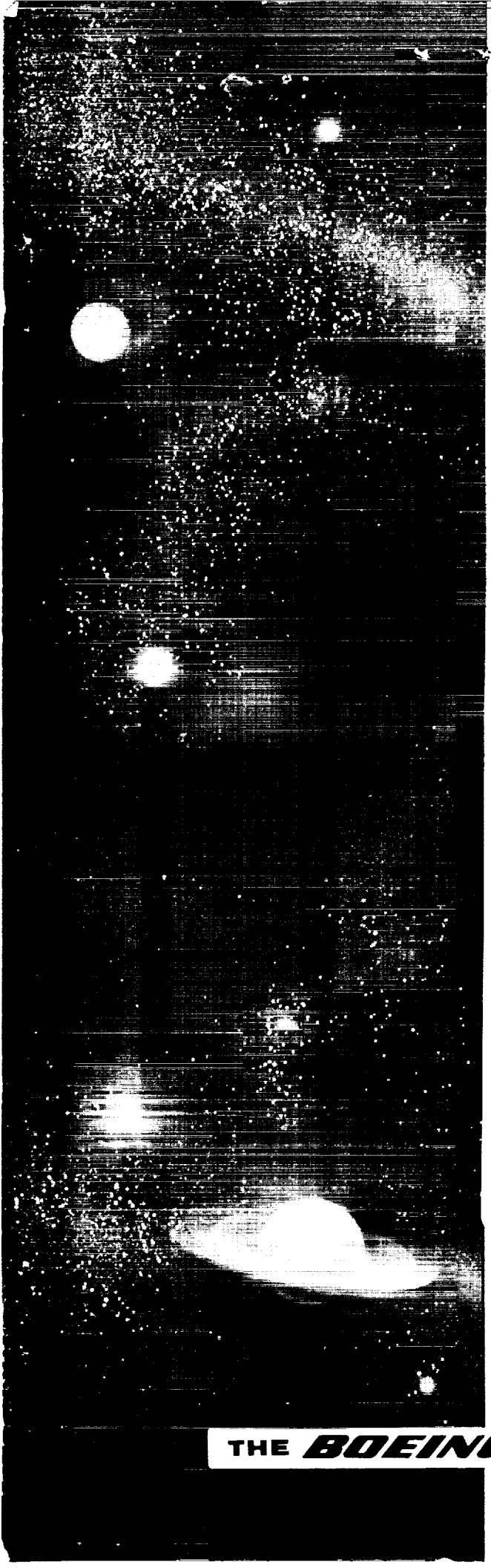

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ABSTRACT AND LIST OF KEY WORDS

This document presents the postflight trajectory for the Apollo/Saturn V AS-502 test flight. Included is an analysis of the ascent trajectory, orbital trajectory of the launch vehicle, and the free flight trajectories of the expended S-IC and S-II stages. Trajectory dependent parameters are provided in earth-fixed launch site, geocentric inertial and geographic polar coordinate systems. The time history of the trajectory parameters is presented from guidance reference release to the physical separation of the CSM from the S-IVB/IU/LEM.

Tables for engine cutoff, stage separation, and orbital insertion conditions are included in this document. Figures of such parameters as altitude, surface and cross ranges, and magnitudes of total velocity and acceleration as a function of range time for the ascent trajectory are presented.

The following is a list of key words for use in indexing this document for data retrieval:

Apollo/Saturn V
AS-502
Postflight Trajectory
Operational Trajectory
Ascent Trajectory
Free Flight Trajectory
Orbital Trajectory

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PREFACE

This document has been prepared by the Saturn V Flight Evaluation Staff of The Boeing Company to satisfy the technical requirements specified by NASA/MSFC Contract NAS8-5608, Schedule II, Part V, Exhibit AA, Task 1.0, SSR-210.

The analyses presented in this document were conducted by the following Boeing personnel in collaboration with Messieurs J. Haussler, L. Lofton, and C. Varnado of the R-AERO-FFT Section of MSFC:

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R-AERO-P-#17	Tracking and Network Specifications	3/26/68
R-AERO-P-#35b	Transponder Locations	3/26/68
DRL-20F	Operational Trajectory Certified Data	4/3/68
I-MO-#17b	Q/L Significant Time of Events	4/4/68
I-MO-#4e	Meteorological Data (Preliminary)	4/4/68
I-MO-#4a	Insertion Point and/or Orbital Elements	4/5/68
I-MO-#4c	Six Seconds Raw Radar	4/5/68 and 4/6/68
R-AERO-P-#21	Preliminary Trajectory	4/5/68 and 4/6/68
I-MO-#5	Q/L Azusa (PVA)	4/5/68
I-MO-#6	IP Raw MP	4/5/68
I-MO-#6	Q/L ODOP (PVA)	4/6/68
I-MO-#18a	Preliminary Guidance Velocities	4/6/68
I-MO-#17a	Preliminary Significant Time of Events	4/8/68
I-MO-#9	Final ODOP (PVA)	4/9/68
I-MO-#4f	Meteorological Data (Final)	4/11/68
I-MO-#17c	Final Significant Time of Events	4/15/68
I-MO-#9	GLOTRAC Station I (PVA)	4/16/68
I-MO-#9	Pulse Radar	4/16/68
I-MO-#18c	Orbital Venting Acceleration Data Cards	4/16/68
I-MO-#11b	Optical Tracking (List Only)	4/23/68
I-MO-#11c	GLOTRAC Segment I (PVA)	4/23/68
I-MO-#9	Twin Falls Victory Ship (FPS-16)	5/14/68

SECTION 1

SUMMARY AND INTRODUCTION

The Apollo/Saturn V AS-502 vehicle was launched from Launch Complex 39, Pad A at the Kennedy Space Center on April 4, 1968, at 7:00:01 A.M. Eastern Standard Time (Range Time Zero) at an azimuth of 90 degrees east of north. Range Time, which is referenced to Range Time Zero, is used throughout this document unless otherwise specified. Guidance Reference Release (GRR) was established to have occurred at -16.845 seconds. First motion occurred at 0.38 seconds. After liftoff a roll maneuver was performed orienting the vehicle to a flight azimuth of 72 degrees east of north.

The vehicle performed nominally during the S-IC stage burn. During the S-II stage burn, premature cutoff of Engine No. 2 occurred at 412.92 seconds. Shortly thereafter, premature cutoff of Engine No. 3 of the S-II stage occurred. As a result, both the S-II and S-IVB stages had a longer burn time. The launch vehicle was inserted into orbit at 757.04 seconds at an altitude of 190.19 kilometers (102.69 n mi) and a total space-fixed velocity of 7842.10 m/s (25728.67 ft/s). The vehicle remained in orbit for approximately two revolutions. Near the end of the second revolution, the scheduled reignition of the S-IVB stage failed to occur; consequently, there was no second burn. At 11667.8 seconds, after reignition of the S-IVB stage failed to occur, the spacecraft (CSM) separated from the launch vehicle. Separation occurred at an altitude of 196.21 km (105.94 n mi) and a total space-fixed velocity of 7846.32 m/s (25742.52 ft/s).

The expended S-IC stage broke up at approximately 397 seconds as determined from photographic coverage. The general impact location of the broken pieces was determined to be 30.20 degrees north latitude and 74.31 degrees west longitude at 528.93 seconds. The impact location of the expended S-II stage was determined to be 31.21 degrees north latitude and 32.18 degrees west longitude and occurred at 1251.24 seconds. The separated S-IVB stage remained in orbit instead of the programmed translunar conic due to the failure of the S-IVB to reignite for the second burn. The S-IVB stage reentered the earth's atmosphere on April 26, and impacted in the Indian Ocean between the east coast of Africa and the west coast of India.

Section 2 of this document defines the coordinate systems and launch parameters used in the conduct of the postflight trajectory analysis.

The postflight mass-point trajectory related parameters and analytical procedures are presented in Sections 3, 4, and 5 from the time of guidance reference release to the time of physical separation of the CSM from the S-IVB/IU/LEM. The trajectory is divided into three phases:

a. Ascent Phase

(CONTINUED)

b. Orbital Phase

c. Free Flight Phase

The ascent phase, covering the portion of flight from guidance reference release to orbital insertion (757.04 seconds), is defined in Section 3. This trajectory was established from data provided by external electrical and optical tracking systems and telemetered onboard data obtained from the ST-124M guidance platform. External data were available from fixed cameras, ODOP, GLOTRAC Segment I, GLOTRAC Station I, and C-band radars. The final ascent trajectory was determined from fixed cameras, ODOP, GLOTRAC Station I, C-band radars and telemetered guidance velocity data.

The orbital phase, defined in Section 4, covers the portion of flight from orbital insertion to the physical separation of the CSM from the S-IVB/IU/LEM. The orbital trajectory was established from data provided by both external electrical tracking system and on-board data provided by the ST-124M guidance platform. External tracking data were provided by the C-band radars of the Manned Space Flight Network.

The free flight phase, defined in Section 5, covers the trajectories of the expended S-IC and S-II stages. These trajectories are based on initial conditions obtained from the final postflight trajectory at separation. The separation impulses for both stages were used in the simulation.

Appendix A provides a detailed definition of the symbols, nomenclature, and coordinate systems used throughout the document.

Appendix B contains the time history of the trajectory parameters in tabular form.

SECTION 2

COORDINATE SYSTEMS AND LAUNCH PARAMETERS

The trajectory parameters of the vehicle center of gravity are tabulated in Appendix B in earth-fixed launch site, geocentric inertial, and geographic polar coordinate systems. The earth-fixed launch site and geographic polar coordinate systems conform to the "Project Apollo Coordinate System Standards," (PACSS), see Reference 1. The earth-fixed launch site and geographic polar coordinate systems are designated PACSS10 and PACSS1, respectively. The geocentric inertial coordinate system together with the trajectory symbols and terminology used in this document are defined in Appendix A.

The Fischer Ellipsoid of 1960, see Reference 2, is used as the representative model for the earth and its gravitational field. All latitude and longitude coordinates are defined with respect to this ellipsoid.

The geographic coordinates for Launch Complex 39, Pad A at the Kennedy Space Center are:

Geodetic Latitude	28.608422 degrees North
Longitude	80.604133 degrees West

The height of the gimbal plane and center of gravity of the launch vehicle above the reference ellipsoid are:

Gimbal Plane (Station 100)	32.0 m (105.0 ft)
C.G. at First Motion	59.5 m (195.2 ft)

The azimuth alignments are as follows:

Launch Azimuth	90.0 degrees East of North
Flight Azimuth	72.0 degrees East of North
ST-124M Platform Azimuth	72.0 degrees East of North

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SECTION 3

ASCENT TRAJECTORY ANALYSIS

3.1 ASCENT TRAJECTORY

A comparison of actual and nominal times for significant flight events is presented in Table 3-I. The nominal times for these events are taken from References 3 and 4.

The trajectory parameters, associated with the premature cutoff of the engine No. 2 in S-II stage, are given in Table 3-II. More information about this event can be found in Reference 6.

The tracking stations and the vehicle ground track are shown in Figure 3-1.

The actual altitude, surface range, and cross range are shown in Figures 3-2 through 3-4 respectively for the entire ascent trajectory. The magnitude of the total earth-fixed velocity vector and the associated elevation angle are shown in Figure 3-5. The magnitude of the total space-fixed velocity vector and the associated flight path angle are shown in Figure 3-6. The magnitude of the total inertial acceleration vector indicating the various engine cutoff profiles is shown in Figure 3-7. Mach number and dynamic pressure are shown during the S-IC phase of the ascent trajectory in Figure 3-8.

Various trajectory parameters, such as altitude, velocity, and acceleration are given at some significant event times in Table 3-III.

Engine cutoff and stage separation conditions are given in Tables 3-IV and 3-V, respectively.

The velocity gain between S-IC OECO and S-IC/S-II separation due to thrust decay was 11.2 m/s (36.7 ft/s). The velocity gain between S-II ECO and S-II/S-IVB separation due to thrust decay amounted to 2.0 m/s (6.6 ft/s). The velocity gain from S-IVB ECO to the end of thrust decay amounted to 2.5 m/s (8.2 ft/s). These velocity gains were derived from the telemetered guidance data.

The ascent trajectory, from guidance reference release to orbital insertion, is tabulated in both metric and English units in Tables B-I through B-VI. These tables present the trajectory in the earth-fixed launch site (PACSS10), geocentric inertial, and geographic polar (PACSS1) coordinate systems. The definitions pertaining to the trajectory symbols and the coordinate systems are given in Appendix A.

3.2 DATA SOURCES

Tracking data and telemetered guidance data were obtained during the period of first motion through orbital insertion. The time periods for which tracking system coverage was available are shown in Figure 3-9 and itemized

3.2 (CONTINUED)

in Table 3-VI. The geographic locations of the tracking stations and the ground track for the ascent trajectory are shown in Figure 3-1. The antenna locations for the various tracking systems and the vehicle center of gravity are shown in Figure 3-10. Throughout Sections 3 and 4, approximate values were used for tracking comparisons.

3.2.1 Optical Tracking Data

Optical tracking data were provided by both fixed cameras and theodolites. These data were available as position, velocity, and acceleration components in the earth-fixed launch site coordinate system and are defined as metric data. The fixed cameras furnished data from time of first motion to 11.7 seconds. The theodolites furnished data from 0.7 seconds to 55.0 seconds. These data formed the basis from which the early launch phase of the trajectory was derived.

Comparisons between optical tracking data and the ascent trajectory were calculated as position differences (tracking data minus trajectory data) in PACSS10. The maximum differences for camera data were found to be 3 m (10 ft) for the vertical component, and 1 m (3 ft) for the cross range and down range components.

The maximum differences for theodolite data as compared with the ascent trajectory were found to be 7 m (23 ft), 3 m (10 ft), and 6 m (20 ft) respectively for the vertical, cross range, and down range components.

3.2.2 ODOP

Data from the ODOP tracking system were available from 4.1 seconds to 110.9 seconds. These data were received in reduced metric form as position, velocity, and acceleration components in PACSS10. Comparisons between ODOP data and the ascent trajectory were calculated as position differences in PACSS10. The differences in vertical (XE), cross range (YE), and down range (ZE) components versus time are shown in Figures 3-11, 3-12, and 3-13, respectively. The maximum differences were 8 m (26 ft) in vertical component and 3 m (10 ft) in cross range component. The difference in down range component increased with time and reached a maximum value of 33 m (108 ft) at 110 seconds.

3.2.3 GLOTRAC Station I

GLOTRAC Station I provided an independent set of data between 18 and 231 seconds. These data were received in both measured parameter and metric form. The metric data, which were obtained from the measured parameter data by a coordinate transformation, were used in the trajectory solution. These data contained little random noise except at the beginning and at the end of the tracking period.

Comparisons between these metric data and the ascent trajectory were calculated as position differences in PACSS10. The differences in vertical

3.2.3 (Continued)

(XE), cross range (YE), and down range (ZE) components were plotted as functions of time and shown in Figures 3-11, 3-12, and 3-13, respectively. The difference in vertical component started from a maximum at 34 m (112 ft), decreased gradually to zero at 50 seconds, and then increased in the opposite direction to 43 m (141 ft) near the end of the tracking period. The difference in cross range component fluctuated and reached a maximum value of 25 m (82 ft) near the end of the tracking period. The difference in down range components fluctuated and reached a maximum value of 20 m (66 ft) near the end of the tracking period.

3.2.4 GLOTRAC Segment I

Reduced metric data from GLOTRAC Segment I were available from 25 to 485 seconds. These data were received as position, velocity, and acceleration components in PACSS10. However, the data were delivered too late to be used in the trajectory solution.

Comparisons of these data and the ascent trajectory were calculated as position differences in PACSS10. The differences in vertical (XE), cross range (YE), and down range (ZE) components were plotted as functions of time and shown in Figures 3-11, 3-12, and 3-13, respectively. The differences in vertical and down range components increased monotonically and reached the maximum values of 297 m (974 ft) and 100 m (328 ft), respectively at 485 seconds. The cross range difference fluctuated and had a maximum value of 16 m (52 ft).

3.2.5 C-Band Radars

Extensive C-band tracking data were furnished by the stations located at Cape Kennedy, Patrick Air Force Base, Merritt Island, Grand Bahama Island, Grand Turk Island, Bermuda Island, and the Twin Falls Victory Ship. These tracking data were provided as measured parameters in azimuth angle, elevation angle, and slant range. These measurements are defined in Reference 1 and designated as PACSS3a.

Comparisons between these data and the ascent trajectory were calculated in PACSS3a. The position components of the ascent trajectory in PACSS10 were corrected for the differences between the center of gravity and each transponder location. The corrected position components were transformed into the measured parameters of PACSS3a. Differences or deviations (tracking data minus measured parameters derived from ascent trajectory) were calculated and plotted as functions of time. These difference plots were smoothed and plotted as Figures 3-14 through 3-16.

3.2.5.1 Cape Kennedy (1.16) Radar

Tracking data between 1 and 287 seconds were received from the 1.16 radar. The azimuth and elevation angle measurements were noisy throughout the time span of tracking. The slant range measurements showed a large deviation in the

3.2.5.1 (Continued)

time interval between 92 and 100 seconds. The maximum deviations were 0.008 degrees in azimuth angle, 0.034 degrees in elevation angle, and 70 m (230 ft) in slant range.

3.2.5.2 Patrick (0.18) Radar

Patrick (0.18) radar data from 1 to 519 seconds were received. Azimuth angle measurements contained little noise except for the first 25 seconds and during the later portion (314 to 519 seconds) of tracking. The elevation angle measurements were noisy for the first 35 seconds and during the later portion (334 to 519 seconds) of tracking. The slant range measurements contained little noise throughout the tracking span except near the very end (495 to 519 seconds) of tracking. A discontinuity in the slant range measurements occurred at approximately 367 seconds indicating a switch from beacon to skin tracking. The maximum deviations were 0.008 degrees in azimuth angle, 0.026 degrees in elevation angle, and 55 m (180 ft) in slant range.

3.2.5.3 Merritt Island (19.18) Radar

Merritt Island (19.18) radar data from 1 to 534 seconds were received. The azimuth angle measurements were of good quality except at the beginning (1 to 28 seconds) and during the later portion (315 to 534 seconds) where the data were noisy. The elevation angle measurements deviated considerably from the ascent trajectory and were noisy at the beginning (1 to 27 seconds) and during the later portion (307 to 534 seconds) of tracking. The slant range measurements contained little noise except near the end (525 to 534 seconds) of tracking. A discontinuity in the slant range measurements occurred at approximately 293 seconds indicating a switch from beacon to skin tracking. The maximum deviations were 0.01 degrees in azimuth angle, 0.05 degrees in elevation angle, and 70 m (230 ft) in slant range.

3.2.5.4 Grand Bahama (3.18) Radar

Grand Bahama (3.18) radar data from 107 to 524 seconds were received. The data were in good agreement with the ascent trajectory. The data were of good quality except that the elevation angle measurements were wild near the end (480 to 524 seconds) of the tracking period. The maximum deviations were 0.02 degrees in the azimuth angle, 0.014 degrees in the elevation angle, and 120 m (394 ft) in slant range.

3.2.5.5 Grand Turk (7.18) Radar

Grand Turk (7.18) radar data from 218 to 472 seconds were received. The azimuth angle measurements deviated from the ascent trajectory by 0.024 degrees and appeared to be noisy. The elevation angle measurements deviated considerably from the ascent trajectory with a maximum value of approximately 0.5 degrees. The slant range measurements contained little noise with a maximum deviation of 130 m (427 ft).

3.2.5.6 Bermuda (67.16 and 67.18) Radars

Two sets of radar data were received from Bermuda. Station 67.16 (radar FPS-16) furnished data from 276 to 733 seconds, and station 67.18 (radar FPQ-6) furnished data from 250 to 795 seconds. The data obtained from radar FPS-16 contained more random noise than those from radar FPQ-6.

The azimuth angle measurements from both radars, as shown in Figure 3-14, were all within 0.01 degrees from the ascent trajectory except in the time interval between 510 to 630 seconds. At approximately 540 seconds, a large deviation occurred which reached the maximum values of 0.20 and 0.14 degrees respectively for the FPS-16 and FPQ-6 radars.

The elevation angle measurements from both radars, see Figure 3-15, deviated a maximum of 0.07 degrees at approximately 560 seconds.

The maximum deviations in slant range measurements reached 250 m (820 ft) for the FPS-16 radar at approximately 715 seconds, and 280 m (919 ft) for FPQ-6 radar at approximately 520 seconds.

3.2.5.7 Twin Falls Victory Ship (86.16) Radar

The Twin Falls Victory Ship obtained tracking data while underway. The 86.16 radar data were received for three time intervals: 471 to 530 seconds, 560 to 802 seconds, and 823 to 908 seconds. A radar operational problem occurred which caused the accuracy of the data to be of questionable value. The data were delivered too late to be used in the trajectory solution. Comparisons between these data and the ascent trajectory showed that the deviations in all three measurements were large and varying rapidly as shown by Figures 3-14 through 3-16.

3.3 TRAJECTORY DETERMINATION

The ascent trajectory from guidance reference release to orbital insertion was established by a composite solution of available tracking data and telemetered onboard guidance velocity data. The procedures used to accomplish this task were as follows:

a. Input data processing

b. Determination and merging of trajectory segments

c. Output data processing

3.3.1 Input Data Processing

Before the data were used in the trajectory solution, one or more of the following processing steps were performed:

a. Inspecting for format and parity errors

b. Time editing

3.3.1 (Continued)

c. Data editing and filtering

d. Refraction correction

e. Reformatting

f. Coordinate transformation

3.3.2 Determination and Merging of Trajectory Segments

The position components of the tracking point of the vehicle in PACSS10 were established by merging the launch phase and ascent phase trajectory segments.

The launch phase (from first motion to 25 seconds) was based on the optical tracking data, namely, the fixed cameras and theodolites data. The ascent phase (from 25 seconds to orbital insertion at 757.04 seconds) was based on a composite fit of external electrical tracking data and telemetered onboard guidance velocity data. A computer program (GATE), which uses a guidance error model, was utilized. The telemetered guidance velocity data were used as the generating parameter and error coefficients were estimated to best fit the tracking observations. The Kalman recursive method was used for the estimation. The GATE program was also constrained to satisfy the insertion conditions that were obtained by the Orbital Correction Program (OCP). Reference 5 gives a theoretical discussion of the GATE program.

The position components were filtered and differentiated to obtain vehicle velocity and acceleration components in PACSS10. Since numerical differentiators tend to distort the data through the transient areas (engine cut-offs), the guidance velocity data were integrated and used to fill-in these areas.

These data were then transformed from the tracking point to the vehicle center of gravity.

3.3.3 Output Data Processing

The trajectory data of Section 3.3.2 were transformed to several coordinate systems. Various trajectory parameters were also calculated and are presented in Appendix B.

In calculating the Mach number and dynamic pressure, measured meteorological data were used up to an altitude of 50.2 km (27.1 n mi). Above this altitude the measured data were merged into the U.S. Standard Reference Atmosphere.

3.4 ERROR ANALYSIS

An estimate of the total uncertainty of the ascent trajectory can be obtained by examining the tracking data comparison plots and utilizing the accuracy of the insertion point obtained by orbital analysis.

Comparisons of the metric data with the ascent trajectory are shown in Figures 3-11 through 3-13. Comparisons of the measured parameter data with the ascent trajectory are shown in Figures 3-14 through 3-16. These plots indicate the dispersive and secular characteristics of the data, and hence of the ascent trajectory itself.

The accuracy of the insertion point, established in Section 4.3.1 by the Orbital Correction Program (OCP), was ±500 m (±1640 ft) in position components and ±1.0 m/s (±3.3 ft/s) in velocity components referenced to the earth-fixed launch site coordinate system (PACSS10).

Based on the above information, an estimate of the total uncertainty of the ascent trajectory was derived and plotted in Figure 3-17. At S-IC OECO, the estimated uncertainties of position and velocity components in PACSS10 are ±80 m (±262 ft) and ±0.4 m/s (±1.3 ft/s), respectively. At S-II ECO, the estimated uncertainties of position and velocity components in PACSS10 are ±360 m (±1181 ft) and ±0.8 m/s (±2.6 ft/s), respectively. At S-IVB ECO and orbital insertion, the estimated uncertainties of position and velocity components in PACSS10 have increased to ±500 m (±1640 ft) and ±1.0 m/s (±3.3 ft/s), respectively.

