135,095	55,73091	41206,65	4,5870078E-02	2,8729543E-02	-,6330565	1127104	717,9444
41	1135,288	55,05311	40072,61	4,5765074E-02	2,8969690E-02	-,6128431	1152779	695,5256
42	1134,595	55,06508	39936,30	4,4602627E-02	2,9135045E-02	-,5804338	1177667	672,7265
43	1133,740	55,02769	37936,11	4,4419063E-02	2,9208283E-02	-,5597140	1201870	649,8095
44	1133,006	55,06503	36920,51	4,5612421E-02	2,9190057E-02	-,5556849	1225460	626,9552
45	1132,287	53,20604	35904,06	-5,7094468E-02	2,9089857E-02	,5164058	1248572	604,6356
46	1131,590	51,17776	34917,11	-6,2380641E-02	2,9055383E-02	,5224250	1271007	583,5352
47	1130,915	48,02609	33903,53	-6,5103451E-02	2,9032952E-02	,5093223	1292837	563,7748
48	1131,265	47,67314	33038,71	4,5463195E-02	2,9099511E-02	-,4830470	1314091	545,1512
49	1129,625	45,16800	32107,74	4,5785870E-02	2,9019262E-02	-,4702032	1334670	526,6979
50	1128,109	44,77811	31173,56	4,3814995E-02	2,8922679E-02	-,4376669	1354662	508,5093
51	1128,413	[illegible]	30236,79	4,3450739E-02	2,8744863E-02	-,4231237	1374071	490,6448

TRAJECTORY NUMBER 4.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3,00 15 MAY 1972

[illegible] TO ENERGY

	MASS	ALPHA	HEIGHT	CL	CD	ANZH7B	ESPEF	DYNPP
52	1127,837	47,70157	27305,56	3,8462315E-02	2,860030FE-02	-,3670476	1392890	473,1439
53	1127,261	[illegible]	[illegible]	-7,[illegible]E-02	2,8173099E-02	,5482622	1411171	456,3127
54	1126,744	[illegible]	[illegible]	-7,[illegible]E-02	2,7930482E-02	,5043993	1428933	440,8324
55	1126,224	[illegible]	[illegible]	4,4616066E-02	2,786510EF-02	-,3740650	1446113	426,4703
56	1125,720	[illegible]	[illegible]	4,962[illegible]E-02	2,757874GF-02	-,3977060	1462791	412,6117
57	1125,236	41,[illegible]	[illegible]	5,2251369E-02	2,7338119F-02	-,4031205	1479026	399,2071
58	[illegible]	[illegible]	23530,60	4,[illegible]E-02	2,7107614F-02	-,3691402	1494812	386,2483
59	[illegible]	[illegible]	[illegible],25	5,3[illegible]E-02	2,6814645F-02	-,3869176	1510157	373,7569
60	1123,[illegible]	[illegible]	23136,49	5,1497723E-02	2,6535661F-02	-,3612902	1525064	361,7253
61	1123,402	[illegible]	22457,63	6,1[illegible]E-02	2,6212272F-02	-,4068307	1539540	350,1570
62	1122,977	[illegible]	[illegible]	-9,[illegible]E-02	2,5935698E-02	,3244282	1553574	339,1509
63	1122,[illegible]	[illegible]	21170,37	6,5247860E-02	2,5697871E-02	-,4110578	1567179	329,0384
64	1122,165	[illegible]	[illegible]	6,7272610E-02	2,5465466E-02	-,4053134	1580402	319,4200
65	1121,775	[illegible]	[illegible]	7,3557[illegible]E-02	2,5219624F-02	-,4267448	1593227	310,1957
66	1121,393	33,[illegible]	[illegible]	7,3423167E-02	2,4705597F-02	-,4125027	1605684	300,2066
67	1121,[illegible]	32,[illegible]	[illegible]	7,[illegible]E-02	2,4278186E-02	-,4036092	1617608	290,5390
68	1120,[illegible]	[illegible]	[illegible]	7,5307759E-02	2,3806653F-02	-,3960849	1629604	281,4239
69	1120,317	[illegible]	[illegible]	7,7[illegible]E-02	2,3363527E-02	-,3950371	1641076	272,8468
70	1119,[illegible]	[illegible]	[illegible]	9,7025315E-02	2,3151201F-02	-,3721953	1652219	264,7645
71	1119,647	[illegible]	[illegible]	,1317744	2,2847639F-02	-,4745530	1663032	257,1105
72	1119,325	[illegible]	[illegible]	,1082193	2,2590061F-02	-,4746016	1673530	249,8671
73	1119,012	[illegible]	[illegible]	,1265249	2,2415231E-02	-,5291501	1683712	243,0069
74	1118,707	27,[illegible]	15305,69	,1162757	2,2005513F-02	-,4977768	1693600	236,5010
75	1118,[illegible]	[illegible]	[illegible],63	,1194824	2,1806419F-02	-,4970038	1703252	230,3817
76	1118,[illegible]	[illegible]	[illegible],58	,1270013	2,1672735E-02	-,5170660	1712672	224,6353
77	1117,[illegible]	25,[illegible]	14514,97	,1294738	2,1565502F-02	-,5110129	1721860	219,2363
78	1117,510	[illegible]	[illegible],31	,1273075	2,1370601F-02	-,4917763	1730831	214,1846
79	1117,274	23,[illegible]	[illegible],51	,1265005	2,1218284F-02	-,4779421	1739598	209,4868
80	1117,[illegible]	22,[illegible]	[illegible]	,1316951	2,1246650F-02	-,4869175	1748161	205,1372
81	1116,[illegible]	21,[illegible]	13126,70	,1260615	2,1040749F-02	-,4641802	1756537	201,1323
82	1116,[illegible]	20,[illegible]	[illegible]	,1342488	2,1123481F-02	-,4769075	1764733	197,4726
83	1115,225	[illegible]	12653,16	,1742574	2,2024530F-02	-,6007140	1772701	194,0998
84	1115,970	[illegible]	[illegible],58	,1706940	2,1878672F-02	-,5795027	1780476	190,9599
85	1115,726	[illegible]	[illegible],57	,1756415	2,1950163F-02	-,5866023	1788102	188,0648
86	1115,483	[illegible]	11985,21	,1744349	2,1868707E-02	-,5745762	1795588	185,4113
87	1115,243	17,27265	11796,51	,1616800	2,1142932F-02	-,4746284	1802983	183,0362
88	1115,[illegible]	[illegible]	[illegible]	,1715789	2,1771691F-02	-,5520682	1810259	180,9585
89	1114,773	15,[illegible]	11607,3[illegible]	,1629213	2,1049639E-02	-,4592269	1817435	179,1650
90	1114,542	[illegible]	11329,[illegible]	,1375008	2,0908526F-02	-,4390970	1824553	177,7097
91	1114,313	13,[illegible]	[illegible]	,1290728	2,0659908F-02	-,4128929	1831617	176,6110
92	1114,[illegible]	[illegible]	11170,73	,1240219	2,0897951E-02	-,4075009	1838649	175,8879
93	1113,860	[illegible]	11125,93	,1382420	2,1283168F-02	-,4362124	1845637	175,5329
94	1113,635	9,577202	11045,70	,1260949	2,1106609F-02	-,3998187	1852612	175,5474
95	1113,410	8,[illegible]	[illegible],31	,1309006	2,1418530F-02	-,4153714	1859590	175,9493
96	1113,165	7,[illegible]	[illegible]	,1370393	2,1791465F-02	-,4355328	1866563	176,7283
97	1112,961	[illegible]	11122,55	,1265736	2,1835728F-02	-,4066683	1873563	177,8923
98	1112,746	[illegible]	[illegible],45	,1434357	2,3238765F-02	-,5242452	1880546	179,4210
99	1112,51[illegible]	4,[illegible]	11253,49	,1347212	2,3617196F-02	-,4396499	1887555	181,2929
100	1112,244	3,[illegible]	11315,65	,1579700	2,4151156F-02	-,5180030	1894604	183,5385
101	1112,056	2,[illegible]	11419,68	,1495592	2,4569755F-02	-,4986397	1901682	186,1328
102	1111,927	1,[illegible]	11531,06	,1406750	2,5341640F-02	-,4908592	1908815	189,0968

TRAJECTORY NUMBER 4.

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS OF POOR QUALITY

ATP? [illegible] ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE [illegible] STAGE 1 CYCLE 10 PASS 2 PAGE 176

FULL OPTIMIZATION TO ENERGY

	ALTMS	ALPHA	[illegible]	CL	CD	AMZH76	ESPEF	DYNPP
103	1111,595	.6466710	11604,50	.1630367	2.0955452E-02	-.5270618	1915982	192.4312
104	1111,312	-.3930208	11814,43	.1659040	2.7300063E-02	-.5133562	1923191	196.1351
105	111[illegible],176	-1.330209	11991,25	.1382716	2.6373136E-02	-.4976309	1930447	200.2276
106	111[illegible],887	-2.187205	12115,10	.1615531	2.9632975E-02	-.5200348	1937740	204.7236
107	111[illegible],006	-3.113907	12399,03	.1247251	3.0753106E-02	-.4711526	1945080	209.6407
108	111[illegible],300	-4.250809	12621,36	.1227046	3.2237948E-02	-.4779527	1952468	215.0189
109	111[illegible],[illegible]	-5.[illegible]05	12[illegible],21	.1115363	3.3718065E-02	-.4485664	1959695	220.8804
110	11[illegible],[illegible]	-5.[illegible]65	13177,25	9.6[illegible]E-02	3.5352908E-02	-.4012291	1967355	227.2678
111	11[illegible],[illegible]	-10.15799	[illegible]	-5.5761493E-02	3.7144928E-02	.1971445	1974780	234.2975
112	11[illegible],[illegible]	-12.72736	13653,10	-7.7769254E-02	3.8602797E-02	.2960601	1982326	242.4373
113	11[illegible],[illegible]	-12.72736	13653,10	-7.7764254E-02	3.8602797E-02	.2960601	1982326	242.4373
114	11[illegible],[illegible]	-12.[illegible]736	13653,10	-7.7764254E-02	3.8602797E-02	.2960601	1982326	242.4373
115	11[illegible],336	-12.85943	13906,91	-7.6773192E-02	3.8740552E-02	.2928631	1982974	243.1912

TRAJECTORY NUMBER 4.

[illegible] OPTIMIZATION [illegible] ENERGY

	TI E	V?77F	HGL7F	G?M7D	VI77F	RG77N	AMACH	AMASF1
1	0.	[illegible]	45?55,22	-11,55520	2549,029	0,	1,066934	15839,95
2	1,000000	[illegible]	450?7,74	-1?,84793	25?1,556	,1667902	1,081420	16314,74
3	2,000000	[illegible]	44627,51	-13,43695	2573,361	,3353540	1,096302	16869,61
4	3,000000	1975,775	44576,48	-13,70035	2586,975	,5059331	1,111251	17470,09
5	4,000000	[illegible]	44317,69	-13,76835	2601,104	,6786888	1,126199	18092,66
6	5,000000	[illegible]	[illegible]	-13,68050	2615,560	,8537823	1,141076	18732,74
7	6,000000	11?0,960	[illegible]	-13,51152	2532,185	1,031214	1,155855	19367,05
8	7,000000	1133,208	43575,86	-13,26990	2641,913	1,211144	1,170619	20055,89
9	8,000000	1147,558	43275,96	-13,05711	2059,690	1,393093	1,185401	20739,33
10	9,000000	1161,908	43117,43	-12,83136	2074,486	1,576340	1,200224	21435,74
11	10,000000	1176,278	4270?,05	-12,56743	2689,348	1,765667	1,215068	22015,79
12	11,000000	[illegible]	42515,12	-12,29206	2704,303	1,955052	1,229679	22597,61
13	12,000000	1203,903	42253,14	-11,99165	2719,258	2,147797	1,244679	23180,39
14	13,000000	1219,331	420?4,10	-11,72938	2734,171	2,342641	1,259541	23765,75
15	14,000000	1233,803	41757,28	-11,46907	2749,109	2,539984	1,274490	24354,85
16	15,000000	1248,208	41512,41	-11,22287	2764,132	2,739826	1,289463	24946,39
17	16,000000	1262,763	41271,79	-10,?0325	2779,230	2,942248	1,304395	25537,62
18	17,000000	1277,187	41655,13	-1?,56461	2794,292	3,147168	1,319304	26127,55
19	18,000000	1291,0?2	[illegible]	-1?,31707	2809,273	3,354669	1,334257	26718,05
20	19,000000	1306,255	40572,21	-10,05139	2824,222	3,564668	1,349278	27310,79
21	20,000000	1321,750	40344,08	-9,851864	2839,208	3,777166	1,364311	27905,08
22	21,000000	1335,265	40120,63	-9,565369	2854,232	3,992164	1,379287	28498,19
23	22,000000	1349,083	39911,19	-9,240989	2869,246	4,209741	1,394197	29115,52
24	23,000000	1364,159	39666,69	-8,956562	2884,199	4,429817	1,409114	29770,51
25	24,000000	1378,620	39475,93	-8,737346	2899,049	4,652392	1,424082	30428,22
26	25,000000	1393,138	39217,85	-8,563400	2915,881	4,877466	1,439080	31086,22
27	26,000000	1407,618	3906?,09	-8,339251	2928,717	5,105039	1,454066	31703,29
28	27,000000	1422,068	38855,60	-8,064824	2945,569	5,335031	1,468985	32397,07
29	28,000000	1436,435	38682,36	-7,797395	2958,378	5,567602	1,483804	33044,19
30	29,000000	1450,882	38479,28	-7,487881	2973,112	5,802672	1,498521	33683,54
31	30,000000	1461,780	38274,80	-7,143439	2987,745	6,040161	1,513090	34312,10
32	31,000000	1478,784	38100,01	-6,801371	3002,199	6,280149	1,527498	34928,21
33	32,000000	1492,939	37930,15	-6,494067	3016,434	6,522555	1,541758	35532,52
34	33,000000	1506,222	37768,09	-6,226606	3030,474	6,767379	1,555893	36126,92
35	34,000000	1519,501	37607,05	-5,940320	3044,347	7,014542	1,569920	36712,99
36	35,000000	1533,208	37456,13	-5,810514	3058,073	7,263961	1,583862	37292,69
37	36,000000	1546,713	37296,63	-5,624918	3071,703	7,515719	1,597714	37867,02
38	37,000000	1559,966	37147,49	-5,386498	3085,241	7,769733	1,611399	38459,50
39	38,000000	1573,067	37010,16	-5,126251	3098,562	8,026005	1,624880	39045,86
40	39,000000	1586,864	36866,46	-4,871541	3111,719	8,284534	1,638161	39620,84
41	40,000000	1598,560	36735,63	-4,595995	3124,044	8,545239	1,651214	40182,27
42	41,000000	1610,321	36610,12	-4,347239	3137,317	8,808041	1,664044	40729,52
43	42,000000	1623,153	36490,42	-4,124729	3149,754	9,073019	1,676680	41264,03
44	43,000000	1635,236	36376,45	-3,829651	3161,982	9,340012	1,689132	41788,88
45	44,000000	1647,786	36236,67	-3,701465	3174,020	9,609021	1,701402	42302,70
46	45,000000	1658,702	36161,58	-3,547682	3185,884	9,880045	1,713494	42805,81
47	46,000000	1670,335	36001,44	-3,349969	3197,580	10,15308	1,724708	43278,84
48	47,000000	1681,710	35905,36	-3,155277	3209,104	10,42798	1,735708	43736,85
49	48,000000	1692,981	35875,23	-2,971508	3220,456	10,70461	1,746578	44184,28
50	49,000000	1704,029	35790,61	-2,814257	3231,646	10,98349	1,757333	44622,20
51	50,000000	1715,018	35700,12	-2,709492	3242,690	11,26403	1,768000	45053,32

TRAJECTORY NUMBER 5.

[illegible] III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM [illegible]

FUEL MINIMIZATION TO ENERGY

	TIME	VR77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
52	51.00000	1725.959	35628,02	-2.416347	3253,636	11.54642	1.778583	45479,55
53	52.00000	1736.691	35551,11	-2.497822	3264.450	11.83058	1.789031	45898,98
54	53.00000	1747.235	35477,40	-2,344259	3275.119	12.11652	1.799333	46309,26
55	54.00000	1757.680	35404,39	-2.167544	3285.656	12.40423	1.809524	46607,14
56	55.00000	1768.015	35340,70	-1.963423	3296.090	12.69371	1.819639	47301,98
57	56.00000	1778.197	35287,94	-1.691707	3306.371	12.98469	1.829626	47781,58
58	57.00000	1788.218	35237,45	-1.418665	3316.505	13.27776	1.839557	48244,76
59	58.00000	1798.109	35197,38	-1.245039	3326.545	13.57252	1.849468	48696,40
60	59.00000	1808.043	35161,29	-1.047329	3336.478	13.86850	1.859325	49135,54
61	60.00000	1817.874	35131,36	-.8430164	3346.295	14.16437	1.869120	49561,07
62	61.00000	1827.548	35107,78	-.6397712	3355.995	14.46577	1.878857	49972,16
63	62.00000	1837.039	35092,79	-.4155707	3365.555	14.76686	1.888511	50366,93
64	63.00000	1846.301	35081,59	-.1860110	3374,925	15,06941	1.898046	50740,81
65	64.00000	1855.409	35081,15	.1111749	3384.135	15.37356	1.907508	51092,79
66	65.00000	1864.365	35088,31	.3199259	3393.188	15.67917	1.916867	51424,42
67	66.00000	1873.163	35101,76	.5038114	3402,090	15.98631	1.926175	51737,84
68	67.00000	1882.361	35121,23	.6836522	3410,861	16.29482	1.935390	52033,96
69	68.00000	1891.059	35146,07	.8609408	3419.506	16.60478	1.944535	52312,57
70	69.00000	1899.678	35178,05	1.035849	3428,024	16.91619	1.953613	52573,39
71	70.00000	1908.058	35215,33	1.207370	3436,417	17,22869	1.962624	52816,14
72	71.00000	1916.342	35258,81	1.372563	3444,688	17.54305	1.971569	53040,70
73	72.00000	1924.501	35307,08	1.530361	3452,841	17.85840	1.980450	53247,27
74	73.00000	1932.601	35361,17	1.683513	3460,881	18.17522	1.989272	53436,03
75	74.00000	1940.685	35420,04	1.835741	3468,808	18.49320	1.998037	53606,87
76	75.00000	1948.567	35485,60	1.995427	3476,610	18.81255	2,006743	53818,19
77	76.00000	1956.321	35556,47	2.166340	3484,279	19.13316	2.015375	54026,47
78	77.00000	1963.938	35633,50	2.342022	3491.798	19.45497	2.023929	54213,35
79	78.00000	1971.416	35717,01	2.519333	3499.167	19,77799	2.032405	54378,17
80	79.00000	1978.743	35806,80	2.696911	3506.387	20.10213	2,040801	54520,48
81	80.00000	1985.947	35913,24	2.874167	3513.458	20.42741	2,049118	54639,94
82	81.00000	1992.909	36021,06	3.050927	3520,377	20.75390	2,057356	54736,28
83	82.00000	1999.707	36115,38	3.227009	3527.146	21.08143	2.065516	54814,29
84	83.00000	2006.652	36251,22	3.402334	3533,761	21.41002	2.072643	54852,75
85	84.00000	2013.283	36353,50	3.576017	3540,220	21.73957	2.079675	54850,28
86	85.00000	2019.787	36482,10	3,749245	3546,524	22.07024	2.086352	54821,62
87	86.00000	2026.060	36617,07	3.914465	3552,672	22.40181	2.092473	54766,69
88	87.00000	2032.250	36757,73	4.082790	3558,668	22.73442	2.099237	54665,69
89	88.00000	2038.237	36906,69	4.224803	3564,535	23.06784	2.105452	54579,87
90	89.00000	2044.159	37059,10	4.330121	3570,314	23.40231	2.111539	54452,27
91	90.00000	2049.905	37216,88	4.557439	3575,829	23.73758	2.117505	54302,20
92	91.00000	2055.161	37380,97	4.691662	3580,959	24,07366	2.123244	54109,83
93	92.00000	2060.712	37560,69	5.291561	3585,688	24.41047	2.128060	53666,23
94	93.00000	2065.682	37750,09	4.673898	3591,477	24.74800	2.133812	53000,05
95	94.00000	2071.303	37893,47	3.374057	3596,611	25.08698	2.139701	53462,42
96	95.00000	2077.760	37997,90	2.068132	3605,937	25.42741	2.146279	53469,68
97	96.00000	2084.767	38047,90	.8053735	3613,434	25.76921	2.153517	53621,47
98	97.00000	2092.591	38055,04	-.4938014	3621,243	26.11231	2.161527	53922,18
99	98.00000	2101.113	38013,10	-1.848619	3629,404	26.45669	2.170402	54386,00
100	99.00000	2110.920	37926,06	-3.219744	3637,864	26.80228	2.180118	55018,39
101	100.00000	2120.746	37776,03	-4.580487	3646,642	27.14900	2.190682	55825,34
102	101.00000	2131.366	37542,25	-5.054553	3656,623	27.49693	2,201653	56776,73

TRAJECTORY NUMBER 5.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

ATOP - 1971 ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

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FUEL MINIMIZATION TO ENERGY

	TIME	VC77F	HC77F	GAM7D	VI77F	RG77N	AMACH	AMASF1
103	101.8706	21311.366	37592.25	-5.854553	3056.623	27.49693	2.201653	56776.73
104	101.8706	21440.843	37430.35	-4.946494	3066.238	27.80133	2.211452	57698.09
105	101.8706	21440.843	37430.34	-4.946494	3066.238	27.80133	2.211452	57698.09
106	101.8711	21440.869	37431.25	-4.946444	3066.244	27.80140	2.211458	57698.66

TRAJECTORY NUMBER 5.

ORIGINAL PAGE IS OF POOR QUALITY

FUEL OPTIMIZATION TO ENERGY

	AMASS	ALPHA	TETTE	CL	CD	ANZHTG	ESPEE	DYNPP
1	1107,336	-12,25059	13776,91	-2,7022806E-02	3,9554037E-02	9,3378453E-02	1982974	243,1910
2	1107,058	-11,60415	14303,48	,1092448	4,0502177E-02	-,5031664	1990498	252,5017
3	1106,772	-11,36767	14785,43	,1520943	4,3126513E-02	-,7167815	1998029	262,4999
4	1106,476	-11,56127	15301,10	,1754572	4,5318517E-02	-,8554991	2005491	272,9672
5	1106,169	-11,41596	15831,11	,1776604	4,7004146E-02	-,9500512	2012959	283,8352
6	1107,651	-11,24616	16369,01	,1054817	4,8816882E-02	-1,029940	2020456	295,0417
7	1107,522	-11,01464	16916,20	,1065173	4,9523262E-02	-1,073375	2028026	306,5473
8	1107,191	-10,83015	17466,72	,1019597	4,5797252E-02	-1,090123	2035799	318,3810
9	1106,829	-10,68902	18031,55	,1852523	4,9917196E-02	-1,093870	2043634	330,5594
10	1106,465	-10,54506	18594,57	,1771921	4,9907265E-02	-1,087902	2052158	343,0992
11	1106,090	-10,30782	19164,92	,1754938	5,0046103E-02	-1,118501	2060755	355,9958
12	1105,705	-10,01818	19716,23	,1750854	5,0101900E-02	-1,157579	2069591	369,2067
13	1105,309	-9,731221	20213,30	,1659262	4,9602691E-02	-1,139463	2078721	382,7328
14	1104,903	-9,723345	20827,55	,1642456	4,9437793E-02	-1,114752	2088220	396,6281
15	1104,489	-9,586162	21402,27	,1504361	4,9125652E-02	-1,113295	2098099	410,9253
16	1104,063	-9,296170	21961,63	,1502490	4,9141584E-02	-1,152044	2108293	425,5894
17	1103,627	-8,072860	22501,28	,1500478	4,9177438E-02	-1,190840	2118755	440,5573
18	1103,181	-8,751583	23145,20	,1415754	4,8693220E-02	-1,165207	2129537	455,8213
19	1102,725	-8,416526	23737,93	,1322741	4,8528673E-02	-1,129236	2140702	471,4390
20	1102,258	-8,648980	24365,11	,1255388	4,8250391E-02	-1,110439	2152252	487,4526
21	1101,782	-8,401640	24926,30	,1250679	4,8303470E-02	-1,107209	2164109	503,8338
22	1101,295	-8,018779	25521,10	,1252313	4,8346546E-02	-1,183126	2176217	520,5097
23	1100,797	-7,733452	26145,33	,1231095	4,8320014E-02	-1,201870	2188593	537,4407
24	1100,289	-7,695584	26762,73	,1144468	4,8091102E-02	-1,157302	2201345	554,6705
25	1099,770	-7,635956	27410,46	,1052148	4,7835331E-02	-1,101652	2214493	572,2631
26	1099,240	-7,317721	28041,20	,1036659	4,7860084E-02	-1,120591	2227969	590,2367
27	1098,696	-7,227009	28673,70	,1004423	4,7815964E-02	-1,120994	2241730	608,5568
28	1098,142	-6,800134	29315,70	,1036011	4,8345044E-02	-1,192130	2255706	627,1520
29	1097,577	-6,887863	29935,85	,1002236	4,7971008E-02	-1,187571	2269911	645,9476
30	1097,001	-6,373201	31557,06	,1005668	4,8068399E-02	-1,226506	2284349	664,9131
31	1096,416	-6,207566	31172,30	9,4540018E-02	4,8119309E-02	-1,250888	2298983	683,9592
32	1095,816	-5,903133	31777,75	9,5667228E-02	4,8159039E-02	-1,236824	2313812	703,0337
33	1095,208	-5,687301	32370,20	8,8176498E-02	4,8164964E-02	-1,201068	2328837	722,1405
34	1094,589	-5,410235	32943,01	8,5469413E-02	4,8165487E-02	-1,177269	2344054	741,3140
35	1093,960	-5,270034	33515,67	8,1453896E-02	4,8146925E-02	-1,148720	2359459	760,5834
36	1093,321	-5,180065	34123,04	7,6709354E-02	4,8105662E-02	-1,113030	2375055	779,9925
37	1092,672	-5,012967	34698,70	7,6617327E-02	4,8136396E-02	-1,139649	2390808	799,5518
38	1092,013	-4,695073	35156,62	7,9320058E-02	4,8171036E-02	-1,206812	2406626	619,1377
39	1091,344	-4,603565	35670,17	7,5344226E-02	4,8057737E-02	-1,176973	2422494	638,6377
40	1090,665	-4,320188	36133,53	7,5289198E-02	4,8024875E-02	-1,203551	2438407	658,0435
41	1089,976	-3,970046	36584,48	7,4506129E-02	4,7981562E-02	-1,216684	2454329	877,2760
42	1089,277	-3,705568	37063,55	7,0592437E-02	4,7840197E-02	-1,178745	2470274	896,3090
43	1088,569	-3,591161	37451,46	6,7382554E-02	4,7810471E-02	-1,156805	2486246	915,1872
44	1087,852	-3,428362	37864,79	6,5013924E-02	4,7725274E-02	-1,141670	2502235	933,9331
45	1087,126	-3,277045	38278,05	6,3832043E-02	4,7648910E-02	-1,144008	2518224	952,5459
46	1086,391	-3,052265	38678,51	6,3027539E-02	4,7537246E-02	-1,153458	2534219	971,0096
47	1085,648	-2,861527	39054,37	6,1436825E-02	4,7426194E-02	-1,155407	2550235	988,4675
48	1084,897	-2,470864	39410,30	6,1486724E-02	4,7310633E-02	-1,151873	2566275	1005,701
49	1084,138	-2,519450	39760,13	5,9415466E-02	4,7186244E-02	-1,139604	2582338	1022,733
50	1083,371	-2,406759	40113,75	5,6107206E-02	4,7041487E-02	-1,108772	2598437	1039,611
51	1082,597	-2,380845	40452,48	5,1073580E-02	4,6964017E-02	-1,049412	2614599	1056,413