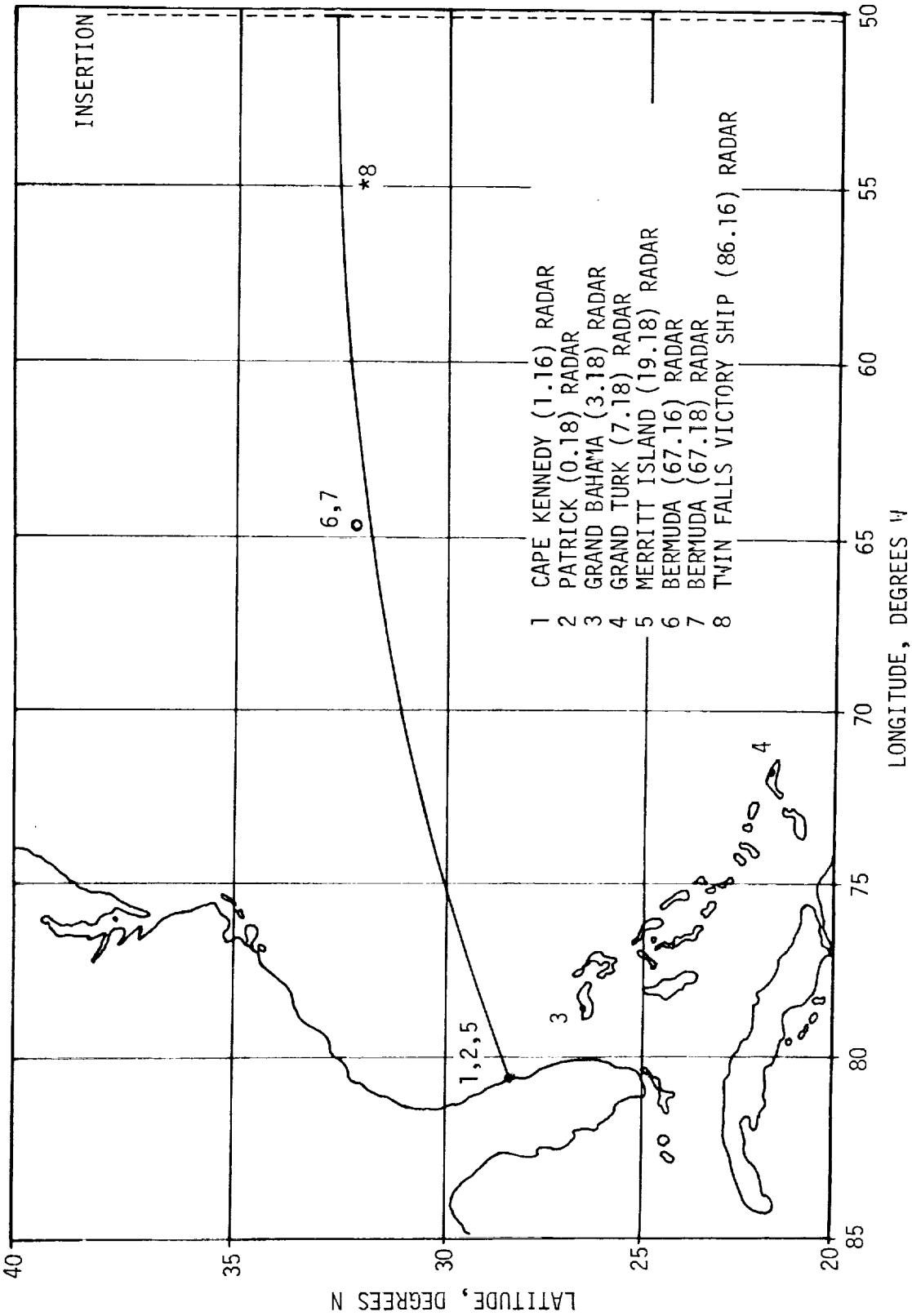

FIGURE 3-1. GROUND TRACK AND TRACKING STATIONS FOR ASCENT TRAJECTORY

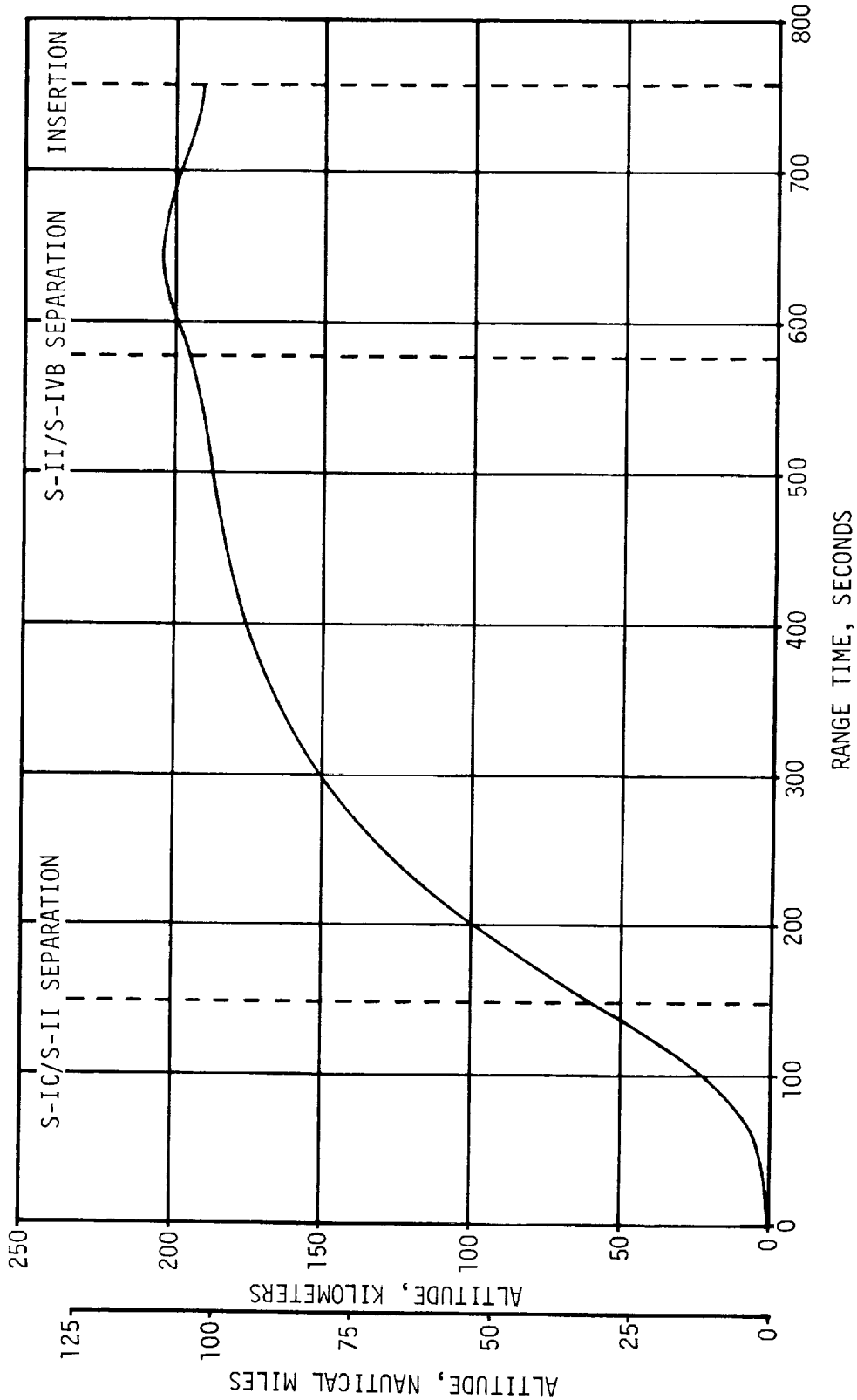

FIGURE 3-2. ALTITUDE - ASCENT TRAJECTORY

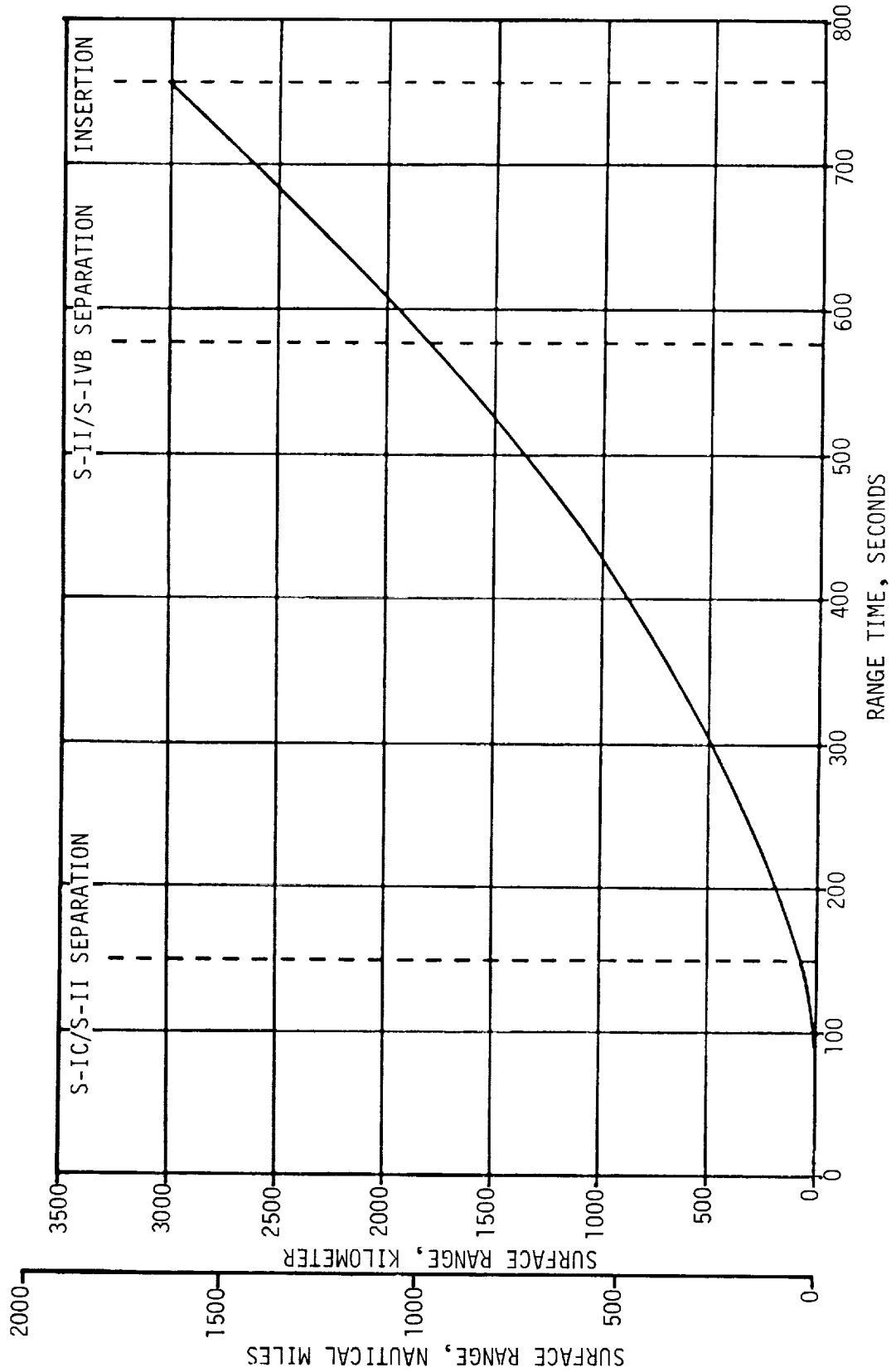

FIGURE 3-3. SURFACE RANGE - ASCENT TRAJECTORY

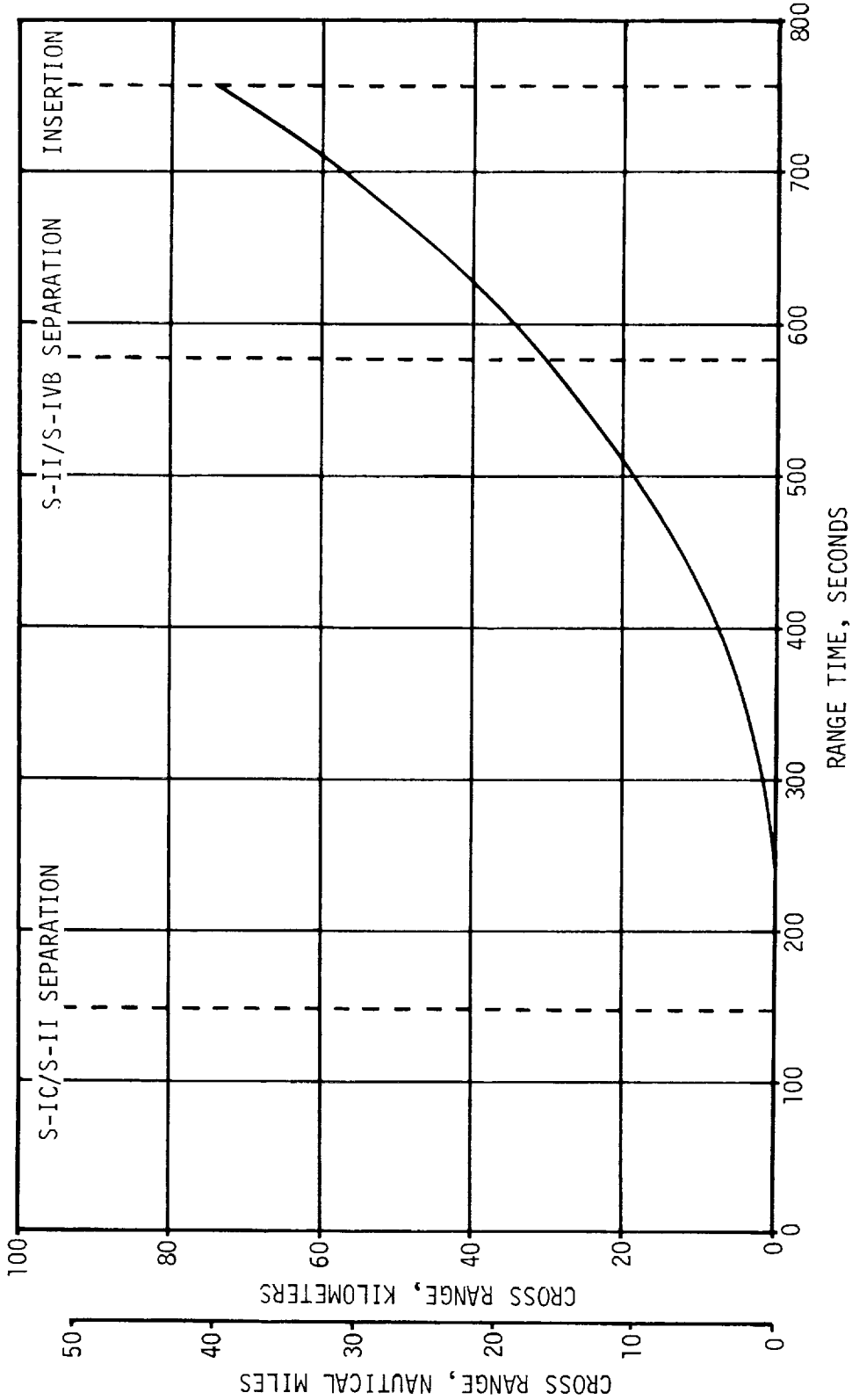

FIGURE 3-4. CROSS RANGE - ASCENT TRAJECTORY

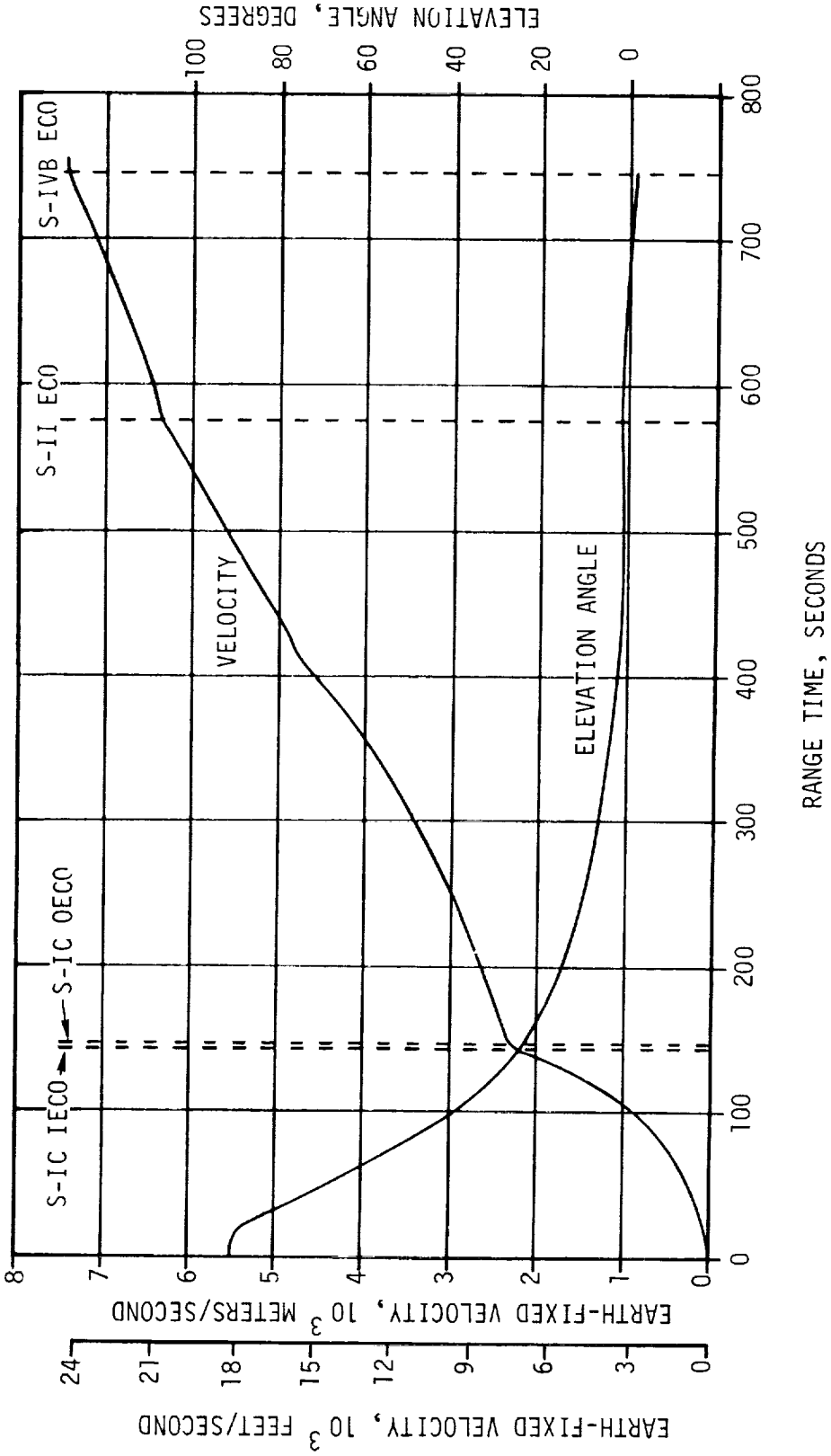

FIGURE 3-5. EARTH-FIXED VELOCITY AND ELEVATION ANGLE - ASCENT TRAJECTORY

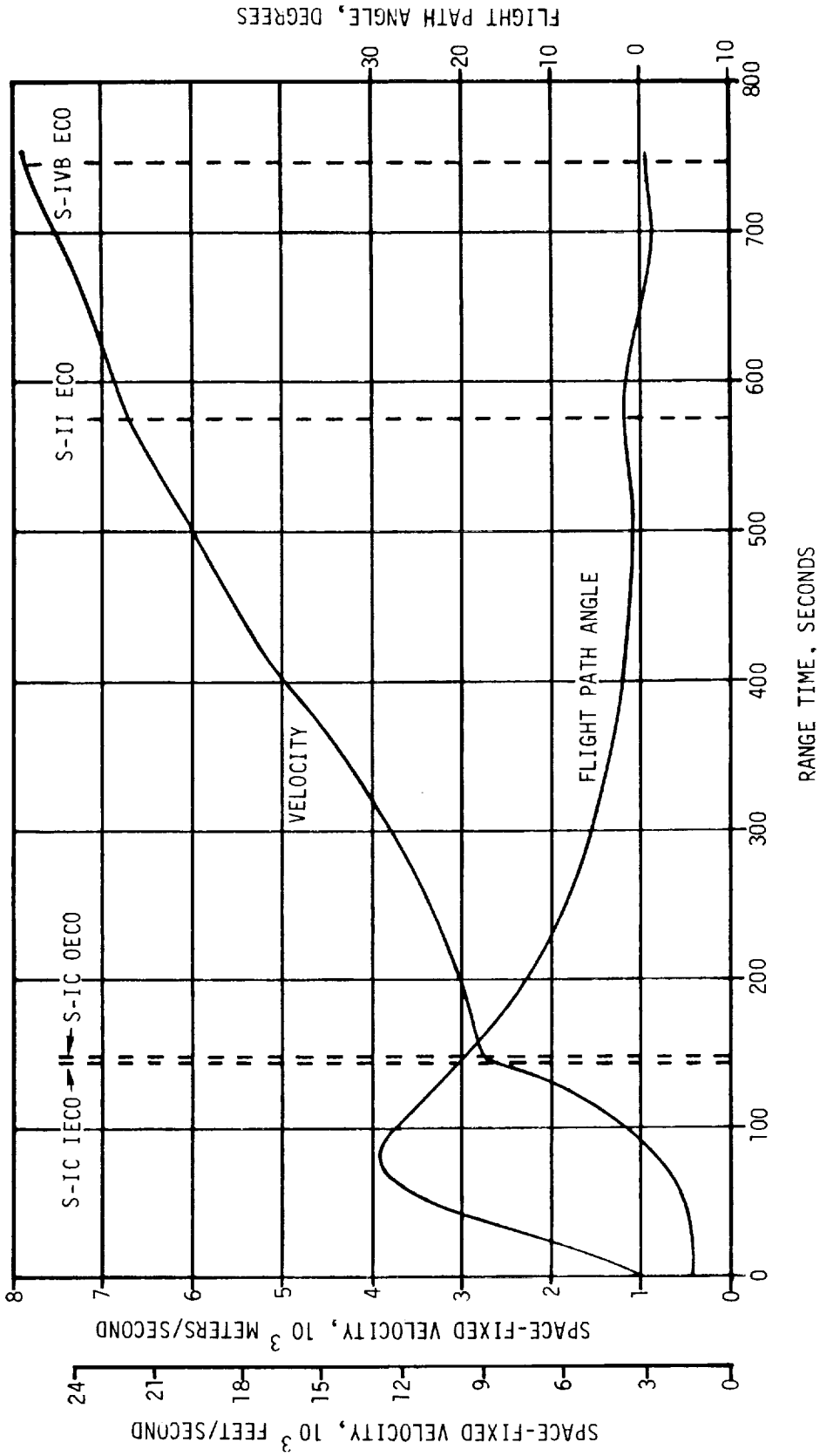

FIGURE 3-6. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - ASCENT TRAJECTORY

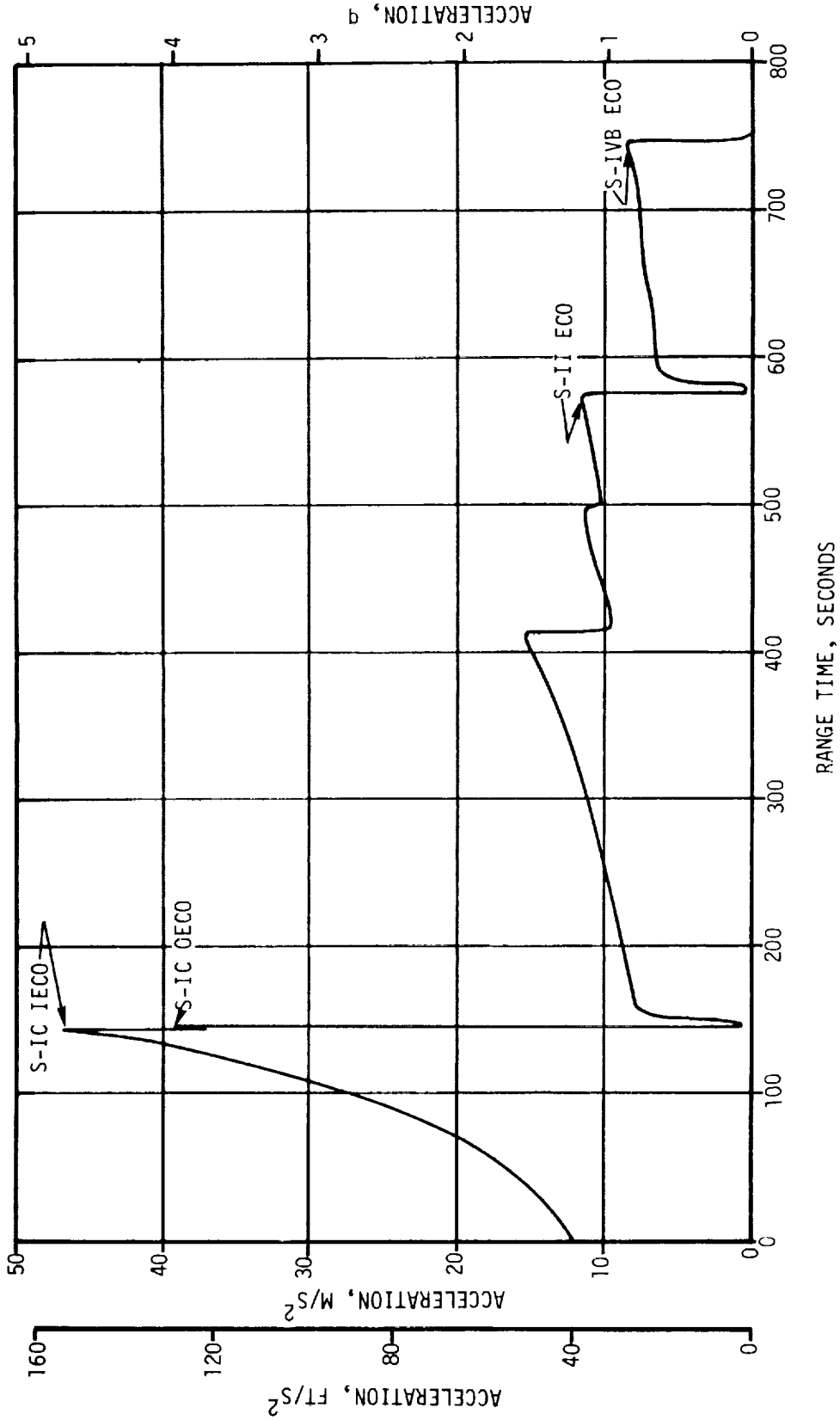

FIGURE 3-7. TOTAL INERTIAL ACCELERATION - ASCENT TRAJECTORY

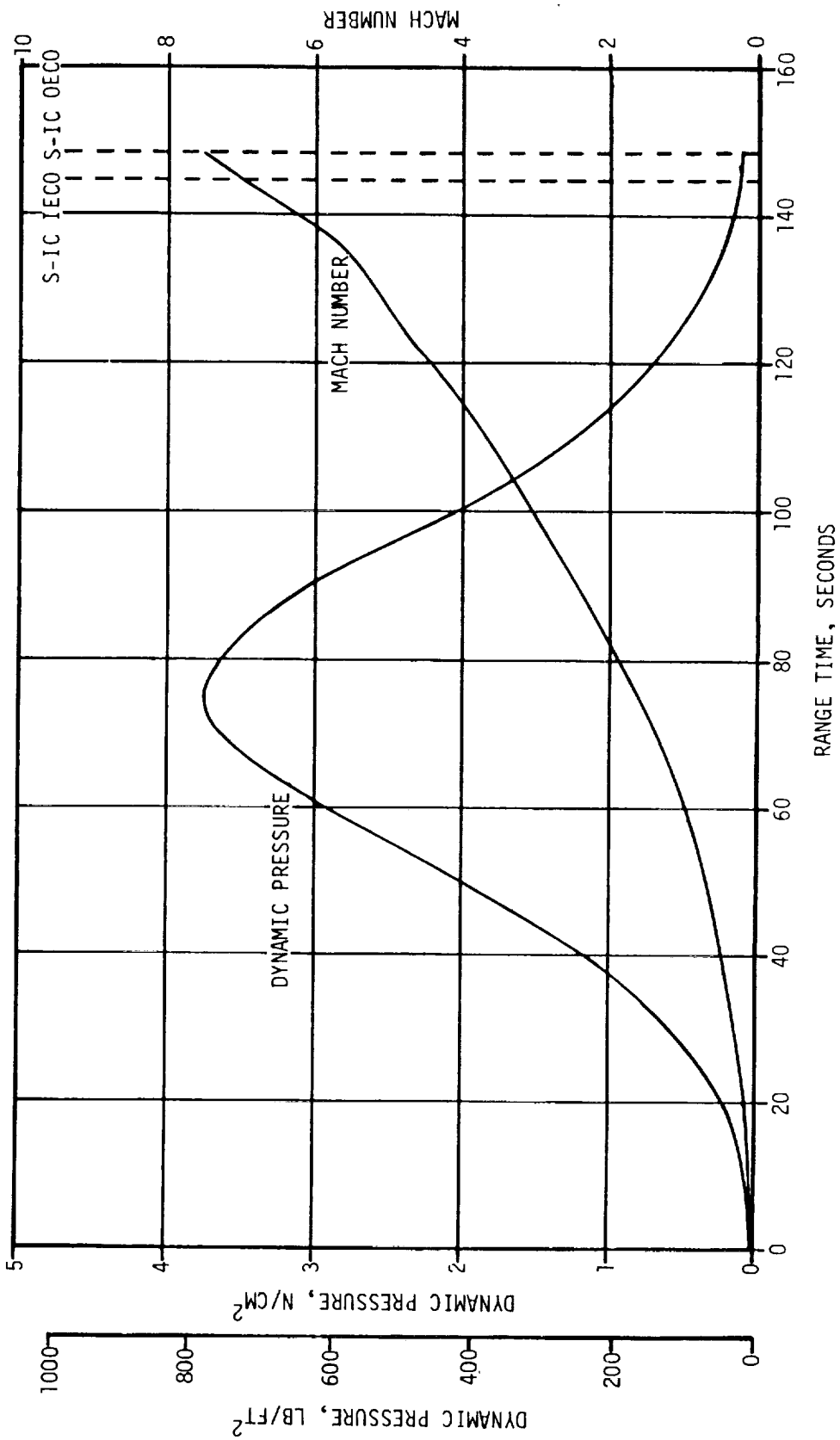

FIGURE 3-8. MACH NUMBER AND DYNAMIC PRESSURE - S-IC PHASE

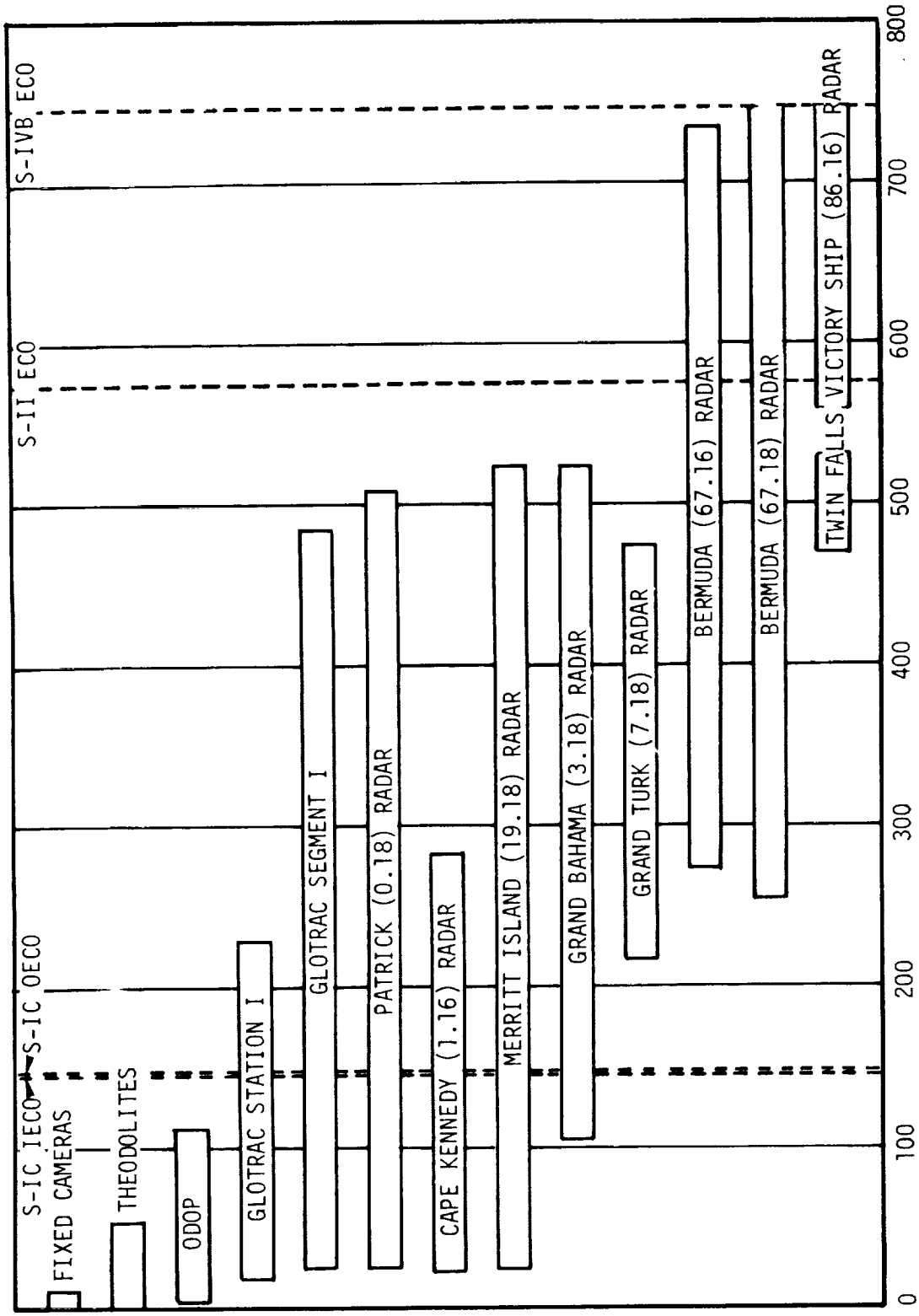

FIGURE 3-9. AVAILABLE TRACKING DATA FOR ASCENT TRAJECTORY

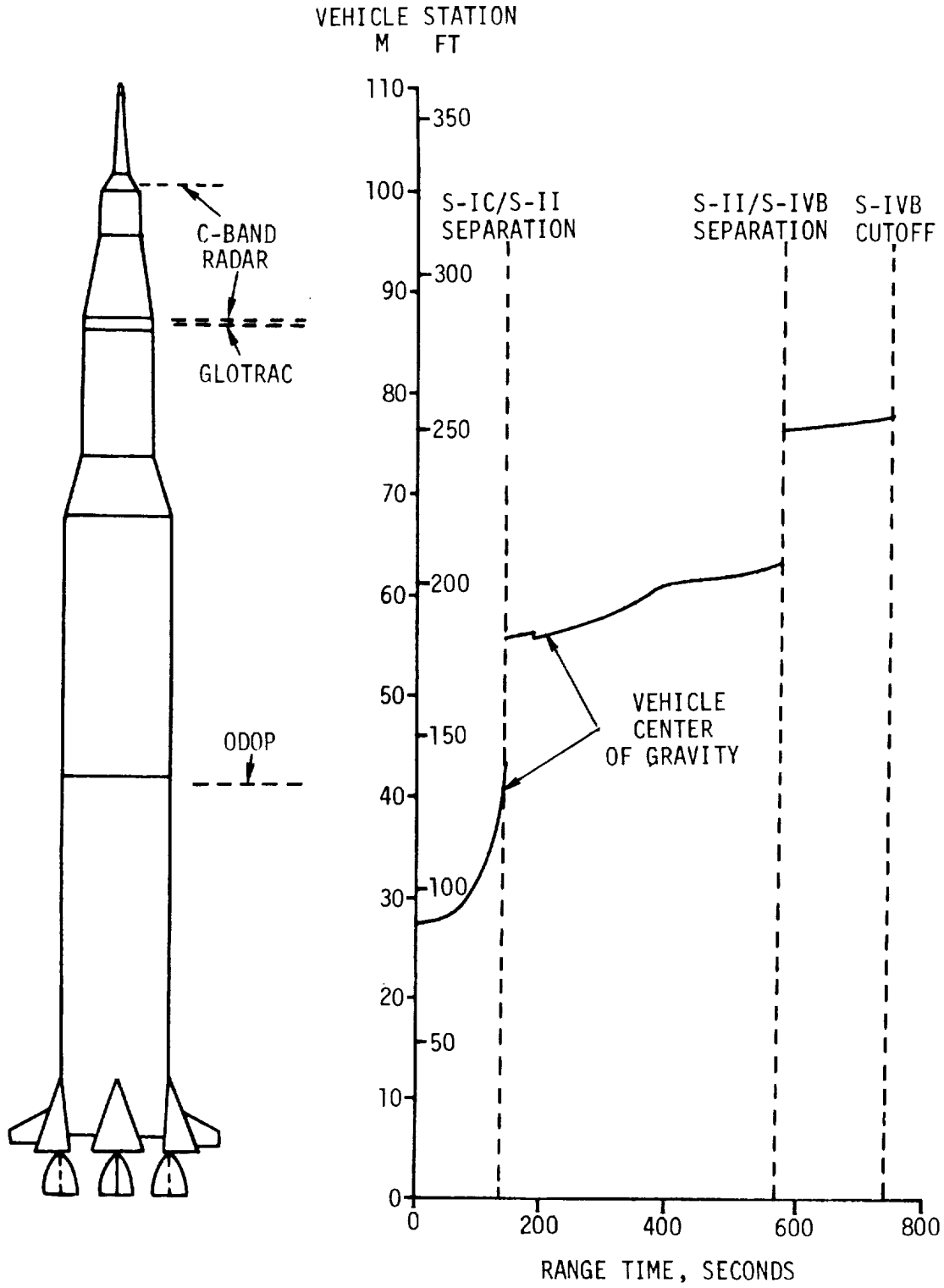

FIGURE 3-10. ANTENNA LOCATIONS AND CENTER OF GRAVITY

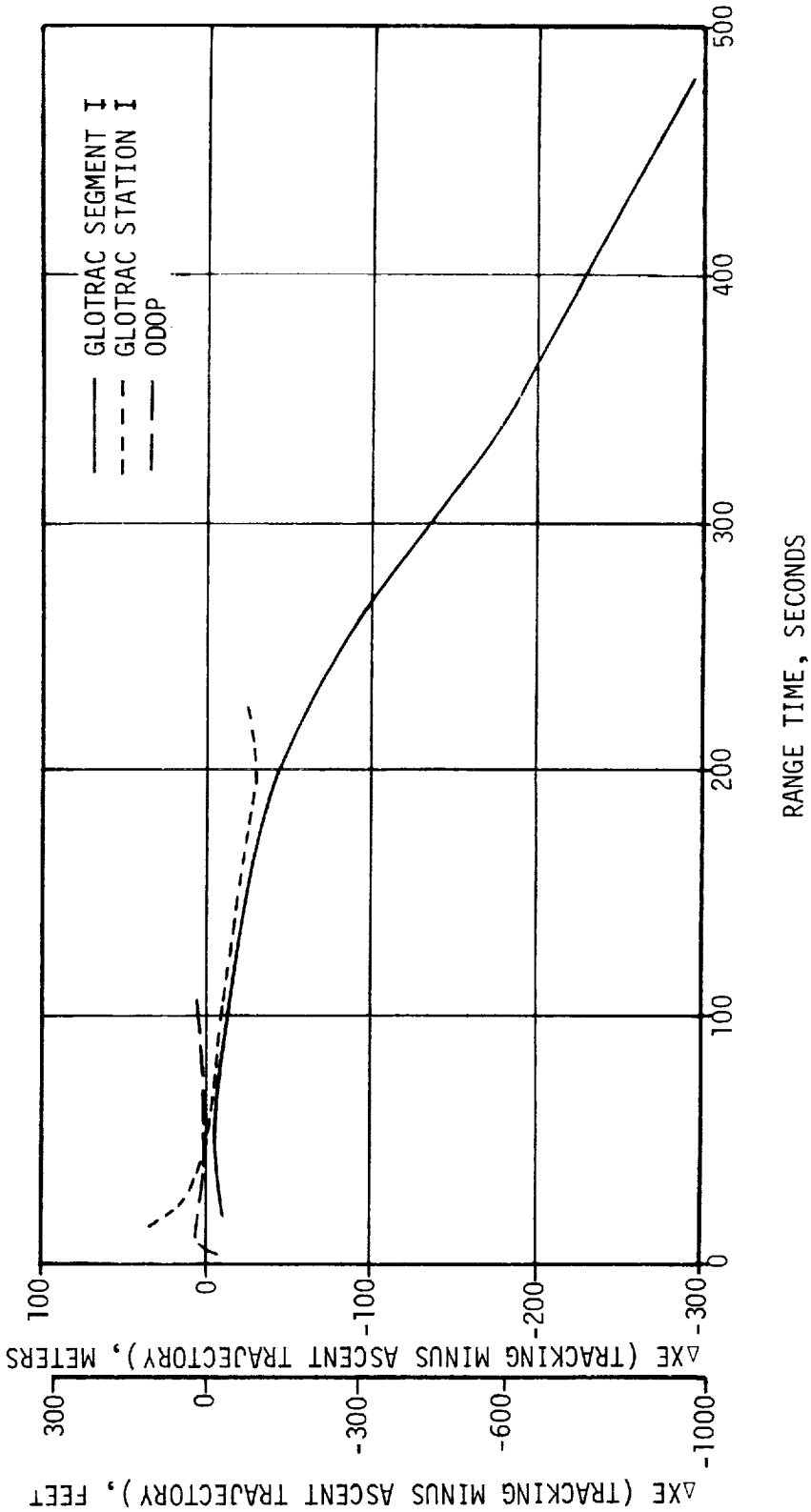

FIGURE 3-11. METRIC TRACKING COMPARISONS - ASCENT TRAJECTORY

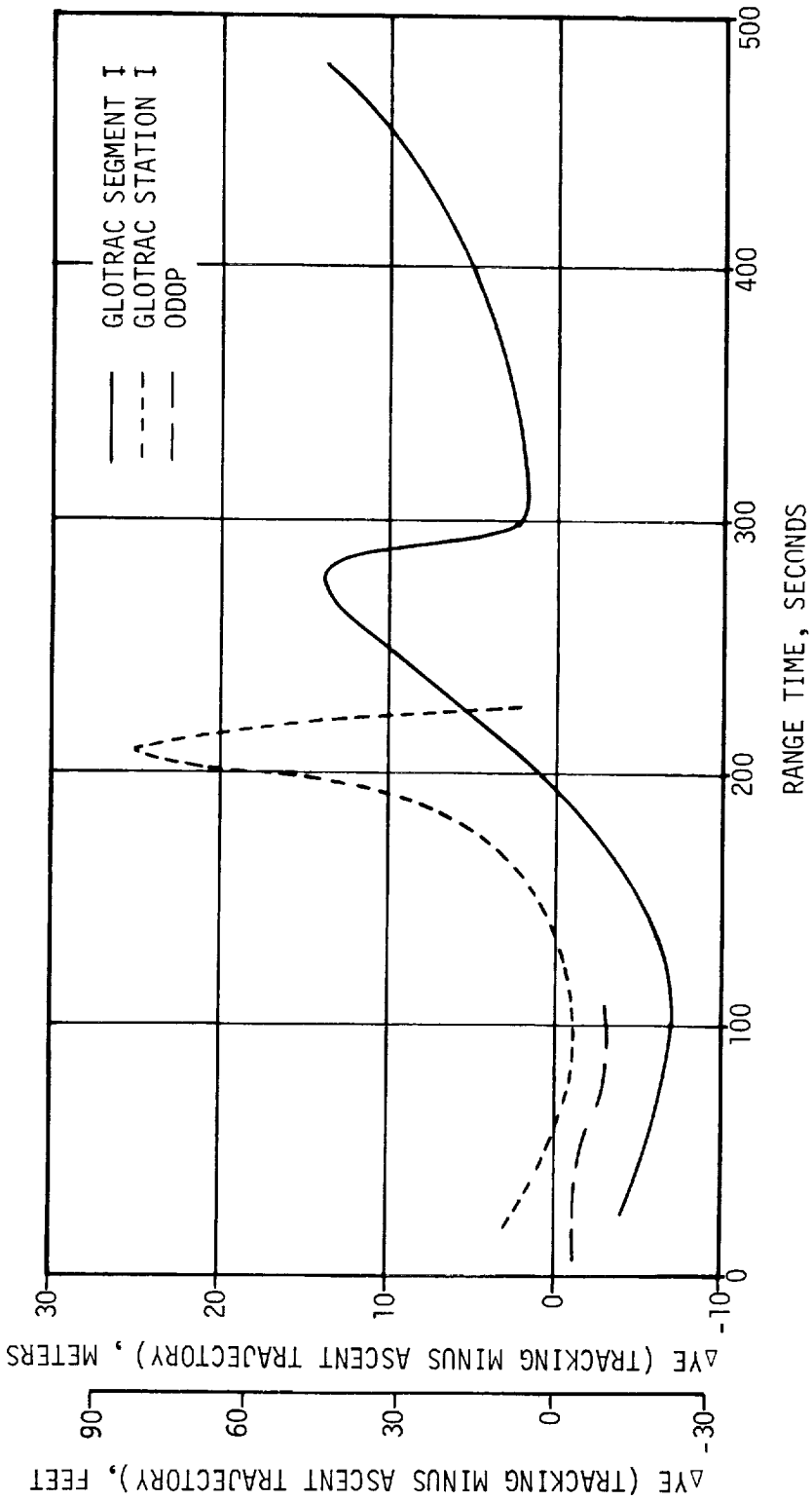

FIGURE 3-12. METRIC TRACKING COMPARISONS - ASCENT TRAJECTORY

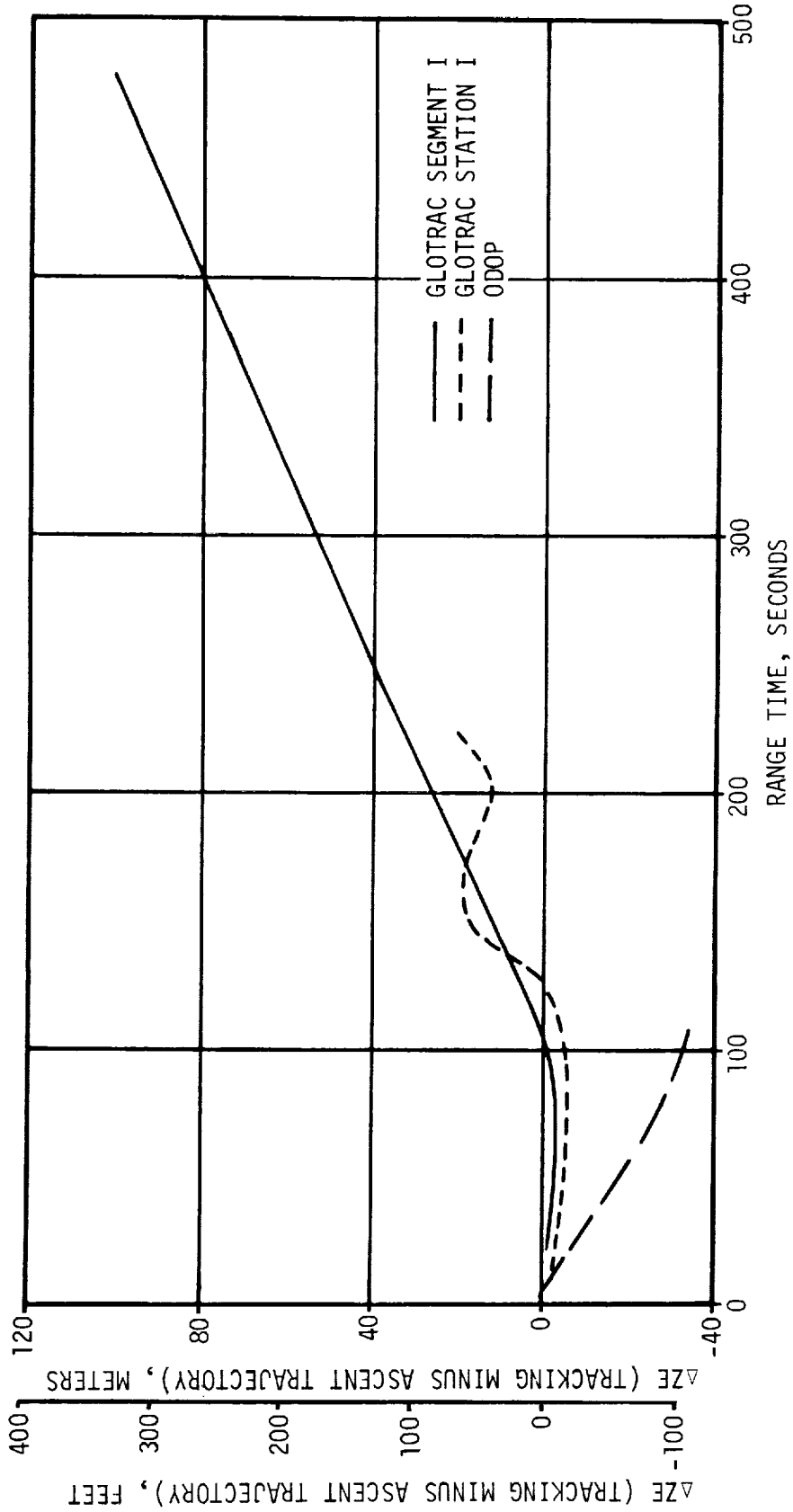

FIGURE 3-13. METRIC TRACKING COMPARISONS - ASCENT TRAJECTORY

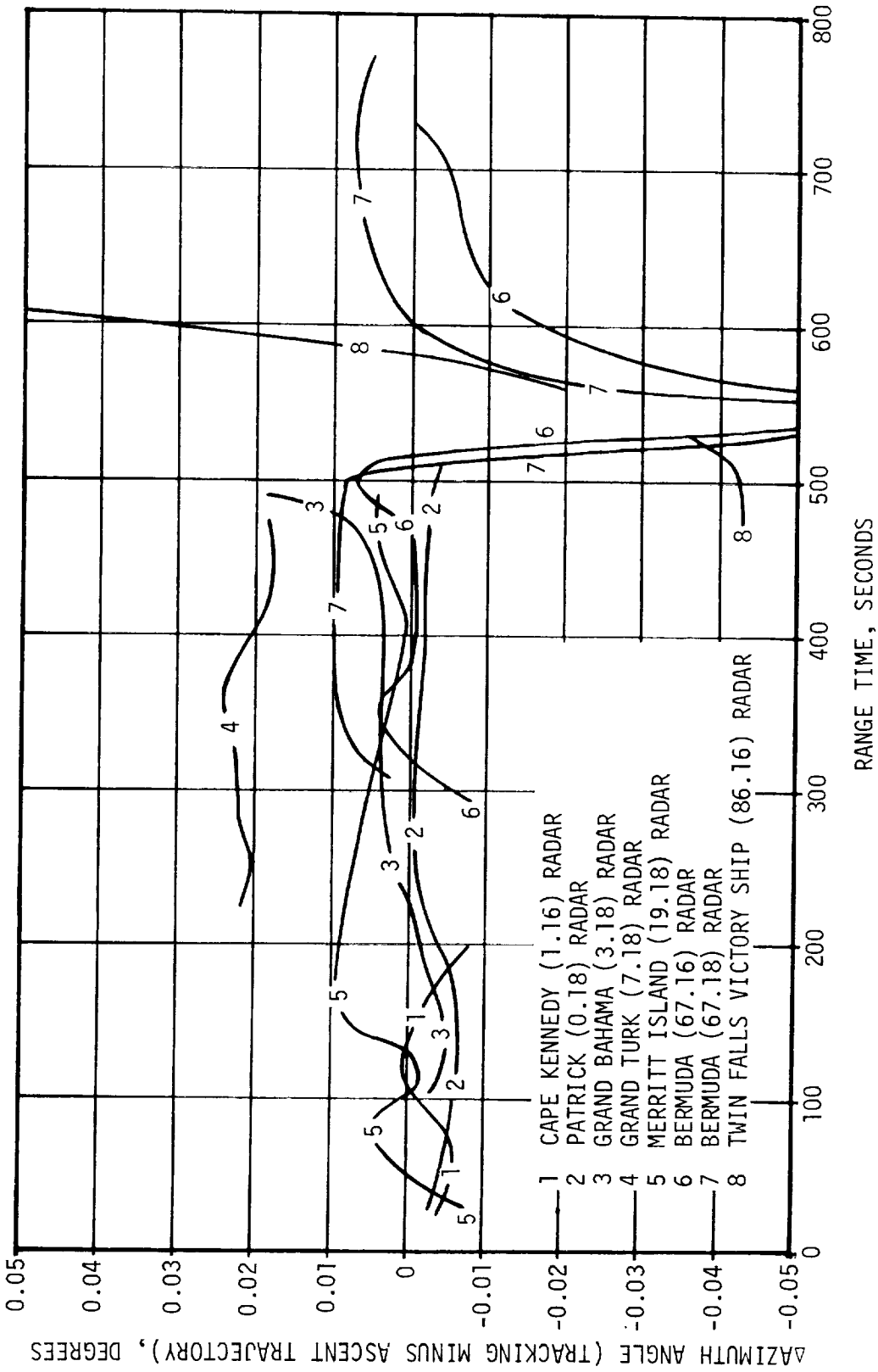

FIGURE 3-14. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT TRAJECTORY

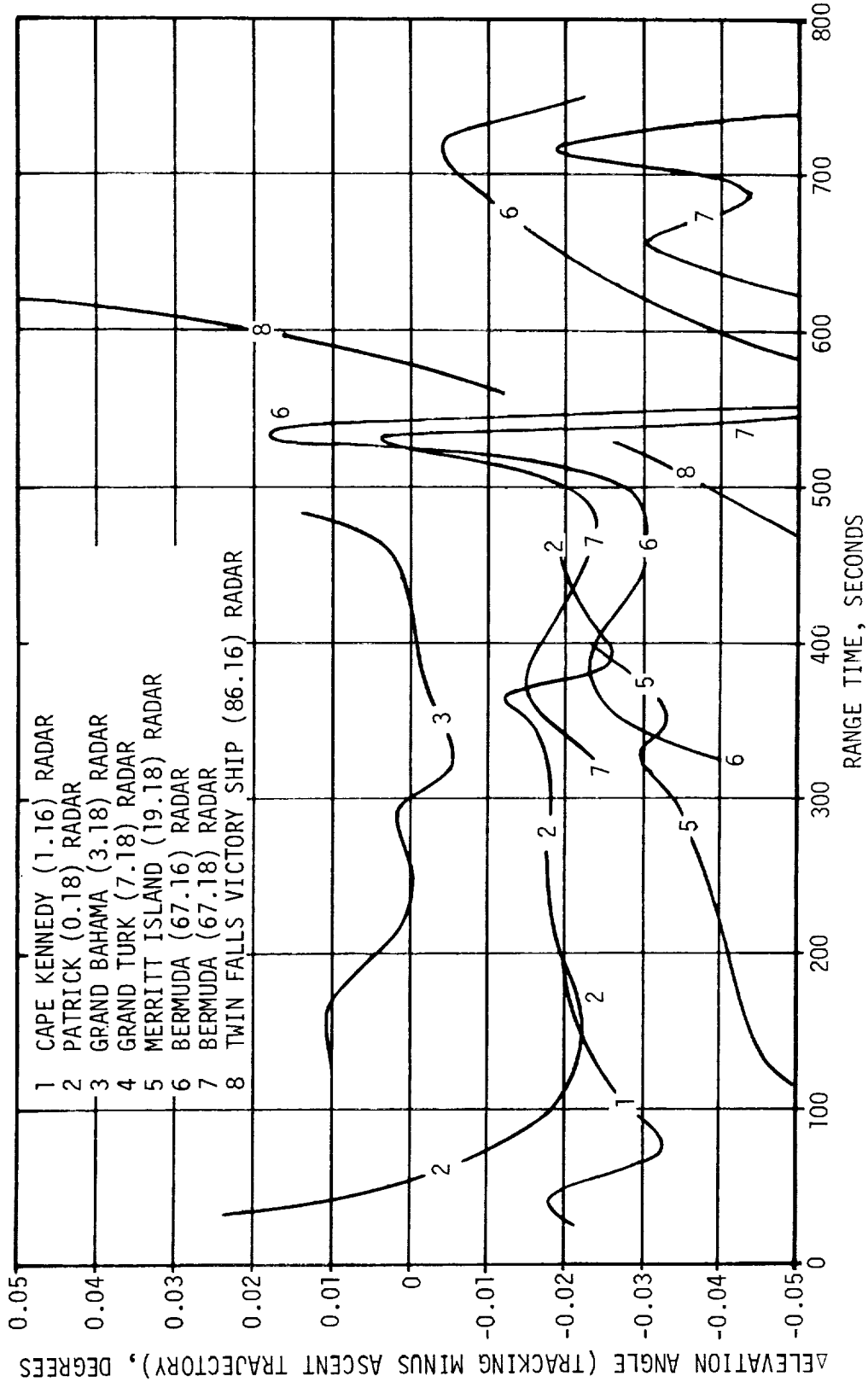

FIGURE 3-15. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT TRAJECTORY

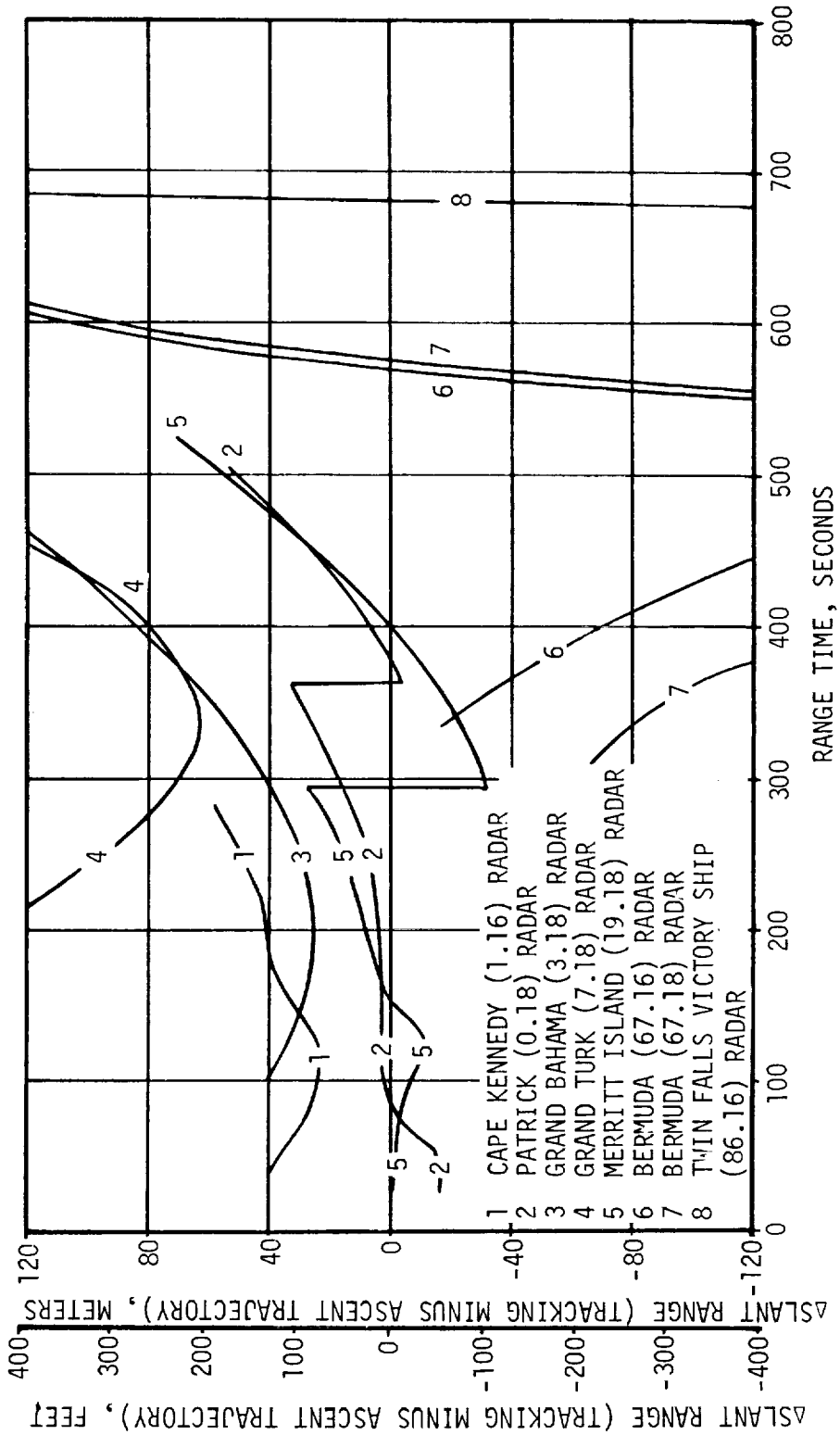

FIGURE 3-16. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT TRAJECTORY

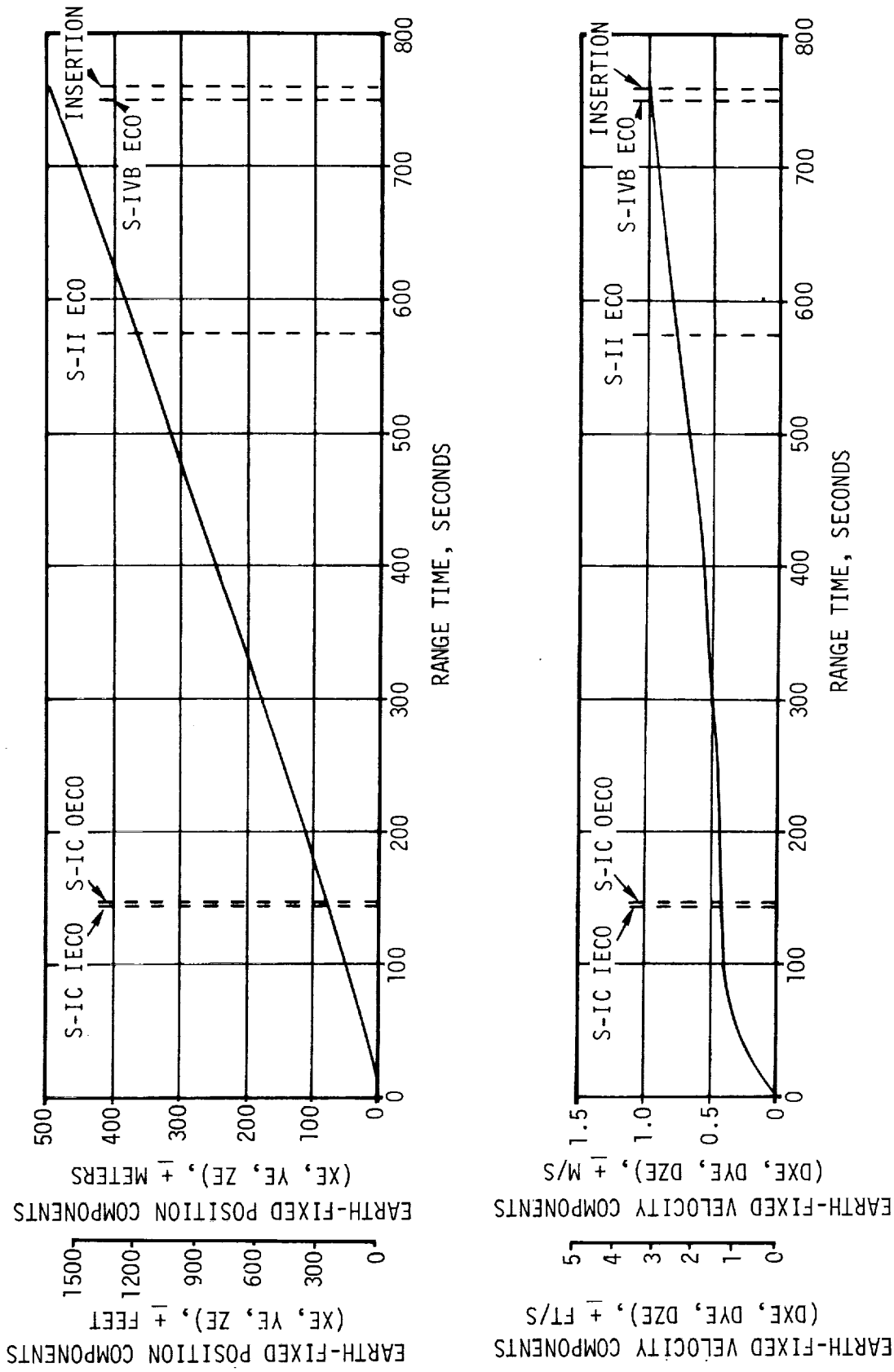

FIGURE 3-17. ESTIMATED UNCERTAINTY OF ASCENT TRAJECTORY

TABLE 3-I. TIMES OF EVENTS

EVENT	RANGE TIME, SEC		
	ACTUAL	NOMINAL	ACT - NOM
Guidance Reference Release	-16.845	-16.320	-0.525
First Motion	0.38	0.38	0.00
IU Umbilical Disconnect	0.69	0.83	-0.14
Mach 1	60.50	61.57	-1.07
Maximum Dynamic Pressure	75.20	79.76	-4.56
S-IC Inboard Engine Cutoff	144.72	144.39	0.33
S-IC Outboard Engine Cutoff	148.41	147.34	1.07
S-IC/S-II Separation Command	149.08	148.04	1.04
S-II Stage Engine No. 2 Out	412.92		
S-II Engine Cutoff	576.33	517.46	58.87
S-II/S-IVB Separation Command	577.08	518.26	58.82
S-IVB Velocity Cutoff Command	747.04	659.03	88.01
Orbital Insertion	757.04	669.03	88.01
Initiate S-IVB Restart Sequence	11287.73	11076.38	211.35
S-IVB/CSM Physical Separation	11667.8	11907.9	-240.1

TABLE 3-II. CONDITIONS AT S-II STAGE ENGINE NO. 2 OUT

PARAMETER	VALUE
Range Time, sec	412.92
Altitude, km (n mi)	177.27 (95.72)
Surface Range, km (n mi)	933.36 (503.97)
Space-Fixed Velocity, m/s (ft/s)	5153.43 (16907.58)
Flight Path Angle, deg	1.611
Heading Angle, deg	78.706
Cross Range, km (n mi)	8.87 (4.79)
Cross Range Velocity, m/s (ft/s)	92.31 (302.85)

TABLE 3-III. SIGNIFICANT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
First Motion	Range Time, sec	0.38
	Total Inertial Acc'n, m/s^2	10.80
	(ft/s^2)	(35.43)
Mach 1	Range Time, sec	60.50
	Altitude, km	7.14
	(n mi)	(3.86)
Maximum Dynamic Pressure	Range Time, sec	75.20
	Dynamic Pressure, N/cm^2	3.755
	(lb/ft^2)	(784.248)
	Altitude, km	12.00
	(n mi)	(6.48)
Maximum Total Inertial Acceleration: S-IC	Range Time, sec	144.72
	Acceleration, m/s^2	46.90
	(ft/s^2)	(153.87)
S-II	Range Time, sec	410.00
	Acceleration, m/s^2	15.53
	(ft/s^2)	(50.95)
S-IVB	Range Time, sec	747.04
	Acceleration, m/s^2	8.33
	(ft/s^2)	(27.33)
Maximum Earth-Fixed Velocity: S-IC	Range Time, sec	149.08
	Velocity, m/s	2396.54
	(ft/s)	(7862.66)
S-II	Range Time, sec	577.08
	Velocity, m/s	6325.43
	(ft/s)	(20752.72)
S-IVB	Range Time, sec	757.04
	Velocity, m/s	7438.83
	(ft/s)	(24405.61)

TABLE 3-IV. ENGINE CUTOFF CONDITIONS - ASCENT TRAJECTORY

PARAMETER	S-IC IECO	S-IC OECO	S-II ECO	S-IVB ECO
Range Time, sec	144.72	148.41	576.33	747.04
Altitude, km (n mi)	56.07 (30.28)	59.45 (32.10)	195.09 (105.34)	190.71 (102.98)
Surface Range, km (n mi)	75.38 (40.70)	83.18 (44.91)	1810.63 (977.66)	2943.03 (1589.11)
Space-Fixed Velocity, m/s (ft/s)	2620.74 (8598.23)	2752.93 (9031.92)	6725.68 (22065.88)	7839.85 (25721.29)
Flight Path Angle, deg	20.145	19.666	1.600	-0.400
Heading Angle, deg	75.131	75.005	83.388	90.237
Cross Range, km (n mi)	-0.12 (-0.06)	-0.13 (-0.07)	30.61 (16.53)	70.92 (38.29)
Cross Range Velocity, m/s (ft/s)	-3.05 (-10.01)	-3.77 (-12.37)	172.47 (565.85)	296.81 (973.79)

TABLE 3-V. STAGE SEPARATION CONDITIONS - ASCENT TRAJECTORY

PARAMETER	S-IC/S-II SEPARATION COMMAND	S-II/S-IVB SEPARATION COMMAND
Range Time, sec	149.08	577.08
Altitude, km (n mi)	60.08 (32.44)	195.25 (105.43)
Surface Range, km (n mi)	84.65 (45.71)	1815.52 (980.30)
Space-Fixed Velocity, m/s (ft/s)	2765.14 (9071.98)	6728.65 (22075.62)
Flight Path Angle, deg	19.530	1.597
Heading Angle, deg	74.996	83.416
Cross Range, km (n mi)	-0.13 (-0.07)	30.74 (16.60)
Cross Range Velocity, m/s (ft/s)	-3.81 (-12.50)	172.83 (567.03)
Geodetic Latitude, deg N	28.843	32.144
Longitude, deg E	-79.780	-62.136

TABLE 3-VI. AVAILABLE TRACKING DATA FOR ASCENT TRAJECTORY

DATA SOURCE	TIME AVAILABLE (SEC)
Fixed Cameras (PVA)*	0 - 12
Theodolites (PVA)*	1 - 55
ODOP (PVA)*	4 - 111
GLOTRAC Station I (MP and PVA)*	18 - 231
GLOTRAC Segment I (PVA)*	25 - 485
Cape Kennedy (1.16) Radar (FPS-16)**	1 - 287
Patrick (0.18) Radar (FPQ-6)**	1 - 519
Merritt Island (19.18) Radar (TPQ-18)**	1 - 534
Grand Bahama (3.18) Radar (TPQ-18)**	107 - 524
Grand Turk (7.18) Radar (TPQ-18)**	218 - 472
Bermuda (67.16) Radar (FPS-16)**	276 - 733
Bermuda (67.18) Radar (FPQ-6)**	250 - 795
Twin Falls Victory Ship (86.16) Radar (FPS-16)**	471 - 530 560 - 802 823 - 908

*MP - Measured Parameters in Direction Cosines and Slant Range

*PVA - Metric Position, Velocity and Acceleration Components (PACSS10)

**Measured Parameters in Azimuth Angle, Elevation Angle, and Slant Range (PACSS3a)

SECTION 4

ORBITAL TRAJECTORY ANALYSIS

4.1 ORBITAL TRAJECTORY

The S-IVB/CSM was inserted into orbit at 757.04 seconds. The nominal mission objective called for the vehicle to remain in a circular parking orbit for approximately two revolutions. During these two revolutions, vehicle subsystem checkout was to be carried out from the tracking stations and Mission Control Center at Houston. Prior to coming within tracking range of the Cape Kennedy area radars at the end of the second revolution, the S-IVB stage was to restart and inject the vehicle onto a conic typical of the translunar conics used for lunar landing missions. Reignition of the S-IVB was not successful. The spacecraft was separated from the launch vehicle by ground command. The physical separation of the S-IVB/CSM occurred at 11667.8 seconds.

The orbital insertion conditions deviated considerably from nominal because of anomalies that occurred during the powered portion of flight. The space-fixed velocity at insertion was 48.16 m/s (158.00 ft/s) greater than nominal and the flight path angle (elevation of space-fixed velocity vector from local horizontal) was 0.378 degree less than nominal. These deviations produced an orbit with an eccentricity 0.0138 greater than nominal. The resulting apogee of the orbit was 171.5 km (92.6 n mi) higher than nominal, and the perigee was 12.2 km (6.6 n mi) less than nominal.

The insertion conditions, as determined by the Orbital Correction Program (OCP), were obtained by a differential correction procedure which adjusted the estimated insertion conditions to fit the C-band radar tracking data in accordance with the weights assigned to the data. After all available C-band radar tracking data were analyzed, some stations and passes were eliminated completely from use in the determination of the insertion conditions. The orbital trajectory was obtained by integrating forward at the desired time intervals using the insertion vector as the initial conditions.

4.2 ORBITAL DATA SOURCES

4.2.1 Orbital Tracking

Orbital tracking was conducted by the NASA Space Tracking and Data Acquisition Network (STADAN). A summary of the C-band radar tracking data is given in Table 4-I. The Unified S-band (USB) and GLOTRAC Segment I data were received but were not used in the orbital solution. The USB data were not utilized for several reasons; there was an abundance of C-band tracking, the USB data arrived late, and lack of confidence in USB data conversion and application to the orbit solution. The GLOTRAC Segment I data covered the time interval from approximately 11600 seconds through S-IVB/CSM separation. These data were used to determine the validity of the orbit prior to separation.

4.2.2 Orbital Venting Acceleration Data

During the orbit, no major thrusting occurred; however, the orbit was continuously perturbed by low-level LH_2 venting thrust. To accurately model the orbit of the vehicle, this perturbation was taken into account. The venting model was derived from telemetered guidance velocity data from the ST-124M guidance platform. The guidance velocity data were fitted in segments by polynomials in time. These polynomials were analytically differentiated to obtain the acceleration components measured by the guidance platform. Table 4-II lists the acceleration polynomials derived by this method. Figure 4-1 reflects the best estimate of the total venting acceleration (RSS of components) after atmospheric effects and biases have been removed. The accelerometer biases as estimated in the OCP closely agree with the preflight laboratory measurements.

4.3 TRAJECTORY ANALYSIS

4.3.1 Orbital Insertion Conditions

The Orbital Correction Program (OCP) was used to solve for the insertion conditions utilizing C-band tracking data and the above mentioned vent model prior to S-IVB/CSM separation. The insertion conditions are given in Table 4-III. A family of values for the insertion parameters was obtained depending upon the combination of data used and the weights applied to the data. The solutions had a spread of ±500 m (±1640 ft) in position components and ±1.0 m/s (±3.3 ft/s) in velocity components referenced to the earth-fixed launch site coordinate system (PACSS10). The orbital insertion conditions determined independently from powered flight tracking lie within this band of solutions. The ground track of the first two revolutions is given in Figure 4-2. The orbital trajectory in PACSS1 is given in Tables B-VIII and B-IX.

4.3.2 Orbital Tracking Analysis

The stations used to obtain the initial orbital conditions, number of data points, and the Root-Mean-Square (RMS) errors of the residuals of each data type are shown in Table 4-IV. These RMS errors represent the difference between the actual radar observations and the calculated observations based on the orbital ephemeris defined by the initial conditions. The RMS residual errors include high frequency errors (assumed Gaussian), systematic errors due to instrumentation biases, mathematical model error, and errors in the correction for atmospheric refraction. The maximum RMS error of the radar residuals was 192 m (630 ft) in slant range, 0.08 degrees in elevation angle, and 0.08 degrees in azimuth angle. Design specifications indicate the expected high frequency errors of the measuring systems are 3 m (10 ft) in slant range and 0.005 degrees in angles for the TPQ-18 and FPQ-6 radars; 6 m (20 ft) in slant range and 0.01 degrees in angles for the FPS-16 radars.

Due to the extended powered flight, the vehicle was not in range of the Bermuda tracking station at insertion. Normally, Bermuda provides some low elevation angle data which can be used to help determine the orbital

4.3.2 (Continued)

insertion conditions. The absence of these data could have been very detrimental to the orbit evaluation had it not been for the presence of the Insertion Ship (Redstone) and the tracking data it provided at insertion and immediately subsequent. The Redstone data were used with a certain degree of skepticism since this was the first time ship data had been used and its accuracy was open to question. The data did fit very well when used in combination with other trackers and the resulting insertion conditions were in good agreement with those obtained from the powered flight. This indicates that data from the Insertion Ship can be very valuable, even for a nominal flight, and its availability and use is certainly highly desirable.

The region of S-IVB/CSM separation was covered by Merritt Island tracking data. The availability of this data helped to "tie-down" the separation conditions.

4.3.3 S-IVB/CSM Separation Conditions

The physical separation conditions are given in Table 4-V. These conditions were obtained by the integration of the insertion conditions to the separation time (11667.8 seconds). Final GLOTRAC Segment I data were received for the interval where the attempted S-IVB reignition occurred. Figure 4-3 shows the orbital trajectory comparison with GLOTRAC Segment I from 11600 seconds to separation. Although GLOTRAC was not used in the solution, these data aided in establishing the validity of the trajectory in this interval. The maximum deviations were about 270 m (886 ft) in the vertical component, 175 m (574 ft) in the cross range component, and 125 m (410 ft) in the down range component.

4.4 POST-SEPARATION STUDY

To verify the separation conditions from the orbital solution, additional solutions were made using the estimated separation conditions as initial trajectory parameters. C-band radar tracking from the third and fourth revolutions as well as post-separation venting polynomials were used to correct this point. The post-separation vent polynomials are shown in Table 4-VI. The tracking data utilized, RMS, and time of track are shown in Table 4-VII. Several solutions using different combinations of data and weights were made. The post-separation conditions obtained in this manner differed from the integrated separation conditions by a maximum of ±800 m (±2625 ft) in position components and ±1 m/s (±3.3 ft/s) in velocity components referenced to the earth-fixed launch site coordinate system (PACSS10).

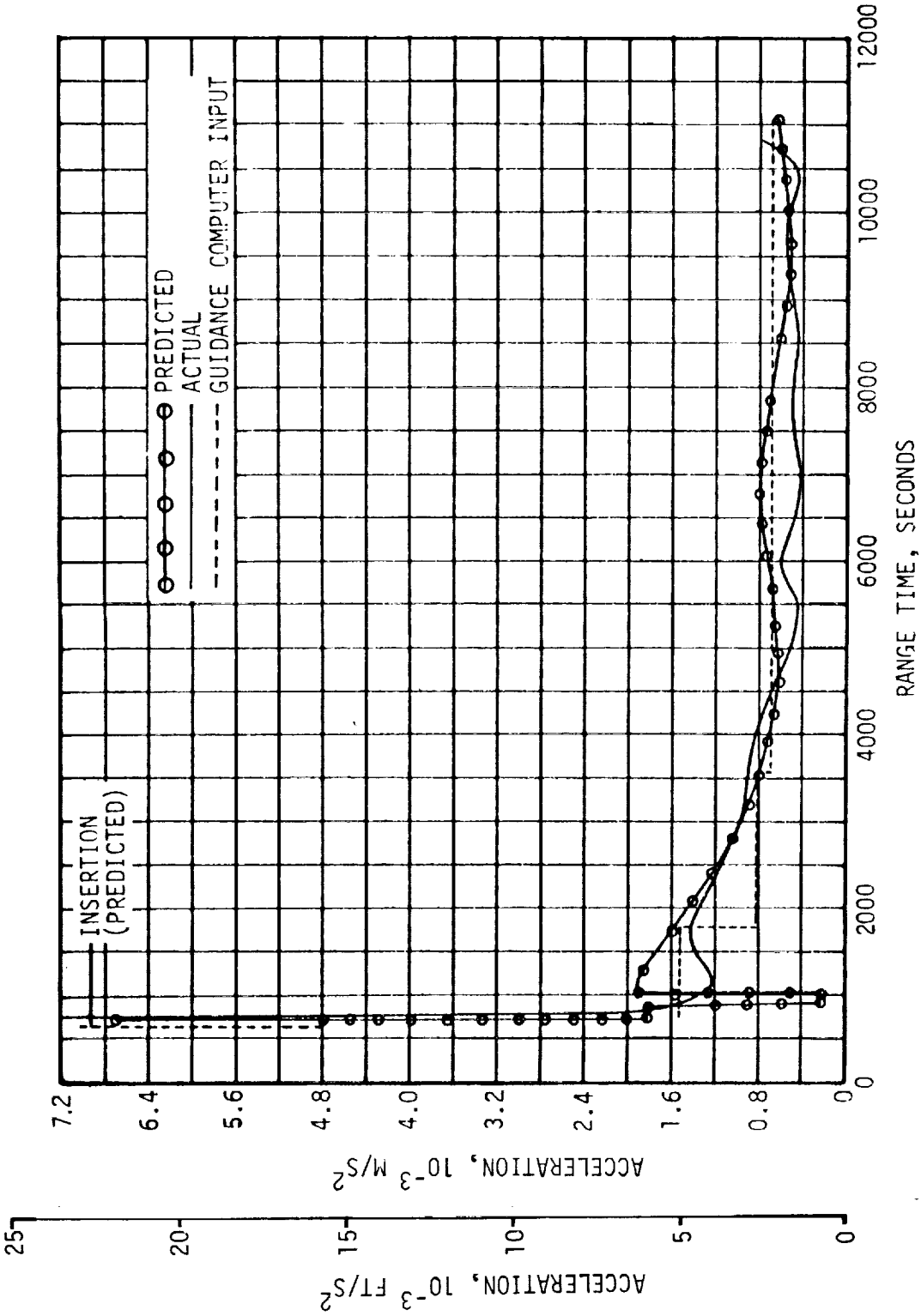

FIGURE 4-1. ORBITAL ACCELERATION DUE TO VENTING

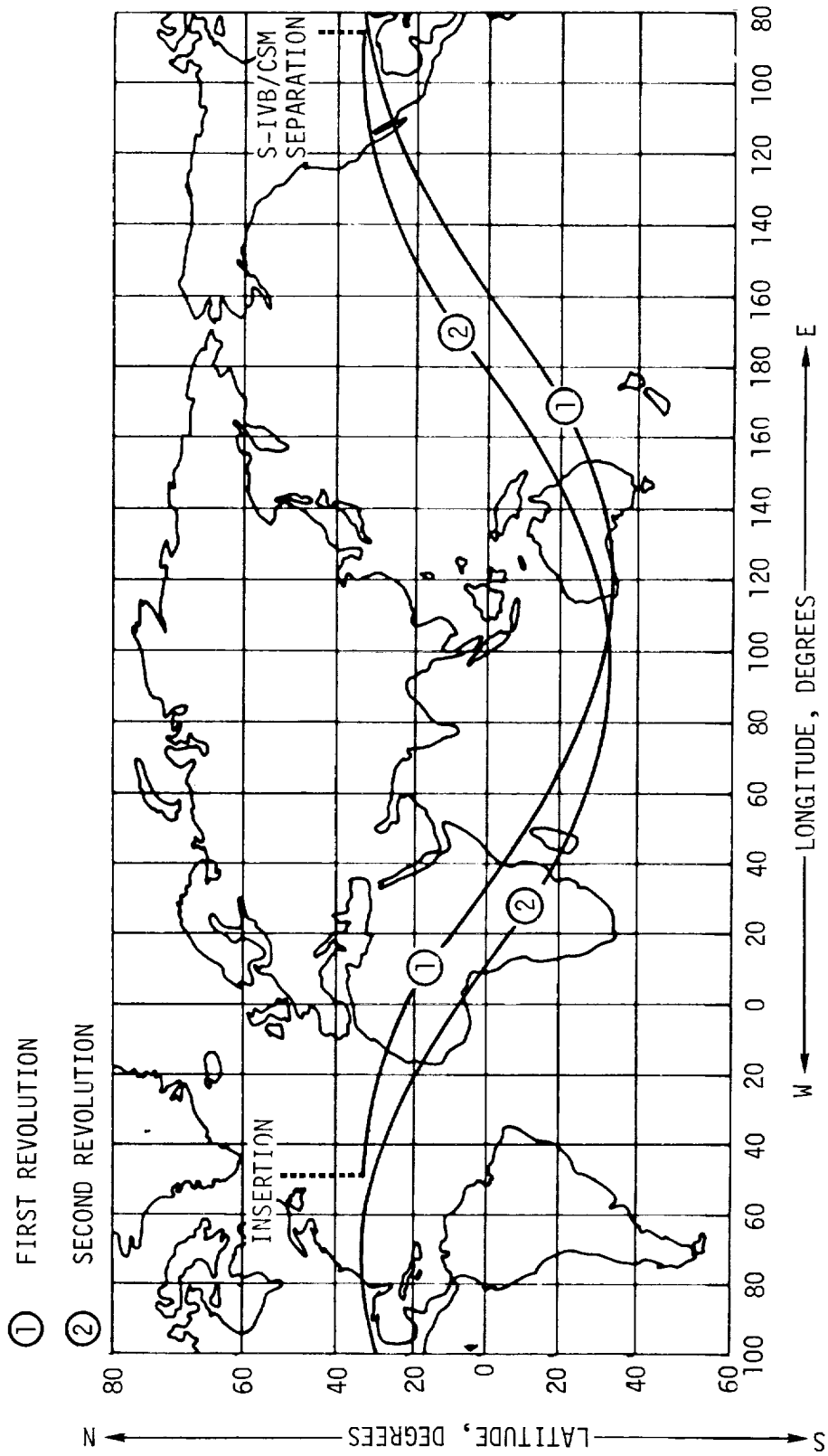

FIGURE 4-2. ORBITAL GROUND TRACK

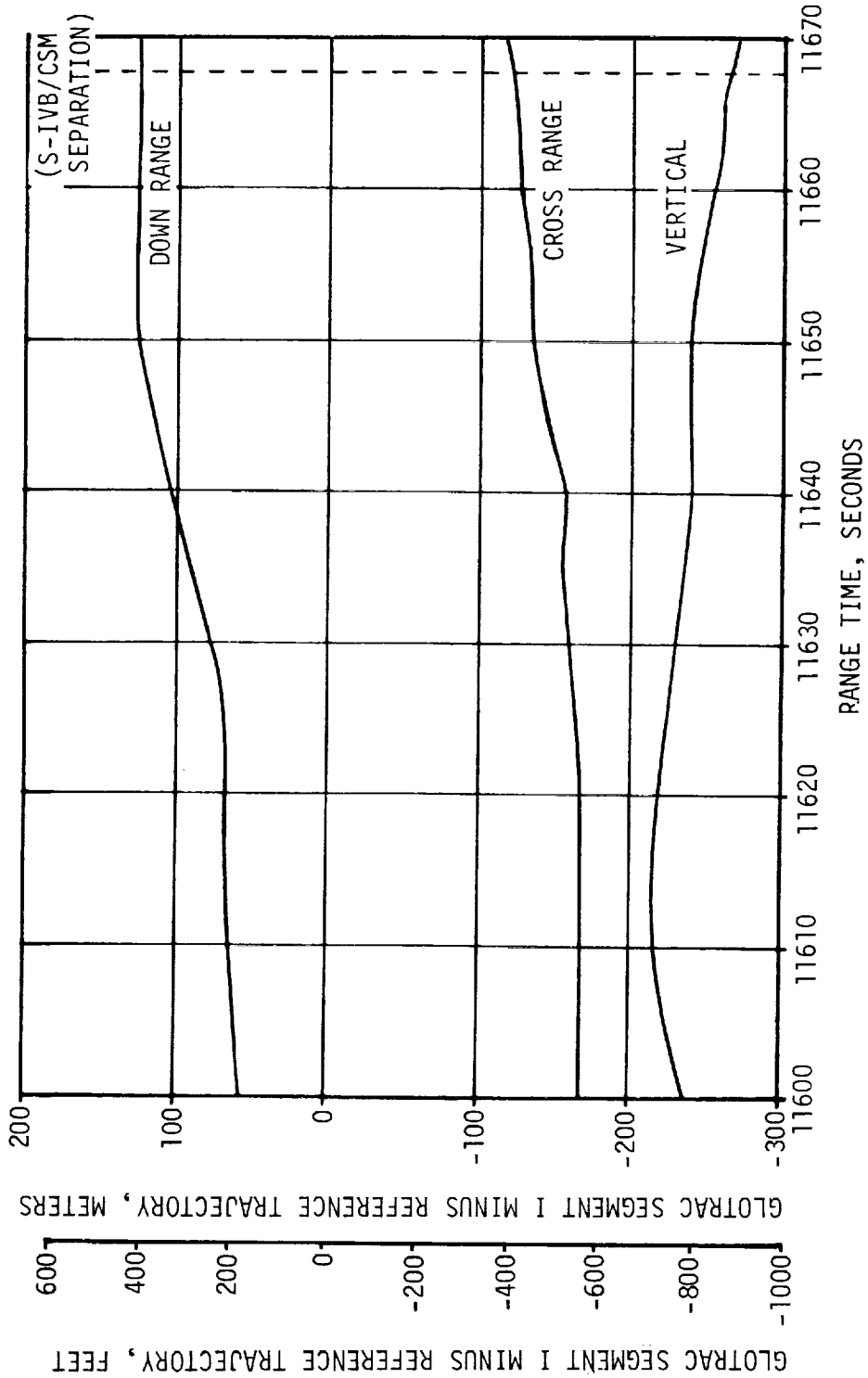

FIGURE 4-3. ORBITAL GLOTRAC SEGMENT I COMPARISON

TABLE 4-I. SUMMARY OF ORBITAL C-BAND TRACKING STATIONS

STATION	TYPE OF RADARS	REV 1	REV 2	REV 3	REV 4	REV 5	REV 6	REV 7
Insertion Ship	FPS-16M	X						
Tananarive	FPS-16M	X	X					
Carnarvon	FPQ-6	X	X	X	X			
Hawaii	FPS-16M		X	X	X	X	X	X
California	FPS-16M	X						
White Sands	FPS-16M	X	X	X	X			
Merritt Island	TPQ-18		X	X*				
Patrick	FPQ-6		X	X*				
Grand Bahama	TPQ-18		X		X			
Bermuda	FPS-16M		X	X				
Antiqua	FPQ-6			X*				
Canary Island	MPS-26	X						

*Tracked Spacecraft After S-IVB/CSM Separation.

TABLE 4-II. ORBITAL VENTING ACCELERATION POLYNOMIALS*

	VERTICAL	
T_b	774	5696
T_e	5696	11668
C_0	$.12975283 \times 10^{-5}$	$.21789019 \times 10^{-6}$
C_1	$-.73596634 \times 10^{-8}$	$-.1181665 \times 10^{-8}$
C_2	$.65101558 \times 10^{-11}$	$.67283844 \times 10^{-12}$
C_3	$-.20752632 \times 10^{-14}$	$-.12582362 \times 10^{-15}$
C_4	$.27002172 \times 10^{-18}$	$.15057460 \times 10^{-19}$
C_5	$-.11630025 \times 10^{-22}$	$-.14864903 \times 10^{-23}$
	DOWN RANGE	
T_b	774	5704
T_e	5704	11668
C_0	$.19396821 \times 10^{-5}$	$.50671047 \times 10^{-6}$
C_1	$-.23655601 \times 10^{-8}$	$.81435391 \times 10^{-9}$
C_2	$-.55480189 \times 10^{-12}$	$-.20298577 \times 10^{-11}$
C_3	$.89302896 \times 10^{-15}$	$.1086725 \times 10^{-14}$
C_4	$-.22811416 \times 10^{-18}$	$-.23059053 \times 10^{-18}$
C_5	$.17628627 \times 10^{-22}$	$.17597028 \times 10^{-22}$
	CROSS RANGE	
T_b	774	
T_e	11668	
C_0	$.25517679 \times 10^{-7}$	
C_1	$-.25843369 \times 10^{-11}$	
C_2	0	
C_3	0	
C_4	0	
C_5	0	

*Polynomials are of the form

$$a = C_0 + C_1 t + C_2 t^2 + C_3 t^3 + C_4 t^4 + C_5 t^5$$

where a is the vertical, down range, or cross range acceleration and $t = T - T_b$ and $T_b \leq T < T_e$.

TABLE 4-III. ORBITAL INSERTION CONDITIONS

PARAMETER	ACTUAL	NOMINAL	ACT-NOM
Range Time, sec	757.04	669.03	88.01
Space-Fixed Velocity, m/s	7842.10	7793.93	48.17
(ft/s)	(25728.67)	(25570.64)	(158.03)
Flight Path Angle, deg	-0.377	0.001	-0.378
Inclination, deg	32.567	32.561	0.006
Eccentricity	0.0141	0.0003	0.0138
Apogee*, km	360.10	188.56	171.54
(n mi)	(194.44)	(101.81)	(92.63)
Perigee*, km	173.15	185.32	-12.17
(n mi)	(93.49)	(100.06)	(-6.57)
Altitude, km	190.19	191.51	-1.32
(n mi)	(102.69)	(103.41)	(-0.72)
Period, min	89.84	88.23	1.61
Geodetic Latitude, deg N	32.730	32.653	0.077
Longitude, deg E	-49.388	-54.709	5.321

*Based on a spherical earth of radius 6378.165 km.

TABLE 4-IV. ORBITAL TRACKING UTILIZATION SUMMARY

STATION	TIME OF TRACK (SECONDS) BEGIN	END	DATA TYPE	VALID OBSER-VATIONS	RMS ERROR OF RESIDUALS
Insertion Ship (FPS-16M) Rev. 1	761	887	Azimuth Angle	21	0.081 deg
			Elevation Angle	21	0.082 deg
			Slant Range	20	14 m (46 ft)
Carnarvon (FPQ-6) Rev. 1	3245	3473	Azimuth Angle	36	0.012 deg
			Elevation Angle	36	0.022 deg
			Slant Range	34	90 m (295 ft)
White Sands (FPS-16M) Rev. 1	5639	5849	Azimuth Angle	31	0.031 deg
			Elevation Angle	31	0.033 deg
			Slant Range	31	192 m (630 ft)
Merritt Island (TPQ-18) Rev. 2	5957	6095	Azimuth Angle	24	0.027 deg
			Elevation Angle	24	0.039 deg
			Slant Range	24	123 m (404 ft)
Carnarvon (FPQ-6) Rev. 2	8957	9215	Azimuth Angle	35	0.008 deg
			Elevation Angle	35	0.015 deg
			Slant Range	35	71 m (232 ft)
Hawaii (FPS-16M) Rev. 2	10481	10787	Azimuth Angle	47	0.006 deg
			Elevation Angle	48	0.020 deg
			Slant Range	48	78 m (255 ft)
Merritt Island (TPQ-18) Rev. 3	11603	11663	Azimuth Angle	11	0.014 deg
			Elevation Angle	11	0.008 deg
			Slant Range	11	94 m (308 ft)

TABLE 4-V. S-IVB/CSM SEPARATION CONDITIONS

PARAMETER	VALUE
Range Time, sec	11667.8
Space-Fixed Velocity, m/s	7846.32
(ft/s)	(25742.52)
Flight Path Angle, deg	-0.281
Inclination, deg	32.567
Eccentricity	0.0153
Apogee*, km	388.72
(n mi)	(209.89)
Perigee*, km	184.83
(n mi)	(99.80)
Altitude, km	196.21
(n mi)	(105.94)
Period, min	90.25
Geodetic Latitude, deg N	32.161
Longitude, deg E	-85.117

*Based on a spherical earth of radius 6378.165 km.

TABLE 4-VI. POST-SEPARATION VENTING ACCELERATION POLYNOMIALS*

	VERTICAL			
T_b	11650	11830	12933	16933
T_e	11830	12933	16933	22033
C_0	$-.26757072 \times 10^{-4}$	$-.22390219 \times 10^{-5}$	$.11275411 \times 10^{-5}$	$-.34432129 \times 10^{-6}$
C_1	$.18722742 \times 10^{-5}$	$.38494089 \times 10^{-7}$	$-.22618237 \times 10^{-8}$	$-.32102019 \times 10^{-9}$
C_2	$-.38702244 \times 10^{-7}$	$-.18441705 \times 10^{-9}$	$.24066347 \times 10^{-11}$	$-.20034067 \times 10^{-12}$
C_3	$.3222850 \times 10^{-9}$	$.36332883 \times 10^{-12}$	$-.13145287 \times 10^{-14}$	$.40837735 \times 10^{-15}$
C_4	$-.11728275 \times 10^{-11}$	$-.31327228 \times 10^{-15}$	$.34659097 \times 10^{-18}$	$-.12416768 \times 10^{-18}$
C_5	$.15580836 \times 10^{-14}$	$.98152306 \times 10^{-19}$	$-.34361687 \times 10^{-22}$	$.10751893 \times 10^{-22}$

	DOWN RANGE			
T_b	11650	11830	14283	18133
T_e	11830	14283	18133	22033
C_0	$.27961639 \times 10^{-5}$	$-.74925528 \times 10^{-7}$	$-.83617421 \times 10^{-6}$	$-.33275601 \times 10^{-6}$
C_1	$-.11900297 \times 10^{-6}$	$.78933398 \times 10^{-9}$	$.11616876 \times 10^{-8}$	$-.41723948 \times 10^{-9}$
C_2	$-.33359453 \times 10^{-8}$	$.35905586 \times 10^{-11}$	$-.84163976 \times 10^{-12}$	$-.36769264 \times 10^{-12}$
C_3	$.67082284 \times 10^{-10}$	$-.11828818 \times 10^{-13}$	$-.18914001 \times 10^{-16}$	$.66497052 \times 10^{-15}$
C_4	$-.35653111 \times 10^{-12}$	$.81514574 \times 10^{-17}$	$.20034812 \times 10^{-18}$	$-.23507321 \times 10^{-18}$
C_5	$.5935485 \times 10^{-15}$	$-.16346446 \times 10^{-20}$	$-.4183741 \times 10^{-22}$	$.25639966 \times 10^{-22}$

	CROSS RANGE	
T_b	11650	11830
T_e	11830	22033
C_0	$.75452137 \times 10^{-5}$	$.61694552 \times 10^{-7}$
C_1	$-.30515045 \times 10^{-6}$	$-.13970701 \times 10^{-9}$
C_2	$.67817171 \times 10^{-8}$	$.81748221 \times 10^{-13}$
C_3	$-.8325674 \times 10^{-10}$	$-.18522613 \times 10^{-16}$
C_4	$.52559185 \times 10^{-12}$	$.18047252 \times 10^{-20}$
C_5	$-.12799897 \times 10^{-14}$	$-.63698976 \times 10^{-25}$

*Polynomials are of the form

$$a = C_0 + C_1 t + C_2 t^2 + C_3 t^3 + C_4 t^4 + C_5 t^5$$

where a is the vertical, down range, or cross range acceleration and $t = T - T_b$ and $T_b \leq T < T_e$.