.TRAJECTORY NUMBER 5.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHA	THETA	CL	CD	AMZRTG	ESPEF	DYNPP
52	1081.815	-2.561233	40787.17	5.2410650E-02	4.0784943E-02	-1.074765	2630774	1073.177
53	1081.026	-2.118965	41116.25	5.2740308E-02	4.0704514E-02	-1.098232	2646911	1089.830
54	1080.236	-1.923027	41437.63	5.3052410E-02	4.0645681E-02	-1.139158	2662994	1106.294
55	1079.420	-1.736159	41725.64	5.3573812E-02	4.0538968E-02	-1.148942	2679095	1122.541
56	1078.614	-1.408986	42208.88	5.4675074E-02	4.0468771E-02	-1.188427	2695282	1138.569
57	1077.793	-1.121103	42577.73	5.7052730E-02	4.0401159E-02	-1.273101	2711487	1154.216
58	1076.960	-.5611605	42930.96	5.2394443E-02	4.6213998E-02	-1.174434	2727844	1169.468
59	1076.127	-.5122848	43272.94	5.1322798E-02	4.6004664E-02	-1.167636	2744390	1184.468
60	1075.282	-.5063743	43603.27	5.0873108E-02	4.5971637E-02	-1.173094	2761050	1199.180
61	1074.430	-.3670018	43921.19	5.0508097E-02	4.5801334E-02	-1.179997	2777809	1213.572
62	1073.571	-.1659520	44220.18	4.9713656E-02	4.5752746E-02	-1.177040	2794670	1227.621
63	1072.704	8.2486715E-02	44516.92	5.0812946E-02	4.5675506E-02	-1.215351	2811592	1241.270
64	1071.831	.3657809	44789.86	5.2347505E-02	4.5634760E-02	-1.263679	2828521	1254.383
65	1070.952	.6155803	45019.11	4.9703910E-02	4.5459301E-02	-1.216946	2845552	1266.947
66	1070.067	.7697040	45281.33	4.6033571E-02	4.5426850E-02	-1.165562	2862640	1279.002
67	1069.176	.9622316	45503.58	4.6238049E-02	4.5341809E-02	-1.160822	2879743	1290.602
68	1068.280	1.133960	45711.74	4.5673657E-02	4.5252995E-02	-1.158480	2896887	1301.777
69	1067.379	1.311566	45905.76	4.5166967E-02	4.5102362E-02	-1.156890	2914071	1312.523
70	1066.473	1.492956	46085.56	4.4705398E-02	4.5070993E-02	-1.154990	2931295	1322.834
71	1065.564	1.666748	46251.05	4.4121073E-02	4.4979872E-02	-1.151470	2948555	1332.704
72	1064.650	1.831104	46412.28	4.3043509E-02	4.4890448E-02	-1.143849	2965847	1342.130
73	1063.732	1.987692	46539.55	4.2816187E-02	4.4799188E-02	-1.137029	2983167	1351.121
74	1062.811	2.137756	46663.12	4.2385747E-02	4.4704375E-02	-1.134523	3000516	1359.663
75	1061.887	2.307321	46773.00	4.2113741E-02	4.4607213E-02	-1.135472	3017896	1367.817
76	1060.960	2.481271	46871.24	4.2443709E-02	4.4523677E-02	-1.150830	3035298	1375.502
77	1060.029	2.655770	46955.35	4.2512846E-02	4.4449940E-02	-1.159263	3052699	1382.686
78	1059.098	2.830878	47023.87	4.2602483E-02	4.4378808E-02	-1.162791	3070092	1389.335
79	1058.156	3.004132	47076.38	4.2260948E-02	4.4306904E-02	-1.164146	3087470	1395.431
80	1057.216	3.177938	47112.64	4.2035995E-02	4.4239662E-02	-1.164554	3104830	1400.962
81	1056.274	3.351525	47132.51	4.1847046E-02	4.4170862E-02	-1.164559	3122168	1405.919
82	1055.329	3.524970	47135.87	4.1670507E-02	4.4102438E-02	-1.164380	3139480	1410.295
83	1054.384	3.697980	47121.32	4.1507783E-02	4.4034398E-02	-1.164052	3156763	1414.086
84	1053.437	3.871245	47085.19	4.1384501E-02	4.3972986E-02	-1.163422	3174006	1416.258
85	1052.489	4.043361	46990.90	4.1296408E-02	4.3915434E-02	-1.162774	3191206	1417.280
86	1051.543	4.214916	46874.64	4.1177408E-02	4.3859340E-02	-1.160762	3208354	1417.621
87	1050.596	4.384118	46749.10	4.0090055E-02	4.3804925E-02	-1.156413	3225402	1417.284
88	1049.651	4.531960	46603.61	4.0592110E-02	4.3752982E-02	-1.146038	3242461	1416.281
89	1048.708	4.651456	46437.18	3.9684910E-02	4.3607564E-02	-1.121377	3259413	1414.654
90	1047.767	4.697280	46258.29	3.7624781E-02	4.3626982E-02	-1.064753	3276305	1412.496
91	1046.829	5.576983	46060.24	4.8154699E-02	4.3503050E-02	-1.339816	3293165	1409.796
92	1045.892	5.860777	45828.07	4.9156218E-02	4.3433543E-02	-1.363109	3309969	1406.009
93	1044.959	6.074863	45557.73	5.2078438E-02	4.3462638E-02	-1.434709	3326604	1400.896
94	1044.031	3.325170	45271.02	-2.3719917E-02	4.3053613E-02	.5249611	3342796	1395.232
95	1043.107	2.119816	45183.06	-2.2121464E-02	4.3433578E-02	.4839628	3359228	1393.210
96	1042.184	.7340587	45026.35	-2.2099946E-02	4.3341979E-02	.4927496	3375581	1395.193
97	1041.260	-.8933964	45182.07	-1.9667806E-02	4.3370013E-02	.4088918	3391821	1401.132
98	1040.332	-1.881821	45257.52	-2.4374710E-02	4.3041219E-02	.5512192	3408210	1411.163
99	1039.397	-3.264526	45568.13	-2.4681703E-02	4.2957688E-02	.5658143	3424858	1425.697
100	1038.453	-4.490179	46012.44	-2.5652790E-02	4.2821720E-02	.6093389	3441697	1444.915
101	1037.496	-5.667604	46596.55	-2.4115068E-02	4.2722910E-02	.5692993	3458737	1469.050
102	1036.523	-3.614605	47268.10	3.8073276E-02	4.2560948E-02	-1.163346	3475451	1496.917

TRAJECTORY NUMBER 5.

FUEL OPTIMIZATION TO ENERGY

	MASS	ALPHD	TE77D	CL	CD	ANZB7G	ESPEF	DYNPP
103	1038,578	-[illegible]	47288,10	3,847327E-02	4,2560988E-02	-1,163346	3475451	1496,917
104	1035,663	-4,643277	47914,16	3,4685291E-02	4,2510739E-02	-1,076067	3490546	1522,027
105	1035,663	-4,643277	47914,16	3,4685291E-02	4,2510739E-02	-1,076067	3490546	1522,027
106	1035,663	-4,643277	47914,55	3,4683532E-02	4,2510709E-02	-1,076028	3490557	1522,042

TRAJECTORY NUMBER 5.

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	2140.859	37430.25	-4.906443	3666.245	0.	2.211458	57698.67
2	1.0000000	2148.935	37274.98	-5.391373	3676.068	.3513962	2.219801	58537.05
3	2.000000	2156.858	37175.33	-1.916430	3684.648	.7046465	2.227572	59199.05
4	3.000000	2163.700	37128.33	-.6421450	3692.424	1.059428	2.235149	59708.30
5	4.000000	2170.747	37126.12	.5427758	3699.394	1.415500	2.242332	60073.64
6	5.000000	2177.087	37169.37	1.722865	3705.531	1.772620	2.248840	60277.48
7	6.000000	2183.117	37254.37	2.684949	3710.825	2.130065	2.255109	60349.50
8	7.000000	2189.209	37370.30	3.337446	3716.386	2.489117	2.261402	60331.97
9	8.000000	2195.160	37507.74	3.845317	3721.845	2.848574	2.267550	60242.12
10	9.000000	2200.944	37668.00	4.603306	3726.059	3.208677	2.272802	60038.84
11	10.000000	2204.984	37858.85	5.236402	3729.954	3.569182	2.277697	59765.68
12	11.00000	2209.432	38068.13	5.644202	3734.004	3.930172	2.282499	59350.48
13	12.00000	2213.967	38291.02	5.861732	3738.007	4.291644	2.286977	58915.28
14	13.00000	2218.108	38518.37	5.902303	3742.095	4.653769	2.291255	58452.88
15	14.00000	2222.113	38746.65	5.894927	3746.125	5.016525	2.295392	57976.61
16	15.00000	2225.998	38974.56	5.866026	3750.070	5.380013	2.299404	57491.21
17	16.00000	2229.774	39201.60	5.831757	3753.914	5.744066	2.303305	57024.01
18	17.00000	2233.450	39427.71	5.799531	3757.656	6.108763	2.307102	56556.27
19	18.00000	2237.021	39653.03	5.775008	3761.293	6.474106	2.310791	56083.10
20	19.00000	2240.481	39877.77	5.749395	3764.794	6.840012	2.314366	55603.68
21	20.00000	2243.835	40101.82	5.717977	3768.212	7.206683	2.317830	55174.58
22	21.00000	2247.163	40324.72	5.673411	3771.623	7.573038	2.321268	54812.07
23	22.00000	2250.481	40545.93	5.614000	3775.047	7.941118	2.324695	54451.11
24	23.00000	2253.793	40764.79	5.535603	3778.494	8.309282	2.328117	54093.61
25	24.00000	2257.108	40980.54	5.439819	3781.968	8.678010	2.331541	53741.85
26	25.00000	2260.431	41192.62	5.334522	3785.462	9.047383	2.334974	53397.49
27	26.00000	2263.764	41400.81	5.226630	3788.966	9.417401	2.338416	53061.24
28	27.00000	2267.105	41605.08	5.120200	3792.473	9.787984	2.341867	52733.13
29	28.00000	2270.451	41805.51	5.017425	3795.976	10.15921	2.345323	52412.81
30	29.00000	2273.797	42002.28	4.919452	3799.470	10.53100	2.348780	52099.74
31	30.00000	2277.140	42195.56	4.826838	3802.951	10.90336	2.352234	51793.26
32	31.00000	2280.475	42385.56	4.739777	3806.413	11.27634	2.355678	51492.70
33	32.00000	2283.796	42572.50	4.658199	3809.853	11.64992	2.359109	51197.34
34	33.00000	2287.100	42756.56	4.581736	3813.267	12.02405	2.362522	50906.53
35	34.00000	2290.382	42937.94	4.509613	3816.652	12.39883	2.365912	50619.65
36	35.00000	2293.638	43116.76	4.440342	3820.007	12.77409	2.369275	50336.24
37	36.00000	2296.866	43293.09	4.371150	3823.331	13.14999	2.372610	50056.08
38	37.00000	2300.064	43466.87	4.300787	3826.625	13.52647	2.375913	49779.27
39	38.00000	2303.231	43638.05	4.229976	3829.889	13.90333	2.379185	49505.96
40	39.00000	2306.368	43806.61	4.157276	3833.121	14.28064	2.382425	49236.26
41	40.00000	2309.473	43972.42	4.082667	3836.324	14.65842	2.385633	48970.50
42	41.00000	2312.548	44135.46	4.006612	3839.493	15.03756	2.388809	48708.65
43	42.00000	2315.591	44295.79	3.937845	3842.625	15.41669	2.391952	48451.13
44	43.00000	2318.599	44453.58	3.872760	3845.715	15.79630	2.395059	48196.83
45	44.00000	2321.568	44609.00	3.815449	3848.756	16.17648	2.398126	47945.18
46	45.00000	2324.497	44762.78	3.776204	3851.732	16.55714	2.401146	47677.59
47	46.00000	2327.331	44915.50	3.755263	3854.603	16.93836	2.404079	47379.77
48	47.00000	2330.074	45067.74	3.742150	3857.370	17.31991	2.406913	47114.69
49	48.00000	2332.776	45219.67	3.730888	3860.095	17.70202	2.409704	46893.52
50	49.00000	2335.446	45371.34	3.720591	3862.785	18.08453	2.412462	46670.70
51	50.00000	2338.082	45522.79	3.712087	3865.440	18.46745	2.415184	46446.10

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	V177F	RG77N	AMACH	AMASF1
52	51,00000	2340,681	45674,12	3,706291	3868,056	18,85085	2,417870	46219,51
53	52,00000	2343,242	45825,45	3,704061	3870,629	19,23466	2,420515	45990,64
54	53,00000	2345,761	45976,92	3,705161	3873,158	19,61885	2,423117	45759,13
55	54,00000	2348,236	46128,66	3,706973	3875,639	20,00346	2,425674	45524,68
56	55,00000	2350,665	46280,77	3,716024	3878,071	20,38848	2,428183	45287,03
57	56,00000	2353,044	46433,41	3,727199	3880,449	20,77389	2,430641	45045,83
58	57,00000	2355,371	46586,75	3,742207	3882,770	21,15963	2,433044	44800,66
59	58,00000	2357,643	46740,90	3,759693	3885,033	21,54577	2,435391	44551,20
60	59,00000	2359,856	46895,97	3,779593	3887,236	21,93223	2,437677	44297,25
61	60,00000	2362,009	47052,06	3,802735	3889,375	22,31910	2,439901	44038,52
62	61,00000	2364,099	47209,31	3,828840	3891,448	22,70629	2,442060	43774,70
63	62,00000	2366,124	47367,84	3,858245	3893,451	23,09380	2,444151	43505,51
64	63,00000	2368,079	47527,79	3,891549	3895,381	23,48155	2,446171	43230,61
65	64,00000	2369,963	47689,33	3,929176	3897,234	23,86971	2,448117	42949,58
66	65,00000	2371,771	47852,65	3,972126	3899,005	24,25811	2,449985	42661,98
67	66,00000	2373,499	48018,01	4,021528	3900,688	24,64675	2,451769	42367,24
68	67,00000	2375,142	48185,65	4,077420	3902,279	25,03563	2,453467	42064,71
69	68,00000	2376,694	48355,84	4,138463	3903,773	25,42475	2,455071	41753,79
70	69,00000	2378,153	48528,77	4,205437	3905,164	25,81412	2,456577	41434,01
71	70,00000	2379,514	48704,98	4,297746	3906,426	26,20364	2,457983	41104,23
72	71,00000	2380,761	48885,83	4,422039	3907,531	26,59333	2,459271	40761,27
73	72,00000	2381,857	49072,31	4,562264	3908,462	26,98310	2,460403	40402,24
74	73,00000	2382,763	49264,94	4,716310	3909,179	27,37295	2,461340	40025,21
75	74,00000	2383,179	49466,34	5,026922	3909,181	27,76288	2,461769	39617,54
76	75,00000	2383,429	49673,05	4,678044	3909,925	28,15265	2,462027	39194,62
77	76,00000	2384,010	49857,74	4,445275	3910,621	28,54290	2,462627	38825,13
78	77,00000	2384,888	50050,78	4,855449	3910,372	28,93307	2,462708	38445,22
79	78,00000	2386,258	50251,34	4,564547	3910,945	29,32308	2,462883	38106,02
80	79,00000	2388,763	50431,69	4,310426	3911,783	29,71349	2,463405	37812,84
81	80,00000	2385,406	50612,86	4,323498	3912,423	30,10391	2,464069	37519,19
82	81,00000	2384,094	50789,39	4,177278	3913,300	30,49456	2,464780	37234,17
83	82,00000	2386,837	50961,12	4,060387	3914,169	30,88550	2,465548	36958,28
84	83,00000	2387,189	51121,37	3,944714	3915,212	31,27636	2,465912	36692,99
85	84,00000	2388,197	51284,47	3,218187	3916,443	31,66774	2,466952	36488,31
86	85,00000	2389,010	51385,29	2,765250	3917,650	32,05928	2,467792	36282,93
87	86,00000	2390,760	51475,48	1,569739	3920,142	32,45138	2,469600	36167,08
88	87,00000	2392,734	51527,77	1,185361	3922,271	32,84397	2,471039	36120,57
89	88,00000	2394,977	51579,63	1,225053	3924,404	33,23689	2,472853	36078,21
90	89,00000	2397,071	51627,49	1,058724	3926,656	33,63012	2,474720	36043,58
91	90,00000	2399,338	51668,36	,9011174	3928,969	34,02376	2,476461	36022,26
92	91,00000	2401,667	51703,24	,7648480	3931,334	34,41788	2,480667	36012,39
93	92,00000	2403,563	51725,87	,1677226	3933,310	34,81224	2,482825	36014,12
94	93,00000	2406,119	51723,85	-9,020268AE-03	3935,870	35,20709	2,485466	36072,51
95	93,00000	2406,119	51723,85	-9,020268AE-03	3935,870	35,20709	2,485466	36072,51
96	93,15918	2406,409	51724,05	6,8365483E-02	3936,160	35,26997	2,485766	36078,39
97	93,15918	2406,409	51724,05	6,8365483E-02	3936,160	35,26997	2,485766	36078,39
98	93,17993	2406,447	51724,11	7,8368782E-02	3936,197	35,27819	2,485805	36079,09

TRJAECTORY NUMBER 6.

	AMASS	ALPHD	TE77P	CL	CD	ANZBTG	EBPEF	DYNPP
1	1035,643	-2.800012	47914.55	9,8677248E-02	4,5306154E-02	-2,892284	3490557	1522.043
2	1034.650	-1.892217	48491.21	8,9985787E-02	4,4702174E-02	-2,887589	3502424	1508.998
3	1033,648	-0,556707AE-02	48925.87	8,8886225E-02	4,4575029F-02	-2,889636	3515936	1503.273
4	1032,616	,8205937	49233.56	7,7865422AE-02	4,3478E46F-02	-2,896304	3530284	1577,474
5	1031.581	2.100717	49426.10	7,7851313E-02	4,3649A03F-02	-2,906456	3545244	1587,797
6	1030.542	3.191506	49493,85	7,8A829BAE-02	4,3365512F-02	-2,924952	3560360	1593,722
7	1029,500	3.792057	49454,76	6,1924108E-02	4,2706659F-02	-1,948778	3576304	1596,110
8	1028,458	4.113860	49341,69	5,0081707E-02	4,2183184E-02	-1,595939	3593323	1596,144
9	1027,417	4,596869	49171,70	4,8A0602SE-02	4,2145945E-02	-1,557492	3610756	1594,305
10	1026,379	5,885904	48922,18	6,6933074E-02	4,2958807E-02	-2,096189	3627044	1589,453
11	1025,344	5,916006	48588,14	4,5713591E-02	4,2095422F-02	-1,456278	3643574	1581,784
12	1024,316	6,338068	48205,11	4,5908815E-02	4,2064868F-02	-1,455019	3660514	1572,621
13	1023,295	6,191928	47778,78	3,2974851E-02	4,2088402E-02	-1,045726	3677215	1562,035
14	1022,282	6,164998	47334,35	3,0342176E-02	4,2072852E-02	-,9820517	3693646	1550,906
15	1021,277	6,133134	46881,93	2,9218041E-02	4,2051700E-02	-,9430697	3709821	1539,589
16	1020,280	6,101460	46465,15	2,8663027E-02	4,2028241E-02	-,9266591	3725733	1528,207
17	1019,291	6,081888	46075,26	2,9095945E-02	4,1996305F-02	-,9272047	3741349	1516,817
18	1018,310	6,066932	45725,48	2,9440072E-02	4,1963452F-02	-,9308924	3756807	1505,434
19	1017,338	6,062138	45073,77	2,9981798E-02	4,1930513E-02	-,9399743	3771978	1494,046
20	1016,374	6,051010	44819,52	3,0184126E-02	4,1899921E-02	-,9392531	3786895	1482,632
21	1015,418	6,016270	44708,44	2,9840513E-02	4,1872761E-02	-,9232621	3801562	1471,207
22	1014,468	5,967836	43852,03	2,9479298E-02	4,1846003F-02	-,9070884	3816185	1459,910
23	1013,525	5,900776	43497,27	2,8985893E-02	4,1820091F-02	-,8874924	3830662	1448,798
24	1012,588	5,807882	43145,63	2,8251803E-02	4,1795590F-02	-,8616030	3845104	1437,920
25	1011,657	5,705566	42798,87	2,7798857E-02	4,1769802F-02	-,8437200	3859462	1427,334
26	1010,732	5,604731	42458,20	2,7727681E-02	4,1741987E-02	-,8365985	3873732	1417,079
27	1009,812	5,508185	42124,35	2,7900501F-02	4,1712769F-02	-,8361821	3887911	1407,165
28	1008,899	5,416862	41797,19	2,8205874E-02	4,1682842F-02	-,8394273	3901994	1397,568
29	1007,991	5,331191	41476,55	2,8586237E-02	4,1652057F-02	-,8446320	3915976	1388,331
30	1007,089	5,251330	41162,02	2,8995014E-02	4,1621104F-02	-,8508451	3929855	1379,373
31	1006,192	5,177251	40853,17	2,9423967E-02	4,1589969E-02	-,8575119	3943625	1370,690
32	1005,300	5,108775	40549,48	2,9856281E-02	4,1558768F-02	-,8642831	3957282	1362,261
33	1004,414	5,045879	40250,46	3,0279782E-02	4,1527615F-02	-,8706326	3970823	1354,061
34	1003,532	4,986579	39955,63	3,0680029E-02	4,1496648F-02	-,8767823	3984242	1346,069
35	1002,656	4,930417	39664,57	3,1033036F-02	4,1466076F-02	-,8815164	3997536	1338,266
36	1001,784	4,878490	39376,93	3,1295831E-02	4,1436240F-02	-,8839465	4010701	1330,635
37	1000,917	4,830006	39092,58	3,1389498E-02	4,1407747F-02	-,8820921	4023731	1323,169
38	1000,055	4,783163	38811,62	3,1500596E-02	4,1379363F-02	-,8807490	4036621	1315,865
39	999,1982	4,692699	38534,19	3,1657553E-02	4,1350853F-02	-,8806301	4049369	1308,725
40	998,3457	4,624596	38260,37	3,1648273E-02	4,1323845E-02	-,8763900	4061972	1301,747
41	997,4978	4,559905	37990,44	3,1759509E-02	4,1296182F-02	-,8752651	4074425	1294,937
42	996,6545	4,498051	37724,51	3,1990118E-02	4,1267855F-02	-,8771887	4086727	1288,295
43	995,8157	4,440358	37462,47	3,2366652E-02	4,1238612F-02	-,8828279	4098878	1281,814
44	994,9812	4,387440	37203,94	3,2846323E-02	4,1208802F-02	-,8909236	4110877	1275,478
45	994,1512	4,362199	36948,33	3,3436198F-02	4,1178304E-02	-,9018041	4122723	1269,265
46	993,3255	4,348813	36696,46	3,4883560E-02	4,1155345E-02	-,9334858	4134414	1263,139
47	992,5048	4,376185	36375,75	3,5709801E-02	4,1088732E-02	-,9496804	4145884	1257,005
48	991,6892	4,378318	36107,94	3,6076352E-02	4,1047040E-02	-,9545644	4157124	1250,824
49	990,8776	4,376775	35881,41	3,6248406E-02	4,1007551E-02	-,9547514	4168266	1244,645
50	990,0698	4,378170	35654,85	3,6493683E-02	4,0967822E-02	-,9566622	4179341	1238,473
51	989,2658	4,381958	35428,16	3,6763226E-02	4,0928314E-02	-,9590959	4190316	1232,306

TRAJECTORY NUMBER 6.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TE77P	CL	CD	ANZB7G	EBFEF	DYNPP
52	988.4658	4.390399	35201.20	3.7105329E-02	4.0884626E-02	-.9631942	4201220	1226.136
53	987.6697	4.403179	34973.76	3.7478237E-02	4.0849134E-02	-.9679334	4212039	1219.954
54	986.8775	4.418122	34745.60	3.7812596E-02	4.0819502E-02	-.9716519	4222773	1213.749
55	986.0894	4.435119	34516.52	3.8126718E-02	4.0772606E-02	-.9747857	4233417	1207.512
56	985.3054	4.457355	34286.34	3.8516252E-02	4.0734618E-02	-.9795801	4243970	1201.236
57	984.5255	4.484628	34054.81	3.8942294E-02	4.0696915E-02	-.9850922	4254429	1194.910
58	983.7498	4.514352	33821.66	3.9322669E-02	4.0660300E-02	-.9893868	4264793	1188.522
59	982.9780	4.544085	33586.66	3.9618341E-02	4.0625203E-02	-.9915653	4275056	1182.064
60	982.2113	4.578143	33349.68	3.9986609E-02	4.0590181E-02	-.9952810	4285218	1175.530
61	981.4486	4.616338	33110.52	4.0392036E-02	4.0555600E-02	-.9996709	4295274	1168.913
62	980.6904	4.656341	32868.97	4.0758663E-02	4.0522223E-02	-1.002997	4305223	1162.205
63	979.9369	4.701299	32624.82	4.1192516E-02	4.0489066E-02	-1.007666	4315060	1155.400
64	979.1880	4.751049	32377.85	4.1661994E-02	4.0456470E-02	-1.012029	4324785	1148.487
65	978.4440	4.805781	32127.77	4.2160295E-02	4.0424505E-02	-1.018609	4334392	1141.459
66	977.7048	4.868450	31874.27	4.2758222E-02	4.0392633E-02	-1.026262	4343881	1134.302
67	976.9707	4.930984	31616.95	4.3416423E-02	4.0361175E-02	-1.034958	4353246	1127.005
68	976.2418	5.015525	31355.36	4.4055865E-02	4.0331636E-02	-1.042910	4362489	1119.550
69	975.5181	5.094239	31069.10	4.4597476E-02	4.0303117E-02	-1.048367	4371599	1111.924
70	974.7999	5.183959	30817.83	4.5328866E-02	4.0274544E-02	-1.057626	4380574	1104.117
71	974.0872	5.352898	30540.70	4.8015472E-02	4.0227114E-02	-1.108813	4389424	1096.102
72	973.3864	5.531535	30255.46	4.9904677E-02	4.0189341E-02	-1.141747	4398150	1087.798
73	972.6797	5.697814	29960.37	5.0780427E-02	4.0205692E-02	-1.152075	4406700	1079.130
74	971.9853	5.895877	29654.48	5.2318265E-02	4.0258386E-02	-1.175700	4414993	1070.046
75	971.2976	6.674375	29332.36	6.9227856E-02	4.0977668E-02	-1.521167	4422396	1060.157
76	970.6172	3.934412	29000.97	-1.7336311E-02	4.0861546E-02	.2963785	4429574	1049.945
77	969.9436	6.030566	28706.27	6.6930492E-02	4.0867984E-02	-1.448329	4436840	1041.218
78	969.2766	6.573217	28411.85	7.1721928E-02	4.1072775E-02	-1.534288	4443173	1031.715
79	968.6157	3.976096	28150.13	-1.1779822E-02	4.1214398E-02	.1763636	4449964	1022.010
80	967.9602	5.748864	27916.46	6.1570369E-02	4.0627220E-02	-1.304671	4456910	1013.661
81	967.3098	4.972003	27682.17	3.2927308E-02	4.0300550E-02	-.7216093	4464211	1005.457
82	966.6645	4.977724	27454.02	3.8385713E-02	4.0233131E-02	-.8248874	4471473	997.5784
83	966.0239	4.934042	27232.27	4.0265855E-02	4.0202611E-02	-.8562718	4478714	990.0344
84	965.3881	2.486847	27024.07	-2.5382945E-02	4.0355892E-02	.4367337	4484656	982.7649
85	964.7563	5.129129	26853.63	7.8491409E-02	4.1492740E-02	-1.592404	4491298	977.3533
86	964.1291	1.553175	26685.40	-3.4738285E-02	4.0230832E-02	.6140725	4497404	971.9183
87	963.5027	.4551467	26573.46	-3.1344318E-02	4.0242866E-02	.5470348	4504457	969.1531
88	962.8786	2.727338	26511.80	6.4860877E-02	4.0659150E-02	-1.316398	4510643	968.3295
89	962.2553	2.001558	26451.22	3.6556017E-02	4.0124157E-02	-.7759143	4517623	967.6617
90	961.6327	1.781417	26395.98	3.4864077E-02	4.0116275E-02	-.7354527	4524465	967.2195
91	961.0105	1.703908	26350.09	3.7628191E-02	4.0053661E-02	-.7893762	4531141	967.1574
92	960.3886	1.578781	26312.20	3.7884990E-02	4.0017794E-02	-.7950192	4537844	967.4213
93	959.7668	-.5753053	26268.88	-1.8850523E-02	4.0549900E-02	.3061417	4543117	967.9007
94	959.1444	1.955008	26300.12	7.9446971E-02	4.1364242E-02	-1.607768	4549202	970.0547
95	959.1444	1.955008	26300.12	7.9446971E-02	4.1364242E-02	-1.607768	4549202	970.0547
96	959.0453	2.018653	26300.83	7.8931350E-02	4.1309680E-02	-1.598229	4549906	970.2793
97	959.0453	2.018653	26300.83	7.8931350E-02	4.1309680E-02	-1.598229	4549906	970.2793
98	959.0323	2.026951	26300.87	7.8867233E-02	4.1302872E-02	-1.597042	4549999	970.3067