TABLE 4-VII. POST-SEPARATION TRACKING UTILIZATION SUMMARY

STATION	TIME OF TRACK (SECONDS) BEGIN	END	DATA TYPE	VALID OBSER-VATIONS	RMS ERROR OF RESIDUALS
Carnarvon (FPQ-6) Rev. 3	14603	15041	Azimuth Angle	38	0.010 deg
			Elevation Angle	36	0.006 deg
			Slant Range	38	46 m (151 ft)
Hawaii (FPS-16M) Rev. 3	16169	16403	Azimuth Angle	35	0.006 deg
			Elevation Angle	32	0.006 deg
			Slant Range	40	47 m (154 ft)
White Sands (FPS-16M) Rev. 3	17009	17237	Azimuth Angle	16	0.012 deg
			Elevation Angle	19	0.013 deg
			Slant Range	21	103 m (338 ft)
Grand Bahama (TPQ-18) Rev. 4	17453	17627	Azimuth Angle	25	0.020 deg
			Elevation Angle	26	0.024 deg
			Slant Range	23	24 m (79 ft)
Carnarvon (FPQ-6) Rev. 4	20339	20651	Azimuth Angle	45	0.002 deg
			Elevation Angle	49	0.005 deg
			Slant Range	43	5 m (16 ft)
Hawaii (FPS-16M) Rev. 4	21989	22031	Azimuth Angle	8	0.008 deg
			Elevation Angle	7	0.009 deg
			Slant Range	8	43 m (141 ft)

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SECTION 5

FREE FLIGHT TRAJECTORIES

5.1 S-IC FREE FLIGHT TRAJECTORY

Postflight predictions of earth surface impact parameters for the spent S-IC stage were computed using a mass point trajectory simulation computer program. S-IC postflight burn out position and velocity data were combined with nominal main propulsion system decay performance and nominal retro-rocket performance to initialize the simulation program.

Three separate theoretical trajectories were computed for the spent S-IC stage. These three trajectories represent the following booster atmospheric entry conditions:

a. Zero degree angle-of-attack entry

b. Ninety degree angle-of-attack entry

c. Tumbling entry

The tumbling booster case is considered to define actual case impact conditions although no tracking coverage was available for confirmation. The S-IC spent stage trajectory was observed photographically and this coverage indicated the stage broke up at approximately 397 seconds. This information was not incorporated in the computed theoretical trajectories.

Results of the three computed S-IC spent stage trajectories are summarized in Table 5-1. Ground Track is shown in Figure 5-I. The S-IC stage trajectory is given in both metric and English units in Tables B-IX and B-X, respectively.

5.2 S-II FREE FLIGHT TRAJECTORY

Three separate theoretical trajectories, corresponding to the zero degree, ninety degree, and tumbling case trajectories computed for the S-IC stage, were computed for the spent S-II stage.

The computed results, assuming a tumbling stage, were considered to define stage impact conditions since no photographic coverage of the spent S-II stage was available.

Results of the three computed S-II spent stage trajectories are summarized in Table 5-II. Ground Track is shown in Figure 5-I. The S-II stage trajectory is given in both metric and English units in Tables B-XI and B-XII, respectively.

5.3 S-IVB FREE FLIGHT TRAJECTORY

The S-IVB stage, after failing to achieve second burn, remained in earth orbit until April 26, 1968. On that date the stage reentered the atmosphere between the east coast of Africa and the west coast of India.

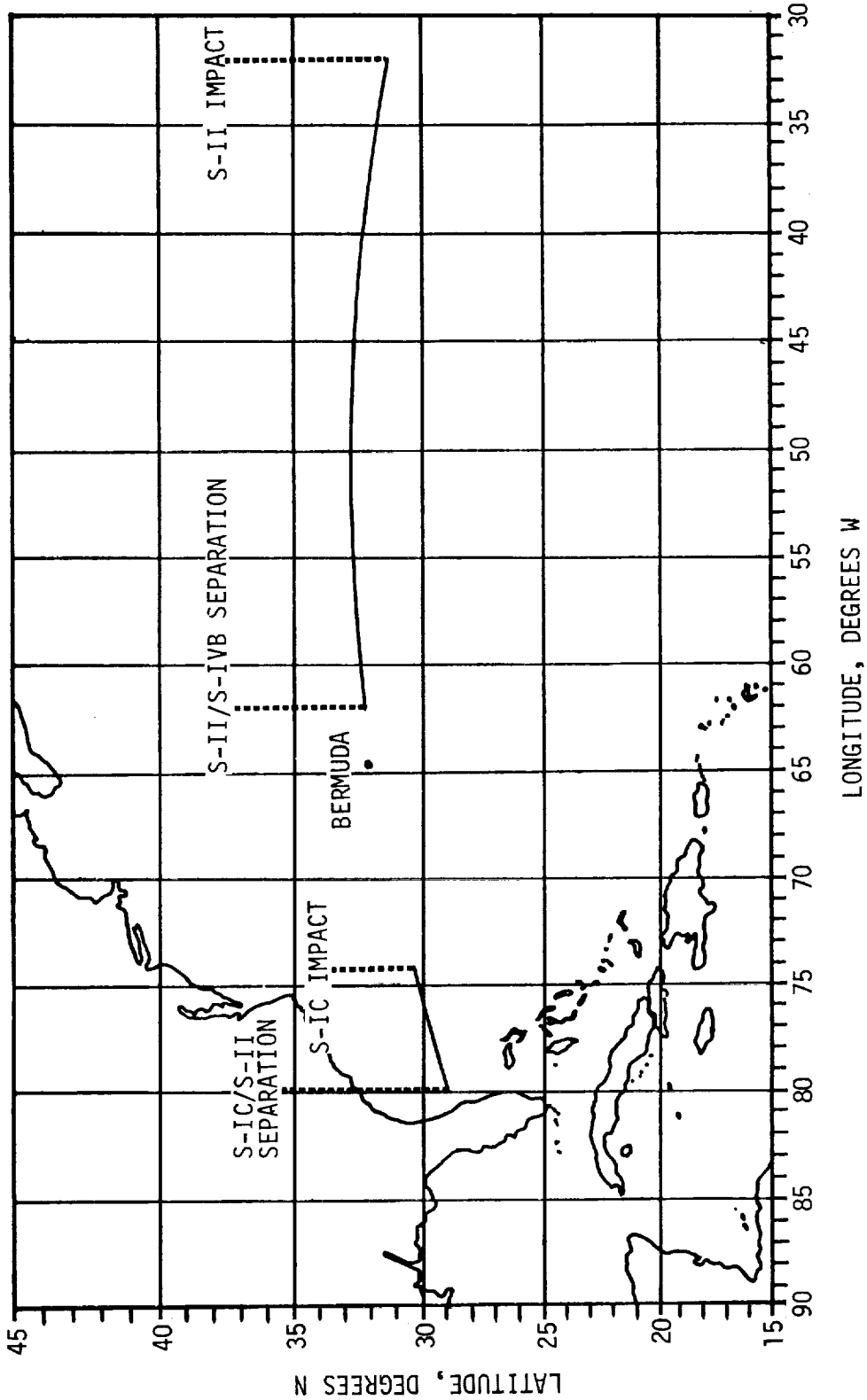

FIGURE 5-1. GROUND TRACKS FOR S-IC AND S-II SPENT STAGES

TABLE 5-I. S-IC THEORETICAL FREE FLIGHT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Impact Time, sec	528.93
	Impact Latitude, deg N	30.20
	Impact Longitude, deg E	-74.31
	Impact Range, km	635.39
	(n mi)	(343.08)
Impact: 0° Angle-of-Attack	Impact Time, sec	488.01
	Impact Latitude, deg N	30.23
	Impact Longitude, deg E	-74.20
	Impact Range, km	647.16
	(n mi)	(349.44)
Impact: 90° Angle-of-Attack	Impact Time, sec	561.55
	Impact Latitude, deg N	30.18
	Impact Longitude, deg E	-74.40
	Impact Range, km	626.62
	(n mi)	(338.35)
Apex: Tumbling Case	Range Time, sec	257.04
	Altitude, km	109.56
	(n mi)	(59.16)
	Surface Range, km	316.41
	(n mi)	(170.85)
Stage Breakup: Tumbling Case	Range Time, sec	397.
	Altitude, km	28.9
	(n mi)	(15.6)
	Surface Range, km	612.2
	(n mi)	(330.6)

TABLE 5-II. S-II THEORETICAL FREE FLIGHT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Impact Time, sec	1251.24
	Impact Latitude, deg N	31.21
	Impact Longitude, deg E	-32.18
	Impact Range, km	4648.42
	(n mi)	(2509.95)
Impact: 0° Angle-of-Attack	Impact Time, sec	1221.43
	Impact Latitude, deg N	31.17
	Impact Longitude, deg E	-31.97
	Impact Range, km	4669.36
	(n mi)	(2521.25)
Impact: 90° Angle-of-Attack	Impact Time, sec	1292.87
	Impact Latitude, deg N	31.24
	Impact Longitude, deg E	-32.40
	Impact Range, km	4626.93
	(n mi)	(2498.34)
Apex: Tumbling Case	Range Time, sec	655.39
	Altitude, km	202.61
	(n mi)	(109.40)
	Surface Range, km	2293.44
	(n mi)	(1238.36)

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APPENDIX A

DEFINITIONS OF TRAJECTORY SYMBOLS AND COORDINATE SYSTEMS

SYMBOL	DEFINITIONS
XE, YE, ZE DXE, DYE, DZE DDXE, DDYE, DDZE	Position, velocity and acceleration components of vehicle center of gravity in Earth-Fixed Launch Site Coordinate System. The origin of this system is at the intersection of Fischer Ellipsoid (1960) and the normal to it which passes through the launch site. The X axis coincides with the ellipsoid normal passing through the site, positive upward. The Z axis is parallel to the earth-fixed flight azimuth, defined at guidance reference release time, and is positive down range. The Y axis completes a right-handed system. This coordinate system is identical to Standard Coordinate System 10 of Project Apollo Coordinate System Standards, abbreviated as PACSS10.
XSP, YSP, ZSP DXSP, DYSP, DZSP DDXSP, DDYSP, DDZSP	Position, velocity and acceleration components of vehicle center of gravity in Geocentric Inertial Coordinate System. The origin of this system is at the center of earth. The X-Y plane is coincident with the equatorial plane. The X axis points through the Greenwich meridian at midnight or zero hour on the day of launch. The Z axis points north along the earth's axis of rotation (through the north pole). The Y axis completes a right-handed system. The direction of the coordinate axes remain fixed in space, and the origin moves with the center of earth. This coordinate system is related to Standard Coordinate System 4 of Project Apollo Coordinate System Standards, abbreviated as PACSS4. The PACSS4 is obtained from this coordinate system by a counter clockwise rotation around the Z axis through an angle determined by the mean sidereal time at midnight or zero hour on the day of launch.
GC DIST GC LAT GD LAT LONG	Position components of vehicle center of gravity in Geographic Polar Coordinate System. Position in this system is defined by the geocentric distance (GC DIST), geocentric latitude (GC LAT), geodetic latitude (GD LAT), and longitude (LONG). Geocentric distance is the distance from the geocenter to vehicle center of gravity. Geocentric latitude is the angle between the radius vector

APPENDIX A (CONTINUED)

SYMBOL	DEFINITIONS
	of the subvehicle point and the equatorial plane, positive north of the equatorial plane. Geodetic latitude is the angle between the normal to the Fischer Ellipsoid through the subvehicle point and the equatorial plane, positive north of the equatorial plane. Longitude is the angle between the projection of the radius vector into the equatorial plane and the Greenwich meridian, positive east of the Greenwich meridian. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
EF VEL VEL-AZ VEL-EL	Earth-fixed velocity of vehicle center of gravity in Geographic Polar Coordinate System. Velocity in this system is given in terms of azimuth (VEL-AZ), elevation (VEL-EL), and magnitude of the velocity vector (EF VEL). Azimuth is the angle between the projection of the velocity vector into the local horizontal plane and the north direction in this plane, positive east of north. Elevation is the angle between the velocity vector and the local horizontal plane, positive above the horizontal plane. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
SF VEL FLT-PATH HEAD	Space-fixed velocity of vehicle center of gravity in Geographic Polar Coordinate System. Velocity in this system is given in terms heading angle (HEAD), flight path angle (FLT-PATH), and magnitude of velocity vector (SF VEL). Heading angle is the angle between the projection of the velocity vector into the local horizontal plane and the north direction in this plane, positive east of north. Flight path angle is the angle between the velocity vector and the local horizontal plane, positive above the horizontal plane. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.

APPENDIX A (CONTINUED)

SYMBOL	DEFINITIONS
ALTITUDE	Perpendicular distance from vehicle center of gravity to Fischer Ellipsoid, positive above Fischer Ellipsoid.
LAT	Geodetic latitude of vehicle, positive north of the equatorial plane.
RANGE	Surface range measured along Fischer Ellipsoid from the launch site to the subvehicle point.
TIME	Range time, referenced to nearest integer second before IU umbilical disconnect.

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APPENDIX B

TIME HISTORY OF TRAJECTORY PARAMETERS

The postflight trajectory, from guidance reference release to S-IVB/CSM separation, is tabulated in both metric and English units in Tables B-I through B-XII.

Tables B-I and B-IV give the earth-fixed launch site position, velocity, and acceleration components for the ascent trajectory in metric and English units, respectively.

Tables B-II and B-V give the geocentric inertial position, velocity, and acceleration components for the ascent trajectory in metric and English units, respectively.

Tables B-III and B-VI give the geographic polar coordinates for the ascent trajectory in metric and English units, respectively.

Tables B-VII and B-VIII give the geographic polar coordinates for the orbital trajectory in metric and English units, respectively.

Tables B-IX and B-X give the trajectory parameters for the S-IC spent stage in metric and English units, respectively.

Tables B-XI and B-XII give the trajectory parameters for the S-II spent stage in metric and English units, respectively.

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
GUIDANCE REFERENCE RELEASE									
-16.845	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
FIRST MOTION									
0.380	60	0	0	0.0	0.0	-0.0	1.00	0.00	-0.00
IU UMBILICAL DISCONNECT									
0.690	60	0	0	0.4	-0.0	-0.0	1.63	-0.00	-0.01
1.0	60	0	0	1.0	-0.0	-0.0	2.63	-0.00	-0.01
2.0	63	0	0	3.7	0.0	-0.0	2.68	0.01	-0.02
3.0	67	0	0	6.4	0.0	-0.0	2.73	0.02	-0.04
4.0	76	0	0	9.1	0.0	-0.1	2.78	0.03	-0.08
5.0	85	0	0	11.9	0.1	-0.2	2.83	0.05	-0.10
6.0	100	0	0	14.8	0.1	-0.3	2.88	0.07	-0.07
7.0	115	0	-1	17.7	0.2	-0.4	2.93	0.09	-0.16
8.0	135	1	-1	20.7	0.3	-0.6	2.98	0.12	-0.25
9.0	155	1	-2	23.7	0.4	-0.9	3.04	0.13	-0.26
10.0	183	2	-3	26.8	0.6	-1.1	3.11	0.14	-0.23
11.0	210	2	-4	29.9	0.7	-1.3	3.18	0.14	-0.14
12.0	243	3	-6	33.1	0.9	-1.4	3.25	0.13	-0.04
13.0	276	4	-7	36.4	1.0	-1.4	3.32	0.11	0.06
14.0	316	5	-8	39.8	1.1	-1.3	3.40	0.07	0.09

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
15.0	356	6	-10	43.2	1.1	-1.2	3.48	-0.05	0.05
16.0	399	7	-11	46.5	1.0	-1.2	3.56	-0.19	0.09
17.0	448	8	-12	50.1	0.7	-1.0	3.63	-0.23	0.32
18.0	500	8	-13	53.8	0.5	-0.5	3.70	-0.24	0.57
19.0	555	9	-13	57.5	0.3	0.2	3.78	-0.25	0.76
20.0	615	9	-12	61.4	0.0	1.0	3.85	-0.25	0.90
21.0	678	9	-11	65.3	-0.2	1.9	3.93	-0.25	1.02
22.0	746	9	-8	69.3	-0.5	3.0	4.02	-0.23	1.09
23.0	817	8	-5	73.3	-0.7	4.1	4.11	-0.22	1.22
24.0	892	7	0	77.5	-0.9	5.5	4.19	-0.20	1.42
25.0	972	6	6	81.7	-1.1	7.0	4.28	-0.18	1.58
26.0	1056	5	14	86.0	-1.3	8.6	4.37	-0.17	1.66
27.0	1144	4	24	90.4	-1.5	10.3	4.43	-0.16	1.72
28.0	1237	2	35	94.9	-1.6	12.0	4.51	-0.15	1.78
29.0	1334	0	48	99.4	-1.8	13.9	4.59	-0.14	1.95
30.0	1436	-2	62	104.0	-1.9	15.9	4.67	-0.14	2.03
31.0	1543	-3	79	108.6	-2.0	18.0	4.76	-0.13	2.15
32.0	1654	-6	98	113.4	-2.2	20.2	4.84	-0.08	2.26
33.0	1770	-8	120	118.3	-2.2	22.5	4.91	-0.07	2.38
34.0	1891	-10	143	123.3	-2.2	24.9	4.98	-0.06	2.52
35.0	2017	-12	170	128.3	-2.3	27.5	5.05	-0.05	2.68
36.0	2148	-15	198	133.4	-2.3	30.3	5.12	-0.05	2.82
37.0	2284	-17	229	138.6	-2.3	33.2	5.20	-0.04	3.00
38.0	2425	-19	264	143.9	-2.4	36.3	5.27	-0.04	3.17
39.0	2572	-22	301	149.1	-2.4	39.6	5.34	-0.03	3.31
40.0	2724	-24	342	154.6	-2.4	43.1	5.42	-0.03	3.48
41.0	2882	-27	386	160.1	-2.5	46.8	5.49	-0.02	3.67
42.0	3044	-29	434	165.6	-2.5	50.6	5.56	-0.01	3.90
43.0	3213	-32	486	171.2	-2.5	54.6	5.63	-0.01	4.08
44.0	3387	-34	543	176.9	-2.5	58.8	5.71	-0.00	4.25
45.0	3567	-37	603	182.7	-2.5	63.1	5.78	0.00	4.44
46.0	3753	-39	668	188.5	-2.5	67.7	5.85	0.00	4.64
47.0	3945	-42	737	194.4	-2.4	72.5	5.92	0.01	4.81
48.0	4143	-44	812	200.4	-2.4	77.4	5.99	0.01	5.00
49.0	4346	-47	891	206.5	-2.4	82.5	6.05	0.02	5.19
50.0	4556	-49	976	212.6	-2.4	87.8	6.12	0.02	5.44
51.0	4772	-51	1066	218.8	-2.3	93.4	6.21	0.02	5.70
52.0	4994	-54	1162	225.1	-2.4	99.3	6.27	0.03	5.92
53.0	5223	-56	1264	231.4	-2.4	105.2	6.32	0.03	6.11
54.0	5458	-58	1372	237.8	-2.5	111.5	6.36	0.03	6.33
55.0	5699	-61	1486	244.1	-2.6	117.9	6.40	0.04	6.55
56.0	5947	-64	1607	250.6	-2.6	124.7	6.44	0.04	6.80
57.0	6201	-66	1734	257.1	-2.6	131.6	6.48	0.05	7.06

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
58.0	6461	-69	1869	263.6	-2.5	138.8	6.52	0.05	7.25
59.0	6729	-71	2011	270.1	-2.7	146.2	6.56	0.05	7.43
60.0	7002	-74	2160	276.6	-2.8	153.9	6.59	0.06	7.58
MACH 1									
60.500	7142	-76	2238	280.0	-2.8	157.7	6.61	0.06	7.68
61.0	7283	-77	2318	283.3	-2.8	161.6	6.63	0.06	7.79
62.0	7570	-80	2483	289.7	-2.7	169.6	6.68	0.07	8.00
63.0	7863	-82	2656	296.3	-2.6	177.7	6.74	0.07	8.23
64.0	8163	-85	2837	303.1	-2.5	186.1	6.79	0.08	8.46
65.0	8470	-87	3027	309.9	-2.4	194.7	6.84	0.08	8.69
66.0	8783	-90	3226	316.6	-2.3	203.5	6.89	0.08	8.89
67.0	9104	-92	3433	323.5	-2.1	212.4	6.96	0.09	9.17
68.0	9431	-94	3650	330.5	-2.1	221.8	7.05	0.09	9.40
69.0	9766	-96	3876	337.5	-2.0	231.2	7.12	0.09	9.63
70.0	10107	-98	4112	344.7	-1.9	241.2	7.17	0.10	9.81
71.0	10456	-100	4357	351.9	-1.8	251.2	7.23	0.10	10.02
72.0	10812	-102	4613	359.0	-1.7	261.3	7.28	0.11	10.28
73.0	11175	-103	4879	366.4	-1.6	272.0	7.30	0.12	10.63
74.0	11545	-105	5157	373.8	-1.4	282.9	7.33	0.12	11.02
75.0	11923	-106	5444	381.0	-1.3	294.1	7.36	0.13	11.43
MAXIMUM DYNAMIC PRESSURE									
75.200	12000	-106	5503	382.5	-1.2	296.4	7.36	0.13	11.51
76.0	12308	-107	5744	388.4	-1.2	305.8	7.38	0.14	11.80
77.0	12701	-109	6055	395.8	-1.1	317.8	7.39	0.14	12.20
78.0	13101	-109	6379	403.2	-0.9	330.4	7.39	0.15	12.56
79.0	13508	-110	6715	410.6	-0.7	343.2	7.39	0.16	12.92
80.0	13923	-111	7065	418.0	-0.5	356.3	7.38	0.17	13.31
81.0	14345	-111	7427	425.2	-0.5	369.8	7.37	0.18	13.74
82.0	14774	-112	7804	432.5	-0.3	383.8	7.35	0.19	14.14
83.0	15211	-112	8194	439.8	-0.1	398.2	7.30	0.20	14.59
84.0	15655	-112	8600	447.1	0.1	413.0	7.24	0.21	15.09
85.0	16106	-112	9020	454.3	0.4	428.3	7.17	0.22	15.61
86.0	16564	-111	9456	461.4	0.7	443.9	7.09	0.22	16.06
87.0	17030	-110	9907	468.4	0.9	459.9	7.01	0.23	16.46
88.0	17502	-109	10375	475.3	1.1	476.5	6.92	0.21	16.90
89.0	17981	-108	10860	482.3	1.1	493.5	6.86	0.05	17.24
90.0	18467	-107	11362	489.0	1.2	510.7	6.80	-0.05	17.70
91.0	18960	-106	11881	495.8	1.1	528.5	6.74	-0.09	18.11
92.0	19460	-105	12418	502.5	1.0	546.6	6.69	-0.11	18.51

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
93.0	19966	-104	12974	509.2	0.9	565.2	6.65	-0.12	18.88
94.0	20479	-103	13548	515.9	0.9	584.3	6.61	-0.13	19.23
95.0	20999	-102	14142	522.5	0.7	603.7	6.59	-0.12	19.55
96.0	21525	-102	14755	529.0	0.6	623.4	6.58	-0.11	19.89
97.0	22058	-101	15389	535.5	0.6	643.6	6.57	-0.09	20.19
98.0	22597	-100	16042	542.1	0.6	663.9	6.58	-0.07	20.52
99.0	23143	-100	16716	548.7	0.4	684.7	6.60	-0.06	20.82
100.0	23696	-100	17411	555.3	0.4	705.9	6.64	-0.04	21.11
101.0	24255	-99	18128	562.0	0.3	727.2	6.69	-0.03	21.42
102.0	24820	-99	18865	568.7	0.3	748.9	6.77	-0.02	21.74
103.0	25393	-99	19625	575.5	0.3	770.9	6.84	-0.01	22.05
104.0	25972	-98	20407	582.4	0.3	793.2	6.90	-0.00	22.37
105.0	26559	-98	21212	589.3	0.3	815.8	6.95	0.00	22.71
106.0	27152	-98	22039	596.3	0.3	838.8	6.99	0.00	23.03
107.0	27752	-97	22889	603.3	0.3	862.0	7.04	0.01	23.39
108.0	28359	-97	23763	610.4	0.3	885.7	7.08	0.01	23.76
109.0	28974	-97	24660	617.5	0.3	909.7	7.13	0.01	24.15
110.0	29595	-96	25582	624.7	0.3	934.1	7.14	0.02	24.54
111.0	30224	-96	26529	631.9	0.3	958.8	7.15	0.02	24.91
112.0	30860	-96	27500	638.9	0.3	983.9	7.14	0.02	25.31
113.0	31503	-95	28497	646.0	0.4	1009.5	7.13	0.02	25.70
114.0	32153	-95	29519	653.1	0.4	1035.4	7.11	0.01	26.18
115.0	32810	-95	30568	660.3	0.4	1061.9	7.09	-0.01	26.64
116.0	33474	-94	31643	667.3	0.4	1088.7	7.07	-0.03	27.11
117.0	34145	-94	32745	674.4	0.4	1116.0	7.05	-0.06	27.54
118.0	34824	-93	33875	681.4	0.3	1143.7	7.03	-0.07	27.97
119.0	35509	-93	35033	688.5	0.3	1171.9	7.02	-0.07	28.39
120.0	36201	-93	36219	695.5	0.2	1200.4	7.03	-0.07	28.82
121.0	36901	-93	37434	702.5	0.1	1229.3	7.03	-0.07	29.25
122.0	37607	-93	38678	709.5	0.0	1258.9	7.04	-0.07	29.70
123.0	38320	-93	39952	716.6	-0.1	1288.8	7.05	-0.07	30.13
124.0	39041	-93	41256	723.6	-0.1	1319.2	7.07	-0.07	30.60
125.0	39768	-93	42591	730.8	-0.2	1350.5	7.08	-0.07	31.06
126.0	40503	-93	43958	737.8	-0.3	1382.2	7.10	-0.07	31.56
127.0	41245	-94	45356	744.9	-0.4	1414.0	7.13	-0.07	32.11
128.0	41994	-94	46786	752.0	-0.5	1446.1	7.16	-0.08	32.66
129.0	42749	-95	48248	759.2	-0.5	1479.1	7.22	-0.08	33.20
130.0	43513	-95	49745	766.5	-0.6	1512.7	7.27	-0.09	33.68
131.0	44283	-96	51275	773.8	-0.7	1546.7	7.32	-0.10	34.20
132.0	45061	-97	52839	781.2	-0.8	1581.4	7.38	-0.12	34.75
133.0	45846	-97	54438	788.5	-0.9	1616.4	7.44	-0.13	35.40
134.0	46639	-98	56072	795.9	-1.0	1652.2	7.49	-0.14	36.01
135.0	47438	-100	57743	803.5	-1.2	1688.5	7.54	-0.15	36.57

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
136.0	48246	-101	59450	811.1	-1.3	1725.5	7.59	-0.16	37.31
137.0	49061	-102	61195	818.7	-1.5	1763.0	7.66	-0.17	37.96
138.0	49884	-104	62977	826.5	-1.6	1801.3	7.74	-0.18	38.57
139.0	50715	-106	64798	834.2	-1.8	1840.2	7.80	-0.19	39.26
140.0	51553	-107	66658	842.1	-2.1	1879.6	7.87	-0.20	39.96
141.0	52400	-110	68558	850.0	-2.3	1919.9	7.98	-0.21	40.65
142.0	53254	-112	70499	858.0	-2.5	1961.2	8.05	-0.21	41.34
143.0	54116	-115	72481	866.1	-2.7	2003.0	8.13	-0.21	42.04
144.0	54987	-117	74505	874.3	-2.9	2045.3	8.20	-0.21	42.73
S-IC INBOARD ENGINE CUTOFF									
144.720	55618	-119	75989	879.9	-3.1	2075.2	8.26	-0.21	43.23
145.0	55865	-120	76572	881.7	-3.1	2086.2	7.04	-0.20	38.82
146.0	56750	-124	78678	887.6	-3.3	2123.4	4.81	-0.20	34.47
147.0	57640	-127	80817	892.5	-3.5	2158.3	4.90	-0.19	35.13
148.0	58535	-131	82993	897.5	-3.8	2194.6	4.98	-0.10	35.80
S-IC OUTBOARD ENGINE CUTOFF									
148.410	58907	-132	83905	899.6	-3.8	2208.5	5.03	0.04	36.07
149.0	59442	-134	85214	897.6	-3.8	2222.0	-7.33	0.05	3.12
S-IC/S-II SEPARATION COMMAND									
149.080	59516	-135	85392	896.9	-3.8	2222.4	-9.91	0.05	-1.62
150.0	60342	-138	87435	889.5	-3.9	2224.0	-9.91	0.06	-1.05
152.0	62096	-146	91878	871.9	-3.7	2224.3	-8.34	0.08	2.28
154.0	63827	-153	96324	857.2	-3.5	2231.0	-6.71	0.11	6.29
156.0	65523	-160	100799	843.8	-3.3	2243.1	-6.41	0.13	6.78
158.0	67198	-166	105298	831.0	-3.0	2256.7	-6.33	0.15	6.95
160.0	68847	-172	109825	818.3	-2.7	2270.5	-6.30	0.16	7.02
162.0	70471	-177	114380	805.7	-2.4	2284.5	-6.26	0.16	7.10
164.0	72070	-182	118964	793.3	-2.1	2298.7	-6.24	0.16	7.13
166.0	73644	-186	123575	780.8	-1.9	2312.9	-6.21	0.17	7.14
168.0	75193	-189	128215	768.4	-1.5	2327.2	-6.20	0.17	7.17
170.0	76718	-192	132884	756.0	-1.2	2341.6	-6.18	0.17	7.19
172.0	78218	-194	137582	743.7	-0.9	2356.0	-6.17	0.17	7.19
174.0	79693	-195	142308	731.5	-0.6	2370.5	-6.14	0.17	7.26
176.0	81143	-196	147064	719.2	-0.3	2385.0	-6.12	0.18	7.30
178.0	82570	-197	151848	707.0	-0.0	2399.6	-6.09	0.18	7.34
180.0	83972	-196	156662	694.9	0.3	2414.4	-6.06	0.18	7.36
182.0	85349	-196	161506	682.8	0.6	2429.1	-6.04	0.18	7.46

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
184.0	86703	-194	166379	670.7	1.0	2444.1	-6.01	0.19	7.48
186.0	88032	-192	171282	658.8	1.3	2459.1	-5.99	0.19	7.55
188.0	89338	-189	176215	646.9	1.7	2474.2	-5.96	0.19	7.57
190.0	90620	-185	181179	635.0	2.0	2489.3	-5.93	0.19	7.61
192.0	91878	-181	186172	623.2	2.3	2504.4	-5.88	0.19	7.62
194.0	93112	-176	191197	611.5	2.7	2519.6	-5.77	0.20	7.57
196.0	94323	-170	196251	600.2	3.2	2534.8	-5.57	0.23	7.50
198.0	95512	-163	201336	589.2	3.6	2549.7	-5.24	0.24	7.40
200.0	96679	-155	206450	579.1	4.1	2564.4	-4.95	0.25	7.34
202.0	97826	-147	211594	569.1	4.6	2579.1	-4.71	0.25	7.23
204.0	98955	-137	216767	559.8	5.1	2593.5	-4.55	0.26	7.19
206.0	100066	-126	221968	550.6	5.6	2607.9	-4.49	0.26	7.21
208.0	101158	-114	227198	541.6	6.1	2622.3	-4.49	0.26	7.21
210.0	102232	-102	232458	532.5	6.6	2636.8	-4.50	0.26	7.25
212.0	103288	-88	237746	523.4	7.2	2651.3	-4.53	0.27	7.31
214.0	104326	-73	243063	514.4	7.7	2666.0	-4.55	0.27	7.37
216.0	105346	-57	248409	505.2	8.2	2680.8	-4.57	0.28	7.43
218.0	106347	-40	253786	496.1	8.8	2695.7	-4.60	0.28	7.49
220.0	107331	-22	259192	486.9	9.4	2710.7	-4.62	0.29	7.55
222.0	108295	-3	264629	477.6	10.0	2725.8	-4.65	0.29	7.60
224.0	109241	18	270096	468.2	10.5	2741.1	-4.67	0.30	7.66
226.0	110168	40	275593	458.9	11.1	2756.4	-4.68	0.30	7.71
228.0	111077	62	281122	449.5	11.7	2771.9	-4.70	0.30	7.74
230.0	111966	86	286681	440.0	12.3	2787.5	-4.72	0.31	7.80
232.0	112837	112	292272	430.6	12.9	2803.1	-4.73	0.31	7.85
234.0	113689	138	297894	421.1	13.6	2818.9	-4.74	0.31	7.89
236.0	114521	166	303547	411.5	14.2	2834.7	-4.75	0.31	7.92
238.0	115335	195	309233	402.0	14.9	2850.7	-4.76	0.32	7.97
240.0	116130	225	314950	392.5	15.5	2866.8	-4.77	0.32	8.03
242.0	116905	257	320700	382.9	16.1	2882.9	-4.77	0.32	8.08
244.0	117662	290	326482	373.4	16.8	2899.1	-4.78	0.32	8.13
246.0	118399	324	332296	363.8	17.4	2915.5	-4.79	0.33	8.18
248.0	119117	360	338144	354.2	18.1	2931.9	-4.79	0.33	8.22
250.0	119816	396	344024	344.6	18.7	2948.4	-4.80	0.33	8.27
252.0	120496	434	349937	335.1	19.4	2965.0	-4.81	0.34	8.33
254.0	121157	474	355884	325.5	20.0	2981.7	-4.81	0.34	8.37
256.0	121798	514	361865	315.9	20.7	2998.5	-4.82	0.34	8.43
258.0	122420	556	367878	306.2	21.4	3015.5	-4.82	0.34	8.49
260.0	123023	600	373926	296.6	22.1	3032.5	-4.83	0.34	8.55
262.0	123607	645	380009	287.0	22.8	3049.7	-4.84	0.35	8.59
264.0	124171	691	386125	277.3	23.5	3066.9	-4.85	0.35	8.64
266.0	124716	739	392276	267.6	24.2	3084.2	-4.86	0.35	8.70
268.0	125242	788	398462	257.8	24.9	3101.6	-4.87	0.35	8.77

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
270.0	125748	838	404683	248.1	25.6	3119.1	-4.89	0.36	8.83
272.0	126234	890	410939	238.3	26.2	3136.8	-4.90	0.36	8.88
274.0	126701	943	417230	228.5	27.0	3154.6	-4.91	0.36	8.94
276.0	127148	998	423557	218.6	27.7	3172.5	-4.92	0.37	8.98
278.0	127576	1054	429921	208.8	28.4	3190.5	-4.94	0.37	9.03
280.0	127984	1111	436320	198.9	29.2	3208.7	-4.95	0.37	9.10
282.0	128372	1171	442755	189.0	29.9	3226.9	-4.96	0.37	9.17
284.0	128740	1231	449227	179.0	30.7	3245.2	-4.98	0.38	9.23
286.0	129098	1293	455736	169.1	31.4	3263.6	-4.99	0.38	9.29
288.0	129416	1357	462282	159.1	32.1	3282.2	-5.01	0.38	9.34
290.0	129725	1422	468865	149.0	32.9	3300.9	-5.02	0.39	9.39
292.0	130013	1488	475486	139.0	33.7	3319.8	-5.03	0.39	9.45
294.0	130281	1557	482144	128.9	34.5	3338.7	-5.05	0.39	9.51
296.0	130528	1626	488841	118.8	35.3	3357.7	-5.06	0.40	9.56
298.0	130756	1698	495575	108.6	36.1	3376.9	-5.08	0.40	9.62
300.0	130963	1771	502348	98.4	36.9	3396.2	-5.09	0.40	9.67
302.0	131150	1845	509160	88.2	37.7	3415.6	-5.11	0.41	9.72
304.0	131316	1921	516011	78.0	38.5	3435.0	-5.12	0.41	9.79
306.0	131462	1999	522900	67.7	39.3	3454.7	-5.13	0.41	9.86
308.0	131587	2078	529830	57.4	40.2	3474.5	-5.15	0.41	9.93
310.0	131691	2160	536799	47.1	41.0	3494.4	-5.16	0.42	10.00
312.0	131775	2242	543807	36.8	41.8	3514.4	-5.18	0.42	10.06
314.0	131839	2327	550856	26.3	42.7	3534.6	-5.19	0.43	10.12
316.0	131881	2413	557946	16.0	43.5	3554.9	-5.21	0.43	10.17
318.0	131903	2501	565076	5.5	44.3	3575.3	-5.23	0.43	10.22
320.0	131903	2590	572247	-5.0	45.2	3595.8	-5.25	0.44	10.28
322.0	131883	2682	579460	-15.5	46.0	3616.4	-5.27	0.44	10.34
324.0	131841	2775	586713	-26.1	46.9	3637.1	-5.29	0.44	10.40
326.0	131779	2869	594008	-36.7	47.8	3657.9	-5.31	0.45	10.47
328.0	131695	2966	601345	-47.3	48.7	3678.9	-5.33	0.45	10.54
330.0	131590	3064	608724	-58.0	49.6	3700.0	-5.35	0.45	10.61
332.0	131463	3164	616146	-68.7	50.5	3721.3	-5.37	0.46	10.67
334.0	131315	3266	623610	-79.5	51.4	3742.7	-5.39	0.46	10.74
336.0	131145	3369	631117	-90.3	52.3	3764.2	-5.42	0.46	10.81
338.0	130954	3475	638667	-101.2	53.2	3786.0	-5.43	0.46	10.88
340.0	130740	3582	646261	-112.1	54.2	3807.9	-5.45	0.47	10.95
342.0	130506	3692	653899	-123.0	55.1	3829.8	-5.47	0.47	11.03
344.0	130249	3803	661580	-134.0	56.0	3852.0	-5.49	0.48	11.10
346.0	129970	3916	669307	-145.0	57.0	3874.3	-5.52	0.48	11.17
348.0	129669	4031	677078	-156.1	57.9	3896.7	-5.54	0.48	11.25
350.0	129346	4147	684894	-167.2	58.9	3919.3	-5.56	0.49	11.32
352.0	129000	4266	692755	-178.3	59.8	3942.0	-5.58	0.49	11.41
354.0	128633	4387	700662	-189.5	60.8	3964.9	-5.60	0.49	11.50

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
356.0	128243	4509	708615	-200.7	61.8	3988.1	-5.62	0.50	11.58
358.0	127830	4634	716614	-212.0	62.7	4011.3	-5.65	0.50	11.65
360.0	127395	4760	724660	-223.3	63.7	4034.7	-5.67	0.50	11.73
362.0	126937	4889	732753	-234.7	64.7	4058.2	-5.70	0.51	11.81
364.0	126456	5019	740893	-246.1	65.7	4081.9	-5.73	0.51	11.88
366.0	125953	5151	749081	-257.6	66.7	4105.8	-5.75	0.51	11.97
368.0	125426	5286	757317	-269.2	67.7	4129.8	-5.78	0.52	12.06
370.0	124876	5422	765601	-280.8	68.7	4154.1	-5.81	0.52	12.15
372.0	124303	5560	773933	-292.5	69.7	4178.5	-5.84	0.52	12.24
374.0	123706	5701	782315	-304.2	70.7	4203.0	-5.87	0.53	12.34
376.0	123086	5843	790746	-315.9	71.8	4227.8	-5.91	0.53	12.43
378.0	122443	5988	799227	-327.8	72.8	4252.8	-5.94	0.53	12.52
380.0	121775	6134	807757	-339.8	73.9	4277.9	-5.97	0.54	12.61
382.0	121084	6283	816339	-351.8	74.9	4303.2	-6.01	0.54	12.71
384.0	120368	6434	824971	-363.8	76.0	4328.8	-6.04	0.54	12.81
386.0	119629	6587	833654	-376.0	77.1	4354.4	-6.07	0.55	12.89
388.0	118865	6743	842389	-388.1	78.2	4380.3	-6.11	0.55	12.99
390.0	118076	6900	851176	-400.4	79.3	4406.5	-6.14	0.56	13.09
392.0	117263	7060	860015	-412.7	80.4	4432.8	-6.18	0.56	13.18
394.0	116426	7222	868907	-425.1	81.5	4459.3	-6.21	0.56	13.28
396.0	115563	7386	877853	-437.5	82.6	4485.9	-6.25	0.57	13.37
398.0	114675	7552	886851	-450.1	83.8	4512.7	-6.28	0.57	13.49
400.0	113763	7721	895904	-462.7	85.0	4539.8	-6.32	0.57	13.60
402.0	112825	7892	905011	-475.4	86.1	4567.2	-6.35	0.57	13.69
404.0	111861	8065	914173	-488.1	87.3	4594.6	-6.39	0.58	13.79
406.0	110872	8241	923390	-500.9	88.4	4622.4	-6.43	0.58	13.89
408.0	109858	8419	932663	-513.8	89.6	4650.3	-6.47	0.58	14.00
410.0	108818	8599	941992	-526.8	90.8	4678.4	-6.51	0.59	14.12
412.0	107750	8782	951376	-539.9	91.9	4706.5	-6.55	0.59	13.79
S-II STAGE ENGINE NO.2 OUT									
412.920	107250	8867	955712	-545.8	92.3	4719.0	-6.56	0.59	10.69
414.0	106656	8967	960815	-552.8	92.7	4731.0	-6.53	0.59	9.26
416.0	105537	9153	970296	-565.2	93.2	4748.7	-5.91	0.59	7.77
418.0	104395	9340	979808	-576.3	93.8	4764.0	-5.16	0.59	7.51
420.0	103232	9528	989351	-586.0	94.4	4779.0	-4.47	0.59	7.39
422.0	102050	9717	998924	-594.9	95.3	4793.7	-4.36	0.59	7.37
424.0	100852	9909	1008526	-603.6	96.4	4808.5	-4.37	0.59	7.40
426.0	99636	10103	1018158	-612.7	97.9	4823.5	-4.67	0.59	7.56
428.0	98402	10301	1027820	-622.3	99.5	4838.8	-4.94	0.58	7.74
430.0	97147	10501	1037514	-632.6	101.1	4854.5	-5.26	0.58	7.90
432.0	95872	10705	1047239	-643.3	102.6	4870.4	-5.52	0.57	8.03

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
434.0	94574	10911	1056996	-654.5	103.8	4886.6	-5.71	0.57	8.14
436.0	93254	11120	1066785	-666.1	104.6	4902.9	-5.91	0.56	8.23
438.0	91910	11330	1076607	-678.2	105.4	4919.4	-6.15	0.56	8.33
440.0	90542	11542	1086463	-690.8	106.3	4936.1	-6.34	0.55	8.43
442.0	89147	11755	1096352	-703.8	107.2	4953.1	-6.51	0.54	8.52
444.0	87727	11970	1106276	-717.2	108.3	4970.3	-6.67	0.54	8.58
446.0	86279	12188	1116233	-730.7	109.5	4987.4	-6.83	0.53	8.64
448.0	84805	12408	1126226	-744.5	110.7	5004.7	-6.94	0.53	8.69
450.0	83302	12631	1136252	-758.4	111.9	5022.1	-7.03	0.53	8.74
452.0	81771	12856	1146314	-772.6	113.1	5039.6	-7.10	0.52	8.79
454.0	80212	13083	1156411	-786.8	114.1	5057.2	-7.18	0.52	8.84
456.0	78624	13312	1166543	-801.3	114.9	5074.9	-7.25	0.52	8.90
458.0	77007	13543	1176711	-815.8	115.7	5092.7	-7.29	0.51	8.94
460.0	75361	13775	1186914	-830.4	116.6	5110.6	-7.33	0.51	8.98
462.0	73686	14009	1197153	-845.1	117.5	5128.6	-7.36	0.51	9.02
464.0	71981	14245	1207428	-859.9	118.5	5146.7	-7.39	0.51	9.06
466.0	70246	14483	1217740	-874.7	119.6	5164.9	-7.41	0.51	9.11
468.0	68482	14723	1228088	-889.5	120.7	5183.1	-7.41	0.50	9.16
470.0	66688	14966	1238472	-904.3	121.8	5201.4	-7.42	0.50	9.20
472.0	64865	15210	1248893	-919.2	122.9	5219.8	-7.42	0.50	9.23
474.0	63012	15457	1259351	-934.0	123.9	5238.3	-7.42	0.50	9.27
476.0	61129	15706	1269847	-948.8	124.8	5256.8	-7.42	0.49	9.31
478.0	59216	15956	1280379	-963.7	125.7	5275.5	-7.42	0.49	9.36
480.0	57274	16208	1290948	-978.5	126.6	5294.2	-7.41	0.49	9.41
482.0	55302	16462	1301556	-993.3	127.6	5313.0	-7.40	0.49	9.43
484.0	53300	16719	1312201	-1008.1	128.6	5331.9	-7.39	0.48	9.43
486.0	51269	16977	1322883	-1022.9	129.7	5350.7	-7.38	0.48	9.39
488.0	49209	17238	1333603	-1037.6	130.8	5369.4	-7.36	0.48	9.33
490.0	47119	17500	1344361	-1052.3	131.8	5387.9	-7.35	0.48	9.27
492.0	44999	17765	1355155	-1067.0	132.7	5406.2	-7.34	0.48	9.08
494.0	42851	18031	1365985	-1081.7	133.6	5424.2	-7.32	0.48	8.90
496.0	40672	18299	1376852	-1096.3	134.4	5441.9	-7.30	0.48	8.75
498.0	38465	18569	1387753	-1110.9	135.3	5459.2	-7.28	0.48	8.59
500.0	36229	18840	1398688	-1125.4	136.1	5476.3	-7.24	0.48	8.49
502.0	33963	19113	1409658	-1139.8	137.1	5493.2	-7.20	0.47	8.41
504.0	31669	19389	1420661	-1154.2	138.1	5509.9	-7.12	0.47	8.36
506.0	29347	19666	1431698	-1168.3	139.1	5526.6	-7.05	0.47	8.33
508.0	26996	19945	1442767	-1182.3	140.1	5543.2	-6.97	0.47	8.29
510.0	24617	20226	1453870	-1196.2	141.1	5559.9	-6.89	0.47	8.27
512.0	22211	20509	1465007	-1209.8	142.0	5576.4	-6.80	0.47	8.24
514.0	19778	20794	1476176	-1223.3	142.9	5592.9	-6.62	0.47	8.21
516.0	17318	21081	1487378	-1236.3	143.8	5609.4	-6.32	0.47	8.19
518.0	14832	21369	1498613	-1248.7	144.7	5625.5	-6.07	0.47	8.20

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
520.0	12322	21660	1509880	-1260.0	145.6	5641.6	-5.87	0.47	8.20
522.0	9791	21952	1521180	-1272.1	146.5	5658.0	-5.86	0.47	8.21
524.0	7235	22246	1532512	-1283.7	147.5	5674.4	-5.86	0.47	8.20
526.0	4656	22542	1543877	-1295.5	148.4	5691.0	-5.85	0.47	8.22
528.0	2053	22839	1555276	-1307.2	149.3	5707.6	-5.85	0.47	8.25
530.0	-573	23139	1566708	-1318.9	150.2	5724.2	-5.84	0.47	8.28
532.0	-3223	23440	1578173	-1330.6	151.1	5740.7	-5.83	0.47	8.28
534.0	-5895	23743	1589671	-1342.2	152.1	5757.3	-5.83	0.47	8.29
536.0	-8591	24048	1601202	-1353.9	153.0	5773.9	-5.82	0.47	8.31
538.0	-11311	24355	1612767	-1365.6	154.0	5790.6	-5.82	0.47	8.34
540.0	-14054	24665	1624364	-1377.3	155.0	5807.3	-5.81	0.47	8.38
542.0	-16820	24975	1635996	-1388.9	155.9	5824.2	-5.80	0.47	8.41
544.0	-19609	25288	1647661	-1400.6	156.8	5841.0	-5.80	0.46	8.44
546.0	-22422	25603	1659360	-1412.1	157.8	5858.0	-5.79	0.46	8.47
548.0	-25258	25919	1671093	-1423.7	158.7	5874.9	-5.79	0.47	8.51
550.0	-28117	26238	1682860	-1435.3	159.6	5892.0	-5.78	0.47	8.53
552.0	-30999	26558	1694661	-1446.8	160.5	5909.1	-5.77	0.47	8.56
554.0	-33904	26880	1706497	-1458.4	161.5	5926.2	-5.77	0.48	8.59
556.0	-36832	27204	1718366	-1469.9	162.5	5943.4	-5.76	0.49	8.63
558.0	-39784	27530	1730270	-1481.4	163.5	5960.7	-5.76	0.49	8.66
560.0	-42758	27858	1742209	-1492.9	164.5	5978.1	-5.75	0.49	8.67
562.0	-45755	28188	1754183	-1504.3	165.5	5995.5	-5.75	0.49	8.69
564.0	-48775	28520	1766191	-1515.8	166.5	6012.8	-5.74	0.49	8.69
566.0	-51818	28854	1778234	-1527.2	167.4	6030.3	-5.74	0.49	8.68
568.0	-54884	29189	1790312	-1538.6	168.4	6047.6	-5.73	0.49	8.66
570.0	-57972	29527	1802425	-1550.1	169.4	6064.9	-5.73	0.49	8.65
572.0	-61084	29867	1814572	-1561.5	170.4	6082.2	-5.73	0.49	8.63
574.0	-64218	30209	1826754	-1572.9	171.4	6099.4	-5.72	0.47	8.62
576.0	-67375	30553	1838970	-1584.5	172.3	6116.0	-5.72	0.45	8.61
S-II ENGINE CUTOFF									
576.330	-67830	30611	1840691	-1586.3	172.5	6117.8	-5.72	0.45	8.61
S-II/S-IVB SEPARATION COMMAND									
577.080	-69091	30739	1845580	-1592.0	172.8	6119.4	-7.86	0.45	0.30
578.0	-70556	30898	1851223	-1599.3	173.2	6117.8	-8.02	0.44	-2.09
580.0	-73772	31246	1863449	-1615.4	174.1	6113.4	-8.02	0.44	-2.10
582.0	-77018	31595	1875676	-1631.0	175.0	6111.7	-7.56	0.44	1.02
584.0	-80295	31946	1887901	-1646.2	175.8	6115.2	-7.63	0.44	2.97
586.0	-83603	32298	1900138	-1662.0	176.5	6121.2	-7.78	0.44	3.45
588.0	-86943	32652	1912387	-1678.1	177.5	6128.1	-7.96	0.69	3.69

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
590.0	-90315	33008	1924651	-1694.3	178.9	6135.6	-8.17	0.75	3.80
592.0	-93720	33368	1936930	-1710.9	180.5	6143.3	-8.42	0.75	3.84
594.0	-97159	33730	1949225	-1728.0	182.0	6151.0	-8.66	0.76	3.86
596.0	-100632	34096	1961535	-1745.5	183.5	6158.7	-8.85	0.76	3.88
598.0	-104141	34464	1973860	-1763.4	185.0	6166.5	-9.05	0.77	3.86
600.0	-107686	34836	1986201	-1781.8	186.6	6174.0	-9.27	0.77	3.82
602.0	-111268	35211	1998557	-1800.6	188.1	6181.6	-9.51	0.77	3.78
604.0	-114889	35589	2010928	-1819.8	189.7	6189.1	-9.71	0.78	3.74
606.0	-118548	35969	2023313	-1839.5	191.2	6196.5	-9.93	0.78	3.69
608.0	-122247	36353	2035714	-1859.5	192.7	6203.8	-10.14	0.78	3.64
610.0	-125986	36740	2048129	-1880.0	194.3	6211.0	-10.35	0.79	3.56
612.0	-129767	37131	2060558	-1900.9	195.9	6218.0	-10.57	0.79	3.48
614.0	-133590	37524	2073001	-1922.2	197.5	6224.9	-10.79	0.79	3.39
616.0	-137456	37920	2085458	-1944.0	199.1	6231.6	-11.00	0.80	3.29
618.0	-141366	38320	2097928	-1966.1	200.6	6238.1	-11.18	0.80	3.18
620.0	-145320	38723	2110411	-1988.6	202.3	6244.3	-11.40	0.81	3.09
622.0	-149321	39129	2122906	-2011.6	203.9	6250.4	-11.59	0.81	2.97
624.0	-153367	39539	2135413	-2034.9	205.5	6256.2	-11.77	0.82	2.86
626.0	-157461	39951	2147931	-2058.7	207.2	6261.8	-11.97	0.82	2.73
628.0	-161602	40367	2160460	-2082.8	208.8	6267.1	-12.15	0.83	2.58
630.0	-165792	40787	2173000	-2107.3	210.5	6272.1	-12.35	0.83	2.43
632.0	-170032	41209	2185549	-2132.2	212.2	6276.8	-12.52	0.84	2.27
634.0	-174321	41635	2198107	-2157.4	213.9	6281.3	-12.71	0.84	2.11
636.0	-178662	42065	2210674	-2183.0	215.6	6285.4	-12.88	0.85	1.95
638.0	-183054	42498	2223249	-2209.0	217.3	6289.1	-13.06	0.85	1.78
640.0	-187498	42934	2235831	-2235.3	219.0	6292.6	-13.22	0.86	1.59
642.0	-191995	43374	2248419	-2261.8	220.7	6295.6	-13.38	0.86	1.40
644.0	-196546	43817	2261013	-2288.7	222.5	6298.3	-13.53	0.86	1.23
646.0	-201150	44264	2273612	-2315.9	224.1	6300.6	-13.64	0.87	1.13
648.0	-205809	44714	2286216	-2343.3	225.8	6302.9	-13.64	0.87	1.19
650.0	-210523	45167	2298824	-2370.5	227.6	6305.5	-13.56	0.87	1.29
652.0	-215291	45624	2311438	-2397.5	229.4	6308.2	-13.50	0.87	1.38
654.0	-220113	46085	2324057	-2424.4	231.1	6311.1	-13.43	0.87	1.47
656.0	-224989	46549	2336682	-2451.2	232.9	6314.2	-13.36	0.87	1.56
658.0	-229918	47016	2349314	-2477.8	234.6	6317.4	-13.28	0.87	1.66
660.0	-234900	47487	2361952	-2504.3	236.4	6320.8	-13.22	0.87	1.75
662.0	-239935	47961	2374597	-2530.7	238.1	6324.4	-13.13	0.86	1.84
664.0	-245022	48439	2387249	-2556.9	239.9	6328.1	-13.08	0.86	1.94
666.0	-250162	48921	2399909	-2583.0	241.6	6332.1	-13.01	0.85	2.03
668.0	-255354	49406	2412578	-2609.0	243.3	6336.3	-12.95	0.85	2.13
670.0	-260598	49894	2425255	-2634.8	245.0	6340.7	-12.86	0.84	2.22
672.0	-265893	50386	2437940	-2660.4	246.6	6345.2	-12.76	0.83	2.32
674.0	-271240	50881	2450635	-2685.9	248.3	6350.0	-12.67	0.82	2.41

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
676.0	-276637	51379	2463340	-2711.2	249.9	6354.9	-12.58	0.81	2.51
678.0	-282094	51880	2476055	-2736.2	251.6	6360.1	-12.48	0.80	2.60
680.0	-287581	52385	2488780	-2761.1	253.2	6365.4	-12.37	0.80	2.70
682.0	-293128	52893	2501516	-2785.7	254.8	6370.9	-12.26	0.79	2.80
684.0	-298724	53404	2514264	-2810.1	256.4	6376.6	-12.12	0.78	2.89
686.0	-304369	53919	2527023	-2834.2	258.0	6382.5	-11.99	0.77	2.99
688.0	-310061	54436	2539794	-2858.1	259.5	6388.6	-11.85	0.76	3.08
690.0	-315801	54957	2552577	-2881.6	261.0	6394.9	-11.72	0.76	3.18
692.0	-321587	55480	2565373	-2904.9	262.6	6401.4	-11.58	0.75	3.27
694.0	-327420	56007	2578183	-2927.9	264.1	6408.1	-11.44	0.74	3.37
696.0	-333299	56537	2591006	-2950.6	265.5	6415.0	-11.25	0.73	3.46
698.0	-339222	57069	2603842	-2972.8	267.0	6422.0	-11.06	0.72	3.56
700.0	-345190	57604	2616693	-2994.7	268.4	6429.3	-10.83	0.71	3.65
702.0	-351201	58143	2629559	-3016.1	269.8	6436.7	-10.59	0.70	3.74
704.0	-357254	58684	2642440	-3037.0	271.2	6444.3	-10.36	0.69	3.83
706.0	-363349	59227	2655336	-3057.4	272.6	6452.1	-10.09	0.68	3.92
708.0	-369484	59774	2668248	-3077.3	273.9	6460.0	-9.83	0.66	4.01
710.0	-375658	60323	2681176	-3096.7	275.3	6468.2	-9.58	0.65	4.09
712.0	-381870	60875	2694121	-3115.6	276.6	6476.4	-9.34	0.63	4.17
714.0	-388120	61429	2707082	-3134.0	277.8	6484.9	-9.05	0.61	4.25
716.0	-394406	61986	2720060	-3151.9	279.1	6493.4	-8.77	0.58	4.32
718.0	-400727	62546	2733055	-3169.1	280.2	6502.1	-8.51	0.57	4.39
720.0	-407082	63107	2746068	-3185.9	281.3	6510.8	-8.25	0.57	4.42
722.0	-413470	63671	2759098	-3202.1	282.5	6519.7	-7.98	0.57	4.46
724.0	-419890	64237	2772146	-3217.7	283.6	6528.6	-7.69	0.57	4.49
726.0	-426341	64805	2785212	-3232.8	284.7	6537.6	-7.39	0.57	4.50
728.0	-432822	65376	2798296	-3247.3	285.9	6546.6	-7.12	0.57	4.51
730.0	-439330	65949	2811398	-3261.3	287.0	6555.6	-6.81	0.57	4.50
732.0	-445866	66524	2824519	-3274.7	288.2	6564.6	-6.54	0.57	4.49
734.0	-452429	67102	2837657	-3287.5	289.3	6573.5	-6.24	0.57	4.46
736.0	-459016	67681	2850812	-3299.7	290.5	6582.4	-5.93	0.58	4.43
738.0	-465628	68264	2863986	-3311.3	291.6	6591.2	-5.66	0.58	4.38
740.0	-472261	68848	2877177	-3322.4	292.8	6599.8	-5.37	0.58	4.33
742.0	-478917	69435	2890385	-3332.9	293.9	6608.3	-5.08	0.58	4.25
744.0	-485593	70023	2903610	-3342.8	295.0	6616.7	-4.81	0.58	4.18
746.0	-492288	70615	2916851	-3352.1	296.2	6624.9	-4.55	0.58	4.08
S-IVB VELOCITY CUTOFF COMMAND									
747.040	-495777	70923	2923743	-3357.0	296.8	6629.1	-4.41	0.57	4.03
748.0	-499002	71208	2930106	-3363.2	297.3	6627.3	-6.26	0.53	-3.07
750.0	-505743	71804	2943355	-3377.9	298.3	6620.5	-7.44	0.50	-3.73
752.0	-512514	72402	2956588	-3392.7	299.3	6613.0	-7.43	0.50	-3.76

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
754.0	-519314	73001	2969806	-3407.6	300.3	6605.4	-7.42	0.50	-3.78
756.0	-526144	73603	2983009	-3422.4	301.3	6597.8	-7.41	0.50	-3.79
ORBITAL INSERTION									
757.040	-529711	73915	2989870	-3430.1	301.8	6593.9	-7.41	0.50	-3.80

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
GUIDANCE REFERENCE RELEASE									
-16.845	-955.001	5521.677	3035.916	-402.6	-69.7	0.0	0.01	-0.03	0.0
-16.0	-956.342	5521.618	3035.916	-402.6	-69.7	0.0	0.01	-0.03	0.0
-15.0	-956.744	5521.548	3035.916	-402.6	-69.8	0.0	0.01	-0.03	0.0
-14.0	-957.147	5521.479	3035.916	-402.6	-69.8	0.0	0.01	-0.03	0.0
-13.0	-957.550	5521.409	3035.916	-402.6	-69.8	0.0	0.01	-0.03	0.0
-12.0	-957.952	5521.339	3035.916	-402.6	-69.9	0.0	0.01	-0.03	0.0
-11.0	-958.355	5521.269	3035.916	-402.6	-69.9	0.0	0.01	-0.03	0.0
-10.0	-958.757	5521.199	3035.916	-402.6	-69.9	0.0	0.01	-0.03	0.0
-9.0	-959.160	5521.129	3035.916	-402.6	-69.9	0.0	0.01	-0.03	0.0
-8.0	-959.563	5521.059	3035.916	-402.6	-70.0	0.0	0.01	-0.03	0.0
-7.0	-959.965	5520.989	3035.916	-402.6	-70.0	0.0	0.01	-0.03	0.0
-6.0	-960.368	5520.919	3035.916	-402.6	-70.0	0.0	0.01	-0.03	0.0
-5.0	-960.770	5520.849	3035.916	-402.6	-70.1	0.0	0.01	-0.03	0.0
-4.0	-961.173	5520.779	3035.916	-402.6	-70.1	0.0	0.01	-0.03	0.0
-3.0	-961.576	5520.709	3035.916	-402.6	-70.1	0.0	0.01	-0.03	0.0
-2.0	-961.978	5520.639	3035.916	-402.6	-70.1	0.0	0.01	-0.03	0.0
-1.0	-962.381	5520.569	3035.916	-402.6	-70.2	0.0	0.01	-0.03	0.0
0.0	-962.783	5520.499	3035.916	-402.6	-70.2	0.0	0.01	-0.03	0.0
FIRST MOTION									
0.380	-962.936	5520.472	3035.916	-402.6	-70.2	-0.0	-0.15	0.84	0.48
IU UMBILICAL DISCONNECT									
0.690	-963.061	5520.450	3035.916	-402.6	-69.9	0.2	-0.23	1.38	0.78
1.0	-963.186	5520.429	3035.916	-402.7	-69.4	0.5	-0.38	2.25	1.26
2.0	-963.589	5520.361	3035.918	-403.1	-67.1	1.8	-0.39	2.30	1.27
3.0	-963.992	5520.294	3035.919	-403.5	-64.8	3.0	-0.38	2.35	1.28
4.0	-964.396	5520.232	3035.924	-403.8	-62.4	4.3	-0.36	2.41	1.29
5.0	-964.800	5520.170	3035.928	-404.2	-59.9	5.6	-0.35	2.47	1.29
6.0	-965.204	5520.112	3035.935	-404.6	-57.4	6.9	-0.39	2.51	1.30
7.0	-965.609	5520.055	3035.942	-404.9	-54.9	8.2	-0.33	2.59	1.28
8.0	-966.014	5520.002	3035.951	-405.2	-52.3	9.5	-0.27	2.67	1.26
9.0	-966.419	5519.949	3035.960	-405.5	-49.6	10.7	-0.27	2.73	1.28
10.0	-966.825	5519.903	3035.973	-405.8	-46.8	12.0	-0.31	2.79	1.31
11.0	-967.231	5519.857	3035.985	-406.2	-44.0	13.4	-0.41	2.82	1.37
12.0	-967.638	5519.816	3036.000	-406.6	-41.2	14.8	-0.50	2.85	1.44
13.0	-968.044	5519.774	3036.015	-407.2	-38.3	16.2	-0.60	2.87	1.52
14.0	-968.452	5519.739	3036.032	-407.8	-35.4	17.8	-0.63	2.91	1.60

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
15.0	-968.860	5519.704	3036.050	-408.4	-32.5	19.5	-0.55	2.95	1.72
16.0	-969.268	5519.671	3036.070	-408.9	-29.7	21.2	-0.55	2.95	1.89
17.0	-969.677	5519.643	3036.092	-409.5	-26.8	23.1	-0.75	2.92	2.02
18.0	-970.087	5519.619	3036.116	-410.4	-23.9	25.2	-0.99	2.90	2.13
19.0	-970.498	5519.595	3036.142	-411.5	-21.0	27.4	-1.17	2.90	2.22
20.0	-970.910	5519.576	3036.171	-412.7	-18.1	29.6	-1.32	2.92	2.30
21.0	-971.324	5519.559	3036.202	-414.1	-15.1	32.0	-1.43	2.95	2.36
22.0	-971.739	5519.546	3036.235	-415.6	-12.1	34.4	-1.52	3.01	2.41
23.0	-972.155	5519.535	3036.271	-417.2	-9.1	36.8	-1.66	3.05	2.48
24.0	-972.573	5519.528	3036.309	-418.9	-6.0	39.3	-1.86	3.08	2.56
25.0	-972.993	5519.524	3036.349	-420.9	-2.9	41.9	-2.02	3.10	2.63
26.0	-973.415	5519.522	3036.393	-422.9	0.2	44.6	-2.12	3.16	2.68
27.0	-973.839	5519.524	3036.439	-425.1	3.4	47.3	-2.19	3.20	2.72
28.0	-974.265	5519.529	3036.487	-427.3	6.6	50.0	-2.26	3.25	2.77
29.0	-974.694	5519.538	3036.539	-429.6	9.9	52.8	-2.43	3.27	2.85
30.0	-975.124	5519.549	3036.593	-432.1	13.1	55.7	-2.52	3.32	2.90
31.0	-975.558	5519.564	3036.650	-434.7	16.4	58.6	-2.65	3.36	2.97
32.0	-975.994	5519.582	3036.711	-437.4	19.7	61.6	-2.77	3.41	3.00
33.0	-976.433	5519.604	3036.774	-440.2	23.2	64.6	-2.90	3.44	3.05
34.0	-976.874	5519.629	3036.840	-443.2	26.7	67.7	-3.05	3.46	3.12
35.0	-977.319	5519.658	3036.909	-446.3	30.1	70.8	-3.20	3.49	3.19
36.0	-977.767	5519.690	3036.982	-449.6	33.7	74.0	-3.35	3.50	3.26
37.0	-978.218	5519.725	3037.057	-453.1	37.2	77.3	-3.52	3.51	3.34
38.0	-978.672	5519.765	3037.136	-456.7	40.7	80.7	-3.69	3.52	3.41
39.0	-979.130	5519.808	3037.219	-460.5	44.2	84.2	-3.84	3.53	3.48
40.0	-979.592	5519.854	3037.304	-464.5	47.8	87.7	-4.00	3.55	3.56
41.0	-980.058	5519.904	3037.394	-468.7	51.3	91.4	-4.19	3.56	3.64
42.0	-980.529	5519.957	3037.487	-473.1	54.9	95.1	-4.41	3.55	3.73
43.0	-981.004	5520.014	3037.584	-477.5	58.4	98.9	-4.59	3.55	3.81
44.0	-981.483	5520.075	3037.685	-482.2	62.0	102.8	-4.76	3.56	3.89
45.0	-981.967	5520.139	3037.790	-487.1	65.6	106.7	-4.94	3.57	3.97
46.0	-982.457	5520.207	3037.898	-492.2	69.2	110.7	-5.14	3.57	4.06
47.0	-982.951	5520.278	3038.011	-497.5	72.7	114.8	-5.31	3.58	4.13
48.0	-983.451	5520.353	3038.128	-502.9	76.3	119.0	-5.50	3.57	4.21
49.0	-983.956	5520.431	3038.249	-508.6	80.0	123.3	-5.68	3.57	4.29
50.0	-984.467	5520.514	3038.375	-514.4	83.6	127.6	-5.92	3.55	4.39
51.0	-984.984	5520.599	3038.504	-520.4	87.1	132.0	-6.17	3.55	4.50
52.0	-985.507	5520.689	3038.639	-526.7	90.7	136.7	-6.39	3.53	4.59
53.0	-986.037	5520.782	3038.778	-533.1	94.2	141.4	-6.57	3.51	4.66
54.0	-986.573	5520.878	3038.922	-539.8	97.7	146.2	-6.77	3.48	4.73
55.0	-987.116	5520.978	3039.070	-546.6	101.0	151.0	-6.99	3.44	4.81
56.0	-987.665	5521.081	3039.224	-553.8	104.5	156.0	-7.22	3.40	4.89
57.0	-988.222	5521.188	3039.382	-561.0	107.9	160.9	-7.47	3.35	4.98

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
58.0	-988.787	5521.298	3039.546	-568.7	111.3	166.0	-7.65	3.33	5.05
59.0	-989.359	5521.411	3039.714	-576.4	114.4	171.2	-7.82	3.31	5.11
60.0	-989.939	5521.527	3039.888	-584.4	117.5	176.5	-7.96	3.29	5.16
MACH 1									
60.500	-990.232	5521.587	3039.977	-588.4	119.2	179.2	-8.06	3.27	5.20
61.0	-990.527	5521.647	3040.067	-592.5	120.9	181.8	-8.16	3.26	5.24
62.0	-991.123	5521.770	3040.252	-600.8	123.9	187.0	-8.36	3.24	5.31
63.0	-991.728	5521.896	3040.441	-609.3	127.0	192.3	-8.58	3.21	5.40
64.0	-992.341	5522.025	3040.637	-618.0	130.3	197.7	-8.80	3.18	5.48
65.0	-992.963	5522.157	3040.837	-626.9	133.4	203.2	-9.02	3.16	5.57
66.0	-993.594	5522.293	3041.043	-636.0	136.5	208.7	-9.22	3.14	5.64
67.0	-994.234	5522.431	3041.255	-645.4	139.6	214.3	-9.48	3.11	5.75
68.0	-994.884	5522.573	3041.472	-655.0	142.7	220.1	-9.71	3.11	5.85
69.0	-995.544	5522.718	3041.695	-664.8	145.7	226.0	-9.93	3.10	5.94
70.0	-996.213	5522.865	3041.924	-674.9	148.8	232.0	-10.10	3.09	6.01
71.0	-996.893	5523.016	3042.159	-685.3	151.8	238.1	-10.30	3.07	6.09
72.0	-997.583	5523.170	3042.401	-695.7	154.8	244.2	-10.56	3.03	6.18
73.0	-998.284	5523.327	3042.648	-706.6	157.7	250.5	-10.88	2.95	6.28
74.0	-998.996	5523.486	3042.902	-717.7	160.7	256.9	-11.24	2.84	6.40
75.0	-999.719	5523.649	3043.162	-729.2	163.4	263.3	-11.62	2.74	6.52
MAXIMUM DYNAMIC PRESSURE									
75.200	-999.865	5523.682	3043.215	-731.5	163.9	264.6	-11.70	2.72	6.54
76.0	-1000.454	5523.814	3043.429	-741.0	166.1	269.9	-11.96	2.64	6.62
77.0	-1001.200	5523.982	3043.702	-753.1	168.6	276.7	-12.33	2.52	6.73
78.0	-1001.940	5524.152	3043.982	-765.8	171.1	283.4	-12.67	2.41	6.82
79.0	-1002.732	5524.325	3044.269	-778.8	173.5	290.3	-13.00	2.30	6.91
80.0	-1003.516	5524.500	3044.563	-792.0	175.7	297.2	-13.35	2.17	7.00
81.0	-1004.315	5524.677	3044.864	-805.4	177.6	304.3	-13.75	2.03	7.11
82.0	-1005.127	5524.856	3045.172	-819.3	179.5	311.4	-14.11	1.88	7.20
83.0	-1005.953	5525.037	3045.487	-833.7	181.3	318.7	-14.52	1.70	7.29
84.0	-1006.794	5525.220	3045.810	-848.4	182.9	326.0	-14.97	1.49	7.39
85.0	-1007.650	5525.404	3046.140	-863.6	184.3	333.4	-15.44	1.26	7.49
86.0	-1008.521	5525.589	3046.477	-879.0	185.5	340.7	-15.83	1.06	7.56
87.0	-1009.408	5525.776	3046.821	-894.8	186.6	348.3	-16.19	0.86	7.63
88.0	-1010.310	5525.964	3047.174	-911.0	187.3	356.0	-16.56	0.64	7.73
89.0	-1011.229	5526.152	3047.534	-927.7	187.8	363.8	-16.80	0.41	7.92
90.0	-1012.165	5526.340	3047.902	-944.4	188.1	371.7	-17.17	0.17	8.09
91.0	-1013.118	5526.529	3048.278	-961.6	188.3	379.9	-17.53	-0.04	8.21
92.0	-1014.088	5526.717	3048.662	-979.2	188.2	388.0	-17.88	-0.21	8.32

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
93.0	-1015.076	5526.906	3049.054	-997.2	188.0	396.4	-18.20	-0.37	8.41
94.0	-1016.083	5527.094	3049.455	-1015.6	187.6	404.8	-18.51	-0.52	8.49
95.0	-1017.107	5527.282	3049.864	-1034.2	187.0	413.4	-18.80	-0.65	8.56
96.0	-1018.151	5527.469	3050.282	-1053.1	186.3	421.9	-19.11	-0.76	8.63
97.0	-1019.214	5527.656	3050.708	-1072.6	185.4	430.5	-19.39	-0.86	8.70
98.0	-1020.296	5527.841	3051.143	-1092.1	184.5	439.2	-19.69	-0.95	8.78
99.0	-1021.398	5528.025	3051.587	-1112.0	183.4	448.1	-19.98	-1.03	8.86
100.0	-1022.520	5528.209	3052.040	-1132.3	182.3	457.1	-20.25	-1.08	8.94
101.0	-1023.662	5528.391	3052.502	-1152.7	181.2	466.1	-20.55	-1.14	9.04
102.0	-1024.825	5528.572	3052.972	-1173.6	180.0	475.2	-20.86	-1.17	9.15
103.0	-1026.009	5528.752	3053.452	-1194.7	178.8	484.5	-21.15	-1.21	9.26
104.0	-1027.215	5528.930	3053.942	-1216.1	177.5	493.8	-21.46	-1.26	9.38
105.0	-1028.442	5529.108	3054.440	-1237.8	176.2	503.2	-21.77	-1.32	9.49
106.0	-1029.690	5529.283	3054.949	-1259.8	174.8	512.8	-22.07	-1.39	9.59
107.0	-1030.961	5529.458	3055.467	-1282.1	173.4	522.5	-22.40	-1.47	9.71
108.0	-1032.255	5529.631	3055.994	-1304.7	171.8	532.3	-22.75	-1.56	9.83
109.0	-1033.571	5529.802	3056.531	-1327.6	170.2	542.2	-23.11	-1.65	9.95
110.0	-1034.910	5529.972	3057.079	-1351.0	168.5	552.3	-23.47	-1.76	10.06
111.0	-1036.273	5530.140	3057.636	-1374.7	166.7	562.4	-23.81	-1.87	10.16
112.0	-1037.660	5530.306	3058.204	-1398.6	164.7	572.5	-24.17	-2.01	10.27
113.0	-1039.070	5530.470	3058.782	-1423.0	162.6	582.9	-24.52	-2.15	10.37
114.0	-1040.506	5530.632	3059.370	-1447.7	160.4	593.3	-24.95	-2.33	10.49
115.0	-1041.966	5530.792	3059.969	-1473.0	158.0	603.9	-25.36	-2.51	10.63
116.0	-1043.452	5530.949	3060.578	-1498.5	155.4	614.5	-25.78	-2.69	10.76
117.0	-1044.964	5531.103	3061.199	-1524.5	152.6	625.4	-26.15	-2.86	10.90
118.0	-1046.501	5531.255	3061.830	-1550.7	149.7	636.3	-26.54	-3.02	11.01
119.0	-1048.065	5531.403	3062.472	-1577.5	146.6	647.4	-26.91	-3.16	11.12
120.0	-1049.656	5531.548	3063.125	-1604.5	143.4	658.5	-27.30	-3.31	11.24
121.0	-1051.275	5531.690	3063.789	-1631.9	140.0	669.8	-27.69	-3.44	11.36
122.0	-1052.921	5531.829	3064.465	-1659.8	136.5	681.3	-28.10	-3.58	11.49
123.0	-1054.595	5531.964	3065.152	-1688.1	132.9	692.8	-28.50	-3.72	11.61
124.0	-1056.297	5532.095	3065.851	-1716.9	129.0	704.5	-28.92	-3.86	11.74
125.0	-1058.029	5532.223	3066.561	-1746.4	125.0	716.4	-29.34	-4.00	11.88
126.0	-1059.791	5532.346	3067.284	-1776.4	120.8	728.5	-29.80	-4.15	12.02
127.0	-1061.582	5532.465	3069.019	-1806.3	116.5	740.6	-30.30	-4.31	12.18
128.0	-1063.404	5532.579	3068.766	-1836.6	112.2	752.8	-30.80	-4.46	12.35
129.0	-1065.256	5532.689	3069.525	-1867.8	107.6	765.2	-31.30	-4.59	12.53
130.0	-1067.140	5532.795	3070.297	-1899.4	103.0	777.9	-31.74	-4.71	12.69
131.0	-1069.055	5532.896	3071.081	-1931.5	98.2	790.7	-32.21	-4.84	12.87
132.0	-1071.003	5532.992	3071.879	-1964.1	93.3	803.7	-32.72	-4.98	13.06
133.0	-1072.984	5533.083	3072.689	-1997.1	88.1	816.8	-33.32	-5.15	13.27
134.0	-1074.998	5533.168	3073.513	-2030.7	82.8	830.2	-33.87	-5.31	13.47
135.0	-1077.046	5533.249	3074.350	-2064.9	77.5	843.8	-34.38	-5.46	13.66

TABLE B-II. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
136.0	-1079.129	5533.324	3075.201	-2099.7	72.0	857.6	-35.05	-5.66	13.89
137.0	-1081.246	5533.393	3076.066	-2134.9	66.3	871.6	-35.65	-5.81	14.11
138.0	-1083.400	5533.457	3076.945	-2170.9	60.5	885.8	-36.21	-5.96	14.32
139.0	-1085.589	5533.514	3077.838	-2207.4	54.4	900.2	-36.85	-6.13	14.55
140.0	-1087.815	5533.566	3078.745	-2244.4	48.2	914.8	-37.48	-6.31	14.78
141.0	-1090.079	5533.611	3079.668	-2282.2	41.8	929.7	-38.13	-6.44	15.02
142.0	-1092.380	5533.650	3080.605	-2320.9	35.3	945.0	-38.77	-6.61	15.25
143.0	-1094.721	5533.682	3081.558	-2360.1	28.6	960.4	-39.41	-6.78	15.47
144.0	-1097.101	5533.707	3082.527	-2399.8	21.7	975.9	-40.05	-6.94	15.69
S-IC INBOARD ENGINE CUTOFF									
144.720	-1098.840	5533.721	3083.233	-2427.8	16.7	986.8	-40.51	-7.05	15.86
145.0	-1099.521	5533.725	3083.510	-2438.0	14.7	990.8	-36.31	-6.71	14.07
146.0	-1101.978	5533.736	3084.508	-2472.6	7.5	1003.9	-32.00	-7.25	11.81
147.0	-1104.465	5533.740	3085.517	-2505.1	0.2	1015.9	-32.62	-7.39	12.03
148.0	-1106.987	5533.737	3086.540	-2538.7	-7.5	1028.3	-33.27	-7.50	12.18
S-IC OUTBOARD ENGINE CUTOFF									
148.410	-1108.039	5533.734	3086.966	-2551.7	-10.3	1033.1	-33.58	-7.50	12.16
149.0	-1109.551	5533.729	3087.579	-2563.6	-16.6	1035.7	-1.68	-7.65	-2.71
S-IC/S-II SEPARATION COMMAND									
149.080	-1109.756	5533.729	3087.663	-2563.9	-17.3	1035.5	3.04	-8.36	-5.23
150.0	-1112.114	5533.715	3088.616	-2564.1	-24.6	1032.5	2.52	-8.54	-5.08
152.0	-1117.233	5533.645	3090.667	-2561.6	-40.5	1024.0	-0.76	-8.24	-3.45
154.0	-1122.352	5533.549	3092.706	-2565.5	-55.9	1018.6	-4.67	-8.10	-1.60
156.0	-1127.492	5533.421	3094.740	-2574.4	-72.0	1015.3	-5.17	-7.99	-1.34
158.0	-1132.650	5533.261	3096.768	-2584.7	-87.9	1012.6	-5.34	-7.98	-1.27
160.0	-1137.831	5533.069	3098.791	-2595.3	-103.9	1010.1	-5.41	-7.97	-1.24
162.0	-1143.032	5532.846	3100.808	-2606.1	-119.8	1007.6	-5.49	-7.96	-1.21
164.0	-1148.255	5532.590	3102.821	-2617.0	-135.7	1005.2	-5.51	-7.95	-1.19
166.0	-1153.500	5532.303	3104.829	-2628.0	-151.6	1002.9	-5.53	-7.94	-1.18
168.0	-1158.767	5531.984	3106.833	-2639.1	-167.4	1000.6	-5.56	-7.94	-1.16
170.0	-1164.057	5531.634	3108.832	-2650.2	-183.3	998.3	-5.57	-7.93	-1.15
172.0	-1169.368	5531.251	3110.826	-2661.4	-199.2	996.1	-5.58	-7.92	-1.14
174.0	-1174.702	5530.837	3112.816	-2672.6	-215.0	993.9	-5.64	-7.92	-1.12
176.0	-1180.059	5530.391	3114.801	-2683.9	-230.8	991.7	-5.68	-7.92	-1.10
178.0	-1185.438	5529.914	3116.783	-2695.3	-246.6	989.5	-5.72	-7.91	-1.07
180.0	-1190.840	5529.405	3118.760	-2706.7	-262.5	987.4	-5.73	-7.89	-1.06
182.0	-1196.265	5528.864	3120.733	-2718.2	-278.2	985.4	-5.83	-7.90	-1.02