TRAJECTORY NUMBER 6.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE FUHA07 STAGE 1 CYCLE 15 PASS 3 PAGE 262

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	250,0000	500,0000	0,	1776,016	0,	,2243112	12076,75
2	1,0000000	268,7115	477,2721	-9,434356	1791,632	4,2322320E-02	,2410811	12077,26
3	2,000000	291,8449	415,9130	-15,05860	1809,422	8,7304900E-02	,2617863	12088,52
4	3,000000	316,5708	329,6227	-17,47303	1830,440	,1352702	,2838783	12106,89
5	4,000000	342,0042	226,9532	-18,84200	1852,968	,1867825	,3065728	12129,74
6	5,000000	368,5443	107,3155	-20,67522	1875,335	,2417612	,3302454	12156,96
7	6,000000	395,4160	-30,50584	-20,99790	1900,424	,3004482	,3541746	12189,07
8	7,000000	421,1253	-172,7072	-19,66628	1927,744	,3634077	,3772024	12222,20
9	8,000000	445,8034	-312,5487	-17,90669	1955,011	,4309621	,3993425	12254,29
10	9,000000	469,7572	-446,6333	-16,23158	1981,335	,5030310	,4207621	12309,74
11	10,000000	492,6014	-573,5650	-14,18294	2007,156	,5794530	,4412237	12362,06
12	11,00000	514,2789	-687,3360	-12,01430	2031,716	,6601076	,4605985	12408,73
13	12,00000	534,8238	-787,2424	-9,930589	2054,804	,7449538	,4790423	12449,89
14	13,00000	554,1529	-870,8229	-7,672305	2076,426	,8334676	,4963554	12484,91
15	14,00000	572,1426	-934,5757	-5,321210	2096,260	,9256093	,5124688	12512,99
16	15,00000	588,8763	-976,5658	-2,977166	2114,161	1,020895	,5274124	12533,84
17	16,00000	604,2748	-995,8548	-,7783502	2130,141	1,119002	,5412497	12547,47
18	17,00000	618,7711	-993,9598	,9978206	2144,611	1,219689	,5542341	12554,64
19	18,00000	632,4857	-974,7544	2,461978	2157,981	1,322633	,5665182	12556,68
20	19,00000	645,3799	-939,5507	3,853625	2170,265	1,427592	,5780675	12554,04
21	20,00000	657,2965	-887,2122	5,449402	2181,134	1,534486	,5887413	12546,43
22	21,00000	668,2226	-815,0055	7,020630	2190,655	1,642912	,5985278	12533,19
23	22,00000	678,2508	-723,9692	8,502887	2199,010	1,752708	,6075101	12503,02
24	23,00000	687,3922	-614,5113	9,933184	2206,211	1,863633	,6156981	12466,85
25	24,00000	695,6384	-486,7462	11,36962	2212,185	1,975525	,6230842	12427,05
26	25,00000	703,0082	-340,4419	12,76268	2217,040	2,088062	,6296853	12383,57
27	26,00000	709,4940	-176,0100	14,18243	2220,650	2,201164	,6354946	12336,55
28	27,00000	715,1213	6,738214	15,50167	2223,317	2,314426	,6405499	12285,88
29	28,00000	719,9412	206,3807	16,82339	2224,902	2,427850	,6453102	12231,57
30	29,00000	723,9316	423,5113	18,20422	2225,231	2,541193	,6493726	12173,76
31	30,00000	727,1014	658,4149	19,56274	2224,520	2,654214	,6527447	12112,28
32	31,00000	729,4694	910,4155	20,93435	2222,697	2,766671	,6554411	12047,24
33	32,00000	731,0548	1179,345	22,25904	2219,981	2,878401	,6574775	11978,57
34	33,00000	731,8501	1464,467	23,66435	2215,953	2,989246	,6588441	11906,35
35	34,00000	731,8128	1766,673	25,12568	2210,623	3,098961	,6595028	11830,24
36	35,00000	730,9819	2085,489	26,52986	2204,455	3,207306	,6594860	11750,18
37	36,00000	729,4610	2418,994	27,75194	2198,111	3,314200	,6588906	11666,50
38	37,00000	727,2673	2765,041	29,01597	2190,753	3,419643	,6576950	11579,56
39	38,00000	724,4065	3123,588	30,09687	2183,417	3,523555	,6559685	11489,23
40	39,00000	721,1166	3491,294	31,03212	2176,131	3,625935	,6537982	11396,19
41	40,00000	717,3103	3866,734	31,87265	2168,749	3,726863	,6512086	11300,66
42	41,00000	713,0704	4248,516	32,63019	2161,291	3,826421	,6482337	11202,89
43	42,00000	708,4393	4635,361	33,28722	2153,908	3,924529	,6449074	11103,08
44	43,00000	703,4520	5025,974	33,89327	2146,417	4,021265	,6412570	11001,46
45	44,00000	698,1361	5419,566	34,41307	2139,030	4,116712	,6373044	10898,14
46	45,00000	692,5945	5814,264	34,66757	2132,740	4,210869	,6331381	10793,37
47	46,00000	686,9792	6206,704	34,60755	2127,934	4,304226	,6288887	10688,67
48	47,00000	681,4565	6593,573	34,14720	2125,141	4,397088	,6247009	10584,42
49	48,00000	676,1664	6971,284	33,43929	2123,671	4,489874	,6206956	10481,92
50	49,00000	671,1926	7337,945	32,42007	2123,801	4,582822	,6169466	10381,88
51	50,00000	666,9201	7686,520	29,91396	2130,727	4,676737	,6137939	10286,56

TRAJECTORY NUMBER 7.

	AMASS	ALPHD	TE77P	CL	CD	ANZBTG	ESPEF	DYNPP
1	1176,000	-6,918030	19945,91	-,4176722	3,8735328E-02	,4541211	47321,95	73,19806
2	1175,791	-12,17932	20080,58	-,1464229	2,0608129E-02	,1609163	51444,35	80,62170
3	1175,583	-12,58080	20265,60	,1940129	2,2312910E-02	-,3528347	55955,88	99,99898
4	1175,374	-12,98795	20478,84	,3270449	3,0411139E-02	-,6629947	60705,33	117,9624
5	1175,165	-15,12335	20697,62	,2771498	2,6755326E-02	-,6585507	65778,77	138,0896
6	1174,955	-18,62873	20937,03	,1651145	2,1209456E-02	-,4701078	71369,50	160,9337
7	1174,745	-16,11366	21188,51	,3525919	3,2439972E-02	-1,099923	77196,28	185,8202
8	1174,534	-14,77244	21435,86	,3532059	3,2491969E-02	-1,244825	83121,41	210,7692
9	1174,323	-13,14481	21675,38	,3448884	3,1817206E-02	-1,359140	89340,84	236,2377
10	1174,111	-12,19837	21961,17	,2981253	2,8173272E-02	-1,306734	95978,10	262,2597
11	1173,898	-9,743050	22230,77	,3241527	3,0183913E-02	-1,554812	102889,6	288,3871
12	1173,684	-8,143971	22489,85	,2873123	2,7442309E-02	-1,503975	110119,5	314,2661
13	1173,469	-6,251177	22727,73	,2745206	2,6579509E-02	-1,553674	117710,1	339,9429
14	1173,254	-4,028171	22945,06	,2721569	2,6429181E-02	-1,651501	125547,4	364,9588
15	1173,038	-1,848057	23139,34	,2607012	2,5700599E-02	-1,686082	133628,5	389,0390
16	1172,822	,3209790	23309,89	,2489757	2,4971654E-02	-1,705616	141963,1	412,0586
17	1172,605	2,239901	23456,90	,2302228	2,4086517E-02	-1,662797	150558,8	433,9638
18	1172,389	3,548845	23583,78	,1989186	2,2507177E-02	-1,511208	159484,5	455,0348
19	1172,172	4,765451	23694,24	,1823327	2,1850375E-02	-1,449681	168682,3	475,4293
20	1171,955	6,058888	23788,69	,1757526	2,1589804E-02	-1,455176	178052,6	495,0116
21	1171,738	7,752090	23865,17	,1822801	2,1848290E-02	-1,562398	187497,1	513,4607
22	1171,522	9,161885	23922,10	,1714641	2,1434123E-02	-1,520602	197060,0	530,6728
23	1171,306	10,52817	23951,44	,1642075	2,1175787E-02	-1,501190	206738,1	546,7202
24	1171,090	11,86196	23962,18	,1584068	2,0969282E-02	-1,488122	216499,2	561,5570
25	1170,875	13,25200	23956,19	,1558484	2,0878204E-02	-1,499290	226309,0	575,1109
26	1170,661	14,55217	23933,50	,1501601	2,0675700E-02	-1,476247	236166,3	587,3613
27	1170,447	15,95678	23894,26	,1495222	2,0660825E-02	-1,496732	246032,8	598,2490
28	1170,235	17,14894	23838,71	,1414294	2,0505445E-02	-1,439922	255915,9	607,6568
29	1170,023	18,47258	23771,60	,1418339	2,0513203E-02	-1,454665	265791,7	612,2856
30	1169,812	19,87041	23689,10	,1431988	2,0539417E-02	-1,474998	275651,9	615,1623
31	1169,603	21,18767	23591,08	,1406535	2,0490548E-02	-1,452233	285501,9	616,2946
32	1169,394	22,56679	23478,02	,1413077	2,0503108E-02	-1,457522	295326,0	615,7337
33	1169,187	23,84631	23350,11	,1384162	2,0447591E-02	-1,423672	305126,8	613,5310
34	1168,980	25,32368	23207,62	,1432969	2,0541300E-02	-1,463383	314871,6	609,7120
35	1168,776	26,81015	23049,67	,1450109	2,0574209E-02	-1,467380	324555,9	604,2231
36	1168,572	28,17077	22876,74	,1421060	2,0518435E-02	-1,422541	334192,9	597,1801
37	1168,370	29,27568	22690,59	,1342620	2,0367830E-02	-1,328124	343798,3	588,8331
38	1168,169	30,63394	22492,40	,1404742	2,0487104E-02	-1,365649	353318,8	579,2949
39	1167,970	31,55356	22282,47	,1296393	2,0279074E-02	-1,241131	362790,5	568,6891
40	1167,772	32,45301	22063,44	,1271438	2,0231161E-02	-1,194335	372196,3	557,3051
41	1167,576	33,25933	21836,23	,1247368	2,0186947E-02	-1,147873	381518,9	545,2589
42	1167,382	33,99574	21601,87	,1231839	2,0168935E-02	-1,108660	390749,6	532,6774
43	1167,189	34,61258	21361,30	,1203544	2,0136111E-02	-1,058443	399882,8	519,6799
44	1166,999	35,23748	21115,44	,1214254	2,0148535E-02	-1,040925	408906,9	506,3694
45	1166,810	35,71760	20864,87	,1186046	2,0115814E-02	-,9912571	417821,1	492,8258
46	1166,622	35,77427	20611,41	,1053601	1,9962177E-02	-,8614361	426641,8	479,2436
47	1166,437	35,53763	20358,06	9,3554327E-02	1,9809761E-02	-,7486695	435369,1	465,8930
48	1166,253	34,79085	20107,99	7,4578457E-02	1,9549157E-02	-,5887540	444011,2	453,0390
49	1166,071	34,02292	19864,30	7,0522299E-02	1,9541045E-02	-,5445234	452546,2	440,8948
50	1165,891	32,74440	19628,76	5,3438318E-02	1,9506877E-02	-,4116063	460965,8	429,5610
51	1165,713	28,64998	19406,47	-5,0481579E-02	1,9500963E-02	,3078531	469296,3	419,5758

TRAJECTORY NUMBER 7.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

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FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	666.9201	7686.520	29.91396	2130.727	0.	.6137939	10286.56
2	1.000000	663.9002	7975.778	22.49707	2154.963	9.8349011E-02	.6116566	10207.70
3	2.000000	666.7886	8195.017	15.92807	2173.512	.2014542	.6129636	10151.75
4	3.000000	669.4504	8343.537	10.20776	2188.660	.3083483	.6175960	10119.26
5	4.000000	677.0923	8436.543	5.999011	2201.117	.4179833	.6248577	10105.38
6	5.000000	686.5990	8489.400	3.231751	2212.444	.5297948	.6337536	10104.60
7	6.000000	697.2221	8517.404	1.645321	2223.625	.6434605	.6436248	10111.83
8	7.000000	708.3985	8531.677	.8322358	2234.949	.7590609	.6539757	10123.38
9	8.000000	719.5994	8540.838	.8674250	2246.145	.8765154	.6643383	10136.30
10	9.000000	730.5188	8553.911	1.180758	2257.017	.9958240	.6744513	10147.93
11	10.00000	741.1823	8571.336	1.570813	2267.599	1.116826	.6843400	10158.24
12	11.00000	751.2498	8596.824	2.545882	2277.359	1.239520	.6936999	10165.89
13	12.00000	760.8570	8635.712	3.093153	2286.726	1.363746	.7026713	10169.88
14	13.00000	770.1707	8680.245	3.733182	2295.696	1.489423	.7113880	10172.31
15	14.00000	778.9042	8736.385	4.594148	2303.863	1.616551	.7196025	10171.45
16	15.00000	787.1411	8804.528	5.540477	2311.507	1.744889	.7273935	10167.37
17	16.00000	794.9378	8882.942	6.041798	2318.659	1.874355	.7348090	10160.61
18	17.00000	801.6977	8976.203	7.783901	2323.483	2.004788	.7413106	10149.28
19	18.00000	807.3482	9097.802	9.381202	2326.933	2.135625	.7468828	10130.29
20	19.00000	812.1991	9240.157	10.94454	2329.189	2.266783	.7517476	10105.76
21	20.00000	816.5883	9402.252	11.64614	2332.235	2.398104	.7562228	10076.47
22	21.00000	820.6756	9570.381	12.10871	2335.447	2.529907	.7605148	10045.88
23	22.00000	823.9261	9750.888	13.66575	2335.418	2.661872	.7640342	10011.50
24	23.00000	826.1776	9957.427	15.13200	2334.221	2.793273	.7667052	9970.088
25	24.00000	827.8736	10181.35	16.20838	2333.162	2.924271	.7689141	9920.917
26	25.00000	828.9035	10420.00	17.32318	2331.186	3.054785	.7705872	9866.573
27	26.00000	829.2526	10675.43	18.61287	2327.734	3.184493	.7716040	9807.044
28	27.00000	828.6670	10949.90	20.12210	2322.427	3.313233	.7718446	9741.466
29	28.00000	827.5148	11242.83	21.06225	2318.183	3.440603	.7716111	9670.495
30	29.00000	825.8810	11545.80	22.06097	2313.128	3.567167	.7709574	9596.197
31	30.00000	823.5076	11863.53	23.29284	2306.337	3.692360	.7696545	9516.877
32	31.00000	820.4206	12196.80	24.53275	2298.607	3.815942	.7677265	9432.283
33	32.00000	816.7056	12544.27	25.66870	2290.487	3.937830	.7652473	9342.788
34	33.00000	812.5028	12903.19	26.52659	2282.913	4.058106	.7623381	9249.227
35	34.00000	807.9258	13272.86	28.07521	2271.376	4.176689	.7586315	9150.794
36	35.00000	801.7108	13659.88	29.09014	2261.404	4.292692	.7543697	9046.308
37	36.00000	795.6972	14052.39	29.85954	2252.187	4.407084	.7498234	8939.204
38	37.00000	789.1128	14442.42	30.79626	2241.585	4.519621	.7447515	8828.290
39	38.00000	781.9805	14860.18	31.73159	2230.400	4.630062	.7391698	8713.436
40	39.00000	774.3803	15274.40	32.55411	2219.275	4.738407	.7331476	8595.012
41	40.00000	766.4893	15692.47	33.09418	2209.235	4.844817	.7268051	8473.895
42	41.00000	758.2267	16111.21	33.55972	2199.303	4.949615	.7201689	8350.872
43	42.00000	749.6083	16531.07	34.15294	2188.362	5.052560	.7131397	8225.475
44	43.00000	740.6375	16952.36	34.65488	2177.572	5.153649	.7057574	8097.659
45	44.00000	731.4776	17372.34	34.85713	2168.169	5.253046	.6981688	7968.487
46	45.00000	722.2020	17787.61	34.77710	2160.155	5.351158	.6904724	7839.101
47	46.00000	713.0039	18195.73	34.51609	2153.044	5.448213	.6827305	7710.318
48	47.00000	703.7871	18595.56	34.20965	2146.149	5.544385	.6749643	7582.521
49	48.00000	694.6871	18986.07	33.59041	2140.830	5.639751	.6672630	7456.301
50	49.00000	685.9008	19362.83	32.47956	2138.009	5.734876	.6598435	7333.603
51	50.00000	677.6950	19722.10	31.09455	2136.600	5.830081	.6528404	7215.973

TRAJECTORY NUMBER 8.

49	88,00000	694,6873	8986,07	,59041	40,830	,039751	,072630	7 6,301	
50	89,00000	685,9008	19362,83	32,47956	2138,009	5,734876	,6598435	7333,603	
51	90,00000	677,6950	19722,10	31,09455	2136,600	5,830081	,6528404	7215,973	

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

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FUEL MINIMIZATION TO ENERGY

	APASS	ALPHD	TE77P	CL	CD	ANZ87G	EBPEF	DYNPP
1	1165,713	23,52220	19408,47	-,3857679	3,5408594E-02	2,596028	469296,3	419,5758
2	1165,536	19,01644	19230,05	-,1952374	2,2351966E-02	1,273091	476571,3	412,0845
3	1165,360	11,07935	19122,62	-,7259441	2,3P46652F-02	1,473186	484198,1	410,3929
4	1165,185	7,693031	19085,63	-,1324265	2,0332590F-02	,8571167	492074,8	414,2572
5	1165,011	4,621915	19104,18	-5,8171441E-02	1,9516343E-02	,3640356	500204,8	422,5476
6	1164,836	2,997313	19160,36	1,6945034E-02	2,0016740E-02	-,1565584	508383,6	433,7846
7	1164,662	2,163904	19239,06	6,6864862E-02	1,9533730F-02	-,5241858	516632,2	446,9221
8	1164,487	1,781503	19330,66	9,5784719E-02	1,9840986E-02	-,7574215	524945,2	461,1607
9	1164,312	2,068427	19424,77	,1397214	2,0472650E-02	-1,121238	533236,6	475,7240
10	1164,137	2,662805	19514,40	,1322892	2,0329952F-02	-1,094836	541573,4	490,0721
11	1163,962	3,100944	19599,56	,1360840	2,0402814E-02	-1,156833	549979,4	504,2108
12	1163,786	4,573737	19675,36	,1702797	2,1391956E-02	-1,475524	558309,9	517,5912
13	1163,611	4,371470	19740,28	,1199975	2,0131972F-02	-1,076073	566821,7	530,2733
14	1163,435	5,372283	19799,81	,1449904	2,0573816E-02	-1,321659	575380,3	542,5827
15	1163,259	6,222284	19848,39	,1487165	2,0568557F-02	-1,346428	583946,4	553,9899
16	1163,084	6,802597	19886,57	,1337820	2,0358614E-02	-1,270915	592583,0	564,5705
17	1162,908	7,477806	19915,78	,1323787	2,0331671F-02	-1,279450	601266,8	574,4062
18	1162,733	10,13866	19928,41	,1961801	2,2272701F-02	-1,903891	609656,2	582,5223
19	1162,558	11,19212	19917,12	,1589200	2,0970825E-02	-1,565403	618117,2	588,5509
20	1162,383	12,90535	19888,10	,1696050	2,1327357F-02	-1,680529	626600,4	592,9812
21	1162,209	12,70486	19844,96	,1100976	2,0017132E-02	-1,110368	635343,6	596,3219
22	1162,035	13,31236	19797,00	,1175727	2,0103843F-02	-1,188780	644117,0	599,2063
23	1161,862	15,79530	19735,12	,1821741	2,1751362F-02	-1,825239	652581,7	600,5581
24	1161,689	16,80653	19651,31	,1506610	2,0691767E-02	-1,514591	661066,1	599,9465
25	1161,518	17,70420	19558,34	,1383300	2,0445935F-02	-1,389780	669653,0	598,1905
26	1161,347	18,92624	19453,86	,1459032	2,0591341F-02	-1,456805	678195,8	595,2516
27	1161,177	20,34009	19334,59	,1546274	2,0821480F-02	-1,530725	686646,4	590,9198
28	1161,008	22,01567	19198,11	,1662554	2,1201977F-02	-1,626925	694965,6	584,9927
29	1160,841	22,36364	19047,62	,1249031	2,0188876F-02	-1,217015	703407,8	577,9845
30	1160,674	23,69451	18887,84	,1481905	2,0635256E-02	-1,418127	711775,3	570,1993
31	1160,509	25,03976	18714,04	,1558835	2,0863061F-02	-1,466887	720008,7	561,2300
32	1160,346	26,27203	18525,95	,1552336	2,0842138E-02	-1,435173	728159,8	551,1465
33	1160,184	27,34083	18324,88	,1506861	2,0692633E-02	-1,366852	736262,2	540,1380
34	1160,023	27,98396	18113,37	,1353018	2,0387794F-02	-1,204894	744348,1	528,4832
35	1159,864	30,48797	17887,91	,1987080	2,2345374E-02	-1,711562	752089,0	515,7398
36	1159,707	30,45909	17647,48	,1287513	2,0262025F-02	-1,092260	759903,3	502,1723
37	1159,552	31,53774	17400,79	,1499207	2,0668477F-02	-1,232235	767681,1	488,4306
38	1159,398	32,58105	17144,22	,1569823	2,0906073E-02	-1,251820	775287,9	474,1953
39	1159,247	33,53684	16877,73	,1580461	2,0943836E-02	-1,221813	782755,9	459,5332
40	1159,097	34,29220	16602,57	,1530539	2,0774671E-02	-1,146463	790118,7	444,6007
41	1158,950	34,59247	16321,24	,1362303	2,0405621E-02	-,9901804	797407,7	429,6272
42	1158,805	35,20232	16035,60	,1457375	2,0588160F-02	-1,021098	804559,2	414,7228
43	1158,662	35,99881	15744,28	,1591866	2,0992215F-02	-1,073120	811516,1	399,7868
44	1158,521	36,35704	15447,47	,1449501	2,0649841E-02	-,9692686	818330,9	384,8849
45	1158,382	36,31989	15146,11	,1322780	2,0329738F-02	-,8319370	825045,1	370,2378
46	1158,246	36,08237	14849,01	,1212354	2,0146331F-02	-,7361865	831636,7	356,0021
47	1158,111	35,76873	14552,12	,1173157	2,0100862F-02	-,6864297	838081,1	342,2650
48	1157,979	35,56790	14258,28	,1240371	2,0178831E-02	-,6967897	844359,5	329,0451
49	1157,849	34,47453	13969,05	9,1940342E-02	1,9787165E-02	-,5041152	850504,8	316,4196
50	1157,722	32,95496	13689,22	6,4415731E-02	1,9528831F-02	-,3483178	856533,7	304,6167
51	1157,596	31,50360	13422,37	5,9827230E-02	1,9519654F-02	-,3142653	862417,5	293,7550

TRAJECTORY NUMBER 8.

	TTAF	VGTTF	HGCTF	GAMTD	VITTF	RGTTN	AMACH	AMASF1
1	0.	677.6950	19722.10	31.09455	2136.600	0.	.6528403	7215.974
2	1.0000000	688.3993	20029.40	23.02831	2158.471	9.8268397E-02	.6646723	7107.516
3	2.000000	683.5771	20245.29	15.06914	2175.067	.2016961	.6605717	7040.342
4	3.000000	683.9172	20377.70	8.149885	2186.704	.3085096	.6612384	7010.375
5	4.000000	688.5585	20436.22	2.092021	2195.698	.4174996	.6658488	7012.358
6	5.000000	676.7733	20428.98	-3.169548	2203.525	.5280213	.6537891	7042.147
7	6.000000	688.0009	20364.09	-7.571349	2211.366	.6396716	.6645020	7095.796
8	7.000000	701.4789	20254.29	-10.13725	2221.418	.7523699	.6771838	7167.364
9	8.000000	715.8858	20121.34	-11.40680	2233.653	.8668417	.6906964	7247.525
10	9.000000	730.7041	19973.07	-12.12497	2247.126	.9832483	.7046461	7333.185
11	10.000000	745.6902	19815.40	-12.51637	2261.377	1.101831	.7188045	7422.450
12	11.00000	761.0797	19651.56	-12.66652	2276.484	1.222752	.7329617	7512.487
13	12.00000	776.8417	19487.99	-12.09004	2291.999	1.346253	.7468860	7600.873
14	13.00000	790.5333	19328.60	-11.24666	2307.897	1.472333	.7603537	7685.917
15	14.00000	804.4383	19180.23	-10.23586	2323.415	1.601154	.7737740	7765.730
16	15.00000	817.7781	19043.69	-9.069345	2338.438	1.732635	.7856348	7840.200
17	16.00000	830.1681	18923.83	-7.604117	2352.789	1.866496	.7971958	7907.479
18	17.00000	841.5505	18825.28	-5.881209	2366.054	2.003176	.8078247	7954.135
19	18.00000	852.3617	18749.23	-4.617637	2377.932	2.141912	.8179488	7989.981
20	19.00000	862.0981	18691.36	-2.820375	2388.773	2.282588	.8271036	8019.650
21	20.00000	870.5760	18644.30	-.8839957	2397.850	2.424948	.8351484	8040.103
22	21.00000	878.3960	18603.00	.6364024	2405.697	2.568763	.8426410	8053.619
23	22.00000	885.1962	18585.20	2.368491	2412.059	2.713707	.8492435	8060.213
24	23.00000	890.9323	18736.00	4.137169	2416.811	2.859538	.8549176	8058.733
25	24.00000	895.9300	18612.45	5.597915	2420.587	3.005852	.8599726	8050.453
26	25.00000	899.8861	18612.60	7.366690	2422.540	3.152569	.8640857	8035.270
27	26.00000	902.5106	19043.69	9.361501	2422.311	3.299706	.8670792	8011.239
28	27.00000	903.8105	19260.81	10.26708	2423.074	3.445521	.8698285	7981.057
29	28.00000	906.4038	19370.09	11.66179	2422.025	3.591835	.8719438	7947.105
30	29.00000	907.1280	19585.15	12.94120	2420.036	3.737424	.8733159	7906.092
31	30.00000	907.3308	19776.31	14.03501	2417.704	3.882529	.8742461	7860.712
32	31.00000	906.8731	20000.93	15.13093	2414.503	4.026908	.8745955	7810.326
33	32.00000	905.9535	20208.29	15.92383	2411.489	4.170401	.8745556	7755.045
34	33.00000	904.7200	20501.08	16.46029	2408.805	4.313410	.8742556	7697.072
35	34.00000	902.8488	20763.79	17.55616	2403.786	4.455613	.8733740	7635.549
36	35.00000	900.5507	21042.67	18.19076	2399.592	4.596526	.8721140	7569.394
37	36.00000	898.0688	21326.14	18.68478	2395.724	4.736878	.8706914	7501.653
38	37.00000	895.3302	21615.80	18.92728	2392.170	4.876418	.8690493	7431.788
39	38.00000	892.3113	21908.53	19.06145	2387.489	5.015235	.8671423	7360.347
40	39.00000	888.8173	22210.52	20.14355	2381.800	5.153804	.8648021	7285.434
41	40.00000	885.3042	22516.90	20.00928	2378.852	5.289887	.8624542	7209.157
42	41.00000	881.8304	22818.06	20.06685	2375.290	5.426447	.8601217	7133.780
43	42.00000	878.1547	23121.69	20.19261	2371.296	5.562201	.8575924	7056.960
44	43.00000	874.5093	23423.19	20.01955	2368.353	5.697471	.8550882	6980.348
45	44.00000	871.0307	23718.90	19.49248	2366.740	5.832099	.8527269	6905.129
46	45.00000	868.0445	23999.07	17.76042	2369.265	5.967770	.8507915	6834.442
47	46.00000	866.2983	24244.73	15.04978	2375.008	6.104491	.8499183	6774.719
48	47.00000	865.7893	24454.36	13.39317	2376.475	6.242583	.8501525	6726.658
49	48.00000	865.7249	24649.60	12.73119	2374.877	6.381239	.8507742	6683.165
50	49.00000	866.0622	24832.88	11.47409	2382.780	6.520298	.8517504	6643.619
51	50.00000	867.2270	24990.64	9.383127	2387.615	6.660405	.8534528	6612.382

TRAJECTORY NUMBER 9.