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
184.0	-1201.713	5528.292	3122.701	-2729.9	-294.0	983.4	-5.84	-7.89	-1.00
186.0	-1207.184	5527.688	3124.666	-2741.6	-309.7	981.5	-5.91	-7.89	-0.98
188.0	-1212.679	5527.053	3126.627	-2753.4	-325.5	979.6	-5.93	-7.88	-0.95
190.0	-1218.198	5526.386	3128.584	-2765.2	-341.2	977.7	-5.97	-7.87	-0.93
192.0	-1223.740	5525.688	3130.538	-2777.1	-356.9	975.9	-5.98	-7.83	-0.91
194.0	-1229.306	5524.958	3132.488	-2789.0	-372.4	974.1	-5.96	-7.71	-0.88
196.0	-1234.896	5524.197	3134.434	-2801.0	-387.7	972.4	-5.93	-7.51	-0.82
198.0	-1240.510	5523.406	3136.377	-2812.8	-402.6	970.8	-5.90	-7.20	-0.71
200.0	-1246.148	5522.586	3138.317	-2824.6	-416.6	969.6	-5.89	-6.92	-0.58
202.0	-1251.809	5521.738	3140.254	-2836.3	-430.5	968.3	-5.83	-6.69	-0.50
204.0	-1257.493	5520.864	3142.190	-2848.0	-443.8	967.4	-5.82	-6.53	-0.44
206.0	-1263.201	5519.964	3144.124	-2859.6	-456.9	966.4	-5.85	-6.48	-0.41
208.0	-1268.932	5519.037	3146.056	-2871.3	-469.9	965.6	-5.84	-6.49	-0.41
210.0	-1274.686	5518.084	3147.987	-2883.0	-483.0	964.8	-5.87	-6.51	-0.41
212.0	-1280.464	5517.105	3149.915	-2894.7	-496.1	963.9	-5.92	-6.56	-0.41
214.0	-1286.265	5516.100	3151.842	-2906.6	-509.3	963.1	-5.97	-6.60	-0.41
216.0	-1292.090	5515.068	3153.768	-2918.6	-522.5	962.3	-6.03	-6.64	-0.41
218.0	-1297.939	5514.010	3155.692	-2930.7	-535.8	961.5	-6.07	-6.68	-0.41
220.0	-1303.813	5512.925	3157.614	-2942.9	-549.2	960.7	-6.12	-6.72	-0.40
222.0	-1309.711	5511.813	3159.535	-2955.1	-562.6	959.9	-6.16	-6.76	-0.41
224.0	-1315.634	5510.675	3161.454	-2967.5	-576.2	959.0	-6.21	-6.80	-0.40
226.0	-1321.581	5509.509	3163.371	-2979.9	-589.9	958.2	-6.25	-6.83	-0.40
228.0	-1327.554	5508.315	3165.287	-2992.5	-603.6	957.4	-6.28	-6.85	-0.40
230.0	-1333.551	5507.094	3167.201	-3005.1	-617.3	956.6	-6.33	-6.89	-0.40
232.0	-1339.574	5505.846	3169.113	-3017.8	-631.1	955.8	-6.36	-6.92	-0.40
234.0	-1345.622	5504.570	3171.024	-3030.6	-645.0	955.0	-6.39	-6.94	-0.39
236.0	-1351.696	5503.266	3172.933	-3043.4	-659.0	954.2	-6.43	-6.96	-0.39
238.0	-1357.796	5501.934	3174.841	-3056.4	-672.9	953.5	-6.47	-6.99	-0.38
240.0	-1363.922	5500.574	3176.747	-3069.4	-687.0	952.7	-6.51	-7.02	-0.37
242.0	-1370.074	5499.187	3178.652	-3082.5	-701.0	952.0	-6.56	-7.04	-0.36
244.0	-1376.252	5497.770	3180.555	-3095.7	-715.1	951.3	-6.60	-7.06	-0.35
246.0	-1382.456	5496.326	3182.457	-3108.9	-729.3	950.6	-6.64	-7.09	-0.35
248.0	-1388.688	5494.853	3184.358	-3122.3	-743.5	949.9	-6.68	-7.11	-0.34
250.0	-1394.946	5493.352	3186.257	-3135.7	-757.7	949.3	-6.72	-7.13	-0.33
252.0	-1401.230	5491.823	3188.155	-3149.2	-772.0	948.7	-6.77	-7.15	-0.32
254.0	-1407.542	5490.264	3190.052	-3162.7	-786.3	948.1	-6.80	-7.18	-0.31
256.0	-1413.881	5488.677	3191.947	-3176.4	-800.7	947.4	-6.86	-7.20	-0.30
258.0	-1420.248	5487.062	3193.842	-3190.2	-815.2	946.9	-6.91	-7.23	-0.29
260.0	-1426.642	5485.417	3195.735	-3204.0	-829.6	946.3	-6.95	-7.26	-0.28
262.0	-1433.064	5483.743	3197.627	-3218.0	-844.1	945.7	-6.99	-7.28	-0.27
264.0	-1439.514	5482.041	3199.518	-3232.1	-858.7	945.2	-7.03	-7.31	-0.27
266.0	-1445.993	5480.309	3201.408	-3246.1	-873.4	944.7	-7.08	-7.34	-0.26
268.0	-1452.499	5478.547	3203.297	-3260.3	-888.1	944.1	-7.14	-7.38	-0.25

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
270.0	-1459.034	5476.756	3205.185	-3274.5	-902.8	943.6	-7.19	-7.41	-0.24
272.0	-1465.597	5474.936	3207.071	-3288.9	-917.6	943.2	-7.23	-7.44	-0.23
274.0	-1472.190	5473.086	3208.957	-3303.4	-932.6	942.7	-7.28	-7.47	-0.23
276.0	-1478.811	5471.206	3210.842	-3318.0	-947.5	942.2	-7.31	-7.50	-0.23
278.0	-1485.462	5469.296	3212.727	-3332.7	-962.5	941.8	-7.36	-7.53	-0.22
280.0	-1492.142	5467.356	3214.610	-3347.4	-977.6	941.4	-7.41	-7.56	-0.21
282.0	-1498.851	5465.386	3216.492	-3362.2	-992.8	940.9	-7.47	-7.60	-0.20
284.0	-1505.591	5463.385	3218.374	-3377.1	-1008.0	940.5	-7.52	-7.63	-0.19
286.0	-1512.360	5461.354	3220.254	-3392.1	-1023.3	940.1	-7.57	-7.67	-0.19
288.0	-1519.159	5459.292	3222.134	-3407.3	-1038.6	939.7	-7.61	-7.70	-0.18
290.0	-1525.989	5457.199	3224.013	-3422.5	-1054.1	939.4	-7.66	-7.73	-0.18
292.0	-1532.850	5455.076	3225.892	-3437.9	-1069.5	939.0	-7.70	-7.76	-0.17
294.0	-1539.741	5452.921	3227.770	-3453.3	-1085.1	938.7	-7.75	-7.80	-0.17
296.0	-1546.663	5450.736	3229.647	-3468.8	-1100.7	938.3	-7.79	-7.83	-0.16
298.0	-1553.616	5448.519	3231.523	-3484.4	-1116.4	938.0	-7.84	-7.86	-0.16
300.0	-1560.601	5446.270	3233.399	-3500.1	-1132.2	937.7	-7.88	-7.89	-0.15
302.0	-1567.617	5443.990	3235.274	-3515.9	-1148.0	937.4	-7.93	-7.93	-0.14
304.0	-1574.665	5441.678	3237.149	-3531.8	-1163.9	937.1	-7.98	-7.96	-0.14
306.0	-1581.745	5439.334	3239.022	-3547.9	-1179.9	936.8	-8.04	-8.00	-0.13
308.0	-1588.857	5436.958	3240.896	-3564.0	-1195.9	936.6	-8.10	-8.04	-0.12
310.0	-1596.001	5434.551	3242.769	-3580.2	-1212.0	936.3	-8.16	-8.08	-0.11
312.0	-1603.178	5432.110	3244.641	-3596.6	-1228.2	936.1	-8.21	-8.11	-0.10
314.0	-1610.387	5429.638	3246.513	-3613.0	-1244.5	935.9	-8.26	-8.14	-0.10
316.0	-1617.630	5427.133	3248.385	-3629.6	-1260.8	935.7	-8.30	-8.18	-0.09
318.0	-1624.906	5424.595	3250.256	-3646.3	-1277.3	935.6	-8.34	-8.21	-0.09
320.0	-1632.215	5422.024	3252.127	-3663.0	-1293.7	935.4	-8.39	-8.25	-0.09
322.0	-1639.558	5419.420	3253.998	-3679.7	-1310.3	935.2	-8.44	-8.29	-0.08
324.0	-1646.934	5416.783	3255.868	-3696.6	-1326.9	935.0	-8.49	-8.33	-0.08
326.0	-1654.345	5414.112	3257.738	-3713.6	-1343.6	934.9	-8.54	-8.37	-0.07
328.0	-1661.789	5411.408	3259.608	-3730.7	-1360.3	934.8	-8.60	-8.42	-0.07
330.0	-1669.268	5408.671	3261.478	-3747.9	-1377.3	934.6	-8.66	-8.46	-0.06
332.0	-1676.781	5405.899	3263.347	-3765.3	-1394.2	934.5	-8.71	-8.51	-0.06
334.0	-1684.329	5403.094	3265.216	-3782.8	-1411.3	934.4	-8.76	-8.55	-0.05
336.0	-1691.912	5400.254	3267.085	-3800.3	-1428.4	934.3	-8.82	-8.59	-0.05
338.0	-1699.531	5397.380	3268.953	-3818.0	-1445.7	934.2	-8.88	-8.63	-0.04
340.0	-1707.185	5394.472	3270.822	-3835.9	-1463.0	934.1	-8.94	-8.68	-0.03
342.0	-1714.875	5391.528	3272.690	-3853.8	-1480.4	934.1	-9.00	-8.72	-0.02
344.0	-1722.600	5388.550	3274.558	-3871.9	-1497.9	934.1	-9.06	-8.77	-0.02
346.0	-1730.362	5385.537	3276.426	-3890.1	-1515.5	934.1	-9.11	-8.81	-0.01
348.0	-1738.161	5382.488	3278.295	-3908.4	-1533.2	934.0	-9.18	-8.86	-0.00
350.0	-1745.996	5379.404	3280.163	-3926.8	-1551.0	934.0	-9.24	-8.90	0.01
352.0	-1753.868	5376.284	3282.031	-3945.4	-1568.9	934.1	-9.31	-8.95	0.02
354.0	-1761.778	5373.129	3283.899	-3964.1	-1586.8	934.1	-9.39	-9.01	0.03

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
356.0	-1769.725	5369.937	3285.768	-3982.9	-1604.9	934.2	-9.46	-9.05	0.04
358.0	-1777.710	5366.709	3287.636	-4001.9	-1623.1	934.3	-9.51	-9.10	0.04
360.0	-1785.733	5363.445	3289.505	-4020.9	-1641.3	934.5	-9.57	-9.15	0.05
362.0	-1793.794	5360.144	3291.374	-4040.1	-1659.7	934.6	-9.64	-9.20	0.05
364.0	-1801.893	5356.806	3293.244	-4059.5	-1678.1	934.7	-9.70	-9.26	0.06
366.0	-1810.032	5353.432	3295.113	-4079.0	-1696.8	934.8	-9.77	-9.31	0.06
368.0	-1818.210	5350.019	3296.983	-4098.6	-1715.5	935.0	-9.84	-9.37	0.07
370.0	-1826.427	5346.570	3298.853	-4118.4	-1734.3	935.2	-9.92	-9.42	0.08
372.0	-1834.683	5343.082	3300.724	-4138.3	-1753.3	935.4	-10.00	-9.49	0.09
374.0	-1842.980	5339.557	3302.595	-4158.3	-1772.3	935.6	-10.07	-9.55	0.10
376.0	-1851.317	5335.993	3304.466	-4178.6	-1791.4	935.8	-10.15	-9.61	0.10
378.0	-1859.695	5332.391	3306.338	-4198.9	-1810.8	936.0	-10.22	-9.67	0.11
380.0	-1868.113	5328.750	3308.210	-4219.4	-1830.2	936.2	-10.29	-9.74	0.11
382.0	-1876.573	5325.070	3310.083	-4240.1	-1849.8	936.4	-10.37	-9.80	0.12
384.0	-1885.074	5321.351	3311.956	-4260.9	-1869.5	936.7	-10.45	-9.86	0.13
386.0	-1893.617	5317.592	3313.830	-4281.8	-1889.3	936.9	-10.52	-9.93	0.13
388.0	-1902.202	5313.794	3315.704	-4303.0	-1909.2	937.2	-10.60	-9.99	0.14
390.0	-1910.829	5309.955	3317.579	-4324.3	-1929.2	937.5	-10.68	-10.06	0.15
392.0	-1919.499	5306.077	3319.454	-4345.8	-1949.5	937.8	-10.75	-10.12	0.15
394.0	-1928.213	5302.157	3321.330	-4367.4	-1969.8	938.2	-10.83	-10.19	0.16
396.0	-1936.969	5298.198	3323.207	-4389.1	-1990.2	938.5	-10.91	-10.25	0.16
398.0	-1945.769	5294.197	3325.084	-4411.0	-2010.8	938.8	-11.00	-10.33	0.18
400.0	-1954.614	5290.154	3326.962	-4433.2	-2031.5	939.1	-11.09	-10.40	0.19
402.0	-1963.502	5286.071	3328.841	-4455.5	-2052.4	939.5	-11.17	-10.46	0.19
404.0	-1972.436	5281.945	3330.721	-4477.9	-2073.3	939.9	-11.25	-10.53	0.20
406.0	-1981.414	5277.777	3332.601	-4500.5	-2094.5	940.3	-11.33	-10.60	0.21
408.0	-1990.438	5273.567	3334.482	-4523.2	-2115.8	940.7	-11.42	-10.68	0.22
410.0	-1999.508	5269.314	3336.364	-4546.2	-2137.2	941.2	-11.51	-10.75	0.22
412.0	-2008.622	5265.017	3338.246	-4569.0	-2158.7	941.6	-11.20	-10.68	0.11
S-II STAGE ENGINE NO.2 OUT									
412.920	-2012.831	5263.026	3339.112	-4579.1	-2168.5	941.8	-8.41	-9.65	-0.73
414.0	-2017.781	5260.678	3340.129	-4588.6	-2179.1	941.4	-7.12	-9.15	-1.11
416.0	-2026.972	5256.301	3342.010	-4601.9	-2196.8	939.8	-5.88	-8.11	-1.22
418.0	-2036.187	5251.891	3343.888	-4613.4	-2212.6	938.2	-5.78	-7.38	-0.93
420.0	-2045.425	5247.451	3345.763	-4624.8	-2227.0	937.1	-5.79	-6.75	-0.63
422.0	-2054.686	5242.983	3347.636	-4636.2	-2240.6	936.1	-5.79	-6.65	-0.58
424.0	-2063.970	5238.489	3349.507	-4647.8	-2253.9	935.0	-5.81	-6.68	-0.58
426.0	-2073.278	5233.968	3351.376	-4659.6	-2267.4	933.5	-5.90	-6.99	-0.67
428.0	-2082.609	5229.419	3353.241	-4671.7	-2281.6	931.6	-6.01	-7.29	-0.75
430.0	-2091.965	5224.842	3355.102	-4684.1	-2296.4	929.7	-6.09	-7.62	-0.86
432.0	-2101.345	5220.234	3356.960	-4696.4	-2311.8	927.6	-6.16	-7.89	-0.94

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
434.0	-2110.751	5215.594	3358.813	-4708.8	-2327.8	925.6	-6.21	-8.10	-1.00
436.0	-2120.190	5210.923	3360.663	-4721.1	-2344.2	923.8	-6.26	-8.30	-1.06
438.0	-2129.635	5206.218	3362.509	-4733.5	-2361.2	921.8	-6.30	-8.56	-1.15
440.0	-2139.115	5201.478	3364.350	-4745.9	-2378.7	919.6	-6.34	-8.75	-1.21
442.0	-2148.619	5196.703	3366.188	-4758.6	-2396.6	917.3	-6.39	-8.93	-1.26
444.0	-2158.150	5191.892	3368.020	-4771.4	-2414.8	914.5	-6.41	-9.10	-1.32
446.0	-2167.705	5187.045	3369.846	-4784.3	-2433.1	911.8	-6.43	-9.26	-1.37
448.0	-2177.287	5182.160	3371.667	-4797.2	-2451.7	908.8	-6.45	-9.37	-1.41
450.0	-2186.894	5177.238	3373.482	-4810.1	-2470.4	905.8	-6.47	-9.48	-1.43
452.0	-2196.528	5172.279	3375.291	-4823.1	-2489.4	902.9	-6.50	-9.56	-1.45
454.0	-2206.187	5167.281	3377.093	-4836.1	-2508.7	900.0	-6.53	-9.65	-1.47
456.0	-2215.872	5162.244	3378.891	-4849.1	-2528.1	897.1	-6.56	-9.73	-1.49
458.0	-2225.583	5157.168	3380.682	-4862.1	-2547.7	894.3	-6.59	-9.79	-1.50
460.0	-2235.321	5152.054	3382.468	-4875.2	-2567.4	891.5	-6.61	-9.84	-1.50
462.0	-2245.084	5146.899	3384.248	-4888.4	-2587.1	888.6	-6.63	-9.88	-1.50
464.0	-2254.874	5141.705	3386.023	-4901.7	-2606.9	885.6	-6.66	-9.92	-1.50
466.0	-2264.691	5136.471	3387.791	-4915.1	-2626.8	882.5	-6.70	-9.96	-1.50
468.0	-2274.535	5131.198	3389.553	-4928.6	-2646.7	879.5	-6.73	-9.98	-1.49
470.0	-2284.405	5125.885	3391.309	-4942.1	-2666.6	876.4	-6.76	-10.01	-1.48
472.0	-2294.303	5120.532	3393.058	-4955.6	-2686.6	873.4	-6.79	-10.02	-1.47
474.0	-2304.228	5115.138	3394.802	-4969.2	-2706.7	870.5	-6.82	-10.04	-1.45
476.0	-2314.180	5109.705	3396.540	-4982.8	-2726.8	867.6	-6.85	-10.06	-1.44
478.0	-2324.159	5104.231	3398.273	-4996.5	-2746.9	864.8	-6.89	-10.07	-1.42
480.0	-2334.166	5098.717	3399.999	-5010.2	-2767.1	862.0	-6.93	-10.09	-1.40
482.0	-2344.200	5093.162	3401.721	-5024.1	-2787.3	859.2	-6.95	-10.09	-1.39
484.0	-2354.262	5087.568	3403.436	-5038.0	-2807.4	856.4	-6.94	-10.09	-1.38
486.0	-2364.352	5081.933	3405.146	-5051.9	-2827.5	853.5	-6.90	-10.07	-1.39
488.0	-2374.470	5076.257	3406.850	-5065.7	-2847.6	850.6	-6.85	-10.04	-1.40
490.0	-2384.615	5070.542	3408.549	-5079.3	-2867.6	847.8	-6.75	-9.99	-1.42
492.0	-2394.787	5064.787	3410.241	-5092.7	-2887.5	844.9	-6.61	-9.94	-1.45
494.0	-2404.985	5058.992	3411.928	-5105.7	-2907.4	842.1	-6.46	-9.87	-1.49
496.0	-2415.209	5053.158	3413.609	-5118.4	-2927.2	839.2	-6.32	-9.80	-1.52
498.0	-2425.459	5047.284	3415.285	-5130.9	-2946.7	836.2	-6.18	-9.73	-1.55
500.0	-2435.733	5041.371	3416.954	-5143.1	-2966.1	833.1	-6.09	-9.66	-1.56
502.0	-2446.031	5035.419	3418.617	-5155.2	-2985.3	830.0	-6.02	-9.60	-1.56
504.0	-2456.353	5029.429	3420.274	-5167.2	-3004.4	826.8	-5.98	-9.53	-1.54
506.0	-2466.700	5023.402	3421.925	-5179.2	-3023.4	823.9	-5.96	-9.45	-1.51
508.0	-2477.070	5017.336	3423.569	-5191.1	-3042.2	820.7	-5.94	-9.38	-1.48
510.0	-2487.464	5011.233	3425.207	-5203.1	-3060.9	817.8	-5.93	-9.30	-1.44
512.0	-2497.882	5005.092	3426.840	-5214.9	-3079.4	815.0	-5.92	-9.22	-1.41
514.0	-2508.324	4998.915	3428.467	-5226.7	-3097.7	812.3	-5.92	-9.06	-1.33
516.0	-2518.789	4992.701	3430.089	-5238.7	-3115.7	809.8	-5.95	-8.79	-1.19
518.0	-2529.278	4986.452	3431.706	-5250.4	-3133.0	807.4	-6.00	-8.58	-1.07

TABLE B-II. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
520.0	-2530.790	4980.168	3433.318	-5262.3	-3149.3	805.7	-6.03	-8.42	-0.98
522.0	-2550.327	4973.853	3434.928	-5274.2	-3166.5	803.5	-6.04	-8.42	-0.97
524.0	-2569.888	4967.504	3436.533	-5286.3	-3183.3	801.6	-6.03	-8.41	-0.97
526.0	-2571.472	4961.120	3438.134	-5298.5	-3200.2	799.7	-6.05	-8.42	-0.96
528.0	-2582.082	4954.703	3439.732	-5310.8	-3217.1	797.8	-6.07	-8.42	-0.95
530.0	-2592.716	4948.252	3441.325	-5323.0	-3234.1	795.9	-6.09	-8.43	-0.94
532.0	-2603.374	4941.767	3442.915	-5335.2	-3250.9	794.1	-6.10	-8.43	-0.94
534.0	-2614.056	4935.248	3444.502	-5347.4	-3267.8	792.2	-6.10	-8.43	-0.93
536.0	-2624.763	4928.696	3446.084	-5359.6	-3284.6	790.4	-6.12	-8.44	-0.93
538.0	-2635.495	4922.109	3447.663	-5371.8	-3301.5	788.5	-6.15	-8.45	-0.92
540.0	-2646.251	4915.489	3449.238	-5384.2	-3318.5	786.6	-6.17	-8.45	-0.90
542.0	-2657.032	4908.835	3450.810	-5396.6	-3335.5	784.8	-6.20	-8.47	-0.89
544.0	-2667.837	4902.148	3452.378	-5409.0	-3352.4	783.0	-6.22	-8.48	-0.87
546.0	-2678.668	4895.426	3453.942	-5421.5	-3369.4	781.3	-6.25	-8.48	-0.86
548.0	-2689.524	4888.670	3455.503	-5434.0	-3386.4	779.6	-6.28	-8.49	-0.85
550.0	-2700.404	4881.880	3457.060	-5446.6	-3403.4	777.9	-6.30	-8.50	-0.84
552.0	-2711.310	4875.056	3458.615	-5459.2	-3420.3	776.3	-6.32	-8.50	-0.84
554.0	-2722.241	4868.199	3460.166	-5471.9	-3437.4	774.6	-6.35	-8.51	-0.83
556.0	-2733.198	4861.307	3461.713	-5484.6	-3454.4	772.9	-6.39	-8.52	-0.83
558.0	-2744.180	4854.381	3463.257	-5497.5	-3471.4	771.2	-6.41	-8.53	-0.82
560.0	-2755.188	4847.421	3464.798	-5510.3	-3488.4	769.6	-6.42	-8.53	-0.81
562.0	-2766.221	4840.428	3466.336	-5523.2	-3505.5	768.1	-6.43	-8.53	-0.80
564.0	-2777.281	4833.399	3467.870	-5536.1	-3522.5	766.4	-6.43	-8.53	-0.80
566.0	-2788.366	4826.337	3469.402	-5549.0	-3539.5	764.9	-6.42	-8.53	-0.80
568.0	-2799.477	4819.241	3470.930	-5561.8	-3556.5	763.3	-6.40	-8.52	-0.81
570.0	-2810.613	4812.111	3472.455	-5574.6	-3573.6	761.7	-6.39	-8.51	-0.81
572.0	-2821.775	4804.947	3473.977	-5587.3	-3590.6	760.1	-6.37	-8.51	-0.81
574.0	-2832.963	4797.749	3475.495	-5600.0	-3607.6	758.5	-6.35	-8.52	-0.79
576.0	-2844.175	4790.517	3477.011	-5612.2	-3624.5	756.6	-6.32	-8.52	-0.78
S-II ENGINE CUTOFF									
576.330	-2845.774	4789.484	3477.211	-5613.3	-3626.8	756.1	-6.32	-8.52	-0.78
S-II/S-IVB SEPARATION COMMAND									
577.080	-2850.240	4786.597	3477.827	-5613.4	-3632.7	753.5	1.54	-7.47	-4.06
578.0	-2855.416	4783.250	3478.523	-5610.3	-3639.0	749.3	3.72	-6.78	-4.78
580.0	-2866.625	4775.959	3480.010	-5602.7	-3652.6	739.6	3.72	-6.77	-4.78
582.0	-2877.826	4768.640	3481.482	-5597.6	-3666.6	731.0	0.84	-7.47	-3.71
584.0	-2889.019	4761.292	3482.936	-5597.1	-3682.1	724.0	-0.89	-8.20	-3.21
586.0	-2900.215	4753.911	3484.378	-5598.8	-3699.0	717.4	-1.29	-8.50	-3.16
588.0	-2911.415	4746.495	3485.806	-5601.3	-3716.5	710.8	-1.56	-8.64	-3.39

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
590.0	-2922.621	4739.045	3487.221	-5604.5	-3734.0	703.9	-1.65	-8.84	-3.50
592.0	-2933.834	4731.559	3488.622	-5607.8	-3751.9	696.7	-1.63	-9.07	-3.62
594.0	-2945.053	4724.037	3490.008	-5611.1	-3770.3	689.4	-1.61	-9.27	-3.73
596.0	-2956.278	4716.477	3491.379	-5614.2	-3789.0	681.8	-1.58	-9.45	-3.82
598.0	-2967.510	4708.880	3492.735	-5617.3	-3808.1	674.0	-1.52	-9.61	-3.93
600.0	-2978.748	4701.245	3494.075	-5620.2	-3827.4	666.0	-1.45	-9.78	-4.04
602.0	-2989.991	4693.570	3495.399	-5623.0	-3847.3	657.8	-1.36	-9.97	-4.17
604.0	-3001.240	4685.856	3496.706	-5625.6	-3867.4	649.3	-1.28	-10.13	-4.28
606.0	-3012.494	4678.100	3497.996	-5628.1	-3887.8	640.7	-1.20	-10.31	-4.41
608.0	-3023.753	4670.304	3499.269	-5630.3	-3908.5	631.7	-1.11	-10.46	-4.52
610.0	-3035.016	4662.466	3500.523	-5632.4	-3929.6	622.6	-1.00	-10.62	-4.65
612.0	-3046.283	4654.585	3501.759	-5634.3	-3951.0	613.2	-0.88	-10.78	-4.78
614.0	-3057.553	4646.662	3502.976	-5635.9	-3972.7	603.5	-0.75	-10.93	-4.91
616.0	-3068.827	4638.695	3504.173	-5637.3	-3994.6	593.6	-0.62	-11.08	-5.04
618.0	-3080.103	4630.683	3505.350	-5638.4	-4016.9	583.4	-0.49	-11.19	-5.16
620.0	-3091.380	4622.627	3506.506	-5639.3	-4039.3	573.0	-0.36	-11.34	-5.29
622.0	-3102.660	4614.525	3507.642	-5639.9	-4062.2	562.3	-0.21	-11.46	-5.42
624.0	-3113.940	4606.378	3508.755	-5640.1	-4085.1	551.3	-0.08	-11.58	-5.54
626.0	-3125.220	4598.184	3509.847	-5640.1	-4108.4	540.1	0.08	-11.71	-5.68
628.0	-3136.500	4589.944	3510.915	-5639.8	-4132.0	528.6	0.25	-11.80	-5.81
630.0	-3147.780	4581.656	3511.961	-5639.1	-4155.7	516.8	0.42	-11.92	-5.95
632.0	-3159.057	4573.321	3512.982	-5638.1	-4179.6	504.8	0.61	-12.01	-6.08
634.0	-3170.332	4564.937	3513.980	-5636.7	-4203.8	492.4	0.79	-12.12	-6.22
636.0	-3181.604	4556.505	3514.952	-5635.0	-4228.1	479.9	0.97	-12.20	-6.35
638.0	-3192.872	4548.025	3515.899	-5632.9	-4252.6	467.0	1.16	-12.29	-6.48
640.0	-3204.136	4539.495	3516.820	-5630.4	-4277.3	453.9	1.36	-12.36	-6.61
642.0	-3215.394	4530.915	3517.715	-5627.6	-4302.0	440.6	1.56	-12.43	-6.74
644.0	-3226.646	4522.286	3518.582	-5624.3	-4327.0	427.0	1.75	-12.49	-6.87
646.0	-3237.891	4513.607	3519.423	-5620.6	-4352.1	413.2	1.86	-12.55	-6.95
648.0	-3249.128	4504.878	3520.235	-5616.9	-4377.2	399.4	1.81	-12.57	-6.93
650.0	-3260.359	4496.098	3521.020	-5613.4	-4402.4	385.6	1.72	-12.54	-6.87
652.0	-3271.582	4487.268	3521.778	-5610.1	-4427.4	371.9	1.63	-12.52	-6.82
654.0	-3282.799	4478.388	3522.508	-5607.0	-4452.4	358.3	1.54	-12.49	-6.76
656.0	-3294.010	4469.459	3523.211	-5604.1	-4477.4	344.9	1.45	-12.46	-6.70
658.0	-3305.216	4460.479	3523.887	-5601.2	-4502.2	331.5	1.36	-12.43	-6.64
660.0	-3316.415	4451.450	3524.537	-5598.6	-4527.1	318.3	1.27	-12.40	-6.58
662.0	-3327.610	4442.371	3525.161	-5596.2	-4551.8	305.2	1.18	-12.37	-6.51
664.0	-3338.800	4433.243	3525.758	-5593.9	-4576.6	292.2	1.09	-12.36	-6.45
666.0	-3349.986	4424.065	3526.329	-5591.8	-4601.3	279.3	1.00	-12.34	-6.39
668.0	-3361.167	4414.838	3526.875	-5590.0	-4625.9	266.6	0.91	-12.31	-6.33
670.0	-3372.345	4405.561	3527.396	-5588.2	-4650.5	254.0	0.81	-12.27	-6.25
672.0	-3383.520	4396.236	3527.891	-5586.7	-4675.1	241.6	0.72	-12.23	-6.18
674.0	-3394.692	4386.861	3528.362	-5585.4	-4699.5	229.3	0.62	-12.19	-6.10

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
676.0	-3405.862	4377.438	3528.809	-5584.3	-4723.9	217.2	0.53	-12.15	-6.02
678.0	-3417.029	4367.966	3529.231	-5583.3	-4748.1	205.2	0.43	-12.10	-5.94
680.0	-3428.195	4358.446	3529.630	-5582.6	-4772.3	193.4	0.34	-12.04	-5.86
682.0	-3439.359	4348.877	3530.005	-5582.1	-4796.3	181.7	0.23	-11.98	-5.77
684.0	-3450.523	4339.261	3530.357	-5581.7	-4820.2	170.3	0.13	-11.90	-5.67
686.0	-3461.686	4329.597	3530.686	-5581.6	-4843.9	159.0	0.03	-11.83	-5.58
688.0	-3472.849	4319.885	3530.993	-5581.7	-4867.5	148.0	-0.07	-11.74	-5.48
690.0	-3484.013	4310.127	3531.278	-5581.9	-4890.9	137.1	-0.18	-11.67	-5.38
692.0	-3495.177	4300.322	3531.541	-5582.4	-4914.2	126.5	-0.28	-11.59	-5.28
694.0	-3506.342	4290.470	3531.784	-5583.2	-4937.3	116.0	-0.39	-11.50	-5.18
696.0	-3517.509	4280.573	3532.006	-5584.1	-4960.1	105.8	-0.50	-11.38	-5.06
698.0	-3528.678	4270.630	3532.207	-5585.2	-4982.7	95.9	-0.61	-11.26	-4.93
700.0	-3539.850	4260.643	3532.389	-5586.6	-5005.0	86.2	-0.73	-11.09	-4.79
702.0	-3551.025	4250.610	3532.552	-5588.2	-5027.0	76.8	-0.85	-10.93	-4.64
704.0	-3562.203	4240.535	3532.696	-5590.1	-5048.7	67.7	-0.97	-10.76	-4.49
706.0	-3573.385	4230.416	3532.823	-5592.2	-5070.0	58.8	-1.09	-10.57	-4.33
708.0	-3584.571	4220.255	3532.932	-5594.5	-5090.9	50.3	-1.21	-10.39	-4.17
710.0	-3595.763	4210.052	3533.024	-5597.1	-5111.5	42.1	-1.32	-10.21	-4.02
712.0	-3606.959	4199.809	3533.100	-5599.9	-5131.8	34.2	-1.43	-10.04	-3.87
714.0	-3618.162	4189.526	3533.161	-5602.8	-5151.6	26.7	-1.55	-9.83	-3.69
716.0	-3629.371	4179.203	3533.207	-5606.0	-5171.1	19.4	-1.65	-9.62	-3.51
718.0	-3640.586	4168.842	3533.239	-5609.4	-5190.1	12.5	-1.75	-9.42	-3.36
720.0	-3651.808	4159.443	3533.257	-5612.9	-5208.7	6.0	-1.83	-9.22	-3.23
722.0	-3663.037	4148.007	3533.263	-5616.6	-5227.0	-0.3	-1.91	-9.00	-3.09
724.0	-3674.274	4137.536	3533.256	-5620.5	-5244.7	-6.3	-1.99	-8.77	-2.94
726.0	-3685.519	4127.029	3533.237	-5624.5	-5262.0	-12.1	-2.05	-8.51	-2.79
728.0	-3696.772	4116.488	3533.208	-5628.7	-5278.7	-17.6	-2.11	-8.29	-2.66
730.0	-3708.033	4105.914	3533.167	-5633.0	-5295.1	-22.8	-2.16	-8.02	-2.52
732.0	-3719.303	4095.308	3533.117	-5637.3	-5310.9	-27.7	-2.20	-7.78	-2.39
734.0	-3730.582	4084.671	3533.056	-5641.7	-5326.2	-32.4	-2.23	-7.52	-2.26
736.0	-3741.870	4074.003	3532.987	-5646.1	-5341.0	-36.8	-2.26	-7.24	-2.12
738.0	-3753.167	4063.307	3532.909	-5650.7	-5355.3	-40.9	-2.27	-6.99	-2.00
740.0	-3764.472	4052.582	3532.824	-5655.1	-5369.0	-44.8	-2.28	-6.73	-1.88
742.0	-3775.787	4041.831	3532.730	-5659.6	-5382.2	-48.5	-2.26	-6.45	-1.76
744.0	-3787.110	4031.054	3532.630	-5664.1	-5394.9	-51.9	-2.25	-6.20	-1.66
746.0	-3798.443	4020.252	3532.522	-5668.5	-5407.0	-55.1	-2.21	-5.94	-1.56
S-IVB VELOCITY CUTOFF COMMAND									
747.040	-3804.339	4014.625	3532.464	-5670.7	-5413.2	-56.8	-2.19	-5.81	-1.50
748.0	-3809.781	4009.426	3532.408	-5667.3	-5418.5	-60.7	4.53	-4.86	-4.27
750.0	-3821.107	3998.578	3532.277	-5657.2	-5429.8	-70.4	5.38	-5.64	-4.99
752.0	-3832.410	3987.707	3532.126	-5646.4	-5441.1	-80.4	5.40	-5.62	-4.99

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
754.0	-3843.692	3976.813	3531.955	-5635.6	-5452.3	-90.4	5.42	-5.61	-4.99
756.0	-3854.952	3965.897	3531.764	-5624.7	-5463.5	-100.4	5.43	-5.59	-4.99
ORBITAL INSERTION									
757.040	-3860.798	3960.209	3531.657	-5619.1	-5469.3	-105.6	5.44	-5.58	-4.99

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
GUIDANCE REFERENCE RELEASE											
-16.845	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-16.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-15.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-14.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-13.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-12.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-11.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-10.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-9.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-8.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-7.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-6.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-5.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-4.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-3.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-2.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-1.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
0.0	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
FIRST MOTION											
0.380	6373.354	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.00	408.6	0	60
IU UMBILICAL DISCONNECT											
0.690	6373.354	-80.6041	28.4470	321.34	89.66	0.4	90.00	0.06	408.6	0	60
1.0	6373.354	-80.6041	28.4470	311.61	89.70	1.0	90.00	0.14	408.6	0	60
2.0	6373.358	-80.6041	28.4470	292.10	89.78	3.7	90.00	0.52	408.6	0	63
3.0	6373.362	-80.6041	28.4470	259.32	89.66	6.4	90.00	0.90	408.7	0	67
4.0	6373.371	-80.6041	28.4470	245.51	89.40	9.1	90.01	1.28	408.7	0	76
5.0	6373.380	-80.6041	28.4470	239.02	89.10	12.0	90.01	1.68	408.7	0	85
6.0	6373.395	-80.6041	28.4470	233.21	88.88	14.8	90.02	2.08	408.7	0	100
7.0	6373.410	-80.6041	28.4470	227.61	88.70	17.7	90.04	2.48	408.7	1	115
8.0	6373.430	-80.6041	28.4470	227.59	88.24	20.7	90.06	2.90	408.7	1	135
9.0	6373.450	-80.6041	28.4469	227.48	87.79	23.7	90.09	3.32	408.7	2	155
10.0	6373.477	-80.6042	28.4469	226.76	87.45	26.8	90.11	3.75	408.7	3	183
11.0	6373.504	-80.6042	28.4469	224.98	87.29	29.9	90.14	4.20	408.7	4	210
12.0	6373.538	-80.6042	28.4469	222.26	87.32	33.2	90.16	4.65	409.0	6	243
13.0	6373.571	-80.6042	28.4469	218.58	87.48	36.4	90.18	5.10	409.3	7	276
14.0	6373.611	-80.6042	28.4469	214.37	87.73	39.8	90.18	5.57	409.7	9	316

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-FL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
15.0	6373.650	-80.6042	28.4469	212.33	87.98	43.3	90.18	6.05	410.1	10	356
16.0	6373.694	-80.6042	28.4469	215.41	88.29	46.6	90.16	6.51	410.5	12	399
17.0	6373.742	-80.6042	28.4469	218.75	88.74	50.1	90.12	7.00	411.0	13	448
18.0	6373.794	-80.6042	28.4469	214.69	89.37	53.8	90.07	7.51	411.9	14	500
19.0	6373.850	-80.6042	28.4469	98.33	89.77	57.5	90.00	8.01	412.9	14	555
20.0	6373.909	-80.6042	28.4469	63.19	89.02	61.4	89.93	8.52	414.2	14	615
21.0	6373.973	-80.6042	28.4469	60.17	88.20	65.3	89.86	9.04	415.6	12	678
22.0	6374.040	-80.6042	28.4469	59.62	87.41	69.3	89.78	9.56	417.2	10	746
23.0	6374.111	-80.6042	28.4469	59.83	86.64	73.4	89.70	10.08	418.9	7	817
24.0	6374.187	-80.6041	28.4469	60.48	85.83	77.7	89.61	10.61	420.8	5	892
25.0	6374.267	-80.6041	28.4469	61.30	84.99	82.0	89.53	11.14	423.0	8	972
26.0	6374.351	-80.6040	28.4470	62.06	84.16	86.4	89.43	11.67	425.3	15	1056
27.0	6374.439	-80.6039	28.4470	62.70	83.38	91.0	89.34	12.20	427.7	24	1144
28.0	6374.532	-80.6038	28.4470	63.26	82.65	95.7	89.25	12.74	430.3	36	1237
29.0	6374.629	-80.6037	28.4471	63.76	81.93	100.4	89.15	13.27	433.0	49	1334
30.0	6374.731	-80.6035	28.4471	64.24	81.20	105.2	89.05	13.80	435.9	64	1436
31.0	6374.837	-80.6034	28.4472	64.66	80.49	110.1	88.95	14.33	438.9	81	1543
32.0	6374.948	-80.6032	28.4473	65.09	79.80	115.2	88.85	14.86	442.1	100	1654
33.0	6375.064	-80.6030	28.4474	65.67	79.13	120.5	88.75	15.40	445.5	122	1770
34.0	6375.185	-80.6028	28.4474	66.14	78.46	125.8	88.65	15.93	449.1	146	1891
35.0	6375.311	-80.6025	28.4475	66.54	77.78	131.2	88.54	16.45	452.9	172	2017
36.0	6375.442	-80.6023	28.4476	66.97	77.10	136.8	88.43	16.97	456.9	201	2148
37.0	6375.578	-80.6020	28.4477	67.35	76.43	142.5	88.32	17.48	461.1	232	2284
38.0	6375.719	-80.6016	28.4479	67.64	75.75	148.4	88.20	18.00	465.6	267	2425
39.0	6375.866	-80.6013	28.4480	67.96	75.05	154.3	88.08	18.48	470.2	304	2572
40.0	6376.018	-80.6009	28.4481	68.24	74.34	160.5	87.95	18.98	475.2	345	2724
41.0	6376.176	-80.6005	28.4483	68.46	73.63	166.8	87.82	19.46	480.3	390	2882
42.0	6376.339	-80.6000	28.4484	68.69	72.93	173.2	87.68	19.93	485.6	438	3045
43.0	6376.507	-80.5995	28.4486	68.91	72.25	179.7	87.55	20.39	491.2	490	3213
44.0	6376.681	-80.5990	28.4488	69.10	71.56	186.4	87.40	20.85	497.0	547	3387
45.0	6376.861	-80.5984	28.4490	69.30	70.87	193.3	87.26	21.29	503.0	607	3568
46.0	6377.047	-80.5978	28.4492	69.51	70.18	200.3	87.12	21.72	509.3	672	3753
47.0	6377.239	-80.5971	28.4494	69.67	69.49	207.5	86.97	22.14	515.7	742	3945
48.0	6377.436	-80.5964	28.4496	69.82	68.82	214.8	86.82	22.55	522.4	817	4143
49.0	6377.640	-80.5956	28.4498	69.97	68.16	222.4	86.67	22.95	529.4	896	4346
50.0	6377.850	-80.5948	28.4501	70.09	67.50	230.0	86.51	23.34	536.5	981	4556
51.0	6378.066	-80.5939	28.4504	70.21	66.83	237.9	86.35	23.71	543.9	1071	4772
52.0	6378.288	-80.5930	28.4506	70.29	66.15	246.0	86.18	24.07	551.7	1167	4994
53.0	6378.516	-80.5920	28.4509	70.34	65.50	254.2	86.01	24.42	559.5	1269	5223
54.0	6378.751	-80.5910	28.4513	70.40	64.83	262.6	85.83	24.75	567.7	1377	5458
55.0	6378.992	-80.5899	28.4516	70.43	64.16	271.1	85.65	25.06	576.0	1491	5699
56.0	6379.240	-80.5887	28.4520	70.50	63.50	279.9	85.47	25.36	584.7	1612	5947
57.0	6379.494	-80.5875	28.4523	70.58	62.86	288.8	85.30	25.65	593.6	1740	6201

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
58.0	6379.754	-80.5862	28.4527	70.68	62.19	297.9	85.13	25.92	602.8	1874	6462
59.0	6380.021	-80.5848	28.4532	70.67	61.53	307.1	84.94	26.17	612.1	2016	6729
60.0	6380.295	-80.5834	28.4536	70.70	60.87	316.5	84.75	26.41	621.7	2166	7003
MACH 1											
60.500	6380.434	-80.5826	28.4538	70.73	60.56	321.4	84.67	26.53	626.6	2244	7142
61.0	6380.575	-80.5819	28.4540	70.77	60.26	326.1	84.58	26.65	631.4	2323	7283
62.0	6380.862	-80.5803	28.4545	70.85	59.63	335.7	84.41	26.85	641.3	2488	7570
63.0	6381.155	-80.5786	28.4550	70.92	59.01	345.6	84.25	27.05	651.4	2661	7863
64.0	6381.455	-80.5768	28.4556	71.00	58.43	355.7	84.09	27.25	661.8	2843	8163
65.0	6381.762	-80.5750	28.4561	71.08	57.83	366.0	83.92	27.43	672.4	3032	8471
66.0	6382.076	-80.5731	28.4567	71.14	57.25	376.4	83.76	27.60	683.2	3231	8784
67.0	6382.396	-80.5711	28.4573	71.21	56.69	387.0	83.60	27.77	694.2	3438	9105
68.0	6382.723	-80.5690	28.4579	71.26	56.12	398.0	83.43	27.92	705.6	3654	9432
69.0	6383.058	-80.5668	28.4585	71.30	55.57	409.2	83.27	28.07	717.1	3880	9767
70.0	6383.399	-80.5645	28.4592	71.35	55.01	420.7	83.10	28.21	729.1	4116	10109
71.0	6383.748	-80.5621	28.4599	71.41	54.46	432.4	82.94	28.34	741.2	4361	10457
72.0	6384.104	-80.5597	28.4606	71.44	53.94	444.1	82.78	28.46	753.4	4616	10813
73.0	6384.467	-80.5571	28.4614	71.49	53.40	456.3	82.62	28.57	766.1	4882	11177
74.0	6384.837	-80.5544	28.4621	71.54	52.87	468.7	82.47	28.67	779.1	5159	11548
75.0	6385.215	-80.5516	28.4630	71.58	52.33	481.3	82.31	28.74	792.3	5446	11926
MAXIMUM DYNAMIC PRESSURE											
75.200	6385.291	-80.5510	28.4631	71.59	52.22	483.9	82.28	28.76	795.0	5505	12002
76.0	6385.600	-80.5487	28.4638	71.61	51.79	494.3	82.15	28.81	805.9	5745	12311
77.0	6385.993	-80.5457	28.4647	71.63	51.24	507.6	81.98	28.87	819.9	6056	12704
78.0	6386.393	-80.5426	28.4656	71.69	50.68	521.2	81.83	28.90	834.3	6379	13104
79.0	6386.800	-80.5393	28.4665	71.74	50.12	535.2	81.68	28.93	849.0	6714	13512
80.0	6387.215	-80.5359	28.4675	71.77	49.56	549.2	81.52	28.94	863.9	7063	13927
81.0	6387.637	-80.5324	28.4685	71.78	49.00	563.5	81.36	28.93	879.1	7424	14349
82.0	6388.066	-80.5288	28.4695	71.82	48.43	578.2	81.21	28.91	894.7	7800	14779
83.0	6388.503	-80.5250	28.4706	71.85	47.87	593.3	81.06	28.89	910.7	8189	15216
84.0	6388.947	-80.5210	28.4717	71.89	47.30	608.6	80.91	28.85	927.1	8593	15661
85.0	6389.399	-80.5170	28.4729	71.93	46.72	624.3	80.76	28.79	943.8	9012	16112
86.0	6389.857	-80.5128	28.4741	71.98	46.14	640.2	80.63	28.71	960.9	9447	16571
87.0	6390.323	-80.5084	28.4753	72.01	45.56	656.5	80.48	28.63	978.2	9897	17037
88.0	6390.795	-80.5038	28.4766	72.03	44.98	673.0	80.33	28.53	995.9	10363	17510
89.0	6391.275	-80.4991	28.4779	72.03	44.39	690.0	80.18	28.42	1014.0	10846	17991
90.0	6391.762	-80.4943	28.4793	72.04	43.81	707.1	80.03	28.30	1032.2	11346	18477
91.0	6392.255	-80.4892	28.4807	72.03	43.23	724.6	79.87	28.18	1050.9	11863	18971
92.0	6392.755	-80.4840	28.4822	72.02	42.65	742.4	79.72	28.05	1069.9	12398	19472

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
93.0	6393.262	-80.4787	28.4837	72.02	42.08	760.8	79.57	27.91	1089.4	12951	19979
94.0	6393.776	-80.4731	28.4853	72.01	41.52	779.5	79.42	27.76	1109.3	13524	20494
95.0	6394.296	-80.4673	28.4869	72.00	40.96	798.4	79.27	27.61	1129.4	14115	21015
96.0	6394.823	-80.4614	28.4886	72.00	40.40	817.6	79.13	27.45	1149.7	14725	21542
97.0	6395.357	-80.4553	28.4903	72.00	39.85	837.3	78.99	27.28	1170.5	15355	22076
98.0	6395.898	-80.4489	28.4921	72.00	39.33	857.1	78.86	27.12	1191.5	16006	22617
99.0	6396.444	-80.4424	28.4940	71.99	38.81	877.5	78.72	26.96	1212.9	16676	23165
100.0	6396.998	-80.4357	28.4959	71.99	38.30	898.1	78.60	26.80	1234.6	17368	23719
101.0	6397.559	-80.4288	28.4979	71.99	37.81	919.0	78.47	26.64	1256.5	18081	24280
102.0	6398.126	-80.4216	28.4999	72.00	37.33	940.3	78.35	26.48	1278.9	18814	24848
103.0	6398.700	-80.4143	28.5020	72.00	36.87	962.1	78.24	26.33	1301.5	19570	25423
104.0	6399.281	-80.4067	28.5041	72.00	36.42	984.1	78.12	26.17	1324.5	20347	26005
105.0	6399.869	-80.3989	28.5063	72.01	35.98	1006.4	78.01	26.02	1347.7	21147	26594
106.0	6400.465	-80.3909	28.5086	72.02	35.56	1029.1	77.91	25.87	1371.3	21969	27190
107.0	6401.067	-80.3827	28.5109	72.02	35.14	1052.2	77.80	25.73	1395.2	22814	27793
108.0	6401.677	-80.3742	28.5133	72.02	34.74	1075.6	77.70	25.58	1419.5	23683	28404
109.0	6402.294	-80.3656	28.5158	72.03	34.34	1099.5	77.60	25.43	1444.2	24574	29021
110.0	6402.918	-80.3567	28.5183	72.03	33.95	1123.7	77.50	25.29	1469.2	25490	29646
111.0	6403.550	-80.3475	28.5209	72.04	33.57	1148.3	77.41	25.14	1494.6	26430	30279
112.0	6404.189	-80.3381	28.5235	72.05	33.19	1173.1	77.31	24.99	1520.2	27395	30919
113.0	6404.835	-80.3285	28.5263	72.06	32.82	1198.5	77.22	24.84	1546.3	28384	31566
114.0	6405.489	-80.3186	28.5291	72.06	32.46	1224.2	77.14	24.69	1572.8	29399	32221
115.0	6406.150	-80.3085	28.5319	72.07	32.10	1250.4	77.05	24.54	1599.8	30440	32883
116.0	6406.819	-80.2981	28.5349	72.08	31.74	1277.0	76.97	24.39	1627.1	31507	33552
117.0	6407.495	-80.2874	28.5379	72.08	31.39	1304.0	76.88	24.23	1654.8	32601	34229
118.0	6408.178	-80.2765	28.5410	72.08	31.04	1331.3	76.80	24.07	1682.8	33721	34913
119.0	6408.868	-80.2653	28.5441	72.09	30.70	1359.2	76.72	23.92	1711.4	34870	35605
120.0	6409.565	-80.2539	28.5474	72.09	30.36	1387.3	76.63	23.76	1740.3	36046	36304
121.0	6410.271	-80.2422	28.5507	72.09	30.03	1415.9	76.56	23.61	1769.5	37251	37010
122.0	6410.984	-80.2301	28.5541	72.09	29.70	1445.1	76.48	23.45	1799.4	38484	37724
123.0	6411.704	-80.2178	28.5575	72.10	29.38	1474.6	76.41	23.29	1829.6	39747	38445
124.0	6412.432	-80.2053	28.5611	72.10	29.06	1504.6	76.33	23.14	1860.3	41039	39174
125.0	6413.167	-80.1924	28.5647	72.11	28.75	1535.5	76.26	22.98	1891.8	42361	39910
126.0	6413.910	-80.1792	28.5684	72.11	28.44	1566.8	76.19	22.82	1923.8	43715	40654
127.0	6414.660	-80.1657	28.5722	72.11	28.14	1598.2	76.12	22.67	1955.8	45100	41405
128.0	6415.418	-80.1519	28.5761	72.12	27.84	1629.9	76.06	22.51	1988.1	46515	42164
129.0	6416.183	-80.1378	28.5801	72.12	27.55	1662.6	75.99	22.36	2021.3	47963	42931
130.0	6416.956	-80.1234	28.5842	72.13	27.26	1695.8	75.93	22.21	2055.1	49444	43705
131.0	6417.738	-80.1086	28.5883	72.13	26.99	1729.5	75.87	22.06	2089.4	50958	44488
132.0	6418.527	-80.0935	28.5926	72.14	26.71	1763.8	75.81	21.91	2124.3	52506	45278
133.0	6419.324	-80.0781	28.5969	72.14	26.44	1798.5	75.75	21.77	2159.5	54088	46077
134.0	6420.129	-80.0624	28.6014	72.15	26.17	1833.9	75.69	21.62	2195.4	55704	46883
135.0	6420.942	-80.0463	28.6059	72.15	25.91	1869.9	75.63	21.48	2232.0	57356	47698

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
136.0	6421.764	-80.0298	28.6105	72.16	25.66	1906.6	75.57	21.33	2269.2	59044	48521
137.0	6422.594	-80.0130	28.6152	72.16	25.41	1943.8	75.52	21.19	2306.9	60768	49353
138.0	6423.432	-79.9958	28.6201	72.17	25.16	1981.9	75.47	21.05	2345.4	62530	50193
139.0	6424.280	-79.9783	28.6250	72.17	24.92	2020.4	75.41	20.91	2384.5	64329	51041
140.0	6425.135	-79.9604	28.6300	72.18	24.68	2059.6	75.36	20.78	2424.2	66166	51899
141.0	6426.000	-79.9421	28.6352	72.18	24.44	2099.7	75.31	20.64	2464.7	68042	52765
142.0	6426.873	-79.9234	28.6404	72.19	24.21	2140.7	75.26	20.50	2506.1	69958	53640
143.0	6427.756	-79.9043	28.6458	72.19	23.98	2182.3	75.21	20.37	2548.2	71915	54525
144.0	6428.648	-79.8848	28.6513	72.20	23.76	2224.4	75.16	20.24	2590.7	73913	55418
S-IC INBOARD ENGINE CUTOFF											
144.720	6429.296	-79.8705	28.6553	72.20	23.60	2254.1	75.13	20.14	2620.7	75377	56067
145.0	6429.549	-79.8649	28.6568	72.20	23.54	2264.9	75.12	20.11	2631.6	75952	56321
146.0	6430.458	-79.8447	28.6625	72.21	23.34	2301.4	75.08	19.98	2668.6	78029	57231
147.0	6431.372	-79.8241	28.6683	72.22	23.14	2335.6	75.05	19.85	2703.2	80139	58147
148.0	6432.293	-79.8031	28.6742	72.22	22.93	2371.0	75.01	19.71	2739.0	82285	59070
S-IC OUTBOARD ENGINE CUTOFF											
148.410	6432.676	-79.7944	28.6766	72.23	22.86	2384.7	75.00	19.67	2752.9	83184	59454
149.0	6433.226	-79.7818	28.6801	72.23	22.71	2396.4	75.00	19.54	2765.0	84474	60006
S-IC/S-II SEPARATION COMMAND											
149.080	6433.303	-79.7801	28.6806	72.23	22.69	2396.5	75.00	19.53	2765.1	84649	60082
150.0	6434.154	-79.7604	28.6861	72.24	22.53	2395.2	75.00	19.39	2764.2	86663	60936
152.0	6435.966	-79.7177	28.6981	72.27	22.17	2389.0	75.02	19.07	2759.0	91040	62751
154.0	6437.753	-79.6749	28.7100	72.30	21.82	2390.0	75.04	18.77	2760.9	95418	64542
156.0	6439.519	-79.6319	28.7220	72.32	21.46	2396.6	75.05	18.47	2768.3	99822	66311
158.0	6441.261	-79.5887	28.7340	72.35	21.10	2404.8	75.06	18.16	2777.4	104249	68058
160.0	6442.982	-79.5452	28.7461	72.38	20.75	2413.5	75.08	17.87	2786.9	108702	69782
162.0	6444.681	-79.5014	28.7582	72.41	20.39	2422.5	75.09	17.57	2796.7	113179	71485
164.0	6446.359	-79.4574	28.7704	72.44	20.05	2431.7	75.10	17.28	2806.7	117683	73167
166.0	6448.016	-79.4131	28.7826	72.47	19.70	2441.1	75.11	16.99	2816.9	122213	74827
168.0	6449.651	-79.3685	28.7949	72.50	19.36	2450.8	75.13	16.70	2827.4	126770	76467
170.0	6451.266	-79.3237	28.8073	72.53	19.02	2460.6	75.14	16.42	2837.9	131352	78085
172.0	6452.860	-79.2785	28.8196	72.56	18.69	2470.6	75.15	16.14	2848.7	135962	79683
174.0	6454.433	-79.2331	28.8321	72.60	18.36	2480.8	75.16	15.86	2859.6	140598	81260
176.0	6455.986	-79.1875	28.8446	72.63	18.04	2491.1	75.18	15.59	2870.6	145261	82817
178.0	6457.518	-79.1415	28.8571	72.66	17.71	2501.6	75.19	15.32	2881.7	149951	84354
180.0	6459.031	-79.0953	28.8697	72.69	17.40	2512.4	75.21	15.05	2893.1	154669	85870
182.0	6460.523	-79.0488	28.8824	72.72	17.08	2523.3	75.22	14.78	2904.7	159414	87367

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
184.0	6461.996	-79.0020	28.8951	72.75	16.77	2534.5	75.23	14.52	2916.5	164187	88843
186.0	6463.448	-78.9549	28.9078	72.78	16.47	2545.8	75.25	14.27	2928.4	168987	90300
188.0	6464.882	-78.9075	28.9206	72.81	16.17	2557.3	75.26	14.01	2940.5	173815	91738
190.0	6466.296	-78.8599	28.9335	72.85	15.87	2569.0	75.28	13.76	2952.8	178672	93156
192.0	6467.691	-78.8119	28.9464	72.88	15.57	2580.8	75.29	13.51	2965.1	183557	94555
194.0	6469.068	-78.7636	28.9593	72.91	15.29	2592.8	75.31	13.27	2977.6	188471	95936
196.0	6470.425	-78.7151	28.9723	72.94	15.01	2604.9	75.33	13.04	2990.2	193413	97297
198.0	6471.765	-78.6663	28.9854	72.98	14.75	2616.9	75.34	12.82	3002.8	198384	98641
200.0	6473.089	-78.6171	28.9985	73.01	14.50	2629.0	75.36	12.61	3015.3	203382	99969
202.0	6474.397	-78.5677	29.0117	73.05	14.27	2641.1	75.38	12.41	3027.8	208408	101282
204.0	6475.692	-78.5180	29.0249	73.08	14.05	2653.2	75.40	12.23	3040.3	213461	102581
206.0	6476.974	-78.4680	29.0381	73.12	13.84	2665.4	75.42	12.05	3052.9	218540	103867
208.0	6478.242	-78.4178	29.0514	73.16	13.63	2677.7	75.44	11.88	3065.5	223647	105140
210.0	6479.493	-78.3672	29.0647	73.19	13.43	2690.0	75.46	11.71	3078.3	228781	106399
212.0	6480.741	-78.3164	29.0781	73.23	13.22	2702.5	75.48	11.53	3091.1	233941	107647
214.0	6481.971	-78.2653	29.0915	73.26	13.02	2715.1	75.50	11.37	3104.1	239129	108881
216.0	6483.188	-78.2139	29.1050	73.30	12.82	2728.0	75.52	11.20	3117.2	244345	110102
218.0	6484.392	-78.1622	29.1185	73.34	12.62	2741.0	75.55	11.03	3130.6	249588	111311
220.0	6485.584	-78.1102	29.1320	73.37	12.42	2754.1	75.57	10.86	3144.1	254860	112507
222.0	6486.763	-78.0580	29.1456	73.41	12.23	2767.4	75.59	10.70	3157.6	260160	113690
224.0	6487.928	-78.0054	29.1592	73.45	12.03	2780.8	75.61	10.53	3171.4	265489	114860
226.0	6489.081	-77.9525	29.1729	73.49	11.84	2794.4	75.63	10.37	3185.3	270847	116017
228.0	6490.221	-77.8993	29.1866	73.52	11.64	2808.2	75.66	10.20	3199.4	276233	117162
230.0	6491.349	-77.8458	29.2004	73.56	11.45	2822.0	75.68	10.04	3213.5	281649	118293
232.0	6492.463	-77.7920	29.2142	73.60	11.26	2836.0	75.70	9.88	3227.8	287095	119412
234.0	6493.565	-77.7379	29.2280	73.64	11.08	2850.2	75.73	9.72	3242.3	292570	120518
236.0	6494.654	-77.6835	29.2419	73.68	10.89	2864.5	75.75	9.57	3256.8	298076	121612
238.0	6495.730	-77.6287	29.2559	73.72	10.71	2878.9	75.77	9.41	3271.6	303611	122692
240.0	6496.794	-77.5737	29.2699	73.75	10.53	2893.5	75.80	9.26	3286.4	309177	123760
242.0	6497.845	-77.5183	29.2839	73.79	10.35	2908.2	75.82	9.10	3301.4	314774	124816
244.0	6498.883	-77.4626	29.2980	73.83	10.17	2923.1	75.84	8.95	3316.6	320401	125859
246.0	6499.909	-77.4065	29.3121	73.87	10.00	2938.1	75.87	8.80	3331.8	326059	126890
248.0	6500.923	-77.3502	29.3263	73.91	9.82	2953.3	75.89	8.66	3347.2	331749	127908
250.0	6501.925	-77.2935	29.3405	73.95	9.65	2968.5	75.92	8.51	3362.7	337470	128914
252.0	6502.914	-77.2364	29.3548	73.99	9.48	2984.0	75.94	8.37	3378.3	343223	129908
254.0	6503.892	-77.1791	29.3691	74.03	9.32	2999.5	75.97	8.23	3394.1	349008	130890
256.0	6504.857	-77.1214	29.3834	74.07	9.15	3015.2	75.99	8.09	3410.0	354824	131861
258.0	6505.811	-77.0633	29.3978	74.11	8.99	3031.1	76.02	7.95	3426.1	360673	132819
260.0	6506.753	-77.0049	29.4122	74.15	8.83	3047.0	76.04	7.81	3442.3	366555	133765
262.0	6507.683	-76.9462	29.4267	74.19	8.68	3063.2	76.07	7.68	3458.7	372469	134700
264.0	6508.601	-76.8871	29.4413	74.23	8.52	3079.5	76.10	7.54	3475.2	378417	135623
266.0	6509.508	-76.8277	29.4558	74.27	8.36	3095.9	76.12	7.41	3491.8	384397	136534
268.0	6510.403	-76.7679	29.4704	74.31	8.21	3112.4	76.15	7.28	3508.5	390412	137434

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
270.0	6511.286	-76.7078	29.4851	74.35	8.06	3129.1	76.17	7.15	3525.3	396459	138322
272.0	6512.158	-76.6473	29.4998	74.39	7.91	3145.9	76.20	7.02	3542.4	402541	139199
274.0	6513.019	-76.5864	29.5146	74.43	7.77	3163.0	76.23	6.90	3559.6	408657	140064
276.0	6513.869	-76.5252	29.5294	74.47	7.62	3180.2	76.25	6.77	3576.9	414807	140919
278.0	6514.707	-76.4636	29.5442	74.51	7.48	3197.5	76.28	6.65	3594.4	420992	141762
280.0	6515.534	-76.4017	29.5591	74.55	7.34	3215.0	76.31	6.53	3612.1	427212	142594
282.0	6516.350	-76.3393	29.5741	74.59	7.20	3232.6	76.34	6.41	3629.8	433467	143414
284.0	6517.155	-76.2766	29.5890	74.64	7.06	3250.2	76.37	6.29	3647.7	439758	144224
286.0	6517.949	-76.2135	29.6041	74.68	6.93	3268.1	76.39	6.17	3665.7	446084	145023
288.0	6518.732	-76.1501	29.6191	74.72	6.79	3286.2	76.42	6.06	3683.9	452446	145811
290.0	6519.504	-76.0862	29.6343	74.76	6.66	3304.5	76.45	5.94	3702.3	458844	146588
292.0	6520.265	-76.0220	29.6494	74.80	6.53	3322.8	76.48	5.83	3720.9	465279	147354
294.0	6521.016	-75.9574	29.6646	74.85	6.40	3341.3	76.51	5.72	3739.5	471751	148110
296.0	6521.756	-75.8924	29.6799	74.89	6.28	3360.0	76.54	5.61	3758.3	478259	148855
298.0	6522.486	-75.8269	29.6952	74.93	6.15	3378.8	76.57	5.50	3777.2	484805	149589
300.0	6523.205	-75.7611	29.7105	74.97	6.03	3397.8	76.60	5.39	3796.3	491388	150313
302.0	6523.913	-75.6949	29.7259	75.02	5.91	3416.9	76.63	5.29	3815.6	498009	151027
304.0	6524.612	-75.6283	29.7414	75.06	5.79	3436.1	76.66	5.19	3834.9	504668	151730
306.0	6525.300	-75.5613	29.7569	75.11	5.67	3455.6	76.69	5.08	3854.5	511365	152423
308.0	6525.978	-75.4939	29.7724	75.15	5.56	3475.2	76.72	4.98	3874.2	518101	153106
310.0	6526.646	-75.4260	29.7980	75.19	5.44	3494.9	76.75	4.88	3894.1	524876	153779
312.0	6527.304	-75.3578	29.8036	75.24	5.33	3514.9	76.78	4.79	3914.1	531690	154443
314.0	6527.952	-75.2891	29.8192	75.28	5.22	3535.0	76.82	4.69	3934.3	538543	155096
316.0	6528.591	-75.2200	29.8349	75.33	5.11	3555.2	76.85	4.60	3954.7	545436	155740
318.0	6529.220	-75.1504	29.8507	75.37	5.01	3575.6	76.88	4.50	3975.2	552369	156374
320.0	6529.839	-75.0805	29.8665	75.41	4.90	3596.1	76.91	4.41	3995.7	559343	156998
322.0	6530.449	-75.0101	29.8823	75.46	4.80	3616.7	76.94	4.32	4016.5	566356	157613
324.0	6531.049	-74.9393	29.8982	75.51	4.70	3637.4	76.98	4.23	4037.3	573410	158218
326.0	6531.640	-74.8680	29.9141	75.55	4.60	3658.4	77.01	4.14	4058.4	580506	158815
328.0	6532.222	-74.7963	29.9301	75.60	4.50	3679.5	77.04	4.06	4079.5	587642	159402
330.0	6532.795	-74.7242	29.9461	75.64	4.40	3700.8	77.08	3.97	4100.9	594820	159980
332.0	6533.359	-74.6516	29.9622	75.69	4.31	3722.3	77.11	3.89	4122.5	602040	160548
334.0	6533.913	-74.5785	29.9783	75.73	4.21	3743.9	77.14	3.81	4144.2	609302	161108
336.0	6534.459	-74.5050	29.9944	75.78	4.12	3765.7	77.18	3.72	4166.0	616607	161659
338.0	6534.996	-74.4311	30.0106	75.83	4.03	3787.7	77.21	3.64	4188.1	623954	162202
340.0	6535.524	-74.3567	30.0268	75.87	3.94	3809.9	77.25	3.57	4210.4	631344	162735
342.0	6536.044	-74.2818	30.0431	75.92	3.86	3832.2	77.28	3.49	4232.8	638779	163260
344.0	6536.555	-74.2064	30.0594	75.97	3.77	3854.7	77.32	3.42	4255.3	646256	163777
346.0	6537.058	-74.1306	30.0758	76.02	3.69	3877.4	77.35	3.34	4278.1	653778	164285
348.0	6537.553	-74.0543	30.0922	76.06	3.60	3900.2	77.39	3.27	4301.0	661344	164785
350.0	6538.039	-73.9775	30.1086	76.11	3.52	3923.3	77.43	3.20	4324.1	668955	165277
352.0	6538.518	-73.9003	30.1251	76.16	3.45	3946.5	77.46	3.13	4347.4	676611	165760
354.0	6538.988	-73.8225	30.1416	76.21	3.37	3969.9	77.50	3.06	4370.9	684313	166236

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
356.0	6539.451	-73.7443	30.1582	76.26	3.29	3993.6	77.54	2.99	4394.6	692060	166705
358.0	6539.906	-73.6655	30.1748	76.30	3.22	4017.4	77.57	2.93	4418.4	699854	167165
360.0	6540.354	-73.5863	30.1914	76.35	3.15	4041.3	77.61	2.86	4442.4	707694	167618
362.0	6540.794	-73.5065	30.2081	76.40	3.08	4065.5	77.65	2.80	4466.6	715581	168064
364.0	6541.227	-73.4263	30.2248	76.45	3.01	4089.8	77.68	2.74	4491.0	723515	168502
366.0	6541.652	-73.3455	30.2416	76.50	2.94	4114.4	77.72	2.68	4515.6	731496	168933
368.0	6542.071	-73.2643	30.2584	76.55	2.87	4139.1	77.76	2.62	4540.4	739526	169357
370.0	6542.482	-73.1825	30.2753	76.60	2.81	4164.1	77.80	2.56	4565.5	747603	169774
372.0	6542.887	-73.1001	30.2922	76.65	2.74	4189.3	77.84	2.50	4590.7	755730	170184
374.0	6543.285	-73.0173	30.3091	76.70	2.68	4214.6	77.88	2.45	4616.1	763906	170587
376.0	6543.676	-72.9339	30.3261	76.75	2.62	4240.2	77.92	2.39	4641.7	772131	170984
378.0	6544.060	-72.8500	30.3431	76.80	2.56	4266.0	77.96	2.34	4667.5	780406	171374
380.0	6544.439	-72.7655	30.3601	76.85	2.50	4292.0	78.00	2.29	4693.6	788731	171758
382.0	6544.813	-72.6805	30.3772	76.91	2.45	4318.2	78.04	2.24	4719.8	797107	172135
384.0	6545.176	-72.5949	30.3943	76.96	2.39	4344.7	78.08	2.19	4746.3	805534	172506
386.0	6545.536	-72.5088	30.4115	77.01	2.34	4371.3	78.12	2.14	4773.0	814012	172872
388.0	6545.889	-72.4221	30.4287	77.06	2.28	4398.2	78.16	2.09	4799.9	822543	173231
390.0	6546.237	-72.3349	30.4459	77.11	2.23	4425.3	78.20	2.05	4827.1	831125	173585
392.0	6546.580	-72.2471	30.4632	77.17	2.18	4452.7	78.25	2.00	4854.4	839761	173932
394.0	6546.916	-72.1587	30.4805	77.22	2.14	4480.3	78.29	1.96	4882.1	848450	174275
396.0	6547.248	-72.0697	30.4978	77.27	2.09	4507.9	78.33	1.92	4909.8	857192	174612
398.0	6547.574	-71.9801	30.5152	77.33	2.04	4535.9	78.38	1.88	4937.8	865989	174944
400.0	6547.895	-71.8900	30.5326	77.38	2.00	4564.2	78.42	1.84	4966.1	874839	175271
402.0	6548.211	-71.7993	30.5501	77.44	1.96	4592.7	78.46	1.80	4994.6	883745	175592
404.0	6548.522	-71.7079	30.5675	77.49	1.92	4621.3	78.51	1.76	5023.3	892706	175910
406.0	6548.829	-71.6160	30.5850	77.55	1.88	4650.3	78.55	1.73	5052.3	901723	176222
408.0	6549.132	-71.5234	30.6026	77.60	1.84	4679.4	78.60	1.69	5081.4	910797	176530
410.0	6549.430	-71.4302	30.6202	77.66	1.80	4708.8	78.64	1.66	5110.9	919927	176834
412.0	6549.722	-71.3364	30.6378	77.71	1.76	4738.2	78.69	1.63	5140.3	929113	177132
	S-II STAGE ENGINE NO.2 OUT										
412.920	6549.855	-71.2931	30.6459	77.74	1.75	4751.3	78.71	1.61	5153.4	933359	177268
414.0	6550.011	-71.2421	30.6554	77.76	1.73	4764.1	78.73	1.59	5166.2	938356	177426
416.0	6550.294	-71.1472	30.6731	77.81	1.69	4783.1	78.77	1.55	5185.2	947640	177716
418.0	6550.573	-71.0520	30.6907	77.87	1.66	4799.7	78.82	1.53	5201.8	956958	178000
420.0	6550.850	-70.9564	30.7083	77.92	1.65	4815.7	78.86	1.52	5217.9	966308	178283
422.0	6551.128	-70.8604	30.7259	77.97	1.65	4831.5	78.91	1.53	5233.6	975688	178567
424.0	6551.407	-70.7641	30.7435	78.03	1.66	4847.2	78.96	1.53	5249.4	985099	178852
426.0	6551.688	-70.6675	30.7611	78.10	1.66	4863.2	79.02	1.53	5265.4	994539	179139
428.0	6551.970	-70.5705	30.7786	78.16	1.65	4879.7	79.08	1.53	5281.9	1004011	179426
430.0	6552.251	-70.4731	30.7961	78.23	1.64	4896.6	79.13	1.52	5298.9	1013515	179714
432.0	6552.532	-70.3753	30.8135	78.29	1.63	4913.8	79.19	1.50	5316.1	1023051	180000

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-FL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
434.0	6552.810	-70.2772	30.8309	78.35	1.61	4931.3	79.24	1.49	5333.6	1032621	180284
436.0	6553.086	-70.1787	30.8483	78.41	1.59	4949.0	79.29	1.47	5351.4	1042225	180565
438.0	6553.359	-70.0798	30.8657	78.46	1.56	4967.1	79.34	1.44	5369.5	1051864	180844
440.0	6553.628	-69.9805	30.8830	78.52	1.53	4985.4	79.39	1.42	5387.8	1061537	181119
442.0	6553.893	-69.8808	30.9003	78.58	1.50	5004.0	79.44	1.39	5406.5	1071247	181389
444.0	6554.152	-69.7806	30.9176	78.64	1.46	5022.9	79.49	1.35	5425.4	1080992	181654
446.0	6554.406	-69.6801	30.9349	78.70	1.43	5041.8	79.54	1.32	5444.3	1090774	181914
448.0	6554.655	-69.5791	30.9522	78.76	1.39	5061.0	79.60	1.29	5463.5	1100593	182168
450.0	6554.898	-69.4778	30.9694	78.82	1.35	5080.3	79.65	1.25	5482.8	1110448	182417
452.0	6555.134	-69.3760	30.9866	78.88	1.31	5099.7	79.71	1.22	5502.2	1120342	182659
454.0	6555.365	-69.2737	31.0037	78.94	1.27	5119.3	79.76	1.18	5521.9	1130273	182896
456.0	6555.590	-69.1711	31.0209	79.00	1.23	5139.0	79.81	1.14	5541.6	1140242	183126
458.0	6555.808	-69.0680	31.0380	79.06	1.20	5158.9	79.86	1.11	5561.5	1150249	183350
460.0	6556.020	-68.9645	31.0551	79.12	1.16	5178.9	79.91	1.07	5581.6	1160295	183568
462.0	6556.227	-68.8605	31.0722	79.18	1.12	5199.1	79.96	1.04	5601.7	1170380	183780
464.0	6556.427	-68.7561	31.0892	79.24	1.08	5219.4	80.02	1.01	5622.0	1180503	183986
466.0	6556.622	-68.6512	31.1062	79.30	1.05	5239.8	80.07	0.97	5642.4	1190666	184186
468.0	6556.811	-68.5459	31.1232	79.36	1.01	5260.2	80.12	0.94	5662.9	1200869	184381
470.0	6556.994	-68.4401	31.1401	79.42	0.98	5280.8	80.18	0.91	5683.6	1211112	184570
472.0	6557.173	-68.3339	31.1571	79.48	0.95	5301.6	80.23	0.88	5704.3	1221394	184754
474.0	6557.346	-68.2273	31.1739	79.54	0.92	5322.4	80.29	0.86	5725.1	1231716	184933
476.0	6557.514	-68.1201	31.1908	79.61	0.89	5343.2	80.34	0.83	5746.0	1242079	185107
478.0	6557.678	-68.0126	31.2076	79.67	0.86	5364.2	80.39	0.80	5767.0	1252483	185276
480.0	6557.838	-67.9045	31.2244	79.73	0.84	5385.3	80.45	0.78	5788.1	1262927	185442
482.0	6557.994	-67.7960	31.2412	79.79	0.81	5406.6	80.50	0.76	5809.4	1273412	185603
484.0	6558.146	-67.6870	31.2579	79.85	0.79	5427.9	80.56	0.74	5830.7	1283938	185760
486.0	6558.294	-67.5776	31.2746	79.92	0.77	5449.1	80.62	0.72	5851.9	1294505	185914
488.0	6558.439	-67.4677	31.2912	79.98	0.75	5470.3	80.67	0.70	5873.1	1305113	186065
490.0	6558.581	-67.3573	31.3078	80.04	0.73	5491.3	80.73	0.68	5894.1	1315762	186213
492.0	6558.721	-67.2465	31.3244	80.10	0.72	5512.1	80.78	0.67	5915.0	1326452	186358
494.0	6558.857	-67.1352	31.3409	80.17	0.70	5532.7	80.84	0.65	5935.5	1337182	186500
496.0	6558.991	-67.0235	31.3574	80.23	0.68	5552.9	80.90	0.64	5955.7	1347951	186639
498.0	6559.123	-66.9113	31.3738	80.29	0.67	5572.8	80.95	0.63	5975.6	1358758	186776
500.0	6559.252	-66.7987	31.3902	80.36	0.66	5592.4	81.01	0.61	5995.3	1369604	186911
502.0	6559.379	-66.6856	31.4066	80.42	0.65	5611.9	81.07	0.60	6014.7	1380488	187044
504.0	6559.505	-66.5722	31.4228	80.49	0.64	5631.2	81.13	0.59	6034.1	1391409	187175
506.0	6559.629	-66.4582	31.4391	80.55	0.63	5650.5	81.18	0.59	6053.4	1402367	187305
508.0	6559.753	-66.3439	31.4552	80.62	0.62	5669.7	81.24	0.58	6072.6	1413363	187434
510.0	6559.876	-66.2291	31.4713	80.68	0.62	5688.8	81.30	0.58	6091.7	1424396	187562
512.0	6560.000	-66.1140	31.4874	80.75	0.62	5707.9	81.36	0.58	6110.8	1435465	187691
514.0	6560.124	-65.9983	31.5034	80.81	0.63	5726.9	81.42	0.58	6129.8	1446572	187820
516.0	6560.249	-65.8823	31.5193	80.88	0.63	5745.8	81.48	0.59	6148.7	1457715	187951
518.0	6560.377	-65.7659	31.5352	80.94	0.65	5764.2	81.54	0.61	6167.2	1468894	188085

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
520.0	6560.510	-65.6490	31.5510	81.01	0.67	5782.4	81.60	0.63	6185.4	1480108	188222
522.0	6560.649	-65.5317	31.5668	81.08	0.69	5801.1	81.66	0.65	6204.0	1491358	188366
524.0	6560.792	-65.4140	31.5825	81.14	0.72	5819.6	81.72	0.67	6222.6	1502644	188515
526.0	6560.941	-65.2955	31.5981	81.21	0.75	5838.4	81.78	0.70	6241.4	1513965	188669
528.0	6561.096	-65.1774	31.6136	81.29	0.77	5857.3	81.84	0.72	6260.2	1525323	188829
530.0	6561.257	-65.0585	31.6291	81.34	0.80	5876.1	81.90	0.75	6279.1	1536717	188995
532.0	6561.424	-64.9391	31.6445	81.41	0.83	5894.9	81.96	0.77	6297.8	1548147	189167
534.0	6561.597	-64.8193	31.6598	81.48	0.86	5913.7	82.03	0.80	6316.7	1559613	189346
536.0	6561.777	-64.6991	31.6751	81.55	0.89	5932.5	82.09	0.83	6335.5	1571115	189531
538.0	6561.964	-64.5785	31.6903	81.61	0.92	5951.4	82.15	0.86	6354.4	1582654	189723
540.0	6562.159	-64.4575	31.7054	81.68	0.95	5970.4	82.21	0.89	6373.5	1594229	189923
542.0	6562.360	-64.3360	31.7204	81.75	0.99	5989.5	82.27	0.92	6392.5	1605841	190129
544.0	6562.569	-64.2141	31.7354	81.82	1.02	6008.6	82.34	0.95	6411.7	1617489	190343
546.0	6562.787	-64.0918	31.7503	81.89	1.05	6027.8	82.40	0.99	6430.9	1629174	190566
548.0	6563.012	-63.9691	31.7651	81.96	1.09	6047.0	82.46	1.02	6450.1	1640895	190796
550.0	6563.247	-63.8459	31.7798	82.03	1.13	6066.4	82.53	1.06	6469.4	1652654	191035
552.0	6563.490	-63.7224	31.7944	82.10	1.16	6085.7	82.59	1.09	6488.8	1664449	191283
554.0	6563.741	-63.5983	31.8090	82.17	1.20	6105.2	82.65	1.13	6508.2	1676281	191540
556.0	6564.003	-63.4739	31.8234	82.24	1.24	6124.6	82.72	1.17	6527.7	1688151	191806
558.0	6564.274	-63.3490	31.8378	82.31	1.29	6144.2	82.78	1.21	6547.3	1700058	192082
560.0	6564.555	-63.2237	31.8521	82.38	1.33	6163.8	82.85	1.25	6567.0	1712002	192368
562.0	6564.846	-63.0980	31.8664	82.45	1.37	6183.5	82.91	1.29	6586.7	1723983	192664
564.0	6565.148	-62.9718	31.8805	82.52	1.42	6203.2	82.98	1.33	6606.3	1736002	192970
566.0	6565.460	-62.8452	31.8945	82.59	1.46	6222.9	83.05	1.37	6626.1	1748059	193287
568.0	6565.783	-62.7181	31.9085	82.66	1.51	6242.5	83.11	1.42	6645.7	1760153	193615
570.0	6566.118	-62.5907	31.9223	82.74	1.56	6262.1	83.18	1.46	6665.3	1772283	193955
572.0	6566.464	-62.4628	31.9361	82.81	1.60	6281.7	83.24	1.51	6684.9	1784451	194305
574.0	6566.821	-62.3344	31.9497	82.88	1.65	6301.3	83.31	1.55	6704.5	1796657	194667
576.0	6567.190	-62.2057	31.9633	82.95	1.70	6320.3	83.38	1.60	6723.5	1808898	195041
S-II ENGINE CUTOFF											
576.330	6567.235	-62.1875	31.9651	82.96	1.70	6322.5	83.39	1.60	6725.7	1810626	195086
S-II/S-IVB SEPARATION COMMAND											
577.080	6567.394	-62.1360	31.9706	82.99	1.70	6325.4	83.42	1.60	6728.7	1815524	195247
578.0	6567.572	-62.0765	31.9768	83.03	1.68	6325.7	83.45	1.58	6729.0	1821180	195427
580.0	6567.937	-61.9474	31.9900	83.11	1.64	6325.7	83.52	1.54	6728.9	1833445	195796
582.0	6568.297	-61.8182	32.0032	83.18	1.61	6328.0	83.59	1.52	6731.3	1845717	196161
584.0	6568.651	-61.6889	32.0162	83.26	1.60	6335.4	83.66	1.50	6738.7	1857995	196519
586.0	6569.003	-61.5594	32.0291	83.33	1.58	6345.2	83.73	1.49	6748.6	1870291	196876
588.0	6569.353	-61.4296	32.0419	83.41	1.57	6356.2	83.80	1.48	6759.6	1882606	197230