	AMASS	ALPHD	TE77P	CL	CD	ANZBTG	EBPEF	DYNPP
1	1157,596	20,91723	13422,37	-,3780314	3,4582243F-02	1,793031	862417,4	293,7550
2	1157,472	15,35179	13170,36	-,4760398	4,5668936F-02	2,180149	866601,8	282,7968
3	1157,350	8,811260	13021,49	-,3811856	3,4911312F-02	1,703193	869703,6	276,6989
4	1157,229	3,091200	12986,05	-,3021602	2,8382459F-02	1,340720	871169,0	275,7406
5	1157,108	-1,995000	12989,92	-,2384192	2,4385059F-02	1,065783	871119,3	279,0341
6	1156,987	-6,315826	13082,41	-,1766012	2,1619962F-02	,8032793	884429,2	286,0243
7	1156,865	-9,708270	13233,65	-,1099856	2,0015832F-02	,5091898	890040,4	296,2799
8	1156,742	-9,546651	13428,91	7,2631742E-02	1,9545263F-02	-,3945230	895860,6	309,1159
9	1156,617	-10,46681	13645,22	9,6979794E-02	1,9857717E-02	-,5412145	901791,4	323,3706
10	1156,491	-10,62082	13875,36	,1354330	2,0390314F-02	-,7797880	907812,8	338,6581
11	1156,364	-11,01780	14116,23	,1358178	2,0397702F-02	-,8182817	913949,0	354,7332
12	1156,235	-10,82784	14359,53	,1737152	2,1482992F-02	-1,086969	920144,4	371,3741
13	1156,104	-10,07306	14599,16	,1731654	2,1451243F-02	-1,132154	926404,8	388,2558
14	1155,972	-8,688467	14831,24	,2117353	2,2901306E-02	-1,436982	932651,5	405,0621
15	1155,839	-7,984572	15050,76	,1941068	2,2166929F-02	-1,372790	938988,5	421,5370
16	1155,704	-6,556185	15257,48	,2105291	2,2823434F-02	-1,542507	945402,7	437,5952
17	1155,568	-4,941836	15446,41	,2204967	2,3246462F-02	-1,669761	951802,1	452,8147
18	1155,431	-3,106196	15596,24	,2306379	2,3746822F-02	-1,798903	958170,7	466,8728
19	1155,294	-2,643783	15723,98	,1749615	2,1422886E-02	-1,410476	964883,7	480,1583
20	1155,155	,1677800	15834,06	,2486527	2,4694344E-02	-2,041154	971376,6	492,1443
21	1155,017	1,023038	15918,86	,2138973	2,2924703E-02	-1,796236	977854,5	502,3266
22	1154,878	2,825048	15985,83	,1919350	2,1977604F-02	-1,643879	984646,9	511,4079
23	1154,739	4,920819	16033,12	,2184127	2,3126843F-02	-1,893880	991358,9	518,9769
24	1154,599	6,475146	16057,81	,2039494	2,2447204F-02	-1,790337	998079,9	524,8300
25	1154,460	7,631852	16064,11	,1830376	2,1693149F-02	-1,623800	1004994	529,3761
26	1154,322	8,479412	16050,13	,2183792	2,3144738F-02	-1,941821	1011731	532,2383
27	1154,183	11,85561	16010,67	,2176585	2,3115050F-02	-1,938469	1018318	533,0262
28	1154,045	11,50087	15945,94	,1257904	2,0402807F-02	-1,133137	1025428	532,9234
29	1153,907	14,10728	15889,47	,2151179	2,3002885F-02	-1,911922	1032293	531,7625
30	1153,770	14,51906	15803,45	,1589357	2,1112120E-02	-1,413706	1039197	529,1224
31	1153,634	15,90709	15705,41	,1734501	2,1468525F-02	-1,529949	1046146	525,6012
32	1153,499	16,91809	15593,58	,1671920	2,1322795F-02	-1,463213	1053049	521,0212
33	1153,365	17,41894	15476,98	,1455848	2,0829321F-02	-1,265181	1060008	515,6941
34	1153,231	17,83062	15353,54	,1363227	2,0648604F-02	-1,173510	1066995	509,9062
35	1153,099	19,70911	15220,01	,1939570	2,2104218F-02	-1,635890	1073725	503,2914
36	1152,968	19,37210	15075,12	,1221466	2,0367940E-02	-1,026270	1080571	495,9812
37	1152,837	20,19877	14926,28	,1488697	2,0838757E-02	-1,275923	1087406	488,4852
38	1152,709	20,47521	14772,13	,1194005	2,0298472F-02	-,9735032	1094224	480,7180
39	1152,581	21,22322	14613,65	,1642631	2,1182465F-02	-1,306739	1100897	472,7068
40	1152,454	21,79313	14448,19	,1557381	2,0931375E-02	-1,218301	1107452	464,1631
41	1152,329	20,65894	14276,04	8,2422665E-02	1,9823470E-02	-,6460742	1114102	455,6594
42	1152,205	21,68886	14108,06	,1501858	2,0716974F-02	-1,134026	1120712	447,4063
43	1152,083	21,35256	13936,45	,1192206	2,0191862F-02	-,8891793	1127191	439,0346
44	1151,962	21,06325	13765,58	,1105712	2,0061761F-02	-,8115007	1133649	430,8630
45	1151,842	20,13468	13598,45	8,1377845F-02	1,9735828E-02	-,5935318	1140084	423,0704
46	1151,723	16,86266	13442,73	-2,9695652E-02	1,9986141F-02	,1779666	1146462	416,0947
47	1151,606	13,66033	13314,37	-6,4750421E-02	1,9670536F-02	,4129915	1152791	410,8563
48	1151,489	10,02703	13214,87	8,0674580E-02	1,9707991E-02	-,5672004	1159057	407,3689
49	1151,373	13,65809	13126,45	,1014993	1,9922223F-02	-,7021966	1165248	404,5255
50	1151,258	11,27260	13047,64	2,0464071E-02	2,0155197E-02	-,1607508	1171404	402,2397
51	1151,144	8,595868	12989,00	-2,1900367E-02	2,0127666E-02	,1200153	1177461	401,0878

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	-0.	847.2270	24990.64	9.383127	2547.615	0.	.8534528	6612.383
2	1.000000	849.5930	25117.75	7.918154	2392.115	.1411550	.8562328	6591.819
3	2.000000	852.2290	25234.47	7.542596	2395.239	.2830356	.8592431	6574.502
4	3.000000	854.9140	25347.73	7.396797	2398.108	.4253098	.8622936	6558.396
5	4.000000	857.5700	25460.27	7.376913	2400.788	.5682477	.8653155	6542.466
6	5.000000	860.1713	25573.29	7.407436	2403.350	.7114987	.8682885	6526.424
7	6.000000	862.7080	25687.30	7.457548	2405.825	.8551527	.8712055	6510.132
8	7.000000	865.1813	25802.46	7.514312	2408.224	.9992904	.8740644	6493.539
9	8.000000	867.5837	25918.85	7.577934	2410.545	1.143670	.8768620	6476.617
10	9.000000	869.9061	26036.63	7.657365	2412.764	1.288053	.8795887	6459.292
11	10.000000	872.1369	26155.09	7.756711	2414.864	1.433638	.8822338	6441.459
12	11.00000	874.2670	26277.51	7.870396	2416.844	1.579006	.8847903	6423.030
13	12.00000	876.2868	26401.02	7.988819	2418.713	1.724816	.8872563	6403.963
14	13.00000	878.1838	26526.64	8.107041	2420.478	1.870888	.8896327	6384.251
15	14.00000	880.0500	26654.32	8.219293	2422.152	2.017203	.8919224	6363.912
16	15.00000	881.7859	26783.89	8.313095	2423.762	2.163678	.8941349	6343.015
17	16.00000	883.4539	26915.09	8.403473	2425.292	2.310476	.8962730	6321.628
18	17.00000	885.0204	27048.01	8.504033	2426.715	2.457516	.8983295	6299.684
19	18.00000	886.5867	27182.63	8.580651	2428.091	2.604717	.9003152	6277.178
20	19.00000	887.9188	27318.88	8.645744	2429.408	2.752160	.9022325	6253.940
21	20.00000	889.2415	27455.38	8.671958	2430.717	2.899845	.9040913	6230.355
22	21.00000	890.5930	27592.26	8.613183	2432.141	3.047691	.9059394	6206.824
23	22.00000	891.9715	27727.62	8.447598	2433.768	3.195779	.9078305	6183.872
24	23.00000	893.4020	27860.29	8.285445	2435.439	3.344189	.9097660	6161.758
25	24.00000	894.7841	27991.67	8.284339	2436.828	3.492922	.9116525	6139.838
26	25.00000	896.0733	28124.14	8.350485	2438.024	3.641745	.9134490	6117.437
27	26.00000	897.2811	28257.77	8.417890	2439.136	3.790790	.9151731	6094.600
28	27.00000	898.4025	28392.72	8.491428	2440.156	3.940006	.9168183	6071.262
29	28.00000	899.4425	28528.96	8.559699	2441.100	4.089388	.9183895	6047.445
30	29.00000	900.4051	28665.39	8.622199	2441.974	4.238923	.9198901	6023.181
31	30.00000	901.2940	28802.89	8.676918	2442.787	4.388542	.9213243	5998.504
32	31.00000	902.1146	28940.33	8.724959	2443.542	4.538243	.9226960	5973.455
33	32.00000	902.8736	29078.61	8.768749	2444.242	4.688108	.9240082	5948.065
34	33.00000	903.5676	29215.64	8.807108	2444.861	4.838046	.9252621	5922.351
35	34.00000	904.1988	29367.42	8.846872	2445.454	4.988068	.9264535	5896.296
36	35.00000	904.7572	29509.67	8.878053	2445.975	5.138252	.9275853	5869.921
37	36.00000	905.2417	29652.84	8.903786	2446.449	5.288636	.9286623	5843.278
38	37.00000	905.6755	29796.26	8.929166	2446.861	5.438700	.9296819	5816.353
39	38.00000	906.0606	29940.19	8.951962	2447.219	5.588965	.9306462	5789.164
40	39.00000	906.4014	30084.60	8.995208	2447.471	5.739390	.9315389	5760.413
41	40.00000	906.6936	30229.48	9.042657	2447.637	5.889745	.9323577	5730.331
42	41.00000	906.9410	30375.77	9.066990	2447.783	6.040101	.9331256	5699.912
43	42.00000	907.1484	30521.54	9.072198	2447.925	6.190587	.9338552	5669.290
44	43.00000	907.3113	30667.96	9.044901	2448.085	6.341012	.9345606	5638.610
45	44.00000	907.4378	30813.46	9.007347	2448.257	6.491458	.9352489	5607.993
46	45.00000	907.5310	30958.22	8.953785	2448.436	6.641944	.9359229	5577.498
47	46.00000	907.5921	31102.02	8.885844	2448.633	6.792531	.9365901	5547.203
48	47.00000	907.6232	31244.37	8.755202	2448.956	6.943118	.9372880	5517.357
49	48.00000	907.7272	31383.17	8.395369	2449.781	7.093866	.9381293	5488.948
50	49.00000	908.2884	31519.06	7.780694	2451.241	7.244775	.9392524	5463.493
51	50.00000	909.2845	31633.44	6.947545	2453.284	7.396168	.9407129	5442.059

TRAJECTORY NUMBER 10.

FUEL MINIMIZATION TO-ENERGY-

	AMASS	ALPHD	TE77P	CL	CD	AN7B76	ESPEF	DYNPP
1	1151,108	8,883960	12969,00	-5,8896255E-02	1,9701914E-02	,3646539	1177461	401,0878
2	1151,030	8,879456	12956,83	,1046930	1,9996516E-02	-,7181079	1183583	401,4769
3	1150,916	8,770861	12932,36	,1243499	2,0273928E-02	-,8498596	1189612	402,2532
4	1150,803	8,807706	12910,24	,1379730	2,0535646E-02	-,9422319	1195581	403,1177
5	1150,690	8,858858	12888,40	,1432961	2,0666090E-02	-,9796494	1201508	403,9579
6	1150,577	8,908015	12866,04	,1452371	2,0739706E-02	-,9944868	1207410	404,7340
7	1150,464	8,961265	12842,84	,1458185	2,0789132E-02	-1,000091	1213294	405,4309
8	1150,352	9,013381	12816,69	,1458189	2,0827251E-02	-1,001613	1219163	406,0434
9	1150,240	9,076621	12793,51	,1462744	2,0880496E-02	-1,005973	1225015	406,5673
10	1150,129	9,170653	12767,12	,1475348	2,0951672E-02	-1,015530	1230846	406,9912
11	1150,017	9,282810	12739,27	,1488189	2,1021744E-02	-1,024927	1236655	407,3002
12	1149,906	9,401496	12707,73	,1495066	2,1078804E-02	-1,029949	1242442	407,4833
13	1149,795	9,516058	12676,42	,1495132	2,1121462E-02	-1,030252	1248209	407,5368
14	1149,685	9,626629	12645,33	,1494539	2,1161197E-02	-1,029700	1253956	407,4618
15	1149,575	9,725921	12612,50	,1488316	2,1168632E-02	-1,025053	1259685	407,2623
16	1149,465	9,796680	12574,13	,1471621	2,1194631E-02	-1,013097	1265398	406,9510
17	1149,356	9,897560	12536,37	,1480755	2,1248946E-02	-1,018241	1271090	406,5357
18	1149,247	10,00073	12497,09	,1486522	2,1299229E-02	-1,022177	1276758	406,0088
19	1149,138	10,03886	12456,12	,1457968	2,1263461E-02	-1,000200	1282409	405,3816
20	1149,030	10,11966	12412,76	,1468107	2,1369009E-02	-1,005279	1288032	404,6651
21	1148,922	10,08278	12366,41	,1418656	2,1378173E-02	-,9703933	1293632	403,8723
22	1148,815	9,939286	12324,06	,1352480	2,1335646E-02	-,9244597	1299221	403,0657
23	1148,708	9,662114	12281,01	,1270283	2,1265506E-02	-,8681716	1304605	402,3201
24	1148,601	9,590418	12239,79	,1332964	2,1471915E-02	-,9083602	1310353	401,6568
25	1148,495	9,802190	12198,77	,1493732	2,1860230E-02	-1,013429	1315819	400,9684
26	1148,389	9,885806	12156,38	,1474993	2,1905579E-02	-,9991115	1321233	400,1768
27	1148,284	9,936656	12112,78	,1493744	2,2018047E-02	-1,009364	1326612	399,2972
28	1148,179	10,01583	12067,80	,1494376	2,2092465E-02	-1,007392	1331956	398,3218
29	1148,074	10,08453	12021,53	,1493370	2,2161536E-02	-1,004124	1337268	397,2565
30	1147,970	10,14869	11974,02	,1493387	2,2228801E-02	-1,001303	1342547	396,1071
31	1147,866	10,20150	11925,39	,1490713	2,2288131E-02	-,9965371	1347794	394,8801
32	1147,763	10,25234	11875,72	,1491701	2,2351449E-02	-,9939672	1353009	393,5822
33	1147,660	10,29497	11825,10	,1491244	2,2409431E-02	-,9903300	1358192	392,2186
34	1147,557	10,36507	11773,57	,1490353	2,2485097E-02	-,9914091	1363341	390,7928
35	1147,455	10,38140	11721,09	,1501933	2,2578072E-02	-,9900227	1368452	389,3021
36	1147,354	10,42063	11667,70	,1498804	2,2646611E-02	-,9841608	1373526	387,7511
37	1147,253	10,45152	11613,54	,1502325	2,2732415E-02	-,9824365	1378562	386,1474
38	1147,152	10,48930	11558,59	,1510777	2,2835564E-02	-,9836852	1383558	384,4907
39	1147,052	10,51626	11502,87	,1512627	2,2909369E-02	-,9805802	1388514	382,7836
40	1146,952	10,60730	11446,97	,1549830	2,3114269E-02	-,9976000	1393418	381,0128
41	1146,853	10,64616	11382,54	,1542160	2,3141246E-02	-,9900389	1398276	379,1716
42	1146,754	10,65969	11320,13	,1531675	2,3153959E-02	-,9786427	1403104	377,2836
43	1146,656	10,68937	11257,16	,1520655	2,3162038E-02	-,9668999	1407902	375,3661
44	1146,558	10,66719	11193,97	,1505530	2,3152797E-02	-,9526565	1412673	373,4378
45	1146,461	10,56500	11130,84	,1504461	2,3196311E-02	-,9471643	1417412	371,5112
46	1146,365	10,51932	11067,91	,1502270	2,3234551E-02	-,9410082	1422116	369,5923
47	1146,269	10,43567	11005,36	,1497542	2,3266649E-02	-,9333434	1426786	367,6908
48	1146,173	10,21078	10943,81	,1427136	2,3158774E-02	-,8660782	1431438	365,8407
49	1146,078	9,520284	10885,66	,1168220	2,2687185E-02	-,7256999	1436127	364,1735
50	1145,984	8,690600	10834,46	,1001288	2,2492705E-02	-,6229600	1440847	362,8572
51	1145,889	7,621734	10772,60	6,1769135E-02	2,2620580E-02	-,5113908	1445551	361,9931

TRAJECTORY NUMBER 10.

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	929.1353	31636.07	6.956639	2453.164	0.	.9406132	5441.051
2	1.0000000	930.0395	31748.21	6.952000	2454.079	.1515542	.9419912	5420.958
3	2.000000	930.7704	31861.81	7.082311	2454.655	.3033503	.9432011	5399.858
4	3.000000	931.3717	31977.78	7.227091	2455.081	.4551463	.9442909	5377.738
5	4.000000	931.8910	32095.88	7.323906	2455.483	.6070230	.9453078	5354.844
6	5.000000	932.3109	32215.48	7.435315	2455.765	.7588997	.9462313	5331.235
7	6.000000	932.5750	32337.44	7.602331	2455.816	.9108569	.9470077	5306.496
8	7.000000	932.7680	32461.80	7.691940	2455.897	1.062734	.9477230	5280.964
9	8.000000	932.8427	32587.35	7.809278	2455.840	1.214610	.9483443	5254.780
10	9.000000	932.7954	32715.50	7.977417	2455.548	1.366487	.9488128	5227.382
11	10.000000	932.6466	32845.99	8.092723	2455.246	1.518202	.9492090	5199.155
12	11.00000	932.4462	32977.83	8.155235	2454.967	1.669918	.9495592	5170.433
13	12.00000	932.1696	33110.59	8.227012	2454.597	1.821553	.9498362	5141.202
14	13.00000	931.8068	33244.62	8.305264	2454.132	1.973107	.9500314	5111.348
15	14.00000	931.4063	33379.51	8.331824	2453.704	2.124580	.9501923	5081.155
16	15.00000	930.9722	33514.49	8.341855	2453.267	2.275973	.9503198	5050.806
17	16.00000	930.5042	33649.55	8.337103	2452.817	2.427286	.9504135	5020.300
18	17.00000	930.0404	33784.11	8.288197	2452.437	2.578518	.9505099	4989.920
19	18.00000	929.5512	33917.83	8.262259	2451.997	2.729749	.9505771	4959.613
20	19.00000	929.0266	34051.28	8.244396	2451.510	2.880820	.9506074	4929.211
21	20.00000	928.5210	34184.00	8.173949	2451.118	3.031890	.9506505	4899.051
22	21.00000	928.0191	34315.37	8.108390	2450.721	3.182880	.9506999	4869.190
23	22.00000	927.4931	34445.89	8.066541	2450.266	3.333790	.9507173	4839.409
24	23.00000	926.9821	34575.48	7.990274	2449.874	3.484618	.9507465	4809.888
25	24.00000	926.4263	34703.97	7.977522	2449.348	3.635447	.9507254	4780.410
26	25.00000	925.8601	34832.37	7.929398	2448.860	3.786114	.9506936	4750.904
27	26.00000	925.3354	34959.28	7.842066	2448.467	3.936782	.9506983	4721.896
28	27.00000	924.7333	35085.36	7.848016	2447.869	4.087369	.9506201	4692.724
29	28.00000	924.0584	35211.91	7.880709	2447.160	4.237794	.9504692	4663.140
30	29.00000	923.3530	35338.68	7.894857	2446.447	4.388139	.9502881	4633.375
31	30.00000	922.5574	35465.85	7.962415	2445.570	4.538323	.9500159	4603.128
32	31.00000	921.6644	35594.34	8.050387	2444.566	4.688346	.9496490	4572.175
33	32.00000	920.6989	35723.96	8.130867	2443.500	4.838207	.9492122	4540.660
34	33.00000	919.6679	35854.68	8.196226	2442.390	4.987827	.9487124	4508.621
35	34.00000	918.6088	35985.97	8.219831	2441.310	5.137285	.9481857	4476.331
36	35.00000	917.5238	36117.27	8.224999	2440.232	5.286582	.9476319	4444.730
37	36.00000	916.4408	36248.21	8.176503	2439.252	5.435718	.9466830	4414.521
38	37.00000	915.3382	36378.41	8.206389	2438.101	5.584692	.9455234	4383.616
39	38.00000	914.2525	36508.94	8.141755	2437.121	5.733425	.9444018	4352.860
40	39.00000	913.2367	36637.35	8.052422	2436.244	5.882077	.9433525	4322.883
41	40.00000	912.1703	36765.09	8.032826	2435.219	6.030487	.9422510	4292.874
42	41.00000	911.1902	36891.76	7.913469	2434.417	6.178817	.9412385	4263.497
43	42.00000	910.3858	37015.36	7.665734	2433.960	6.327066	.9404076	4235.523
44	43.00000	909.7512	37134.43	7.368929	2433.723	6.475315	.9397521	4209.202
45	44.00000	909.2914	37248.53	7.034246	2433.692	6.623564	.9392771	4184.625
46	45.00000	909.0925	37356.56	6.587030	2434.030	6.771894	.9390717	4162.361
47	46.00000	909.2454	37456.33	5.985041	2434.846	6.920304	.9392296	4143.201
48	47.00000	909.7559	37545.96	5.332193	2436.004	7.069037	.9397569	4127.523
49	48.00000	910.6290	37625.18	4.636847	2437.483	7.217931	.9406589	4115.385
50	49.00000	911.9483	37692.50	3.808127	2439.415	7.367228	.9420217	4107.415
51	50.00000	913.7917	37745.50	2.819778	2441.831	7.516928	.9439259	4104.406

TRAJECTORY NUMBER 11.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15-MAY-1972

CASE FUHA07 STAGE 1 CYCLE 10 PASS 2 PAGE 120

FUEL-MINIMIZATION-TO-ENERGY

	AMASS	ALPHD	TE77P	CL	CD	ANZBTG	ESPEF	DYNPP
1	1145,890	8,456710	10790,21	,1455534	2,3447509E+02	=,8936827	1445534	361,8726
2	1145,796	8,748180	10750,95	,1683136	2,4341418E+02	=1,027957	1449957	361,0645
3	1145,703	8,930879	10709,10	,1722708	2,4574166E+02	=1,048910	1454267	360,1022
4	1145,610	9,077545	10664,75	,1723354	2,4650864E+02	=1,046191	1458532	359,0088
5	1145,517	9,096801	10618,54	,1662598	2,4490334E+02	=1,006775	1462789	357,8253
6	1145,425	9,363722	10570,55	,1735802	2,4830087E+02	=1,046533	1467001	356,5479
7	1145,333	9,522529	10519,77	,1775320	2,5051902E+02	=1,065704	1471144	355,1232
8	1145,242	9,445888	10467,14	,1646072	2,4593257E+02	=,9854621	1475297	353,6166
9	1145,151	9,750158	10412,87	,1790370	2,5212153E+02	=1,065352	1479396	352,0245
10	1145,060	9,900572	10355,63	,1776304	2,5179819E+02	=1,051983	1483427	350,2820
11	1144,970	9,946794	10296,45	,1722493	2,4982681E+02	=1,015466	1487457	348,4545
12	1144,881	9,977106	10236,10	,1697282	2,4911693E+02	=,9955777	1491481	346,5786
13	1144,792	10,11068	10174,48	,1744966	2,5109929E+02	=1,017353	1495464	344,6424
14	1144,703	10,17907	10111,34	,1737175	2,5095902E+02	=1,007073	1499407	342,6353
15	1144,615	10,13388	10047,39	,1681420	2,4907190E+02	=,9696887	1503343	340,5989
16	1144,528	10,18576	9983,027	,1713791	2,5045715E+02	=,9820628	1507250	338,5469
17	1144,441	10,14475	9918,253	,1685613	2,4951810E+02	=,9603991	1511128	336,4796
18	1144,354	10,05730	9853,749	,1655664	2,4851478E+02	=,9379967	1514994	334,4320
19	1144,268	10,12910	9789,334	,1731378	2,5145726E+02	=,9740986	1518810	332,3872
20	1144,183	10,08060	9724,636	,1707607	2,5060039E+02	=,9551018	1522585	330,3308
21	1144,098	9,989916	9660,486	,1660485	2,4888425E+02	=,9236311	1526354	328,3078
22	1144,014	9,962216	9596,970	,1721195	2,5123408E+02	=,9509728	1530083	326,3142
23	1143,930	9,936181	9533,561	,1733441	2,5171909E+02	=,9518281	1533763	324,3244
24	1143,847	9,801065	9470,734	,1687798	2,5003474E+02	=,9217090	1537428	322,3665
25	1143,764	9,988840	9407,890	,1843179	2,5665175E+02	=,9988297	1541016	320,4010
26	1143,681	9,743365	9344,966	,1690300	2,5006015E+02	=,9119127	1544592	318,4393
27	1143,600	9,743142	9283,179	,1757825	2,5267970E+02	=,9420101	1548159	316,5342
28	1143,518	9,908713	9220,875	,1881157	2,5826231E+02	=1,000756	1551628	314,5958
29	1143,438	9,906835	9157,550	,1854418	2,5682857E+02	=,9806147	1555044	312,6125
30	1143,357	9,932793	9093,784	,1863916	2,5702456E+02	=,9793088	1558440	310,6165
31	1143,278	10,13607	9028,819	,1968239	2,6146050E+02	=1,026385	1561767	308,5659
32	1143,198	10,19433	8962,176	,1947248	2,6022479E+02	=1,008701	1565045	306,4465
33	1143,120	10,31072	8894,211	,1973565	2,6112293E+02	=1,014924	1568295	304,2780
34	1143,042	10,34752	8825,027	,1951994	2,5977870E+02	=,9967712	1571519	302,0666
35	1142,964	10,32988	8755,274	,1920703	2,5797401E+02	=,9738920	1574718	299,8438
36	1142,887	10,35630	8688,435	,1937382	2,5834536E+02	=,9749662	1577933	297,6178
37	1142,811	10,20222	8629,155	,1857045	2,5401738E+02	=,9275918	1581138	295,1652
38	1142,735	10,53027	8567,988	,2086494	2,6465199E+02	=1,031763	1584266	292,6121
39	1142,659	10,05613	8507,253	,1772704	2,4861929E+02	=,8711389	1587440	290,0990
40	1142,584	10,25704	8448,219	,1996798	2,5799617E+02	=,9711169	1590611	287,6799
41	1142,510	10,21783	8389,008	,1982203	2,5655290E+02	=,9560907	1593715	285,2579
42	1142,436	9,912014	8331,272	,1840009	2,4946905E+02	=,8814493	1596865	282,9235
43	1142,363	9,533941	8276,709	,1739954	2,4449484E+02	=,8280578	1600078	280,7573
44	1142,290	9,251211	8225,761	,1751303	2,4488948E+02	=,8275220	1603301	278,7710
45	1142,217	8,843624	8178,600	,1695387	2,4202690E+02	=,7964892	1606524	276,9724
46	1142,145	8,204444	8136,532	,1547399	2,3624467E+02	=,7243128	1609792	275,4226
47	1142,073	7,392846	8101,290	,1385502	2,3194484E+02	=,6473458	1613115	274,2019
48	1142,002	6,798186	8073,578	,1427023	2,3324160E+02	=,6642064	1616440	273,3341
49	1141,931	5,964930	8053,509	,1322686	2,3142928E+02	=,6156715	1619763	272,8220
50	1141,860	4,916771	8042,491	,1151918	2,2907446E+02	=,5380552	1623114	272,7324
51	1141,789	3,703929	8042,222	9,7650195E-02	2,2806813E+02	=,4592048	1626488	273,1420

TRAJECTORY NUMBER 11.

t_0=250

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7C	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	913,7917	37745,50	2,819778	2441,831	0.	,9439258	4104,405
2	1,0000000	914,9380	37793,02	3,141811	2442,813	,1499410	,9451099	4099,608
3	2,000000	915,9512	37845,49	3,409363	2443,676	,3001257	,9461565	4093,260
4	3,000000	916,8965	37901,60	3,603990	2444,506	,4503901	,9471330	4085,887
5	4,000000	917,7010	37960,85	3,812332	2445,179	,6007351	,9479645	4077,298
6	5,000000	918,3945	38023,49	3,998610	2445,749	,7512413	,9486804	4067,559
7	6,000000	918,9963	38088,85	4,165745	2446,236	,9017476	,9493021	4056,893
8	7,000000	919,4753	38157,03	4,339844	2446,590	1,052334	,9497968	4045,153
9	8,000000	919,8709	38227,87	4,488860	2446,875	1,203002	,9502055	4032,535
10	9,000000	920,2079	38300,85	4,603951	2447,126	1,353669	,9505536	4019,245
11	10,000000	920,5222	38375,33	4,668017	2447,393	1,504337	,9508763	4005,552
12	11,00000	920,8062	38450,60	4,713685	2447,645	1,655085	,9511716	3991,573
13	12,00000	921,0335	38526,70	4,767310	2447,833	1,805914	,9514065	3977,194
14	13,00000	921,1555	38603,94	4,866865	2447,876	1,956662	,9515325	3962,170
15	14,00000	921,1567	38683,15	4,997981	2447,770	2,107410	,9515338	3946,272
16	15,00000	921,0645	38764,45	5,131760	2447,565	2,258158	,9514385	3929,592
17	16,00000	920,8781	38847,93	5,268654	2447,259	2,408825	,9512439	3912,106
18	17,00000	920,7305	38932,97	5,294807	2447,096	2,559412	,9510934	3894,477
19	18,00000	920,6006	39017,59	5,259695	2447,044	2,710080	,9510006	3877,152
20	19,00000	920,4715	39102,11	5,291710	2446,852	2,860666	,9508259	3859,547
21	20,00000	920,3018	39187,15	5,288160	2446,692	3,011173	,9506506	3841,840
22	21,00000	920,1304	39271,78	5,282891	2446,532	3,161679	,9504736	3824,216
23	22,00000	919,9217	39356,63	5,290657	2446,323	3,312185	,9502579	3806,412
24	23,00000	919,6799	39441,52	5,311261	2446,069	3,462611	,9500082	3788,484
25	24,00000	919,4028	39526,88	5,332266	2445,779	3,613036	,9497220	3770,336
26	25,00000	919,0196	39612,76	5,417369	2445,322	3,763381	,9493261	3751,698
27	26,00000	918,5147	39700,54	5,536704	2444,710	3,913646	,9488046	3732,242
28	27,00000	917,9435	39789,97	5,646369	2444,040	4,063749	,9482145	3712,230
29	28,00000	917,4005	39880,68	5,667781	2443,483	4,213771	,9476537	3692,083
30	29,00000	916,8666	39971,12	5,670068	2442,955	4,363633	,9471021	3672,040
31	30,00000	916,2115	40062,23	5,747628	2442,230	4,513494	,9464254	3653,729
32	31,00000	915,4792	40154,69	5,839538	2441,413	4,663114	,9456690	3635,991
33	32,00000	914,6980	40248,46	5,920943	2440,557	4,812652	,9448620	3617,867
34	33,00000	913,9251	40343,12	5,949357	2439,763	4,962030	,9440637	3599,689
35	34,00000	913,1690	40437,77	5,946762	2439,018	5,111327	,9432926	3581,578
36	35,00000	912,4007	40532,33	5,943715	2438,262	5,260063	,9424890	3563,459
37	36,00000	911,6811	40626,47	5,891652	2437,604	5,409437	,9417456	3545,605
38	37,00000	910,9979	40719,45	5,827594	2436,994	5,558331	,9410398	3528,089
39	38,00000	910,4008	40811,15	5,706251	2436,527	5,707145	,9404231	3511,105
40	39,00000	909,9007	40900,21	5,523948	2436,252	5,855958	,9399478	3495,046
41	40,00000	909,6027	40985,97	5,273397	2436,196	6,004771	,9396400	3480,099
42	41,00000	909,6081	41066,82	4,905572	2436,492	6,153585	,9396043	3466,872
43	42,00000	909,8574	41141,11	4,451441	2437,115	6,302479	,9398618	3455,694
44	43,00000	910,3786	41207,91	3,965883	2437,996	6,451534	,9404002	3446,664
45	44,00000	911,2333	41266,58	3,394010	2439,220	6,600831	,9412831	3440,091
46	45,00000	912,4646	41315,46	2,752646	2440,797	6,750450	,9425550	3436,386
47	46,00000	914,0897	41353,86	2,047077	2442,719	6,900312	,9442337	3435,720
48	47,00000	916,1890	41380,14	1,223864	2445,055	7,050495	,9464026	3438,636
49	48,00000	918,8189	41392,31	,2732474	2447,810	7,201244	,9491188	3445,656
50	49,00000	921,9965	41388,59	-,7356307	2450,946	7,352395	,9524012	3457,150
51	50,00000	925,7158	41368,24	-1,808878	2454,424	7,504110	,9562431	3473,241

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TE77P	CL	CD	ANZBTG	ESPEF	DYNPR
1	1141,789	5,628575	8042,220	,2459266	2,8617718E-02	=1,132976	1626488	273,1419
2	1141,718	5,982679	8036,578	,2483172	2,8867197E-02	=1,144180	1629052	273,2052
3	1141,647	6,088538	8027,642	,2359333	2,8154121E-02	=1,087614	1631654	273,1235
4	1141,577	6,228432	8016,584	,2315998	2,7948457E-02	=1,067312	1634312	272,9531
5	1141,506	6,519693	8002,838	,2379108	2,8423023E-02	=1,094881	1636941	272,6578
6	1141,436	6,593106	7986,612	,2292082	2,7909013E-02	=1,053865	1639576	272,2518
7	1141,366	6,808387	7966,383	,2328649	2,8195885E-02	=1,068567	1642215	271,7568
8	1141,296	6,973476	7947,788	,2321436	2,8186045E-02	=1,063004	1644831	271,1533
9	1141,226	7,078067	7926,310	,2287091	2,8002481E-02	=1,044912	1647455	270,4677
10	1141,157	7,154803	7901,400	,2257437	2,7853517E-02	=1,028775	1650094	269,7216
11	1141,087	7,132520	7876,670	,2190952	2,7508174E-02	=,9960995	1652760	268,9450
12	1141,018	7,213319	7851,313	,2217737	2,7701813E-02	=1,005155	1655423	268,1428
13	1140,950	7,275803	7825,045	,2224391	2,7771693E-02	=1,005019	1658061	267,2992
14	1140,881	7,500344	7797,275	,2323339	2,8420902E-02	=1,045553	1660638	266,3830
15	1140,813	7,635163	7767,536	,2323110	2,8419561E-02	=1,041558	1663167	265,3752
16	1140,745	7,796351	7736,077	,2344210	2,8546200E-02	=1,046656	1665676	264,2911
17	1140,677	7,941730	7702,850	,2350844	2,8563752E-02	=1,045021	1668166	263,1291
18	1140,610	7,691631	7669,476	,2138862	2,7237386E-02	=,9479601	1670746	261,9769
19	1140,543	7,733432	7636,825	,2197964	2,7565000E-02	=,9696851	1673363	260,8666
20	1140,476	7,905730	7603,437	,2305759	2,8209382E-02	=1,012125	1675904	259,7175
21	1140,409	7,719218	7569,863	,2165424	2,7330549E-02	=,9472191	1678461	258,5667
22	1140,343	7,876574	7536,441	,2290363	2,8060199E-02	=,9966919	1681004	257,4251
23	1140,277	7,814184	7502,587	,2236647	2,7687770E-02	=,9693048	1683519	256,2650
24	1140,212	7,948816	7468,419	,2324319	2,8221615E-02	=1,002200	1686004	255,0914
25	1140,146	7,900874	7433,753	,2274647	2,7872061E-02	=,9765365	1688473	253,8979
26	1140,081	8,242482	7397,895	,2466863	2,9118188E-02	=1,053497	1690861	252,6452
27	1140,017	8,282871	7360,199	,2408386	2,8680572E-02	=1,022722	1693197	251,3092
28	1139,952	8,457888	7321,301	,2458567	2,8961540E-02	=1,038049	1695526	249,9243
29	1139,889	8,210939	7282,239	,2253325	2,7579896E-02	=,9473139	1697921	248,5468
30	1139,825	8,402687	7243,414	,2398995	2,8464664E-02	=1,002217	1700317	247,1849
31	1139,762	8,571276	7207,527	,2469210	2,8885037E-02	=1,025261	1702623	245,7574
32	1139,699	8,663100	7172,537	,2469581	2,8925684E-02	=1,019312	1704902	244,2809
33	1139,636	8,747979	7136,751	,2472709	2,8779842E-02	=1,014341	1707176	242,7718
34	1139,574	8,654653	7100,827	,2380609	2,8127704E-02	=,9710483	1709491	241,2658
35	1139,512	8,690885	7065,119	,2412834	2,8270993E-02	=,9780030	1711819	239,7777
36	1139,450	8,690859	7029,382	,2412849	2,8208030E-02	=,9720097	1714134	238,2931
37	1139,388	8,530885	6994,275	,2329985	2,7628326E-02	=,9334334	1716481	236,8474
38	1139,328	8,551718	6959,903	,2396065	2,7987886E-02	=,9538990	1718824	235,4421
39	1139,267	8,224328	6926,753	,2238584	2,6963918E-02	=,8870350	1721205	234,1036
40	1139,206	8,057954	6895,681	,2251081	2,7000896E-02	=,8872737	1723627	232,8720
41	1139,146	7,818671	6867,096	,2106713	2,6155817E-02	=,8273015	1726091	231,7660
42	1139,086	7,076215	6842,380	,1972979	2,5425416E-02	=,7725961	1728638	230,8530
43	1139,027	6,523308	6822,187	,1897214	2,5106299E-02	=,7412413	1731234	230,1596
44	1138,967	6,037912	6806,670	,1896898	2,5142638E-02	=,7396416	1733839	229,6877
45	1138,907	5,215682	6796,553	,1703364	2,4369946E-02	=,6649280	1736489	229,4737
46	1138,848	4,572095	6792,703	,1700687	2,4446560E-02	=,6641769	1739171	229,5564
47	1138,789	3,673425	6795,482	,1550102	2,3990743E-02	=,6076015	1741879	229,9517
48	1138,729	2,644903	6806,102	,1389449	2,3675719E-02	=,5478416	1744639	230,7188
49	1138,670	1,463943	6825,677	,1208620	2,3437141E-02	=,4807490	1747440	231,9099
50	1138,610	,4459975	6854,952	,1198491	2,3790802E-02	=,4802430	1750246	233,5583
51	1138,591	=,8386743	6894,157	,1030640	2,4054811E-02	=,4186344	1753033	235,6759

TRAJECTORY NUMBER 12.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

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FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASE1
1	0.	925,7158	41368,24	=1,808878	2454,424	0.	,9502432	3473,242
2	1,0000000	927,2488	41346,67	=,8487247	2456,180	,1521185	,9578267	3482,056
3	2,000000	928,4578	41340,12	=5,3295492E-03	2457,452	,3044789	,9590756	3487,286
4	3,000000	929,5320	41345,58	,6573222	2458,488	,4570811	,9601852	3490,072
5	4,000000	930,2398	41361,46	1,314801	2459,083	,6098445	,9609163	3489,875
6	5,000000	930,7313	41387,72	1,877785	2459,418	,7626079	,9614240	3487,216
7	6,000000	931,0853	41422,00	2,347300	2459,599	,9153713	,9617897	3482,754
8	7,000000	931,2518	41463,69	2,765611	2459,580	1,068215	,9619617	3476,422
9	8,000000	931,3048	41511,36	3,086466	2459,511	1,220979	,9620578	3468,849
10	9,000000	931,3066	41563,84	3,376607	2459,312	1,373662	,9620183	3460,030
11	10,000000	931,0378	41621,25	3,702985	2458,844	1,526344	,9617406	3449,614
12	11,00000	930,6761	41683,91	3,998641	2458,236	1,678806	,9613154	3437,853
13	12,00000	930,2051	41750,53	4,197669	2457,677	1,831307	,9608805	3425,413
14	13,00000	929,6853	41820,07	4,390014	2457,017	1,983667	,9603436	3412,168
15	14,00000	929,1468	41892,39	4,500429	2456,418	2,135866	,9598079	3398,480
16	15,00000	928,6566	41965,71	4,569851	2455,859	2,287904	,9592809	3384,665
17	16,00000	928,0206	42040,60	4,686530	2455,138	2,439942	,9586281	3370,199
18	17,00000	927,3307	42117,32	4,796349	2454,359	2,591738	,9579113	3355,242
19	18,00000	926,6272	42195,47	4,867768	2453,601	2,743454	,9571646	3340,034
20	19,00000	925,9204	42274,84	4,912344	2452,863	2,895089	,9564585	3324,697
21	20,00000	925,1729	42354,09	4,964070	2452,078	3,046682	,9556623	3309,134
22	21,00000	924,4022	42434,50	5,006328	2451,277	3,197794	,9548862	3293,389
23	22,00000	923,6271	42515,35	5,032619	2450,486	3,349026	,9540656	3277,577
24	23,00000	922,8611	42596,66	5,080456	2449,625	3,500096	,9532323	3261,548
25	24,00000	922,0009	42678,53	5,084130	2448,828	3,650925	,9524056	3245,525
26	25,00000	921,1732	42760,21	5,106203	2447,986	3,801754	,9515507	3229,468
27	26,00000	920,2603	42842,75	5,171835	2447,024	3,952340	,9506078	3213,022
28	27,00000	919,3899	42925,82	5,177538	2446,156	4,102766	,9497086	3196,647
29	28,00000	918,5345	43008,61	5,166861	2445,317	4,253111	,9488251	3180,387
30	29,00000	917,6406	43091,35	5,174373	2444,428	4,403295	,9479058	3164,051
31	30,00000	916,7297	43174,16	5,187820	2443,508	4,553317	,9469607	3147,646
32	31,00000	915,7552	43257,26	5,220607	2442,506	4,703179	,9459541	3131,034
33	32,00000	914,7268	43341,05	5,275314	2441,441	4,852879	,9448918	3114,167
34	33,00000	913,7328	43425,21	5,275464	2440,455	5,002418	,9438650	3097,373
35	34,00000	912,8071	43508,80	5,222797	2439,585	5,151715	,9429088	3080,909
36	35,00000	911,8915	43591,43	5,176524	2438,719	5,301012	,9419630	3064,657
37	36,00000	911,0276	43673,18	5,099082	2437,931	5,450067	,9410706	3048,731
38	37,00000	910,2206	43753,32	5,007632	2437,211	5,599041	,9402369	3033,201
39	38,00000	909,5133	43831,81	4,867056	2436,632	5,747935	,9395063	3018,383
40	39,00000	908,9806	43907,30	4,653331	2436,282	5,896749	,9389560	3004,536
41	40,00000	908,5747	43979,22	4,424683	2436,062	6,045481	,9385368	2991,661
42	41,00000	908,3489	44047,21	4,144376	2436,050	6,194295	,9383036	2979,973
43	42,00000	908,3478	44110,02	3,767643	2436,352	6,343108	,9383437	2969,921
44	43,00000	908,7978	44166,08	3,289959	2437,008	6,492002	,9387156	2961,919
45	44,00000	909,5158	44213,62	2,676772	2438,097	6,641138	,9395090	2956,505
46	45,00000	910,7359	44250,44	1,948347	2439,612	6,790516	,9407692	2954,160
47	46,00000	912,4198	44275,16	1,147653	2441,513	6,940135	,9425087	2955,184
48	47,00000	914,5891	44286,69	,2913201	2443,790	7,090158	,9447496	2959,701
49	48,00000	917,3306	44283,61	=,7180408	2446,498	7,240583	,9475856	2968,343
50	49,00000	920,6836	44263,43	=1,778691	2449,619	7,391412	,9510450	2981,579
51	50,00000	924,6238	44225,86	=2,935674	2453,072	7,542805	,9551151	2999,455

TRAJECTORY NUMBER 13.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TETTP	CL	CD	ANZBTG	ESPEF	DYNPR
1	1138,561	2,540733	6894,159	,3636921	4,0690908E-02	=1,444563	1753033	235,6760
2	1138,491	3,584604	6914,407	,3700871	4,1725918E-02	=1,476343	1753765	236,7016
3	1138,431	3,990750	6927,157	,3363356	3,8281391E-02	=1,346665	1754678	237,3936
4	1138,371	4,453672	6935,000	,3209313	3,6962518E-02	=1,288237	1755850	237,6811
5	1138,310	5,247758	6936,557	,3314068	3,8108402E-02	=1,331036	1757015	238,0624
6	1138,250	5,418881	6932,570	,3012435	3,5219066E-02	=1,210722	1758310	238,0146
7	1138,190	5,930052	6925,068	,3044308	3,5589531E-02	=1,222416	1759732	237,8051
8	1138,130	6,170284	6913,601	,2907234	3,4359246E-02	=1,166044	1761217	237,4158
9	1138,070	6,355749	6899,628	,2803030	3,3453520E-02	=1,122389	1762824	236,9221
10	1138,010	6,677424	6883,003	,2827309	3,3662057E-02	=1,129143	1764462	236,3081
11	1137,950	7,104409	6862,827	,2904842	3,4304996E-02	=1,155991	1766043	235,5235
12	1137,891	7,247794	6839,790	,2787924	3,3210818E-02	=1,105675	1767658	234,6105
13	1137,832	7,302128	6815,461	,2676858	3,2242751E-02	=1,057808	1769391	233,6519
14	1137,773	7,616573	6789,395	,2771046	3,2919329E-02	=1,089806	1771125	232,6152
15	1137,714	7,884071	6762,507	,2523702	3,0901546E-02	=,9890061	1772949	231,5528
16	1137,655	7,837421	6735,408	,2649349	3,1800574E-02	=1,033020	1774813	230,4861
17	1137,597	7,794546	6706,809	,2680797	3,1949939E-02	=1,040027	1776615	229,3508
18	1137,539	7,880041	6677,152	,2662482	3,1706379E-02	=1,027718	1778417	228,1665
19	1137,481	7,882940	6647,011	,2610209	3,1202791E-02	=1,002527	1780257	226,9717
20	1137,423	7,930912	6616,633	,2615219	3,1122925E-02	=,9983973	1782121	225,7705
21	1137,366	8,038041	6585,746	,2653137	3,1316969E-02	=1,008021	1783968	224,5484
22	1137,309	8,037021	6554,475	,2623391	3,0978757E-02	=,9914042	1785820	223,3132
23	1137,252	8,077982	6523,081	,2635096	3,0953663E-02	=,9903029	1787681	222,0778
24	1137,196	8,216152	6491,166	,2704934	3,1355698E-02	=1,010517	1789511	220,8195
25	1137,140	8,038630	6459,350	,2566240	3,0202048E-02	=,9539249	1791384	219,5746
26	1137,084	8,311647	6427,412	,2757838	3,1514388E-02	=1,016488	1793225	218,3252
27	1137,028	8,334264	6394,562	,2726644	3,1157989E-02	=1,001243	1795016	217,0336
28	1136,973	8,221703	6361,958	,2636555	3,0300667E-02	=,9628804	1796864	215,7636
29	1136,918	8,291017	6329,617	,2698414	3,0741549E-02	=,9794811	1798718	214,5104
30	1136,863	8,328784	6297,070	,2722114	3,0856385E-02	=,9822138	1800539	213,2469
31	1136,809	8,374040	6264,349	,2747010	3,0941535E-02	=,9852447	1802340	211,9818
32	1136,754	8,508961	6231,119	,2821261	3,1476985E-02	=1,005467	1804096	210,6917
33	1136,700	8,550769	6197,309	,2816511	3,1344608E-02	=,9975686	1805826	209,3774
34	1136,647	8,433240	6163,728	,2726823	3,0532528E-02	=,9602114	1807600	208,0827
35	1136,594	8,336667	6130,933	,2695207	3,0220713E-02	=,9435403	1809420	206,8321
36	1136,540	8,387474	6098,571	,2768570	3,0694669E-02	=,9632014	1811219	205,6026
37	1136,488	8,162372	6066,948	,2655902	2,9779174E-02	=,9191428	1813037	204,4119
38	1136,435	8,182625	6036,315	,2741921	3,0337036E-02	=,9432706	1814857	203,2666
39	1136,383	7,814430	6007,020	,2568117	2,9007894E-02	=,8795292	1816716	202,1919
40	1136,331	7,569079	5980,046	,2544050	2,8786658E-02	=,8672638	1818636	201,2268
41	1136,279	7,344591	5955,172	,2547472	2,8776757E-02	=,8646939	1820562	200,3562
42	1136,228	6,906212	5932,913	,2426560	2,7959815E-02	=,8211239	1822524	199,6060
43	1136,176	6,344260	5914,288	,2284708	2,7090297E-02	=,7715476	1824561	199,0239
44	1136,125	5,681374	5900,189	,2142648	2,6293382E-02	=,7229283	1826675	198,6480
45	1136,074	4,753192	5891,805	,1900876	2,5097845E-02	=,6422703	1828849	198,5318
46	1136,023	3,881979	5890,125	,1790210	2,4691929E-02	=,6061180	1831173	198,7142
47	1135,972	2,940137	5895,655	,1679885	2,4364437E-02	=,5709191	1833496	199,2139
48	1135,921	1,991836	5908,905	,1607047	2,4241865E-02	=,5489778	1835845	200,0519
49	1135,870	,5019755	5931,030	,1232768	2,3376415E-02	=,4264210	1838262	201,2844
50	1135,818	-,3685094	5963,058	,1376974	2,4014988E-02	=,4789017	1840696	202,9527
51	1135,767	-2,054775	6005,066	9,6239830E-02	2,3881985E-02	=,3417517	1843134	205,0620

TRAJECTORY NUMBER 13.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE FUHAQT STAGE 1 CYCLE 10 PASS 2 PAGE 123

FUEL MINIMIZATION TO ENERGY

	TIME	VGI7E	HGC7E	GAMZD	VI77E	RG77N	AMACH	AMASF1
1	0.	924.6238	44225.86	-2.935674	2453.072	0.	.9551151	2999.454
2	1.000000	926.2816	44165.45	-2.114849	2455.090	.1517961	.9568275	3011.042
3	2.000000	927.8119	44156.76	-1.440854	2456.828	.3039952	.9584083	3020.337
4	3.000000	929.0042	44138.69	-.7890643	2458.147	.4564361	.9596400	3026.881
5	4.000000	929.9125	44130.94	-.1806774	2459.107	.6090387	.9605782	3030.876
6	5.000000	930.3073	44133.29	.5080908	2459.482	.7618018	.9609861	3031.668
7	6.000000	930.6472	44146.42	1.022972	2459.753	.9146458	.9613372	3030.511
8	7.000000	930.9800	44166.07	1.434188	2459.959	1.067490	.9616397	3028.135
9	8.000000	930.8160	44193.47	1.935788	2459.688	1.220253	.9615116	3023.231
10	9.000000	930.6514	44228.22	2.304168	2459.388	1.373017	.9613415	3016.991
11	10.000000	930.3140	44268.30	2.662772	2458.897	1.525699	.9609930	3009.359
12	11.00000	929.7541	44314.63	3.024337	2458.159	1.678221	.9604148	3000.039
13	12.00000	929.1820	44365.88	3.285168	2457.446	1.830662	.9598237	2989.879
14	13.00000	928.6236	44420.65	3.457955	2456.790	1.982942	.9592469	2979.186
15	14.00000	927.9228	44476.07	3.656749	2455.968	2.135141	.9585230	2967.648
16	15.00000	927.2480	44538.55	3.770192	2455.225	2.287098	.9578259	2955.695
17	16.00000	926.5642	44600.00	3.867456	2454.471	2.439055	.9571092	2943.539
18	17.00000	925.7856	44663.98	3.963680	2453.642	2.590771	.9563153	2930.845
19	18.00000	925.1451	44727.46	3.954716	2453.013	2.742406	.9556537	2918.457
20	19.00000	924.3172	44791.73	4.060221	2452.116	2.893879	.9547984	2905.491
21	20.00000	923.4479	44858.18	4.146306	2451.181	3.045192	.9538901	2892.037
22	21.00000	922.5659	44925.20	4.209534	2450.268	3.196421	.9529894	2878.530
23	22.00000	921.6880	44993.42	4.243358	2449.371	3.347413	.9520825	2864.827
24	23.00000	920.9619	45061.10	4.177954	2448.699	3.498323	.9513325	2853.446
25	24.00000	920.1337	45128.08	4.197522	2447.842	3.649071	.9504769	2842.071
26	25.00000	919.2858	45195.73	4.211297	2447.010	3.799738	.9496012	2830.562
27	26.00000	918.3995	45263.25	4.246782	2446.103	3.950244	.9486856	2818.970
28	27.00000	917.4944	45331.63	4.267877	2445.189	4.100589	.9477507	2807.223
29	28.00000	916.6482	45399.64	4.250427	2444.361	4.250773	.9468766	2795.703
30	29.00000	915.7576	45467.62	4.256709	2443.472	4.400796	.9459566	2784.073
31	30.00000	914.7163	45536.04	4.347418	2442.369	4.550657	.9448809	2771.972
32	31.00000	913.6056	45606.25	4.436490	2441.196	4.700357	.9437338	2759.453
33	32.00000	912.5458	45677.04	4.455561	2440.108	4.849815	.9426595	2747.068
34	33.00000	911.5083	45747.90	4.449680	2439.141	4.999193	.9416085	2734.750
35	34.00000	910.5095	45818.25	4.400280	2438.237	5.148320	.9406284	2722.703
36	35.00000	909.7633	45887.33	4.293126	2437.488	5.297384	.9397646	2711.151
37	36.00000	908.9736	45954.51	4.192286	2436.778	5.446278	.9389488	2699.992
38	37.00000	908.2761	46020.03	4.057002	2436.183	5.595172	.9382284	2689.319
39	38.00000	907.7523	46082.56	3.829244	2435.860	5.743905	.9377286	2679.640
40	39.00000	907.5661	46140.79	3.505669	2435.844	5.892637	.9374950	2671.249
41	40.00000	907.6470	46193.08	3.088223	2436.167	6.041451	.9375785	2664.492
42	41.00000	908.0887	46238.01	2.561636	2436.870	6.190345	.9380348	2659.703
43	42.00000	908.8365	46274.23	2.026245	2437.834	6.339400	.9388072	2656.908
44	43.00000	909.8759	46302.20	1.480972	2439.041	6.488616	.9398809	2656.007
45	44.00000	911.2467	46321.06	.8961166	2440.554	6.638155	.9413175	2657.276
46	45.00000	913.2249	46329.34	6.145209D-02	2442.582	6.787936	.9433403	2661.505
47	46.00000	915.8130	46322.31	-.9178224	2445.097	6.938120	.9460138	2669.500
48	47.00000	918.8570	46300.40	-1.812673	2447.926	7.088706	.9491586	2680.745
49	48.00000	922.5000	46263.23	-2.871484	2451.130	7.239696	.9529213	2695.692
50	49.00000	926.7766	46207.57	-4.006618	2454.714	7.391251	.9573389	2714.902
51	50.00000	931.6978	46132.17	-5.405948	2458.464	7.543369	.9624220	2738.601

TRAJECTORY NUMBER 14.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	IE77P	CL	CD	ANZBTG	ESPEF	DYNPP
1	1135,767	2,173311	6005,066	,4222439	4,7843038E-02	=1,461639	1843134	205,0620
2	1135,715	2,481585	6030,361	,3826930	4,3041144E-02	=1,332829	1843390	206,1963
3	1135,663	3,037065	6051,096	,3735036	4,2732504E-02	=1,307232	1843884	207,1625
4	1135,611	3,681117	6065,951	,3728637	4,2386440E-02	=1,309605	1844415	207,8749
5	1135,559	4,125813	6075,414	,3602245	4,1074849E-02	=1,268526	1845012	208,3589
6	1135,506	4,214481	6077,757	,3910302	4,4844953E-02	=1,377439	1845455	208,5124
7	1135,454	4,801379	6076,329	,3195016	3,7005568E-02	=1,127244	1846189	208,5337
8	1135,402	5,628258	6072,510	,3515004	4,0238776E-02	=1,238860	1847088	208,4688
9	1135,349	6,100842	6063,049	,3492677	3,9966903E-02	=1,229154	1847846	208,1402
10	1135,297	6,049523	6050,996	,3169590	3,6755619E-02	=1,114140	1848801	207,7208
11	1135,245	6,739056	6035,960	,3424425	3,9204697E-02	=1,199812	1849764	207,1724
12	1135,193	6,856893	6017,285	,3237059	3,7271718E-02	=1,130849	1850720	206,4649
13	1135,141	6,996488	5997,012	,3144083	3,6265432E-02	=1,094635	1851822	205,7057
14	1135,090	6,990079	5975,779	,3006558	3,4829665E-02	=1,043206	1853049	204,9206
15	1135,039	7,465040	5952,661	,3217671	3,6778583E-02	=1,111078	1854229	204,0499
16	1134,987	7,060565	5928,830	,2824473	3,3016249E-02	=,9722866	1855531	203,1643
17	1134,937	7,568749	5904,586	,3137580	3,5775343E-02	=1,074233	1856846	202,2647
18	1134,886	7,353272	5879,184	,2898254	3,3434587E-02	=,9884036	1858158	201,3167
19	1134,835	7,241617	5854,636	,2835197	3,2787773E-02	=,9628525	1859604	200,4237
20	1134,785	7,875430	5828,616	,3226120	3,6263865E-02	=1,088992	1860887	199,4506
21	1134,735	7,500764	5801,587	,2872614	3,2849769E-02	=,9658140	1862192	198,4393
22	1134,685	7,902951	5774,482	,3133364	3,5088014E-02	=1,047277	1863523	197,4305
23	1134,636	7,581793	5747,011	,2861209	3,2482015E-02	=,9522341	1864888	196,4126
24	1134,586	7,488070	5720,053	,2840535	3,2192754E-02	=,9409120	1866376	195,4691
25	1134,537	7,870445	5700,885	,3121825	3,4588654E-02	=1,028007	1867748	194,8932
26	1134,488	7,590446	5677,434	,2896763	3,2440289E-02	=,9497750	1869124	193,5076
27	1134,439	7,992600	5653,762	,3175491	3,4880005E-02	=1,034933	1870462	192,5115
28	1134,391	7,691830	5629,768	,2928978	3,2546102E-02	=,9503605	1871810	191,5046
29	1134,342	7,839124	5606,333	,3055767	3,3582117E-02	=,9860809	1873201	190,5304
30	1134,294	7,831308	5582,612	,3045381	3,3396712E-02	=,9777005	1874552	189,5427
31	1134,246	8,288528	5557,712	,3326894	3,5856496E-02	=1,061340	1875779	188,4937
32	1134,198	8,103122	5531,898	,3116960	3,3832678E-02	=,9892449	1877001	187,4055
33	1134,151	8,131322	5506,493	,3124440	3,3792073E-02	=,9860260	1878307	186,3468
34	1134,104	8,063920	5481,271	,3077771	3,3266499E-02	=,9660214	1879638	185,3021
35	1134,056	7,940682	5456,712	,3021653	3,2686866E-02	=,9434522	1881015	184,2951
36	1134,010	7,712888	5433,321	,2929652	3,1820404E-02	=,9103549	1882455	183,3497
37	1133,963	7,775860	5410,770	,3055197	3,2804644E-02	=,9443073	1883878	182,4440
38	1133,916	7,403175	5389,326	,2874051	3,1229936E-02	=,8847689	1885332	181,5939
39	1133,870	7,048855	5370,182	,2777397	3,0405565E-02	=,8519022	1886885	180,8585
40	1133,824	6,485002	5353,970	,2593861	2,9027887E-02	=,7936701	1888535	180,2655
41	1133,778	5,924774	5341,436	,2484189	2,8254691E-02	=,7587915	1490274	179,8470
42	1133,732	5,104789	5335,307	,2259271	2,6911077E-02	=,6902148	1892107	179,6355
43	1133,686	4,790264	5329,522	,2427937	2,8004590E-02	=,7409647	1893940	179,6198
44	1133,640	4,017224	5329,862	,2252843	2,7006936E-02	=,6889305	1895777	179,7901
45	1133,594	3,461986	5334,964	,2274646	2,7248887E-02	=,6970309	1897644	180,1775
46	1133,548	1,606243	5340,736	,1487784	2,3709862E-02	=,4612623	1899694	180,8811
47	1133,502	,9039244	5346,824	,1699857	2,4679440E-02	=,5287120	1901837	181,9690
48	1133,456	6,4767487E-02	5393,929	,1740636	2,5047537E-02	=,5453383	1903932	183,3730
49	1133,410	=1,715384	5429,198	,1178193	2,3830068E-02	=,3761680	1906101	185,1587
50	1133,363	=2,585417	5473,779	,1380019	2,4831300E-02	=,4440706	1908282	187,3779
51	1133,316	=5,261601	5528,154	3,8122695E-02	2,5358539E-02	=,1322512	1910452	190,0574

TRAJECTORY NUMBER 14.

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAMZD	V177F	RG77N	AMACH	AMASE1
1	0.	931.6978	26132.17	-5.005947	2458.464	0.	.9624220	2738.601
2	1.0000000	933.7299	26051.72	-4.449345	2461.319	.1525216	.9645215	2755.112
3	2.000000	935.0174	25987.65	-3.927465	2463.312	.3056075	.9658515	2767.372
4	3.000000	936.3167	25938.77	-2.618205	2465.040	.4590964	.9671937	2777.610
5	4.000000	937.3236	25901.91	-1.861677	2466.543	.6128277	.9682338	2785.416
6	5.000000	937.8426	25877.91	-1.093921	2467.081	.7667192	.9687906	2790.178
7	6.000000	938.0282	25866.03	-.3479626	2467.342	.9207725	.9689615	2792.255
8	7.000000	937.9394	25866.24	.3356126	2467.253	1.074824	.9688608	2791.982
9	8.000000	937.8881	25876.13	.8884578	2467.129	1.228798	.9687962	2790.435
10	9.000000	937.6408	25893.74	1.307538	2466.815	1.382771	.9685014	2787.405
11	10.000000	937.2428	25918.64	1.717439	2466.329	1.536663	.9681709	2782.967
12	11.000000	936.6641	25949.95	2.126686	2465.593	1.690474	.9675527	2777.048
13	12.00000	935.7837	25988.32	2.562490	2464.536	1.844044	.9666431	2769.398
14	13.00000	934.8698	26033.10	2.901929	2463.462	1.997533	.9656990	2760.782
15	14.00000	933.9528	26062.52	3.154129	2462.414	2.150699	.9647518	2751.539
16	15.00000	933.0171	26135.58	3.343774	2461.374	2.303785	.9637852	2741.764
17	16.00000	932.0146	26191.28	3.517199	2460.271	2.456629	.9627496	2731.445
18	17.00000	930.9239	26249.85	3.685617	2459.079	2.609318	.9616230	2720.513
19	18.00000	929.6927	26311.14	3.884049	2457.721	2.761753	.9603512	2708.842
20	19.00000	928.3773	26375.69	4.066218	2456.284	2.913952	.9589924	2696.513
21	20.00000	927.0841	26442.47	4.185936	2454.910	3.065909	.9576566	2683.959
22	21.00000	925.7062	26511.11	4.319339	2453.439	3.217625	.9562332	2670.942
23	22.00000	924.2653	26581.86	4.446366	2451.907	3.369018	.9547406	2657.466
24	23.00000	922.7724	26654.39	4.567817	2450.325	3.520250	.9532027	2643.671
25	24.00000	921.2068	26728.86	4.690792	2448.662	3.671159	.9515834	2629.414
26	25.00000	919.7853	26804.50	4.695643	2447.249	3.821746	.9501171	2615.417
27	26.00000	918.0389	26879.31	4.662157	2445.937	3.972252	.9487263	2601.749
28	27.00000	917.0784	26953.83	4.636924	2444.604	4.122436	.9473209	2588.102
29	28.00000	915.8145	27027.34	4.562205	2443.407	4.272458	.9460154	2574.866
30	29.00000	914.6243	27099.39	4.463806	2442.301	4.422239	.9447858	2562.038
31	30.00000	913.4250	27169.91	4.400161	2441.158	4.571859	.9435470	2549.409
32	31.00000	912.1628	27239.81	4.387303	2439.912	4.721317	.9422432	2536.711
33	32.00000	910.8492	27309.63	4.405611	2438.591	4.870614	.9408863	2523.907
34	33.00000	909.4772	27379.87	4.448378	2437.193	5.019588	.9394690	2510.909
35	34.00000	908.0932	27450.64	4.479738	2435.791	5.168402	.9380394	2497.829
36	35.00000	906.7113	27521.66	4.496776	2434.403	5.316893	.9366120	2484.740
37	36.00000	905.3833	27592.59	4.470109	2433.102	5.465222	.9352401	2471.821
38	37.00000	904.1818	27662.42	4.372383	2431.982	5.613391	.9339990	2459.394
39	38.00000	903.1108	27730.20	4.224134	2431.028	5.761317	.9328927	2447.596
40	39.00000	902.2054	27795.17	4.016287	2430.275	5.909163	.9319574	2436.612
41	40.00000	901.5330	27856.24	3.732372	2429.799	6.056929	.9312628	2426.760
42	41.00000	901.0902	27912.30	3.396091	2429.567	6.204613	.9308055	2418.171
43	42.00000	900.9514	27962.53	2.971635	2429.666	6.352298	.9306621	2411.141
44	43.00000	901.2277	28005.05	2.417168	2430.203	6.500140	.9309476	2406.203
45	44.00000	901.8975	28038.72	1.795856	2431.101	6.648071	.9316394	2403.513
46	45.00000	902.9612	28061.32	1.126728	2432.335	6.796158	.9327382	2403.106
47	46.00000	904.5750	28072.85	.2938078	2434.052	6.944569	.9344052	2405.761
48	47.00000	906.7901	28069.94	-.6649987	2436.236	7.093221	.9366933	2411.818
49	48.00000	909.6196	28051.23	-1.725126	2438.844	7.242357	.9396162	2421.560
50	49.00000	913.1343	28014.50	-2.907092	2441.879	7.391896	.9432467	2435.482
51	50.00000	917.3349	27958.30	-4.137727	2445.316	7.541837	.9475858	2453.807

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	IEZTP	CL	CD	ANZBTG	ESPEF	DYNPP
1	1133,316	-.1381392	5528.154	.4342818	5.1035967E-02	-1.306543	1910452	190.0574
2	1133,269	1.251344	5565.385	.4676192	5.6850508E-02	-1.516158	1909784	191.6238
3	1133,221	2.095630	5589.134	.4538857	5.4781349E-02	-1.480376	1908946	192.7426
4	1133,173	2.217690	5611.084	.4008199	4.7261937E-02	-1.314613	1908604	193.7313
5	1133,125	3.318399	5627.858	.4273512	5.1146644E-02	-1.406891	1908373	194.4910
6	1133,077	3.814002	5637.948	.4063600	4.8334274E-02	-1.341198	1908113	194.9385
7	1133,029	4.713718	5642.216	.4178850	4.9951233E-02	-1.380422	1907890	195.1182
8	1132,980	5.006932	5641.523	.3980480	4.7664942E-02	-1.282081	1907813	195.0793
9	1132,932	5.230832	5638.407	.3657628	4.3252229E-02	-1.208144	1908062	194.9573
10	1132,884	5.742033	5632.252	.3697943	4.3673924E-02	-1.219805	1908410	194.6987
11	1132,836	5.938820	5623.089	.3533598	4.1627955E-02	-1.163628	1908849	194.3101
12	1132,788	6.552005	5610.690	.3689678	4.3388573E-02	-1.211365	1909286	193.7715
13	1132,740	6.920002	5594.454	.3642340	4.2654733E-02	-1.191497	1909684	193.0525
14	1132,692	6.993317	5579.343	.3434233	4.0117877E-02	-1.119284	1910256	192.2632
15	1132,645	7.178256	5557.037	.3382713	3.9434583E-02	-1.097881	1910974	191.4330
16	1132,597	7.222072	5536.695	.3270828	3.8150591E-02	-1.057003	1911790	190.5655
17	1132,550	7.491406	5515.201	.3345208	3.8721301E-02	-1.075726	1912631	189.6496
18	1132,503	7.596260	5492.388	.3296614	3.8053289E-02	-1.054800	1913481	188.6765
19	1132,456	8.002807	5467.917	.3457117	3.9413315E-02	-1.099584	1914289	187.6267
20	1132,409	7.989272	5442.055	.3307243	3.7723932E-02	-1.046092	1915123	186.5192
21	1132,363	8.078601	5415.823	.3284435	3.7284627E-02	-1.032748	1916051	185.4064
22	1132,317	8.336301	5388.572	.3380578	3.7965133E-02	-1.056094	1916962	184.2496
23	1132,271	8.380837	5360.687	.3317762	3.7121743E-02	-1.029921	1917883	183.0557
24	1132,225	8.600065	5331.445	.3393869	3.7573585E-02	-1.046305	1918815	181.8327
25	1132,179	8.717523	5301.547	.3386873	3.7257613E-02	-1.036917	1919743	180.5708
26	1132,134	8.279555	5272.443	.3050598	3.3856559E-02	-.9285945	1920846	179.3648
27	1132,089	8.533319	5244.115	.3271651	3.5778367E-02	-.9888167	1921992	178.2006
28	1132,044	8.345200	5215.820	.3187291	3.4476051E-02	-.9453884	1923117	177.0408
29	1132,000	8.258089	5186.499	.3139056	3.4266401E-02	-.9370605	1924301	175.9332
30	1131,955	8.121325	5162.102	.3109540	3.3670401E-02	-.9227430	1925507	174.8723
31	1131,911	8.276839	5136.079	.3279584	3.5267120E-02	-.9669445	1926657	173.8265
32	1131,867	8.331415	5109.826	.3330274	3.5596209E-02	-.9757920	1927732	172.7676
33	1131,824	8.471364	5083.293	.3424062	3.6278126E-02	-.9968180	1928759	171.6959
34	1131,780	8.559069	5056.306	.3459528	3.6630447E-02	-1.000609	1929748	170.6047
35	1131,737	8.556682	5029.158	.3433939	3.6045622E-02	-.9869779	1930744	169.5109
36	1131,694	8.594974	5002.018	.3450836	3.6033154E-02	-.9854360	1931752	168.4222
37	1131,651	8.418546	4975.314	.3336474	3.4880488E-02	-.9470769	1932809	167.3602
38	1131,609	8.199374	4949.784	.3244032	3.3940744E-02	-.9155878	1933906	166.3595
39	1131,566	7.987875	4925.687	.3196120	3.3413934E-02	-.8971633	1935137	165.4284
40	1131,524	7.633744	4903.434	.3063121	3.2359857E-02	-.8613538	1936390	164.5844
41	1131,482	7.170481	4883.737	.2947823	3.1183685E-02	-.8203310	1937728	163.8598
42	1131,440	6.802683	4866.834	.2923946	3.0955408E-02	-.8108060	1939115	163.2604
43	1131,399	6.050112	4853.408	.2673139	2.9031699E-02	-.7400270	1940590	162.8183
44	1131,357	5.232777	4844.656	.2471986	2.7638061E-02	-.6840623	1942193	162.5872
45	1131,315	4.555760	4840.824	.2428986	2.7441120E-02	-.6722812	1943853	162.5707
46	1131,274	3.724961	4842.091	.2304678	2.6791068E-02	-.6391699	1945549	162.7744
47	1131,232	2.308469	4849.864	.1857134	2.4548312E-02	-.5184251	1947375	163.2666
48	1131,191	1.284022	4865.211	.1805010	2.4477649E-02	-.5066964	1949289	164.0900
49	1131,149	-.1887678	4888.589	.1484390	2.3445781E-02	-.4213731	1951262	165.2636
50	1131,107	-1.581197	4921.067	.1318661	2.3298421E-02	-.3789767	1953296	166.8360
51	1131,065	-2.894429	4963.096	.1250794	2.3403294E-02	-.3642665	1955350	168.8279

TRAJECTORY NUMBER 15.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	ANASF
1	0.	1032.873	45289.22	-11.55520	2549.629	0.	1.066934	15839.95
2	1.000000	1045.715	45082.37	-11.41902	2562.659	.1671933	1.080200	16277.38
3	2.000000	1058.430	44874.56	-11.38443	2575.544	.3365632	1.093540	16759.61
4	3.000000	1071.600	44664.31	-11.37704	2588.426	.5081097	1.106938	17278.88
5	4.000000	1084.580	44452.08	-11.32147	2601.424	.6816715	1.120346	17811.85
6	5.000000	1097.510	44238.90	-11.19916	2614.520	.8574099	1.133703	18356.13
7	6.000000	1110.366	44026.08	-11.02696	2627.652	1.035325	1.146983	18909.62
8	7.000000	1123.170	43814.36	-10.82393	2640.799	1.215416	1.160209	19471.90
9	8.000000	1135.992	43604.22	-10.62646	2653.949	1.397685	1.173453	20043.97
10	9.000000	1148.879	43395.21	-10.46148	2667.096	1.582129	1.186766	20627.55
11	10.000000	1161.794	43187.19	-10.28663	2680.290	1.768751	1.200107	21221.02
12	11.000000	1174.685	42980.60	-10.06728	2693.551	1.957620	1.213423	21708.87
13	12.000000	1187.527	42776.78	-9.799290	2706.855	2.148684	1.226688	22196.21
14	13.000000	1200.295	42576.70	-9.488683	2720.163	2.341996	1.239877	22681.15
15	14.000000	1213.041	42380.97	-9.192051	2733.410	2.537566	1.253043	23163.71
16	15.000000	1225.845	42188.85	-8.945988	2746.611	2.735392	1.266269	23646.18
17	16.000000	1238.695	41999.66	-8.715393	2759.824	2.935396	1.279504	24129.16
18	17.000000	1251.499	41813.85	-8.436002	2773.071	3.137575	1.292769	24610.28
19	18.000000	1264.229	41632.78	-8.116081	2786.304	3.342093	1.305919	25087.12
20	19.000000	1276.946	41456.73	-7.822121	2799.466	3.548706	1.319055	25560.26
21	20.000000	1289.592	41285.41	-7.508588	2812.577	3.757658	1.332119	26028.92
22	21.000000	1302.206	41119.51	-7.221783	2825.600	3.968705	1.345149	26492.70
23	22.000000	1314.875	40957.58	-7.001504	2838.565	4.182016	1.358236	26955.08
24	23.000000	1327.533	40799.03	-6.777823	2851.517	4.397491	1.371311	27415.54
25	24.000000	1340.113	40644.58	-6.512516	2864.444	4.615068	1.384306	27871.67
26	25.000000	1352.566	40495.47	-6.194642	2877.305	4.834902	1.397169	28320.65
27	26.000000	1364.831	40353.18	-5.817469	2890.036	5.056832	1.409839	28767.42
28	27.000000	1376.967	40218.66	-5.460854	2902.589	5.280939	1.422375	29204.77
29	28.000000	1389.005	40090.82	-5.149727	2914.968	5.507147	1.434810	29632.21
30	29.000000	1400.944	39969.07	-4.874066	2927.193	5.735440	1.447143	30059.38
31	30.000000	1412.757	39852.98	-4.578728	2939.298	5.965754	1.459345	30502.03
32	31.000000	1424.360	39744.08	-4.216556	2951.241	6.198084	1.471332	30929.78
33	32.000000	1435.905	39642.83	-3.938711	2963.026	6.432428	1.483257	31344.74
34	33.000000	1447.303	39547.26	-3.625699	2974.677	6.668708	1.495031	31748.29
35	34.000000	1458.567	39459.06	-3.341973	2986.154	6.906922	1.506666	32136.93
36	35.000000	1469.706	39377.14	-3.083298	2997.512	7.147071	1.518214	32515.48
37	36.000000	1480.756	39301.56	-2.797827	3008.704	7.389074	1.529587	32879.84
38	37.000000	1491.667	39233.60	-2.403836	3019.643	7.633018	1.540651	33225.56
39	38.000000	1501.992	39175.92	-2.060372	3030.338	7.878643	1.551523	33550.11
40	39.000000	1512.885	39124.47	-1.863017	3040.875	8.126127	1.562520	33862.86
41	40.000000	1522.690	39078.66	-1.552430	3051.239	8.375305	1.572904	34161.90
42	41.000000	1532.713	39041.88	-1.240055	3061.360	8.626176	1.583258	34440.68
43	42.000000	1542.561	39012.22	-.9538230	3071.279	8.878739	1.593431	34701.45
44	43.000000	1552.232	38990.13	-.7087523	3080.995	9.132915	1.603420	34954.97
45	44.000000	1561.754	38973.42	-.5181934	3090.544	9.388703	1.613256	35204.76
46	45.000000	1571.138	38961.48	-.3721149	3099.934	9.646023	1.622941	35442.82
47	46.000000	1580.373	38952.90	-.2459639	3109.186	9.904874	1.632489	35671.92
48	47.000000	1589.412	38948.50	-5.5945515E-02	3118.231	10.16518	1.641826	35888.77
49	48.000000	1598.245	38949.90	.1486534	3127.062	10.42701	1.650951	36090.28
50	49.000000	1606.914	38956.54	.3215861	3135.721	10.69030	1.659905	36278.23
51	50.000000	1615.392	38968.09	.5079500	3144.182	10.95495	1.668663	36452.52

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	V177F	RG77N	AMACH	AMASF1
52	51,00000	1623,687	38985,04	,6810276	3152,453	11,22098	1,677231	36612,28
53	52,00000	1631,808	39006,09	,7864210	3160,598	11,48837	1,685662	36760,99
54	53,00000	1639,851	39030,13	,9163767	3168,576	11,75706	1,693929	36900,03
55	54,00000	1647,661	39058,78	1,076686	3176,349	12,02704	1,701996	37025,51
56	55,00000	1655,300	39092,15	1,243806	3183,942	12,29830	1,709867	37137,61
57	56,00000	1662,755	39130,78	1,425570	3191,341	12,57078	1,717588	37234,93
58	57,00000	1670,045	39174,72	1,589724	3198,574	12,84438	1,725118	37317,71
59	58,00000	1677,208	39222,50	1,655399	3205,754	13,11919	1,732559	37390,44
60	59,00000	1684,453	39270,47	1,595356	3212,985	13,39522	1,740001	37462,13
61	60,00000	1691,652	39316,00	1,500062	3220,223	13,67245	1,747438	37537,71
62	61,00000	1698,726	39360,22	1,524796	3227,290	13,95081	1,754744	37612,33
63	62,00000	1705,631	39406,99	1,619629	3234,162	14,23030	1,761878	37677,51
64	63,00000	1712,346	39457,38	1,785541	3240,810	14,51091	1,768814	37730,64
65	64,00000	1718,859	39513,82	1,971129	3247,241	14,79258	1,775502	37766,60
66	65,00000	1725,154	39576,14	2,200994	3253,421	15,07529	1,782044	37785,30
67	66,00000	1731,168	39646,92	2,495932	3259,265	15,35889	1,788253	37780,06
68	67,00000	1737,138	39717,72	1,897035	3265,568	15,64354	1,794424	37773,09
69	68,00000	1743,521	39764,85	1,486553	3272,125	15,92932	1,801017	37829,36
70	69,00000	1749,671	39814,82	1,812465	3278,146	16,21614	1,807370	37915,18
71	70,00000	1755,673	39874,63	2,057453	3284,033	16,50386	1,813570	37975,80
72	71,00000	1761,472	39941,43	2,339448	3289,682	16,79253	1,819561	38015,23
73	72,00000	1766,972	40018,99	2,687103	3294,969	17,08201	1,825242	38029,52
74	73,00000	1772,406	40105,65	2,891058	3300,265	17,37239	1,830855	38046,40
75	74,00000	1777,589	40198,98	3,196249	3305,221	17,66356	1,836209	38043,48
76	75,00000	1782,591	40303,21	3,457197	3310,011	17,95547	1,841376	38015,60
77	76,00000	1787,441	40414,19	3,718509	3314,632	18,24809	1,846385	37970,55
78	77,00000	1792,268	40533,05	3,805397	3319,379	18,54145	1,851367	37910,01
79	78,00000	1796,701	40655,16	4,150576	3323,478	18,83553	1,855951	37831,31
80	79,00000	1800,984	40791,14	4,357222	3327,547	19,13017	1,860375	37723,10
81	80,00000	1805,518	40926,77	4,318225	3332,131	19,42554	1,865059	37621,29
82	81,00000	1809,341	41068,20	4,777442	3335,434	19,72156	1,869007	37487,65
83	82,00000	1812,960	41226,62	5,131952	3338,619	20,01789	1,872746	37317,58
84	83,00000	1816,934	41388,01	5,023599	3342,741	20,31479	1,876851	37151,02
85	84,00000	1820,914	41545,46	4,959443	3346,810	20,61242	1,880962	36989,88
86	85,00000	1824,676	41697,47	4,415794	3351,226	20,91085	1,884849	36830,65
87	86,00000	1828,816	41829,94	4,136796	3355,675	21,21009	1,889124	36714,56
88	87,00000	1832,891	41964,71	4,242395	3359,645	21,50998	1,893334	36591,36
89	88,00000	1837,022	42089,74	3,285619	3364,699	21,81067	1,897602	36485,48
90	89,00000	1841,700	42176,86	2,391118	3370,067	22,11240	1,902475	36461,06
91	90,00000	1846,851	42251,95	2,350353	3375,208	22,41511	1,907755	36467,60
92	91,00000	1851,859	42328,09	2,391462	3380,195	22,71858	1,912928	36466,94
93	92,00000	1856,864	42401,99	2,015233	3385,417	23,02298	1,918098	36472,48
94	93,00000	1862,120	42461,64	1,794658	3390,784	23,32814	1,923527	36507,73
95	94,00000	1867,331	42521,30	1,855256	3395,970	23,63432	1,928910	36540,96
96	95,00000	1872,440	42581,43	1,810789	3401,304	23,94129	1,934394	36575,25
97	96,00000	1877,981	42638,21	1,631660	3406,728	24,24916	1,939912	36615,69
98	97,00000	1883,385	42667,68	1,383199	3412,231	24,55791	1,945493	36670,26
99	98,00000	1888,939	42730,14	1,225901	3417,840	24,86763	1,951230	36740,94
100	99,00000	1894,537	42769,63	1,177534	3423,457	25,17823	1,957013	36817,66
101	100,00000	1900,076	42809,93	,8607061	3429,081	25,48981	1,962735	36899,92
102	101,0000	1905,791	42825,20	,3854777	3434,874	25,80235	1,968639	37014,04

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE FUHA07 STAGE 1 CYCLE 15 PASS 2 PAGE 263

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	V177F	RG77N	AMACH	ANABF1
103	102,0000	1911,821	42833,70	,1944843	3440,921	26,11585	1,974869	37157,97
104	103,0000	1917,888	42836,54	,1193918	3446,989	26,43033	1,981134	37313,15
105	104,0000	1924,157	42827,63	-,2905530	3453,248	26,74585	1,987610	37495,54
106	105,0000	1930,825	42819,08	-,2480762	3459,519	27,06242	1,994085	37677,40
107	106,0000	1936,798	42809,33	-,3508718	3465,883	27,37996	2,000668	37867,85
108	107,0000	1943,052	42788,43	-1,058249	3472,005	27,69855	2,007128	38106,49
109	108,0000	1949,864	42739,45	-1,646514	3478,606	28,01818	2,014165	38416,70
110	109,0000	1956,858	42674,54	-2,339964	3485,229	28,33878	2,021385	38764,13
111	110,0000	1964,403	42583,50	-2,747875	3492,498	28,66051	2,029183	39181,31
112	111,0000	1971,641	42494,21	-2,403452	3499,962	28,98337	2,036660	39587,36
113	112,0000	1979,053	42406,85	-3,008097	3506,936	29,30752	2,044316	39997,42
114	113,0000	1987,036	42285,89	-3,756592	3514,241	29,63256	2,052562	40494,12
115	114,0000	1995,856	42152,59	-3,916531	3522,486	29,95888	2,061260	41032,83
116	115,0000	2003,628	42018,12	-3,668396	3530,894	30,28658	2,069702	41569,39
117	116,0000	2010,965	41900,49	-3,027478	3538,787	30,61572	2,077281	42048,01
118	117,0000	2018,785	41798,37	-2,996088	3546,583	30,94624	2,085317	42513,14
119	118,0000	2024,822	41684,79	-3,416272	3554,292	31,27797	2,093661	43014,15
120	119,0000	2034,742	41565,14	-3,135545	3562,445	31,61098	2,101842	43525,26
121	120,0000	2042,019	41465,26	-2,543155	3570,161	31,94537	2,109359	43977,02
122	121,0000	2049,769	41375,80	-2,640526	3577,836	32,28113	2,117365	44425,89
123	122,0000	2057,556	41270,52	-3,271879	3585,115	32,61793	2,125408	44911,20
124	123,0000	2065,823	41148,16	-3,318808	3593,333	32,95603	2,133952	45451,69
125	124,0000	2071,895	41035,30	-2,976694	3601,679	33,29549	2,142286	45968,49
126	125,0000	2082,100	40930,79	-2,810326	3610,003	33,63641	2,150761	46475,40
127	125,0000	2082,100	40930,79	-2,810326	3610,003	33,63641	2,150761	46475,40
128	125,8943	2089,416	40840,75	-2,730620	3617,365	33,94242	2,158313	46922,91
129	125,8943	2089,416	40840,75	-2,730620	3617,365	33,94242	2,158313	46922,91
130	125,8947	2089,413	40840,71	-2,730595	3617,368	33,94258	2,158316	46923,10

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	IEZZP	CL	CD	ANZBZG	ESPEF	DYNPP
1	1109,336	=A,562788	13886,91	,2453975	4,4825749F=02	=1,053749	1982974	243,1910
2	1109,059	=A,650609	14270,84	,2268785	4,5180750F=02	=1,011096	1989728	251,7558
3	1108,774	=A,905989	14690,39	,2039925	4,5248116F=02	=,9443640	1996694	260,5913
4	1108,480	=A,888522	15137,28	,2028317	4,6459348E=02	=,9724899	2003808	269,7164
5	1108,177	=A,820078	15592,09	,2015684	4,7375348E=02	=1,000697	2011037	279,1105
6	1107,865	=A,632093	16052,74	,2045020	4,8596407E=02	=1,050272	2018349	288,7360
7	1107,543	=A,489900	16517,48	,2005204	4,9301582E=02	=1,065963	2025758	298,5657
8	1107,212	=A,291954	16985,99	,1982782	4,9769546F=02	=1,090239	2033308	308,6027
9	1106,870	=A,226560	17459,12	,1875772	4,9652607E=02	=1,067950	2041092	318,8796
10	1106,519	=A,167683	17938,31	,1787956	4,9586074E=02	=1,053627	2049152	329,4350
11	1106,158	=7,989867	18422,80	,1772842	4,9911278F=02	=1,079682	2057439	340,2558
12	1105,787	=7,766802	18888,55	,1768897	5,0071446F=02	=1,112525	2065915	351,3037
13	1105,408	=7,494735	19356,27	,1765165	5,0230944E=02	=1,145986	2074583	362,5464
14	1105,021	=7,195775	19824,19	,1751469	5,0322069F=02	=1,173364	2083448	373,9888
15	1104,625	=7,058851	20292,51	,1647459	4,9894075F=02	=1,140391	2092587	385,5282
16	1104,221	=6,947402	20763,48	,1555907	4,9415795F=02	=1,112414	2102075	397,3473
17	1103,808	=6,766513	21237,50	,1519994	4,9230725F=02	=1,120825	2111877	409,4127
18	1103,388	=6,430758	21712,02	,1550732	4,9455635E=02	=1,176995	2121893	421,6540
19	1102,958	=6,157835	22184,76	,1517152	4,9300754F=02	=1,186382	2132132	434,0216
20	1102,521	=6,000460	22656,44	,1429287	4,8955395E=02	=1,152637	2142675	446,5445
21	1102,076	=5,633281	23125,98	,1458251	4,9184841E=02	=1,208562	2153441	459,1843
22	1101,622	=5,555332	23593,14	,1329175	4,8614045E=02	=1,136387	2164496	471,9448
23	1101,161	=5,437385	24061,30	,1265794	4,8340050E=02	=1,114281	2175909	484,9169
24	1100,691	=5,220088	24529,62	,1260029	4,8359707E=02	=1,139630	2187576	498,0647
25	1100,214	=4,938598	24995,55	,1267487	4,8453051F=02	=1,176748	2199429	511,3157
26	1099,729	=4,593689	25456,27	,1281027	4,8585491E=02	=1,219871	2211438	524,5941
27	1099,236	=4,179778	25890,37	,1299832	4,8792054F=02	=1,268413	2223564	537,8026
28	1098,736	=3,984646	26309,73	,1206262	4,8421855E=02	=1,209623	2235910	550,9468
29	1098,228	=3,740090	26721,13	,1167603	4,8362204E=02	=1,200507	2248480	564,0634
30	1097,712	=3,576295	27133,47	,1104615	4,8191380E=02	=1,165025	2261251	577,1572
31	1097,189	=3,224940	27561,48	,1134914	4,8400754F=02	=1,222831	2274167	590,2023
32	1096,659	=2,821178	27976,66	,1156784	4,8579327F=02	=1,272823	2287153	603,0739
33	1096,121	=2,844273	28381,11	9,9408931E=02	4,7956347E=02	=1,174660	2300433	615,8682
34	1095,577	=2,289666	28775,80	,1123352	4,8593581E=02	=1,290358	2313815	628,5538
35	1095,025	=2,324212	29157,43	9,5502668E=02	4,8055604E=02	=1,127164	2327380	641,0653
36	1094,467	=1,947649	29530,43	,1017604	4,8235512E=02	=1,220918	2341121	653,5003
37	1093,902	=1,752330	29890,73	9,7146606E=02	4,8184125E=02	=1,190107	2354952	665,7326
38	1093,331	=1,099551	30233,82	,1104770	4,8803090F=02	=1,370244	2368703	677,6004
39	1092,755	=1,126779	30557,46	9,1649659E=02	4,8224764F=02	=1,165793	2382615	689,0979
40	1092,173	=1,042894	30870,47	8,6094175E=02	4,8191468F=02	=1,116769	2396728	700,4455
41	1091,586	=,4390446	31170,70	,1008466	4,8496273F=02	=1,319348	2410815	711,5271
42	1090,993	=,3969660	31451,90	8,7604176E=02	4,8293184E=02	=1,171036	2424954	722,1958
43	1090,396	=1,7243343E=02	31718,03	9,2339671E=02	4,8420570E=02	=1,249189	2439150	732,5458
44	1089,795	1,6032059E=02	31948,60	8,1886480E=02	4,8238463E=02	=1,129657	2453409	742,5440
45	1089,189	,2230178	32130,63	8,1912572E=02	4,8220269E=02	=1,145124	2467702	752,2845
46	1088,579	,2438951	32302,41	7,5153981E=02	4,8058214E=02	=1,068968	2482008	761,7795
47	1087,965	,4095617	32466,48	7,6340542E=02	4,8061436F=02	=1,098482	2496299	771,0861
48	1087,347	,7088547	32620,17	8,0792722E=02	4,8140599E=02	=1,173058	2510485	780,0958
49	1086,726	,8577320	32760,61	7,7459025E=02	4,8044936F=02	=1,139900	2524607	788,7381
50	1086,101	,9948462	32889,28	7,5074657E=02	4,7968013E=02	=1,118643	2538711	797,0635
51	1085,473	1,235048	32006,26	7,6927624E=02	4,7992520E=02	=1,156653	2552740	805,0512

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	IE77P	CL	CD	ANZBTG	ESPEE	DYNPP
52	1084,842	1,333284	33110,70	7,2812498E-02	4,7891290E-02	=1,108712	2566715	812,6801
53	1084,209	1,336758	33205,62	6,7506538E-02	4,7780295E-02	=1,041929	2580671	820,0438
54	1083,573	1,599497	33292,44	7,2969205E-02	4,7848315E-02	=1,131534	2594530	827,1540
55	1082,935	1,729406	33367,75	7,0966668E-02	4,7778878E-02	=1,111511	2608282	833,9068
56	1082,294	1,936429	33431,61	7,2170021E-02	4,7741528E-02	=1,138430	2621961	840,3128
57	1081,652	2,123921	33482,79	7,1836521E-02	4,7676394E-02	=1,141991	2635562	846,3318
58	1081,008	2,245501	33521,46	6,9359641E-02	4,7569908E-02	=1,112474	2649112	851,9753
59	1080,363	2,116362	33551,38	6,0156046E-02	4,7327416E-02	=,9793715	2662692	857,3769
60	1079,717	1,912668	33580,45	5,3301313E-02	4,7127337E-02	=,8804324	2676332	862,7744
61	1079,070	1,806904	33613,22	5,4114707E-02	4,7081942E-02	=,8989161	2689938	868,2699
62	1078,421	2,136305	33645,97	6,5190126E-02	4,7253509E-02	=1,077576	2703339	873,6942
63	1077,771	2,199568	33670,91	6,3289883E-02	4,7156785E-02	=1,054517	2716586	878,8413
64	1077,120	2,563914	33685,80	7,1360054E-02	4,7275444E-02	=1,188170	2729669	883,6405
65	1076,468	2,651054	33685,98	6,6591734E-02	4,7119954E-02	=1,118770	2742644	887,9723
66	1075,816	3,069975	33671,46	7,4189626E-02	4,7236775E-02	=1,245385	2755471	891,8229
67	1075,163	3,385661	33636,42	7,4563736E-02	4,7198360E-02	=1,256399	2768117	895,0097
68	1074,511	,6183360	33600,14	=1,7941167E-02	4,7358912E-02	,2279872	2780735	898,1474
69	1073,858	2,334273	33619,58	7,1733340E-02	4,7038155E-02	=1,222572	2793346	902,7198
70	1073,204	2,822199	33664,22	7,8023334E-02	4,7199320E-02	=1,331328	2805683	906,9279
71	1072,549	2,752971	33686,64	6,4344369E-02	4,6765113E-02	=1,113650	2818110	910,5488
72	1071,893	3,377334	33690,84	7,8140404E-02	4,7123582E-02	=1,344580	2830440	913,6478
73	1071,236	3,633663	33674,11	7,3857206E-02	4,6918376E-02	=1,278150	2842617	915,9545
74	1070,579	3,564872	33661,56	6,2121913E-02	4,6562524E-02	=1,087607	2854999	917,7805
75	1069,921	4,346570	33632,45	8,1307933E-02	4,7154025E-02	=1,407322	2867175	919,0403
76	1069,266	4,142219	33581,75	6,1780805E-02	4,6462863E-02	=1,085390	2879404	919,6186
77	1068,610	4,782202	33516,39	7,6847999E-02	4,6887735E-02	=1,336076	2891601	919,7292
78	1067,955	4,148365	33437,25	4,7114616E-02	4,6095460E-02	=,8431951	2904025	919,4520
79	1067,301	5,732997	33343,75	9,7013164E-02	4,7741865E-02	=1,670704	2915882	918,6241
80	1066,648	4,634009	33224,42	4,3867569E-02	4,6083899E-02	=,7880480	2927923	917,0196
81	1065,998	4,999258	33109,78	5,9810826E-02	4,6196893E-02	=1,051265	2940426	915,6777
82	1065,349	6,463796	32970,01	9,9816449E-02	4,7798869E-02	=1,710512	2951845	913,3537
83	1064,703	5,776967	32798,41	5,7784541E-02	4,6062497E-02	=1,012661	2963453	910,0824
84	1064,061	5,282064	32628,39	4,2672578E-02	4,5964889E-02	=,7516970	2975813	907,0422
85	1063,420	5,660957	32463,38	5,9411151E-02	4,6042383E-02	=1,033880	2988074	904,1789
86	1062,783	5,484157	32301,29	=5,5581023E-03	4,6937995E-02	3,1290351E-02	2999780	901,3363
87	1062,148	5,234998	32176,46	7,4438546E-02	4,6494348E-02	=1,275372	3011565	899,7061
88	1061,515	4,800975	32045,66	5,2837448E-02	4,5698705E-02	=,9212073	3023324	897,9087
89	1060,884	1,342161	31930,33	=4,5551555E-02	4,5669696E-02	=,6824724	3034892	896,5790
90	1060,255	2,618565	31885,85	3,9245287E-02	4,5780155E-02	=,6999145	3046348	897,4394
91	1059,625	3,246118	31867,51	6,4903217E-02	4,5995989E-02	=1,121068	3058168	899,1896
92	1058,995	2,995425	31843,26	5,3182799E-02	4,5512889E-02	=,9317517	3069886	900,7443
93	1058,366	1,880594	31824,68	1,6601126E-02	4,6189527E-02	=,3324129	3081405	902,4609
94	1057,736	2,662015	31831,79	6,2503661E-02	4,5751041E-02	=1,090979	3093171	904,9896
95	1057,105	2,572176	31837,35	5,6311779E-02	4,5465657E-02	=,9920315	3104790	907,4658
96	1056,474	2,357196	31843,47	4,9399220E-02	4,5185031E-02	=,8804967	3116635	910,0102
97	1055,842	1,936880	31855,06	3,9835601E-02	4,5322398E-02	=,7241634	3128462	912,7255
98	1055,209	1,689196	31879,13	3,9534964E-02	4,5262310E-02	=,7219509	3140202	915,8137
99	1054,575	1,802723	31917,06	4,9327034E-02	4,5009877E-02	=,8897566	3152031	919,3524
100	1053,940	1,861788	31960,26	5,2916431E-02	4,5049205E-02	=,9544897	3163881	923,0637
101	1053,304	1,680253?	32008,77	2,0343166E-02	4,5465222E-02	=,4059090	3175515	926,9012
102	1052,666	,4414621	32085,13	2,8795177E-02	4,5163717E-02	=,5525022	3187038	931,5816

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TETTP	CL	CD	ANZBTG	ESPEF	DYNPP
103	1052,025	,8997913	32186,83	5,2327155E-02	4,4842342F-02	=,0605190	3198822	937,1060
104	1051,382	=,2956753	32298,50	1,9587483E-02	4,5240958F-02	=,4003678	3210526	942,9334
105	1050,737	,6685752	32433,67	6,0581467E-02	4,5037400E-02	=1,118363	3222284	949,5124
106	1050,088	,4303306	32568,34	4,9873358E-02	4,4553139F-02	=,0385692	3234093	956,1006
107	1049,435	,1277926	32707,04	4,2227327E-02	4,4577615F-02	=,8103777	3246105	962,8728
108	1048,780	=2,213894	32861,62	=1,6567902E-02	4,5022234F-02	=,2332968	3257570	970,0708
109	1048,119	=1,150030	33074,79	4,2774564E-02	4,4457246F-02	=,8346117	3269268	979,1779
110	1047,453	=3,493079	33319,21	=1,6449713E-02	4,4883685F-02	=,2363821	3280852	989,2792
111	1046,780	=1,767452	33620,10	6,0006834E-02	4,4667325F-02	=1,172310	3292750	1001,280
112	1046,100	=,9906562	33913,84	7,5403260E-02	4,5253418F-02	=1,474491	3304149	1012,998
113	1045,413	=4,677870	34208,17	=3,4880832E-02	4,4276699F-02	,5944898	3316004	1024,901
114	1044,718	=3,396010	34573,77	3,7656968E-02	4,4178698F-02	=,7892839	3327976	1039,185
115	1044,014	=3,542862	34971,59	3,8069677E-02	4,4099234F-02	=,8094210	3340493	1054,720
116	1043,301	=2,208835	35368,92	7,6654966E-02	4,5096561F-02	=1,585849	3352546	1070,244
117	1042,579	=1,389702	35722,16	8,2891399E-02	4,5429573F-02	=1,732701	3363522	1084,185
118	1041,849	=3,192168	36058,70	1,7700563E-02	4,4204901F-02	=,4292073	3375941	1097,944
119	1041,110	=3,411363	36423,32	2,4799331E-02	4,3906321F-02	=,5815601	3388657	1112,782
120	1040,367	=1,447374	36797,52	8,4335234E-02	4,5356382F-02	=1,835952	3400925	1127,938
121	1039,608	=1,386036	37125,06	6,5459621E-02	4,4266744F-02	=1,458730	3412573	1141,465
122	1038,844	=2,905383	37445,11	1,5182217E-02	4,3931050E-02	=,3977583	3425576	1155,082
123	1038,073	=3,838199	37796,04	4,0779664E-03	4,4178608F-02	=,1702421	3438211	1169,756
124	1037,293	=2,167692	38189,84	6,4979234E-02	4,3989282F-02	=1,507706	3451359	1186,106
125	1036,504	=2,105253	38564,17	5,1495592E-02	4,3303215F-02	=1,235674	3464459	1201,866
126	1035,706	=2,215012	38927,96	4,5289758E-02	4,3135391E-02	=1,102528	3478176	1217,470
127	1035,706	=2,215012	38927,96	4,5289758E-02	4,3135391F-02	=1,102528	3478176	1217,470
128	1034,984	=2,215012	39247,96	4,2438877E-02	4,3055809E-02	=1,050140	3490552	1231,331
129	1034,984	=2,215012	39247,96	4,2438877E-02	4,3055809F-02	=1,050140	3490552	1231,331
130	1034,984	=2,215012	39248,09	4,2437962E-02	4,3055774E-02	=1,050124	3490557	1231,337

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	V177F	RG77N	AMACH	AMASF
1	0.	1905,791	42825,20	,3854790	3434,874	0,	1,968638	37014,08
2	1,000000	1911,803	42837,56	,3534427	3440,890	,3134270	1,974849	37150,32
3	2,000000	1917,731	42849,54	,3870226	3446,815	,6279020	1,980972	37284,89
4	3,000000	1923,440	42864,75	,5394329	3452,507	,9433440	1,986869	37407,51
5	4,000000	1928,972	42886,26	,7402253	3458,007	1,259673	1,992584	37513,48
6	5,000000	1930,522	42913,59	,8524798	3463,536	1,576970	1,998316	37608,74
7	6,000000	1940,024	42943,81	,9554766	3469,016	1,895073	2,004000	37717,47
8	7,000000	1945,359	42978,80	1,107440	3474,313	2,214143	2,009512	37820,06
9	8,000000	1950,653	43018,54	1,218192	3479,576	2,534019	2,014980	37911,68
10	9,000000	1955,975	43061,00	1,261682	3484,887	2,854701	2,020478	37998,30
11	10,000000	1961,278	43104,54	1,289617	3490,183	3,176351	2,025955	38081,50
12	11,000000	1966,456	43149,85	1,366446	3495,337	3,498806	2,031304	38156,62
13	12,000000	1971,533	43198,47	1,458356	3500,383	3,822068	2,036548	38221,38
14	13,000000	1976,502	43250,42	1,567411	3505,312	4,146217	2,041681	38275,50
15	14,000000	1981,446	43306,06	1,633451	3510,232	4,471091	2,046788	38320,79
16	15,000000	1986,380	43363,10	1,669267	3515,155	4,796771	2,051885	38362,14
17	16,000000	1991,192	43422,22	1,744070	3519,937	5,123258	2,056855	38394,64
18	17,000000	1995,933	43484,22	1,812886	3524,649	5,450551	2,061753	38418,38
19	18,000000	2000,666	43548,08	1,843698	3529,373	5,778569	2,066642	38437,20
20	19,000000	2005,348	43612,98	1,874863	3534,043	6,107393	2,071478	38451,36
21	20,000000	2009,885	43679,87	1,955354	3538,544	6,436943	2,076165	38456,14
22	21,000000	2014,330	43750,11	2,036384	3542,951	6,767218	2,080757	38450,42
23	22,000000	2018,754	43822,63	2,081888	3547,354	7,098138	2,085326	38438,40
24	23,000000	2023,155	43896,47	2,099995	3551,750	7,429865	2,089872	38422,00
25	24,000000	2027,494	43970,99	2,123634	3556,081	7,762236	2,094355	38401,28
26	25,000000	2031,775	44046,69	2,145852	3560,354	8,095333	2,098777	38375,33
27	26,000000	2035,979	44123,32	2,181524	3564,542	8,429156	2,103119	38344,11
28	27,000000	2040,096	44201,83	2,231218	3568,635	8,763622	2,107372	38305,42
29	28,000000	2044,184	44281,91	2,258102	3572,713	9,098735	2,111595	38261,60
30	29,000000	2048,235	44362,59	2,256360	3576,770	9,434572	2,115780	38214,35
31	30,000000	2052,247	44443,13	2,248272	3580,792	9,770974	2,119924	38165,15
32	31,000000	2056,219	44523,56	2,236812	3584,776	10,10810	2,124027	38113,96
33	32,000000	2060,148	44603,97	2,252195	3588,697	10,44587	2,128081	38060,38
34	33,000000	2064,018	44685,31	2,257241	3592,569	10,78421	2,132078	38002,20
35	34,000000	2067,846	44766,51	2,254658	3596,409	11,12327	2,136038	37942,29
36	35,000000	2071,629	44848,25	2,273118	3600,186	11,46290	2,139945	37878,72
37	36,000000	2075,356	44930,64	2,276081	3603,917	11,80317	2,143795	37811,19
38	37,000000	2079,039	45013,00	2,270077	3607,609	12,14401	2,147600	37747,52
39	38,000000	2082,700	45095,24	2,256208	3611,284	12,48549	2,151381	37714,79
40	39,000000	2086,355	45177,14	2,253463	3614,946	12,82753	2,155157	37681,69
41	40,000000	2089,998	45259,14	2,238683	3618,602	13,17022	2,158918	37647,25
42	41,000000	2093,641	45340,05	2,191740	3622,280	13,51348	2,162684	37614,00
43	42,000000	2097,298	45419,44	2,156717	3625,963	13,85738	2,166460	37582,83
44	43,000000	2100,951	45498,22	2,148911	3629,625	14,20184	2,170234	37551,84
45	44,000000	2104,598	45576,81	2,127393	3633,286	14,54695	2,173998	37520,18
46	45,000000	2108,249	45653,86	2,055173	3636,988	14,89262	2,177773	37490,70
47	46,000000	2111,935	45728,07	1,984668	3640,716	15,23894	2,181580	37466,12
48	47,000000	2115,628	45800,81	1,970115	3644,422	15,58582	2,185395	37443,53
49	48,000000	2119,318	45873,00	1,916060	3648,146	15,93335	2,189207	37421,13
50	49,000000	2123,034	45942,62	1,863693	3651,893	16,28152	2,193045	37403,11
51	50,00000	2126,748	46011,58	1,854662	3655,613	16,63025	2,196878	37389,42

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
52	91,00000	2130,488	46080,16	1,835839	3659,330	16,97963	2,200703	37371,67
53	92,00000	2134,144	46148,11	1,818650	3663,039	17,32966	2,204521	37376,57
54	93,00000	2137,822	46215,89	1,823311	3666,720	17,68025	2,208321	37380,46
55	94,00000	2141,482	46283,78	1,800638	3670,396	18,03140	2,212102	37382,84
56	95,00000	2145,140	46350,58	1,783406	3674,066	18,38320	2,215880	37386,32
57	96,00000	2148,785	46416,96	1,742966	3677,735	18,73557	2,219645	37389,44
58	97,00000	2152,445	46481,07	1,681024	3681,429	19,08858	2,223426	37396,31
59	98,00000	2156,098	46544,15	1,691646	3685,075	19,44223	2,227194	37403,92
60	99,00000	2159,707	46608,21	1,693948	3688,694	19,79645	2,230928	37408,12
61	100,00000	2163,320	46671,56	1,670662	3692,322	20,15123	2,234660	37412,84
62	101,00000	2166,874	46735,24	1,717495	3695,858	20,50657	2,238331	37414,43
63	102,00000	2170,384	46801,29	1,756740	3699,354	20,86257	2,241957	37409,77
64	103,00000	2173,892	46867,75	1,748851	3702,871	21,21904	2,245581	37403,68
65	104,00000	2177,382	46934,07	1,747344	3706,366	21,57616	2,249186	37396,61
66	105,00000	2180,851	47000,40	1,735576	3709,845	21,93384	2,252769	37388,16
67	106,00000	2184,307	47066,11	1,718106	3713,314	22,29209	2,256339	37379,77
68	107,00000	2187,745	47131,67	1,723455	3716,754	22,65091	2,259891	37370,48
69	108,00000	2191,157	47197,57	1,719777	3720,172	23,01028	2,263414	37359,06
70	109,00000	2194,551	47263,14	1,711248	3723,574	23,37014	2,266920	37347,07
71	110,00000	2197,927	47328,34	1,680845	3726,969	23,73065	2,270408	37334,55
72	111,00000	2201,304	47391,90	1,633609	3730,372	24,09172	2,273896	37324,43
73	112,00000	2204,678	47454,32	1,622940	3733,755	24,45327	2,277382	37315,66
74	113,00000	2208,023	47517,28	1,652901	3737,091	24,81547	2,280837	37304,43
75	114,00000	2211,328	47581,42	1,662943	3740,396	25,17815	2,284251	37289,20
76	115,00000	2214,611	47645,64	1,671508	3743,680	25,54140	2,287642	37272,53
77	116,00000	2217,862	47710,41	1,666780	3746,938	25,90513	2,291001	37253,29
78	117,00000	2221,099	47774,55	1,650617	3750,186	26,26942	2,294344	37234,16
79	118,00000	2224,314	47838,67	1,658941	3753,402	26,63428	2,297665	37213,82
80	119,00000	2227,498	47903,41	1,673678	3756,584	26,99962	2,300954	37202,01
81	120,00000	2230,660	47968,96	1,701259	3759,737	27,36545	2,304221	37214,53
82	121,00000	2233,796	48035,71	1,718770	3762,870	27,73184	2,307460	37223,18
83	122,00000	2236,919	48102,61	1,708291	3766,002	28,09872	2,310686	37230,32
84	123,00000	2240,040	48169,00	1,691231	3769,136	28,46615	2,313910	37237,78
85	124,00000	2243,161	48234,64	1,660000	3772,276	28,83408	2,317134	37246,07
86	125,00000	2246,289	48299,36	1,657230	3775,410	29,20248	2,320365	37255,82
87	126,00000	2249,399	48364,93	1,684978	3778,512	29,57145	2,323578	37262,62
88	127,00000	2252,487	48431,08	1,670174	3781,611	29,94082	2,326767	37266,85
89	128,00000	2255,582	48495,63	1,607051	3784,739	30,31084	2,329965	37273,80
90	129,00000	2258,704	48557,56	1,540385	3787,895	30,68126	2,333190	37286,29
91	130,00000	2261,854	48616,57	1,437688	3791,091	31,05233	2,336443	37304,93
92	131,00000	2265,059	48671,11	1,335650	3794,339	31,42388	2,339754	37333,84
93	132,00000	2268,305	48722,60	1,269270	3797,613	31,79591	2,343107	37369,78
94	133,00000	2271,568	48772,60	1,277422	3800,877	32,16859	2,346478	37408,80
95	134,00000	2274,811	48823,68	1,276681	3804,128	32,54175	2,349828	37444,46
96	134,00000	2274,811	48823,68	1,276681	3804,128	32,54175	2,349828	37444,46
97	134,05075	2274,976	48826,25	1,273951	3804,289	32,56070	2,349998	37446,30

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TETTP	CL	CD	ANZBTG	ESPEF	DYNPP
1	1052,666	1,073798	32085,12	5,2178974E+02	4,4900860F+02	=,9517822	3187037	931,5814
2	1052,026	1,017164	32180,06	5,0798971E+02	4,4782810F+02	=,9340528	3198907	936,9138
3	1051,383	1,269984	32273,85	5,8358183E+02	4,5016494E+02	=1,070613	3210639	942,1923
4	1050,738	1,603358	32357,93	6,4459912E+02	4,5198120F+02	=1,183031	3222089	947,1207
5	1050,091	1,809329	32427,89	6,4143410E+02	4,5129091F+02	=1,183798	3233431	951,5961
6	1049,443	1,663361	32488,20	5,4326995E+02	4,4680327F+02	=1,017148	3245022	955,8287
7	1048,792	1,950745	32541,81	6,0789781E+02	4,4891145F+02	=1,136172	3256645	959,8837
8	1048,140	2,089812	32583,62	6,0771248E+02	4,4828276E+02	=1,131851	3268126	963,5560
9	1047,486	2,078993	32616,18	5,5851532E+02	4,4607376F+02	=1,057610	3279706	966,9661
10	1046,831	2,011978	32644,19	5,1836584E+02	4,4400997F+02	=,9898659	3291455	970,2756
11	1046,174	2,074545	32669,54	5,3032059E+02	4,4406476F+02	=1,015094	3303229	973,5128
12	1045,516	2,240732	32689,02	5,6901126E+02	4,4523390F+02	=1,088496	3314843	976,5402
13	1044,856	2,301929	32700,41	5,5037440E+02	4,4405742E+02	=1,058369	3326388	979,3070
14	1044,196	2,496316	32703,53	5,8041568E+02	4,4490281F+02	=1,116110	3337854	981,8052
15	1043,535	2,359887	32699,26	5,0760625E+02	4,4187404F+02	=,9866794	3349412	984,0986
16	1042,873	2,443926	32691,81	5,3152772E+02	4,4206917F+02	=1,033035	3361020	986,3099
17	1042,210	2,594661	32677,87	5,5103681E+02	4,4249752E+02	=1,071321	3372474	988,2929
18	1041,547	2,596166	32657,03	5,2660830E+02	4,4108328F+02	=1,028918	3383901	990,0627
19	1040,883	2,540227	32632,15	5,0384364F+02	4,3973157F+02	=,9892584	3395397	991,7283
20	1040,219	2,443510	32603,87	5,2055741E+02	4,4005695F+02	=1,022088	3406842	993,2847
21	1039,555	2,829257	32568,81	5,5756465E+02	4,4126723F+02	=1,092288	3418084	994,5950
22	1038,891	2,828000	32525,55	5,2663731E+02	4,3958240F+02	=1,036746	3429267	995,6466
23	1038,228	2,831094	32477,19	5,1246558E+02	4,3861082F+02	=1,011928	3440499	996,5591
24	1037,564	2,796764	32425,43	4,9348487E+02	4,3775327E+02	=,9780193	3451747	997,3781
25	1036,901	2,878012	32370,66	5,1353111E+02	4,3793880E+02	=1,016430	3462912	998,0951
26	1036,238	2,848140	32312,06	4,9471051E+02	4,3702996F+02	=,9825033	3474013	998,6894
27	1035,575	2,965747	32249,73	5,2334362E+02	4,3757221E+02	=1,036755	3485006	999,1546
28	1034,914	2,991022	32181,85	5,1433940E+02	4,3670503F+02	=1,020753	3495899	999,4372
29	1034,253	2,968438	32109,97	4,9657155E+02	4,3561951E+02	=,9882591	3506800	999,6087
30	1033,592	2,920120	32035,65	4,7971148E+02	4,3523518E+02	=,9573514	3517661	999,7069
31	1032,933	2,930893	31960,21	4,8603492E+02	4,3473563E+02	=,9696592	3528453	999,7656
32	1032,274	2,894080	31883,60	4,7676436E+02	4,3431492F+02	=,9528004	3539176	999,7834
33	1031,617	3,012458	31805,53	5,1272892E+02	4,3432849F+02	=1,020471	3549817	999,7488
34	1030,960	2,902774	31724,16	4,7199310E+02	4,3342144E+02	=,9445834	3560388	999,6085
35	1030,304	2,970878	31641,80	4,9655171E+02	4,3287700E+02	=,9908180	3570896	999,4343
36	1029,650	2,997473	31556,90	4,9908776E+02	4,3242943E+02	=,9957724	3581330	999,1775
37	1028,996	2,987208	31469,23	4,8006375E+02	4,3206215F+02	=,9602582	3591685	998,8299
38	1028,344	2,958129	31385,83	4,8570138E+02	4,3161376E+02	=,9708930	3601960	998,4358
39	1027,692	2,907257	31331,53	4,7240877E+02	4,3122576F+02	=,9461055	3612199	998,0189
40	1027,041	2,970324	31277,16	4,9519090E+02	4,3073538E+02	=,9889226	3622427	997,6073
41	1026,391	2,865490	31221,93	4,6331706E+02	4,3039162E+02	=,9292759	3632644	997,1712
42	1025,741	2,792447	31167,87	4,5396060E+02	4,2998253F+02	=,9118693	3642848	996,7861
43	1025,092	2,816825	31115,69	4,7438754E+02	4,2950797F+02	=,9503866	3653039	996,4778
44	1024,443	2,846737	31063,85	4,8728039E+02	4,2905652E+02	=,9748095	3663218	996,1891
45	1023,795	2,752051	31011,70	4,6139579E+02	4,2867251E+02	=,9264612	3673384	995,8949
46	1023,148	2,580485	30961,49	4,2639841E+02	4,2828756E+02	=,8610332	3683538	995,6791
47	1022,501	2,596782	30915,38	4,5642886E+02	4,2781118E+02	=,9178551	3693680	995,6211
48	1021,854	2,688091	30871,08	4,9306909E+02	4,2734186E+02	=,9872319	3703804	995,6342
49	1021,207	2,422057	30827,12	4,1884638E+02	4,2696138E+02	=,8481561	3713918	995,6654
50	1020,561	2,548281	30786,84	4,8080068E+02	4,2648693E+02	=,9653865	3724019	995,8367
51	1019,916	2,530237	30747,03	4,7735150E+02	4,2605391E+02	=,9595841	3734100	996,0285

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TETTP	CL	CD	ANZSTG	ESPEF	DYNPP
52	1019,270	2,487128	30708,53	4,6859196E-02	4,2565675E-02	,9437652	3744168	996,2253
53	1018,625	2,494500	30676,11	4,7683158E-02	4,2541902E-02	,9600367	3754214	996,4400
54	1017,980	2,548329	30643,24	4,9361168E-02	4,2517168E-02	,9924531	3764232	996,6400
55	1017,334	2,597274	30609,49	4,4671190E-02	4,2497512E-02	,9082895	3774226	996,8123
56	1016,689	2,502307	30576,90	4,9085719E-02	4,2469529E-02	,9887244	3784193	997,0280
57	1016,043	2,286236	30544,32	4,2963160E-02	4,2455329E-02	,8735402	3794134	997,2466
58	1015,397	2,298028	30514,94	4,5505195E-02	4,2428498E-02	,9224952	3804048	997,5815
59	1014,752	2,481073	30486,50	5,1434454E-02	4,2462841E-02	1,035858	3813915	997,9487
60	1014,106	2,314330	30455,70	4,5550484E-02	4,2383070E-02	,9249681	3823757	998,2337
61	1013,460	2,346432	30425,54	4,7437606E-02	4,2355279E-02	,9616376	3833586	998,5449
62	1012,814	2,574096	30393,53	5,3659383E-02	4,2492039E-02	1,080813	3843308	998,7808
63	1012,168	2,439735	30356,90	4,7628463E-02	4,2309436E-02	,9666351	3853025	998,8568
64	1011,522	2,421398	30319,30	4,7238363E-02	4,2288353E-02	,9597858	3862762	998,9069
65	1010,876	2,449090	30281,23	4,8216942E-02	4,2262225E-02	,9790076	3872468	998,9423
66	1010,230	2,383231	30242,42	4,6170167E-02	4,2248153E-02	,9405709	3882140	998,9518
67	1009,585	2,401334	30203,95	4,7174956E-02	4,2222000E-02	,9603693	3891776	998,9743
68	1008,939	2,461680	30165,07	4,8854609E-02	4,2193260E-02	,9930691	3901381	998,9837
69	1008,294	2,393119	30124,85	4,6390369E-02	4,2181270E-02	,9465612	3910949	998,9463
70	1007,649	2,431995	30084,51	4,7812757E-02	4,2153843E-02	,9743207	3920481	998,9047
71	1007,004	2,390983	30044,06	4,4106894E-02	4,2147044E-02	,9039802	3929973	998,8597
72	1006,360	2,291263	30005,76	4,5189839E-02	4,2121084E-02	,9253143	3939425	998,8894
73	1005,715	2,378526	29968,77	4,8371272E-02	4,2086749E-02	,9869247	3948847	998,9658
74	1005,071	2,469895	29930,17	5,0290954E-02	4,2073925E-02	1,024371	3958233	998,9859
75	1004,427	2,373789	29888,81	4,6389804E-02	4,2052082E-02	,9501040	3967580	998,9087
76	1003,783	2,474484	29846,61	4,9383468E-02	4,2019083E-02	1,008051	3976890	998,8031
77	1003,140	2,359991	29802,75	4,5355131E-02	4,2014374E-02	,9311728	3986159	998,6384
78	1002,497	2,406726	29759,27	4,7324688E-02	4,1985769E-02	,9694496	3995385	998,4864
79	1001,854	2,452675	29715,14	4,8445244E-02	4,1960695E-02	,9914211	4004574	998,3118
80	1001,212	2,446522	29672,39	4,8211414E-02	4,1938537E-02	,9873184	4013724	998,0760
81	1000,569	2,546312	29635,33	4,9833858E-02	4,1902285E-02	1,018861	4022860	997,7773
82	999,9265	2,497419	29595,64	4,7314032E-02	4,1883659E-02	,9706619	4031987	997,3946
83	999,2837	2,459625	29555,16	4,6159164E-02	4,1859764E-02	,9486772	4041098	996,9890
84	998,6408	2,453088	29515,11	4,6327735E-02	4,1830155E-02	,9521681	4050199	996,6024
85	997,9977	2,376246	29475,91	4,4530079E-02	4,1809713E-02	,9178440	4059286	996,2479
86	997,3545	2,513758	29437,97	4,9247560E-02	4,1758301E-02	1,008985	4068369	995,9402
87	996,7112	2,535397	29398,06	4,8836728E-02	4,1731193E-02	1,001352	4077449	995,5718
88	996,0677	2,395447	29356,56	4,4247139E-02	4,1725587E-02	,9131719	4086506	995,1531
89	995,4241	2,286207	29317,34	4,2427774E-02	4,1706688E-02	,8783946	4095538	994,8128
90	994,7804	2,255050	29282,39	4,3474671E-02	4,1672739E-02	,8989759	4104557	994,6175
91	994,1364	2,013576	29252,20	3,8388236E-02	4,1671740E-02	,8014147	4113556	994,5819
92	993,4921	2,036568	29229,70	4,2581681E-02	4,1619709E-02	,8830798	4122548	994,8031
93	992,8471	1,992354	29212,46	4,3153736E-02	4,1586917E-02	,8950689	4131545	995,2020
94	992,2015	2,234886	29197,61	5,1203942E-02	4,1575330E-02	1,051826	4140545	995,6829
95	991,5552	2,019461	29180,45	4,3430842E-02	4,1525938E-02	,9024132	4149543	996,0907
96	991,5552	2,019461	29180,45	4,3430842E-02	4,1525938E-02	,9024132	4149543	996,0907
97	991,5224	2,023760	29179,61	4,3668377E-02	4,1523010E-02	,9070631	4150000	996,1124

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
1	0.	2274.976	48826.25	1.273951	3804.290	0.	2.349998	37408.31
2	1.000000	2278.235	48875.46	1.206545	3807.576	.3736456	2.353365	37485.78
3	2.000000	2281.522	48922.85	1.188275	3810.872	.7479362	2.356760	37529.38
4	3.000000	2284.806	48970.42	1.197523	3814.156	1.122710	2.360152	37572.09
5	4.000000	2288.080	49018.31	1.203525	3817.431	1.498049	2.363534	37615.31
6	5.000000	2291.342	49066.87	1.233915	3820.687	1.873952	2.366904	37658.38
7	6.000000	2294.578	49117.00	1.266522	3823.914	2.250338	2.370246	37686.79
8	7.000000	2297.780	49168.40	1.304899	3827.116	2.627269	2.373564	37717.32
9	8.000000	2300.969	49221.85	1.358928	3830.279	3.004724	2.376848	37742.05
10	9.000000	2304.108	49277.55	1.413693	3833.401	3.382642	2.380091	37760.29
11	10.00000	2307.207	49335.43	1.460054	3836.485	3.761124	2.383292	37772.09
12	11.00000	2310.269	49394.53	1.461947	3839.550	4.140090	2.386455	37779.50
13	12.00000	2313.323	49453.21	1.453278	3842.612	4.519540	2.389610	37786.93
14	13.00000	2316.368	49512.44	1.487888	3845.647	4.899478	2.392755	37792.35
15	14.00000	2319.377	49573.76	1.543650	3848.636	5.279891	2.395863	37791.71
16	15.00000	2322.297	49637.76	1.624909	3851.525	5.660872	2.398879	37781.66
17	16.00000	2325.108	49705.42	1.705112	3854.343	6.042176	2.401825	37732.83
18	17.00000	2327.851	49775.77	1.757244	3857.176	6.423845	2.404720	37659.60
19	18.00000	2330.577	49848.11	1.802597	3859.834	6.806316	2.407536	37579.98
20	19.00000	2333.326	49922.19	1.833651	3862.473	7.188890	2.410272	37494.48
21	20.00000	2335.988	49997.68	1.881375	3865.031	7.572068	2.412936	37403.90
22	21.00000	2338.411	50075.30	1.912013	3867.527	7.955629	2.415525	37334.16
23	22.00000	2340.855	50154.18	1.972344	3869.943	8.339512	2.418049	37261.19
24	23.00000	2343.216	50236.54	2.045749	3872.268	8.723799	2.420488	37180.12
25	24.00000	2345.556	50320.90	2.077427	3874.596	9.108089	2.422908	37094.74
26	25.00000	2347.852	50406.43	2.096795	3876.886	9.493501	2.425277	37006.03
27	26.00000	2350.107	50492.32	2.085682	3879.154	9.878916	2.427606	36915.28
28	27.00000	2352.343	50577.44	2.068664	3881.407	10.26473	2.429917	36824.95
29	28.00000	2354.562	50662.54	2.081150	3883.674	10.65088	2.432208	36733.77
30	29.00000	2356.739	50747.95	2.058998	3885.820	11.03734	2.434457	36640.71
31	30.00000	2358.908	50832.21	2.055255	3887.997	11.42420	2.436698	36548.98
32	31.00000	2361.008	50917.71	2.096665	3890.119	11.81139	2.438908	36454.02
33	32.00000	2363.132	51004.34	2.093298	3892.211	12.19899	2.441061	36355.50
34	33.00000	2365.194	51090.54	2.100262	3894.275	12.58682	2.443192	36256.86
35	34.00000	2367.215	51177.24	2.077978	3896.315	12.97506	2.445278	36156.00
36	35.00000	2369.231	51262.36	2.061278	3898.347	13.36362	2.447362	36057.29
37	36.00000	2371.222	51347.85	2.061988	3900.343	13.75250	2.449417	35958.99
38	37.00000	2373.175	51431.66	1.965480	3902.357	14.14170	2.451435	35858.31
39	38.00000	2375.169	51511.19	1.903026	3904.391	14.53131	2.453395	35767.38
40	39.00000	2377.164	51590.32	1.912286	3906.387	14.92116	2.455356	35676.77
41	40.00000	2379.125	51669.70	1.911484	3908.354	15.31141	2.457281	35584.61
42	41.00000	2381.057	51748.91	1.901312	3910.297	15.70190	2.459177	35491.77
43	42.00000	2382.968	51827.98	1.910238	3912.209	16.09280	2.461051	35398.38
44	43.00000	2384.842	51907.74	1.918348	3914.084	16.48394	2.462887	35302.65
45	44.00000	2386.683	51987.36	1.904946	3915.938	16.87540	2.464689	35206.11
46	45.00000	2388.494	52065.60	1.834396	3917.792	17.26718	2.466459	35110.94
47	46.00000	2390.288	52129.76	1.022336	3919.680	17.65921	2.468868	35034.09
48	47.00000	2392.080	52153.36	.3312917	3921.851	18.05172	2.470968	35036.50
49	48.00000	2394.713	52165.84	.2850638	3924.084	18.44471	2.473683	35070.22
50	49.00000	2397.333	52177.02	.2312480	3927.109	18.83803	2.476390	35105.95
51	50.00000	2399.969	52185.16	.1705483	3929.750	19.23183	2.479113	35147.18

TRAJECTORY NUMBER 16.

ATOP III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE PUHA07 STAGE 1 CYCLE 15 PASS 2 PAGE 222

FUEL MINIMIZATION TO ENERGY

	TIME	VG77F	HGC7F	GAM7D	VI77F	RG77N	AMACH	AMASF1
52	50.00000	2399.969	52189.16	.1705483	3929.750	19.23183	2.479113	35107.16
53	50.13611	2400.330	52186.12	.1673081	3930.111	19.26543	2.479486	35153.05

TRAJECTORY NUMBER 16.

ATOP-III ATMOSPHERIC TRAJECTORY OPTIMIZATION PROGRAM VERSION 3.00 15 MAY 1972

CASE FOHA07 STAGE 1 CYCLE 15 PASS 2 PAGE 223

FIFI MINIMIZATION TO ENERGY

	AMASS	ALPHD	TE77P	CL	CD	ANZH76	ESPEF	DYNPP
1	991,5224	1,977732	29179,82	4,20435P1E-02	4,1532757F-02	,8755969	4150000	996,1127
2	990,8755	1,947564	29165,43	4,3149140E-02	4,1096410F-02	,8980561	4154947	996,0198
3	990,2278	2,067219	29154,38	4,7814592E-02	4,1437187F-02	,9897634	4167901	997,2346
4	989,5790	2,060359	29142,76	4,7037853E-02	4,1411591F-02	,9759149	4177003	997,8339
5	988,9293	2,076319	29130,21	4,7183848E-02	4,1380266F-02	,9799577	4186013	998,4051
6	988,2805	2,185680	29116,19	4,9776536E-02	4,1332664F-02	1,031621	4195030	998,9317
7	987,6300	2,167956	29098,95	4,7789905E-02	4,1315810F-02	,9939998	4204045	999,3509
8	986,9790	2,274240	29079,04	4,9998158E-02	4,1270583F-02	1,038089	4213057	999,6934
9	986,3275	2,331295	29055,00	4,9907680E-02	4,1241339F-02	1,037219	4222069	999,9017
10	985,6756	2,393985	29026,56	4,9994101E-02	4,1211214F-02	1,039653	4231072	999,9644
11	985,0235	2,410600	28993,59	4,8886176E-02	4,1190211F-02	1,018582	4240059	999,8835
12	984,3712	2,300823	28957,75	4,4576029E-02	4,1193701E-02	,9347697	4249010	999,7089
13	983,7188	2,361359	28922,17	4,6849690E-02	4,1188405E-02	,9797027	4257900	999,5044
14	983,0663	2,389010	28885,27	4,9974693E-02	4,1096129E-02	1,041345	4266874	999,3413
15	982,4137	2,505906	28844,14	4,9830112E-02	4,1068978E-02	1,038441	4275801	999,0087
16	981,7612	2,718557	28796,85	5,2909651E-02	4,1150820E-02	1,099326	4284615	998,4603
17	981,1087	2,729359	28716,60	5,0256319E-02	4,1014166E-02	1,047098	4293398	997,6798
18	980,4582	2,756606	28616,01	4,9194015E-02	4,0969577E-02	1,025867	4302157	996,7265
19	979,8086	2,810359	28511,80	4,9325419E-02	4,0928592E-02	1,027850	4310810	995,8108
20	979,1605	2,797800	28404,39	4,7600872E-02	4,0904313E-02	,9933726	4319346	994,9454
21	978,5138	2,906713	28294,33	5,1063170E-02	4,0888815E-02	1,060204	4327770	992,9522
22	977,8686	2,888869	28203,07	4,6277776E-02	4,0841632E-02	,9657179	4336100	991,3969
23	977,2245	3,123808	28110,51	5,3838913E-02	4,0928347E-02	1,117213	4344328	989,7282
24	976,5818	3,073818	28013,03	4,9262904E-02	4,0745571E-02	1,021541	4352480	987,8266
25	975,9406	3,080161	27912,71	4,8223766E-02	4,0720576E-02	,9998550	4360656	985,8133
26	975,3008	3,090457	27810,68	4,7755816E-02	4,0691290E-02	,9892307	4368763	983,7128
27	974,6626	2,996605	27707,86	4,4643937E-02	4,0686756E-02	,9273028	4376798	981,5828
28	974,0259	3,039312	27605,86	4,6650085E-02	4,0635992E-02	,9606902	4384763	979,4360
29	973,3909	3,111899	27503,69	4,8673164E-02	4,0568968E-02	1,002266	4392693	977,2979
30	972,7576	2,935026	27400,87	4,2972628E-02	4,0606614E-02	,8905793	4400540	975,1147
31	972,1255	3,132002	27299,40	5,0060540E-02	4,0511398E-02	1,029758	4408337	972,9814
32	971,4952	3,169964	27196,08	4,9805087E-02	4,0479367E-02	1,019109	4416109	970,7690
33	970,8666	3,029683	27091,00	4,4744430E-02	4,0497610E-02	,9200889	4423790	968,4627
34	970,2397	3,196128	26986,28	5,0364056E-02	4,0431894E-02	1,026186	4431410	966,1623
35	969,6145	2,953083	26880,66	4,2293702E-02	4,0462653E-02	,8698280	4438950	963,8088
36	968,9910	3,149414	26776,96	4,9838324E-02	4,0359044E-02	1,012409	4446436	961,5288
37	968,3693	3,003856	26672,61	4,5673249E-02	4,0369405E-02	,9309470	4453870	959,2190
38	967,7493	2,710516	26570,19	3,7350995E-02	4,0426838E-02	,7710124	4461176	956,9522
39	967,1309	2,971721	26473,00	4,8772089E-02	4,0282820E-02	,9869341	4468482	954,9220
40	966,5141	2,970906	26377,04	4,8285404E-02	4,0258631E-02	,9761868	4475701	952,9138
41	965,8988	2,958005	26280,14	4,7585955E-02	4,0237219E-02	,9613950	4482891	950,8694
42	965,2852	2,935080	26183,27	4,7147341E-02	4,0213629E-02	,9515439	4490010	948,8132
43	964,6731	3,027255	26086,42	5,0042123E-02	4,0157780E-02	1,008718	4497079	946,7503
44	964,0627	2,973001	25988,46	4,7684115E-02	4,0152888E-02	,9585673	4504086	944,6299
45	963,4538	2,947215	25890,47	4,7107757E-02	4,0132182E-02	,9460877	4511012	942,4930
46	962,8460	2,698780	25794,10	4,0550285E-02	4,0175938E-02	,8212298	4517826	940,3982
47	962,2410	,5363970	25715,23	4,7588262E-02	4,0080216E-02	,8318538	4523580	938,7371
48	961,6365	1,218583	25690,03	4,1154209E-02	4,0118128E-02	,8325308	4529201	939,2771
49	961,0312	1,381208	25683,07	4,6569493E-02	3,9999380E-02	,9700371	4535889	940,7806
50	960,4254	1,129942	25676,87	4,1238095E-02	4,0042133E-02	,8577403	4542522	942,3367
51	959,8188	1,212195	25670,69	4,0266365E-02	3,9948282E-02	,9349063	4549105	944,0028

TRAJECTORY NUMBER 16.

FUEL MINIMIZATION TO ENERGY

	AMASS	ALPHD	TE77P	CL	CD	ANZB7G	ESPEF	DYNPP
52	959.8188	1.219589	25674.69	4.6626365E-02	3.9998282E-02	.9349883	4549105	944.0028
53	959.7367	1.219589	25674.58	4.6630523E-02	3.9938972E-02	.9021104	4550002	944.2833

TRAJECTORY NUMBER 16.