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
590.0	6569.701	-61.2996	32.0546	83.49	1.56	6367.8	83.88	1.47	6771.2	1894943	197582
592.0	6570.047	-61.1693	32.0671	83.57	1.55	6379.6	83.95	1.45	6783.1	1907302	197932
594.0	6570.389	-61.0387	32.0795	83.65	1.53	6391.7	84.03	1.44	6795.2	1919683	198279
596.0	6570.728	-60.9078	32.0917	83.73	1.51	6403.9	84.10	1.42	6807.4	1932088	198622
598.0	6571.063	-60.7767	32.1038	83.81	1.48	6416.3	84.18	1.40	6819.8	1944516	198961
600.0	6571.393	-60.6453	32.1158	83.89	1.46	6428.7	84.26	1.37	6832.3	1956967	199295
602.0	6571.717	-60.5135	32.1277	83.97	1.43	6441.3	84.33	1.34	6844.9	1969442	199623
604.0	6572.035	-60.3815	32.1394	84.06	1.39	6453.9	84.41	1.31	6857.5	1981941	199944
606.0	6572.345	-60.2492	32.1509	84.14	1.36	6466.6	84.48	1.28	6870.3	1994464	200259
608.0	6572.648	-60.1166	32.1624	84.22	1.32	6479.4	84.56	1.24	6883.1	2007012	200566
610.0	6572.942	-59.9838	32.1737	84.30	1.28	6492.2	84.64	1.20	6895.9	2019584	200864
612.0	6573.228	-59.8506	32.1848	84.38	1.23	6505.0	84.71	1.16	6908.8	2032180	201153
614.0	6573.503	-59.7171	32.1958	84.47	1.19	6517.9	84.79	1.12	6921.7	2044801	201431
616.0	6573.767	-59.5833	32.2067	84.55	1.13	6530.8	84.87	1.07	6934.6	2057447	201699
618.0	6574.020	-59.4493	32.2174	84.63	1.08	6543.7	84.95	1.02	6947.5	2070117	201956
620.0	6574.260	-59.3149	32.2280	84.72	1.02	6556.4	85.03	0.96	6960.3	2082812	202200
622.0	6574.488	-59.1802	32.2385	84.80	0.96	6569.3	85.10	0.91	6973.2	2095531	202431
624.0	6574.702	-59.0453	32.2488	84.89	0.90	6582.1	85.18	0.85	6985.9	2108276	202648
626.0	6574.901	-58.9100	32.2589	84.97	0.83	6594.8	85.26	0.79	6998.7	2121044	202851
628.0	6575.085	-58.7745	32.2689	85.06	0.76	6607.5	85.34	0.72	7011.4	2133837	203039
630.0	6575.253	-58.6387	32.2787	85.14	0.69	6620.0	85.42	0.65	7024.0	2146655	203210
632.0	6575.405	-58.5026	32.2884	85.23	0.62	6632.5	85.50	0.58	7036.5	2159496	203365
634.0	6575.539	-58.3662	32.2980	85.31	0.54	6644.9	85.58	0.51	7048.9	2172362	203502
636.0	6575.655	-58.2295	32.3074	85.40	0.46	6657.2	85.66	0.43	7061.2	2185251	203621
638.0	6575.751	-58.0925	32.3166	85.48	0.37	6669.3	85.74	0.35	7073.4	2198164	203721
640.0	6575.828	-57.9553	32.3256	85.57	0.29	6681.4	85.82	0.27	7085.4	2211100	203801
642.0	6575.885	-57.8178	32.3346	85.66	0.20	6693.2	85.90	0.19	7097.3	2224059	203861
644.0	6575.921	-57.6800	32.3433	85.74	0.11	6705.0	85.99	0.10	7109.0	2237042	203900
646.0	6575.935	-57.5419	32.3519	85.83	0.01	6716.5	86.07	0.01	7120.6	2250046	203916
648.0	6575.927	-57.4036	32.3603	85.92	-0.08	6728.2	86.15	-0.08	7132.3	2263073	203911
650.0	6575.897	-57.2650	32.3686	86.01	-0.17	6740.2	86.23	-0.16	7144.3	2276123	203884
652.0	6575.845	-57.1261	32.3767	86.09	-0.26	6752.3	86.31	-0.25	7156.4	2289196	203835
654.0	6575.773	-56.9870	32.3846	86.18	-0.35	6764.7	86.40	-0.33	7168.8	2302293	203766
656.0	6575.681	-56.8475	32.3924	86.27	-0.43	6777.3	86.48	-0.41	7181.3	2315414	203676
658.0	6575.569	-56.7078	32.4000	86.36	-0.51	6790.0	86.56	-0.49	7194.0	2328559	203567
660.0	6575.437	-56.5678	32.4074	86.45	-0.59	6802.9	86.65	-0.56	7207.0	2341730	203438
662.0	6575.287	-56.4275	32.4147	86.53	-0.67	6816.1	86.73	-0.63	7220.1	2354926	203290
664.0	6575.119	-56.2869	32.4218	86.62	-0.74	6829.4	86.81	-0.70	7233.4	2368148	203125
666.0	6574.934	-56.1460	32.4287	86.71	-0.81	6843.0	86.89	-0.77	7247.0	2381395	202941
668.0	6574.731	-56.0048	32.4355	86.80	-0.88	6856.7	86.98	-0.83	7260.7	2394670	202741
670.0	6574.512	-55.8633	32.4421	86.89	-0.95	6870.7	87.06	-0.89	7274.6	2407971	202524
672.0	6574.277	-55.7214	32.4485	86.97	-1.01	6884.8	87.14	-0.95	7288.8	2421300	202291
674.0	6574.027	-55.5793	32.4549	87.06	-1.07	6899.1	87.22	-1.01	7303.0	2434657	202043

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
676.0	6573.762	-55.4369	32.4608	87.15	-1.13	6913.6	87.31	-1.06	7317.5	2448041	201780
678.0	6573.484	-55.2940	32.4668	87.24	-1.18	6928.3	87.39	-1.11	7332.1	2461455	201504
680.0	6573.192	-55.1509	32.4725	87.32	-1.23	6943.1	87.47	-1.16	7346.9	2474897	201214
682.0	6572.888	-55.0074	32.4781	87.41	-1.28	6958.0	87.55	-1.21	7361.9	2488368	200912
684.0	6572.573	-54.8636	32.4835	87.50	-1.32	6973.1	87.64	-1.25	7376.9	2501869	200599
686.0	6572.246	-54.7195	32.4887	87.59	-1.36	6988.3	87.72	-1.29	7392.1	2515400	200274
688.0	6571.910	-54.5751	32.4937	87.67	-1.39	7003.6	87.80	-1.32	7407.4	2528960	199940
690.0	6571.565	-54.4303	32.4986	87.76	-1.43	7019.0	87.88	-1.35	7422.8	2542551	199596
692.0	6571.211	-54.2851	32.5033	87.85	-1.46	7034.6	87.97	-1.38	7438.3	2556172	199244
694.0	6570.850	-54.1396	32.5078	87.94	-1.48	7050.3	88.05	-1.40	7454.0	2569825	198884
696.0	6570.483	-53.9938	32.5122	88.02	-1.50	7066.0	88.13	-1.42	7469.7	2583508	198518
698.0	6570.110	-53.8476	32.5163	88.11	-1.52	7081.8	88.21	-1.44	7485.6	2597223	198147
700.0	6569.733	-53.7011	32.5203	88.20	-1.53	7097.6	88.30	-1.45	7501.2	2610969	197771
702.0	6569.352	-53.5542	32.5241	88.29	-1.54	7113.4	88.38	-1.45	7517.0	2624746	197392
704.0	6568.970	-53.4070	32.5278	88.37	-1.54	7129.2	88.46	-1.46	7532.8	2638555	197011
706.0	6568.587	-53.2594	32.5312	88.46	-1.54	7145.0	88.54	-1.45	7548.6	2652395	196629
708.0	6568.204	-53.1115	32.5345	88.55	-1.53	7160.8	88.62	-1.45	7564.3	2666267	196248
710.0	6567.824	-52.9632	32.5376	88.63	-1.51	7176.5	88.71	-1.43	7580.0	2680170	195868
712.0	6567.446	-52.8146	32.5405	88.72	-1.50	7192.2	88.79	-1.42	7595.7	2694104	195492
714.0	6567.073	-52.6657	32.5432	88.81	-1.47	7207.8	88.87	-1.39	7611.3	2708070	195119
716.0	6566.706	-52.5164	32.5457	88.89	-1.44	7223.3	88.95	-1.37	7626.8	2722067	194753
718.0	6566.345	-52.3667	32.5481	88.98	-1.41	7238.7	89.03	-1.34	7642.1	2736095	194393
720.0	6565.992	-52.2168	32.5502	89.07	-1.37	7254.0	89.12	-1.30	7657.4	2750153	194041
722.0	6565.649	-52.0665	32.5522	89.15	-1.33	7269.1	89.20	-1.26	7672.5	2764242	193699
724.0	6565.317	-51.9159	32.5540	89.24	-1.28	7284.0	89.28	-1.22	7687.4	2778361	193367
726.0	6564.997	-51.7649	32.5556	89.33	-1.23	7298.8	89.36	-1.17	7702.2	2792510	193047
728.0	6564.690	-51.6136	32.5570	89.41	-1.17	7313.3	89.44	-1.11	7716.7	2806689	192741
730.0	6564.397	-51.4620	32.5582	89.50	-1.11	7327.7	89.53	-1.06	7731.0	2820896	192448
732.0	6564.120	-51.3102	32.5593	89.59	-1.05	7341.7	89.61	-0.99	7745.1	2835132	192172
734.0	6563.860	-51.1580	32.5601	89.67	-0.98	7355.4	89.69	-0.93	7758.8	2849396	191912
736.0	6563.619	-51.0055	32.5607	89.76	-0.90	7368.8	89.77	-0.86	7772.2	2863687	191671
738.0	6563.396	-50.8527	32.5612	89.85	-0.82	7382.0	89.86	-0.78	7785.3	2878004	191448
740.0	6563.194	-50.6997	32.5614	89.94	-0.74	7394.7	89.94	-0.70	7798.0	2892348	191247
742.0	6563.013	-50.5463	32.5615	90.03	-0.66	7407.0	90.03	-0.62	7810.3	2906716	191066
744.0	6562.855	-50.3928	32.5613	90.11	-0.56	7419.0	90.11	-0.54	7822.3	2921109	190908
746.0	6562.721	-50.2389	32.5609	90.20	-0.47	7430.6	90.19	-0.45	7833.9	2935525	190773
S-IVB VELOCITY CUTOFF COMMAND											
747.040	6562.661	-50.1589	32.5607	90.25	-0.42	7436.6	90.24	-0.40	7839.9	2943031	190713
748.0	6562.609	-50.0849	32.5604	90.29	-0.41	7437.7	90.28	-0.39	7841.0	2949962	190661
750.0	6562.505	-49.9308	32.5596	90.39	-0.40	7438.4	90.37	-0.38	7841.7	2964406	190557
752.0	6562.399	-49.7767	32.5586	90.48	-0.40	7438.5	90.45	-0.38	7841.8	2978849	190451

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
754.0	6562.295	-49.6226	32.5574	90.57	-0.40	7438.6	90.54	-0.38	7841.9	2993293	190346
756.0	6562.191	-49.4685	32.5561	90.66	-0.40	7438.8	90.63	-0.38	7842.0	3007737	190242
ORBITAL INSERTION											
757.040	6562.135	-49.3883	32.5553	90.71	-0.40	7438.8	90.67	-0.38	7842.1	3015251	190185

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
GUIDANCE REFERENCE RELEASE									
-16.845	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
FIRST MOTION									
0.380	195	0	0	0.0	0.0	-0.0	3.29	0.00	-0.00
TU UMBILICAL DISCONNECT									
0.690	195	0	0	1.3	-0.0	-0.0	5.33	-0.01	-0.03
1.0	196	0	0	3.4	-0.0	-0.0	8.64	-0.00	-0.03
2.0	208	0	0	12.1	0.0	-0.0	8.80	0.02	-0.05
3.0	220	0	0	21.0	0.0	-0.1	8.96	0.06	-0.14
4.0	250	0	0	30.0	0.1	-0.3	9.13	0.10	-0.25
5.0	280	0	-1	39.2	0.2	-0.6	9.29	0.16	-0.32
6.0	329	1	-2	48.6	0.4	-0.9	9.46	0.23	-0.24
7.0	378	1	-3	58.1	0.7	-1.3	9.62	0.30	-0.51
8.0	444	2	-4	67.8	1.0	-2.0	9.78	0.38	-0.82
9.0	510	3	-7	77.7	1.5	-2.8	9.98	0.44	-0.85
10.0	599	5	-10	87.8	1.9	-3.6	10.21	0.46	-0.75
11.0	689	7	-14	98.1	2.4	-4.2	10.44	0.46	-0.44
12.0	798	10	-18	108.7	2.8	-4.5	10.67	0.43	-0.14
13.0	906	13	-23	119.5	3.2	-4.5	10.90	0.36	0.19
14.0	1037	16	-27	130.5	3.5	-4.2	11.16	0.21	0.31

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
15.0	1167	20	-31	141.8	3.6	-4.0	11.42	-0.17	0.16
16.0	1310	23	-35	152.7	3.1	-3.8	11.69	-0.64	0.28
17.0	1469	26	-39	164.4	2.4	-3.2	11.92	-0.75	1.04
18.0	1639	28	-41	176.6	1.6	-1.7	12.14	-0.80	1.88
19.0	1822	29	-42	188.8	0.8	0.5	12.39	-0.82	2.49
20.0	2017	30	-40	201.3	0.0	3.2	12.64	-0.82	2.97
21.0	2225	29	-35	214.2	-0.8	6.4	12.89	-0.81	3.34
22.0	2446	28	-27	227.2	-1.6	9.8	13.17	-0.77	3.58
23.0	2680	26	-15	240.6	-2.3	13.6	13.47	-0.71	4.00
24.0	2928	23	0	254.2	-3.0	17.9	13.76	-0.65	4.64
25.0	3189	20	21	268.1	-3.6	22.9	14.04	-0.60	5.18
26.0	3465	16	46	282.2	-4.2	28.2	14.32	-0.56	5.44
27.0	3755	11	77	296.7	-4.8	33.7	14.55	-0.52	5.63
28.0	4059	6	114	311.4	-5.3	39.4	14.79	-0.49	5.84
29.0	4378	1	156	326.1	-5.8	45.5	15.05	-0.47	6.39
30.0	4712	-5	205	341.2	-6.2	52.0	15.32	-0.45	6.68
31.0	5061	-11	260	356.4	-6.7	58.9	15.60	-0.42	7.07
32.0	5426	-18	323	372.1	-7.1	66.1	15.88	-0.26	7.41
33.0	5807	-25	393	388.2	-7.2	73.7	16.11	-0.22	7.81
34.0	6203	-33	470	404.4	-7.4	81.8	16.34	-0.19	8.28
35.0	6616	-40	556	420.8	-7.5	90.3	16.57	-0.17	8.78
36.0	7046	-48	650	437.7	-7.6	99.5	16.81	-0.16	9.26
37.0	7493	-56	752	454.6	-7.7	109.0	17.06	-0.14	9.83
38.0	7957	-63	865	472.0	-7.9	119.1	17.29	-0.12	10.40
39.0	8438	-71	988	489.2	-7.9	129.9	17.52	-0.10	10.87
40.0	8937	-79	1121	507.2	-8.0	141.5	17.78	-0.08	11.40
41.0	9454	-87	1267	525.2	-8.1	153.5	18.02	-0.06	12.04
42.0	9988	-96	1425	543.3	-8.2	166.1	18.25	-0.05	12.80
43.0	10542	-104	1596	561.7	-8.2	179.0	18.48	-0.03	13.38
44.0	11113	-112	1780	580.5	-8.2	192.8	18.72	-0.01	13.95
45.0	11704	-120	1978	599.4	-8.2	207.2	18.96	0.00	14.56
46.0	12314	-129	2191	618.5	-8.1	222.2	19.20	0.01	15.21
47.0	12943	-137	2420	637.7	-8.0	237.8	19.43	0.03	15.78
48.0	13591	-145	2664	657.4	-8.0	254.0	19.64	0.04	16.42
49.0	14260	-153	2925	677.4	-7.8	270.8	19.84	0.05	17.04
50.0	14948	-160	3202	697.5	-7.8	288.2	20.07	0.06	17.86
51.0	15657	-168	3498	717.7	-7.7	306.4	20.37	0.07	18.69
52.0	16386	-176	3812	738.4	-7.8	325.7	20.56	0.09	19.44
53.0	17135	-184	4146	759.2	-8.0	345.3	20.73	0.10	20.05
54.0	17906	-192	4500	780.1	-8.2	365.8	20.86	0.11	20.75
55.0	18697	-200	4875	800.8	-8.5	386.9	20.99	0.12	21.51
56.0	19510	-209	5271	822.0	-8.6	409.1	21.11	0.14	22.31
57.0	20344	-217	5689	843.4	-8.5	431.6	21.25	0.15	23.17

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
58.0	21199	-226	6131	864.9	-8.3	455.4	21.39	0.17	23.79
59.0	22075	-234	6597	886.1	-8.8	479.7	21.51	0.18	24.38
60.0	22973	-244	7087	907.4	-9.1	505.0	21.62	0.19	24.87
MACH 1									
60.500	23431	-248	7343	918.5	-9.1	517.5	21.68	0.20	25.20
61.0	23893	-253	7604	929.3	-9.0	530.3	21.75	0.21	25.55
62.0	24835	-262	8145	950.5	-8.8	556.3	21.92	0.22	26.24
63.0	25796	-270	8713	972.2	-8.5	583.1	22.10	0.23	26.99
64.0	26781	-279	9309	994.5	-8.1	610.5	22.28	0.25	27.75
65.0	27788	-287	9931	1016.6	-7.8	638.7	22.45	0.26	28.50
66.0	28817	-294	10583	1038.8	-7.4	667.5	22.62	0.27	29.17
67.0	29868	-302	11264	1061.4	-7.0	697.0	22.83	0.28	30.07
68.0	30942	-308	11974	1084.3	-6.8	727.6	23.12	0.29	30.85
69.0	32040	-315	12716	1107.4	-6.5	758.7	23.35	0.30	31.58
70.0	33160	-322	13490	1130.9	-6.2	791.2	23.53	0.32	32.19
71.0	34304	-328	14296	1154.5	-5.8	824.2	23.71	0.34	32.86
72.0	35472	-333	15135	1177.9	-5.6	857.4	23.88	0.36	33.74
73.0	36663	-339	16009	1202.0	-5.2	892.5	23.96	0.38	34.86
74.0	37879	-343	16918	1226.2	-4.6	928.1	24.04	0.40	36.16
75.0	39118	-348	17862	1250.0	-4.1	965.0	24.14	0.43	37.50
MAXIMUM DYNAMIC PRESSURE									
75.200	39369	-349	18056	1254.8	-4.1	972.5	24.16	0.43	37.77
76.0	40382	-352	18845	1274.2	-3.9	1003.1	24.20	0.45	38.71
77.0	41670	-356	19867	1298.5	-3.7	1042.7	24.23	0.47	40.02
78.0	42982	-359	20929	1322.8	-2.9	1083.8	24.25	0.49	41.22
79.0	44318	-361	22032	1347.2	-2.1	1125.9	24.23	0.52	42.39
80.0	45679	-364	23178	1371.3	-1.7	1169.1	24.21	0.55	43.66
81.0	47063	-366	24368	1395.0	-1.6	1213.4	24.18	0.58	45.07
82.0	48472	-367	25603	1418.9	-1.0	1259.2	24.11	0.62	46.38
83.0	49904	-367	26885	1443.0	-0.4	1306.3	23.94	0.65	47.86
84.0	51361	-367	28214	1466.8	0.3	1354.9	23.75	0.68	49.52
85.0	52841	-367	29593	1490.4	1.2	1405.1	23.51	0.71	51.22
86.0	54344	-365	31023	1513.7	2.4	1456.4	23.26	0.74	52.68
87.0	55871	-362	32505	1536.9	3.1	1509.0	22.98	0.75	54.00
88.0	57421	-359	34039	1559.5	3.6	1563.2	22.72	0.68	55.44
89.0	58994	-355	35629	1582.2	3.7	1619.0	22.50	0.17	56.56
90.0	60588	-352	37276	1604.3	3.8	1675.6	22.30	-0.15	58.06
91.0	62205	-348	38980	1626.6	3.6	1733.8	22.10	-0.29	59.43
92.0	63845	-344	40742	1648.5	3.4	1793.3	21.95	-0.35	60.74

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS,- ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
93.0	65506	-341	42565	1670.7	3.1	1854.4	21.83	-0.39	61.95
94.0	67189	-338	44450	1692.7	2.8	1916.9	21.69	-0.43	63.10
95.0	68894	-336	46398	1714.3	2.3	1980.6	21.62	-0.41	64.15
96.0	70620	-334	48410	1735.6	2.1	2045.1	21.58	-0.35	65.26
97.0	72368	-331	50488	1757.0	2.0	2111.5	21.57	-0.28	66.26
98.0	74138	-330	52632	1778.5	1.8	2178.2	21.60	-0.24	67.31
99.0	75929	-328	54843	1800.2	1.4	2246.5	21.67	-0.20	68.32
100.0	77741	-327	57124	1821.9	1.2	2315.9	21.80	-0.13	69.25
101.0	79575	-325	59474	1843.7	1.1	2385.7	21.96	-0.10	70.28
102.0	81432	-324	61894	1865.9	1.1	2456.9	22.20	-0.06	71.33
103.0	83310	-323	64388	1888.2	1.1	2529.3	22.44	-0.03	72.33
104.0	85211	-322	66953	1910.7	1.0	2602.4	22.64	-0.01	73.41
105.0	87135	-321	69592	1933.3	1.0	2676.6	22.81	0.01	74.49
106.0	89081	-320	72306	1956.3	1.1	2751.9	22.95	0.02	75.55
107.0	91050	-319	75096	1979.3	1.0	2828.2	23.09	0.02	76.72
108.0	93043	-318	77962	2002.5	1.0	2905.8	23.23	0.03	77.94
109.0	95058	-317	80907	2025.9	1.0	2984.5	23.38	0.04	79.22
110.0	97097	-316	83931	2049.5	1.0	3064.6	23.42	0.06	80.52
111.0	99160	-315	87037	2073.0	1.0	3145.8	23.46	0.07	81.74
112.0	101246	-314	90223	2096.1	1.1	3228.0	23.44	0.08	83.04
113.0	103355	-313	93493	2119.4	1.3	3312.0	23.39	0.07	84.32
114.0	105487	-312	96847	2142.9	1.4	3397.0	23.32	0.04	85.88
115.0	107643	-310	100288	2166.4	1.5	3483.8	23.25	-0.02	87.42
116.0	109823	-309	103816	2189.4	1.4	3572.0	23.18	-0.10	88.95
117.0	112025	-308	107432	2212.7	1.3	3661.5	23.12	-0.20	90.37
118.0	114251	-306	111139	2235.6	1.1	3752.2	23.05	-0.22	91.78
119.0	116499	-305	114938	2258.7	0.9	3844.8	23.04	-0.23	93.14
120.0	118771	-305	118830	2281.8	0.5	3938.4	23.05	-0.23	94.55
121.0	121065	-304	122815	2304.7	0.3	4033.2	23.07	-0.24	95.96
122.0	123382	-304	126898	2327.8	0.0	4130.1	23.10	-0.24	97.45
123.0	125723	-304	131077	2351.0	-0.2	4228.4	23.14	-0.24	98.86
124.0	128087	-304	135355	2374.1	-0.4	4328.1	23.18	-0.24	100.39
125.0	130474	-305	139734	2397.5	-0.7	4430.7	23.22	-0.23	101.91
126.0	132884	-306	144218	2420.7	-1.0	4534.9	23.28	-0.23	103.54
127.0	135317	-307	148805	2443.9	-1.3	4639.1	23.38	-0.24	105.36
128.0	137774	-309	153497	2467.2	-1.6	4744.4	23.51	-0.25	107.15
129.0	140254	-310	158295	2490.8	-1.8	4852.8	23.68	-0.26	108.92
130.0	142758	-312	163205	2514.7	-2.1	4963.0	23.85	-0.29	110.49
131.0	145286	-314	168224	2538.7	-2.4	5074.6	24.03	-0.34	112.19
132.0	147838	-317	173355	2563.0	-2.6	5188.2	24.21	-0.38	114.01
133.0	150414	-320	178602	2586.8	-3.0	5303.2	24.40	-0.42	116.15
134.0	153014	-323	183964	2611.2	-3.4	5420.5	24.57	-0.46	118.14
135.0	155637	-327	189444	2636.0	-3.8	5539.8	24.74	-0.50	119.99

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
136.0	158237	-331	195046	2661.0	-4.3	5661.0	24.92	-0.53	122.40
137.0	160962	-335	200769	2686.2	-4.9	5784.2	25.14	-0.56	124.54
138.0	163662	-340	206618	2711.5	-5.4	5909.8	25.38	-0.59	126.54
139.0	166387	-346	212593	2737.0	-6.1	6037.2	25.60	-0.62	128.82
140.0	169138	-353	218694	2762.7	-6.7	6166.7	25.82	-0.66	131.09
141.0	171914	-360	224928	2788.6	-7.4	6299.0	26.18	-0.68	133.36
142.0	174717	-367	231295	2815.1	-8.1	6434.3	26.42	-0.69	135.64
143.0	177546	-376	237799	2841.7	-8.8	6571.6	26.67	-0.69	137.92
144.0	180402	-385	244440	2868.5	-9.5	6710.4	26.90	-0.68	140.20
S-IC INBOARD ENGINE CUTOFF									
144.720	182475	-392	249309	2886.7	-10.0	6808.5	27.11	-0.67	141.84
145.0	183284	-395	251220	2892.9	-10.2	6844.4	23.09	-0.67	127.36
146.0	186189	-405	258130	2912.1	-11.0	6966.4	15.77	-0.64	113.08
147.0	189107	-417	265149	2928.3	-11.6	7081.1	16.07	-0.61	115.26
148.0	192045	-429	272288	2944.6	-12.4	7200.0	16.33	-0.32	117.45
S-IC OUTBOARD ENGINE CUTOFF									
148.410	193266	-433	275279	2951.5	-12.4	7245.9	16.49	0.13	118.34
149.0	195018	-441	279574	2944.7	-12.4	7290.0	-24.05	0.16	10.23
S-IC/S-II SEPARATION COMMAND									
149.080	195261	-442	280158	2942.6	-12.5	7291.3	-32.52	0.16	-5.32
150.0	197972	-454	286861	2918.2	-12.7	7296.4	-32.52	0.20	-3.44
152.0	203726	-478	301437	2860.5	-12.1	7297.5	-27.37	0.28	7.47
154.0	209390	-502	316025	2812.3	-11.5	7319.7	-22.02	0.35	20.63
156.0	214971	-524	330705	2768.3	-10.8	7359.4	-21.03	0.43	22.25
158.0	220464	-545	345466	2726.3	-9.9	7403.9	-20.78	0.49	22.80
160.0	225876	-563	360320	2684.8	-9.0	7449.3	-20.66	0.51	23.04
162.0	231204	-581	375264	2643.5	-7.9	7495.2	-20.54	0.53	23.29
164.0	236450	-595	390301	2602.6	-7.0	7541.6	-20.46	0.54	23.38
166.0	241614	-609	405430	2561.7	-6.1	7588.2	-20.39	0.55	23.43
168.0	246697	-620	420654	2521.1	-5.0	7635.1	-20.35	0.55	23.54
170.0	251699	-629	435971	2480.4	-4.1	7682.3	-20.28	0.56	23.57
172.0	256619	-636	451383	2440.0	-3.1	7729.8	-20.23	0.57	23.60
174.0	261459	-641	466890	2399.8	-2.1	7777.3	-20.15	0.57	23.81
176.0	266219	-644	482492	2359.6	-1.0	7824.9	-20.07	0.58	23.96
178.0	270898	-645	498190	2319.6	-0.0	7872.8	-19.99	0.58	24.09
180.0	275497	-644	513984	2279.7	1.0	7921.2	-19.89	0.59	24.14
182.0	280017	-641	529875	2240.1	2.1	7969.7	-19.80	0.60	24.49

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
184.0	284458	-636	545864	2200.6	3.1	8018.7	-19.72	0.61	24.54
186.0	288819	-629	561949	2161.4	4.2	8067.8	-19.65	0.61	24.76
188.0	293103	-619	578134	2122.4	5.4	8117.3	-19.55	0.62	24.85
190.0	297308	-607	594418	2083.5	6.5	8167.0	-19.46	0.62	24.98
192.0	301436	-593	610802	2044.6	7.7	8216.6	-19.30	0.63	24.99
194.0	305486	-576	627285	2006.3	8.9	8266.5	-18.93	0.67	24.84
196.0	309459	-557	643869	1969.0	10.3	8316.3	-18.27	0.75	24.61
198.0	313358	-535	660551	1933.1	11.8	8365.3	-17.21	0.79	24.28
200.0	317189	-510	677331	1899.9	13.5	8413.5	-16.23	0.81	24.09
202.0	320953	-481	694207	1867.3	15.1	8461.5	-15.47	0.83	23.74
204.0	324656	-449	711177	1836.5	16.8	8508.9	-14.93	0.84	23.59
206.0	328300	-414	728242	1806.5	18.4	8556.1	-14.71	0.85	23.67
208.0	331884	-375	745401	1776.8	20.1	8603.5	-14.72	0.85	23.67
210.0	335408	-333	762656	1747.1	21.8	8650.9	-14.77	0.86	23.78
212.0	338873	-288	780005	1717.3	23.5	8698.5	-14.85	0.88	23.99
214.0	342278	-239	797450	1687.5	25.1	8746.6	-14.94	0.90	24.17
216.0	345624	-187	814992	1657.6	27.0	8795.2	-15.01	0.91	24.39
218.0	348909	-131	832631	1627.5	28.8	8844.2	-15.09	0.93	24.57
220.0	352134	-72	850369	1597.3	30.7	8893.5	-15.16	0.94	24.77
222.0	355299	-8	868205	1566.9	32.7	8943.1	-15.25	0.96	24.94
224.0	358402	59	886141	1536.2	34.5	8993.2	-15.32	0.97	25.15
226.0	361445	130	904178	1505.5	36.4	9043.3	-15.37	0.99	25.30
228.0	364425	205	922316	1474.6	38.4	9094.3	-15.42	1.00	25.40
230.0	367343	283	940555	1443.7	40.4	9145.3	-15.47	1.01	25.59
232.0	370200	366	958897	1412.7	42.4	9196.6	-15.53	1.02	25.75
234.0	372995	453	977342	1381.4	44.6	9248.4	-15.57	1.03	25.87
236.0	375727	544	995891	1350.2	46.7	9300.3	-15.60	1.03	26.00
238.0	378396	640	1014543	1318.9	48.7	9352.7	-15.63	1.04	26.16
240.0	381003	739	1033301	1287.7	50.8	9405.3	-15.65	1.05	26.34
242.0	383548	843	1052165	1256.3	52.9	9458.2	-15.66	1.06	26.53
244.0	386029	951	1071135	1225.0	55.0	9511.6	-15.69	1.06	26.68
246.0	388448	1063	1090211	1193.6	57.1	9565.2	-15.71	1.07	26.83
248.0	390804	1180	1109396	1162.2	59.3	9619.1	-15.73	1.08	26.97
250.0	393098	1300	1128688	1130.7	61.4	9673.2	-15.75	1.09	27.15
252.0	395328	1425	1148089	1099.3	63.5	9727.7	-15.76	1.10	27.32
254.0	397496	1554	1167599	1067.9	65.6	9782.6	-15.78	1.11	27.47
256.0	399600	1688	1187220	1036.3	67.8	9837.7	-15.80	1.12	27.66
258.0	401642	1826	1206950	1004.7	70.1	9893.3	-15.82	1.12	27.86
260.0	403620	1968	1226793	973.1	72.4	9949.0	-15.85	1.13	28.04
262.0	405535	2115	1246747	941.6	74.7	10005.5	-15.87	1.14	28.20
264.0	407386	2267	1266815	909.7	77.0	10062.2	-15.91	1.15	28.36
266.0	409174	2423	1286996	877.8	79.3	10118.8	-15.94	1.16	28.56
268.0	410898	2584	1307291	845.9	81.6	10176.0	-15.99	1.16	28.77

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
270.0	412558	2750	1327700	813.8	83.9	10233.4	-16.03	1.17	28.96
272.0	414154	2920	1348225	781.8	86.1	10291.3	-16.07	1.18	29.15
274.0	415686	3094	1368866	749.6	88.5	10349.7	-16.11	1.19	29.32
276.0	417153	3274	1389624	717.4	90.8	10408.5	-16.15	1.20	29.47
278.0	418556	3458	1410500	685.1	93.3	10467.7	-16.19	1.21	29.64
280.0	419894	3647	1431495	652.7	95.7	10527.2	-16.24	1.21	29.86
282.0	421167	3840	1452610	620.0	98.1	10586.9	-16.28	1.22	30.07
284.0	422375	4039	1473843	587.4	100.6	10646.8	-16.33	1.23	30.27
286.0	423518	4243	1495198	554.7	103.0	10707.4	-16.38	1.24	30.46
288.0	424595	4451	1516673	521.8	105.5	10768.3	-16.42	1.25	30.65
290.0	425606	4665	1538271	488.9	108.0	10829.8	-16.47	1.26	30.82
292.0	426551	4883	1559993	456.0	110.6	10891.6	-16.52	1.28	31.00
294.0	427430	5107	1581838	422.8	113.2	10953.6	-16.56	1.29	31.20
296.0	428243	5336	1603808	389.7	115.7	11016.1	-16.61	1.30	31.37
298.0	428989	5570	1625903	356.3	118.3	11079.0	-16.66	1.31	31.55
300.0	429669	5809	1648124	322.8	120.9	11142.3	-16.70	1.32	31.72
302.0	430281	6054	1670472	289.4	123.6	11205.9	-16.75	1.33	31.90
304.0	430827	6303	1692948	255.8	126.2	11269.8	-16.80	1.34	32.12
306.0	431305	6558	1715552	222.1	128.9	11334.4	-16.85	1.35	32.35
308.0	431716	6819	1738286	188.3	131.7	11399.3	-16.90	1.36	32.57
310.0	432059	7085	1761150	154.4	134.5	11464.5	-16.94	1.37	32.80
312.0	432334	7357	1784145	120.6	137.2	11530.3	-16.99	1.38	33.01
314.0	432541	7634	1807272	86.4	140.0	11596.4	-17.04	1.39	33.19
316.0	432681	7917	1830532	52.4	142.7	11663.1	-17.10	1.41	33.36
318.0	432751	8205	1853925	18.0	145.4	11730.1	-17.15	1.42	33.54
320.0	432753	8499	1877452	-16.3	148.2	11797.3	-17.22	1.43	33.73
322.0	432686	8798	1901115	-51.0	151.0	11864.9	-17.28	1.44	33.93
324.0	432550	9103	1924912	-85.7	153.9	11932.6	-17.35	1.45	34.13
326.0	432344	9414	1948846	-120.3	156.8	12001.1	-17.42	1.46	34.35
328.0	432069	9730	1972917	-155.1	159.7	12069.9	-17.49	1.47	34.58
330.0	431724	10052	1997127	-190.3	162.6	12139.2	-17.56	1.48	34.81
332.0	431309	10381	2021475	-225.5	165.6	12209.1	-17.63	1.49	35.02
334.0	430823	10715	2045964	-260.9	168.5	12279.3	-17.70	1.50	35.25
336.0	430266	11055	2070593	-296.4	171.5	12349.9	-17.77	1.51	35.46
338.0	429638	11401	2095364	-332.0	174.6	12421.2	-17.82	1.53	35.69
340.0	428938	11753	2120278	-367.7	177.7	12493.1	-17.89	1.54	35.94
342.0	428168	12112	2145337	-403.5	180.8	12565.1	-17.95	1.55	36.18
344.0	427325	12476	2170539	-439.5	183.8	12637.7	-18.02	1.56	36.42
346.0	426410	12847	2195888	-475.6	186.9	12710.9	-18.10	1.57	36.64
348.0	425423	13224	2221384	-512.0	190.1	12784.4	-18.17	1.58	36.91
350.0	424363	13607	2247027	-548.5	193.2	12858.5	-18.24	1.59	37.15
352.0	423230	13997	2272818	-585.1	196.3	12933.2	-18.31	1.60	37.43
354.0	422023	14392	2298760	-621.7	199.5	13008.3	-18.38	1.61	37.73

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
356.0	420743	14795	2324853	-658.5	202.7	13084.2	-18.45	1.63	38.00
358.0	419390	15203	2351097	-695.5	205.8	13160.3	-18.53	1.64	38.24
360.0	417962	15618	2377495	-732.7	208.9	13237.1	-18.61	1.65	38.48
362.0	416460	16039	2404046	-770.0	212.2	13314.3	-18.70	1.66	38.73
364.0	414882	16466	2430753	-807.4	215.4	13391.9	-18.79	1.67	38.98
366.0	413230	16900	2457615	-845.2	218.7	13470.4	-18.88	1.68	39.26
368.0	411502	17341	2484635	-883.2	222.0	13549.3	-18.97	1.69	39.56
370.0	409698	17789	2511813	-921.3	225.3	13628.8	-19.06	1.70	39.86
372.0	407818	18243	2539151	-959.5	228.6	13709.0	-19.16	1.71	40.17
374.0	405860	18703	2566650	-998.0	232.0	13789.5	-19.27	1.72	40.48
376.0	403826	19171	2594310	-1036.5	235.5	13870.8	-19.39	1.73	40.79
378.0	401715	19645	2622135	-1075.5	238.9	13952.7	-19.49	1.75	41.08
380.0	399525	20126	2650123	-1114.7	242.3	14035.2	-19.60	1.76	41.37
382.0	397256	20614	2678276	-1154.1	245.9	14118.2	-19.71	1.77	41.70
384.0	394909	21110	2706597	-1193.6	249.4	14202.0	-19.82	1.79	42.01
386.0	392482	21612	2735085	-1233.4	252.9	14286.2	-19.93	1.80	42.29
388.0	389976	22121	2763743	-1273.3	256.5	14371.2	-20.04	1.81	42.63
390.0	387389	22638	2792571	-1313.5	260.2	14457.0	-20.15	1.82	42.94
392.0	384722	23162	2821572	-1354.1	263.7	14543.2	-20.27	1.83	43.24
394.0	381973	23693	2850746	-1394.8	267.4	14630.3	-20.38	1.85	43.56
396.0	379143	24231	2880094	-1435.5	271.1	14717.5	-20.50	1.86	43.87
398.0	376232	24777	2909617	-1476.7	274.9	14805.5	-20.61	1.87	44.25
400.0	373237	25331	2939317	-1518.0	278.7	14894.5	-20.73	1.88	44.60
402.0	370160	25892	2969196	-1559.6	282.5	14984.3	-20.85	1.88	44.91
404.0	366999	26461	2999255	-1601.3	286.3	15074.2	-20.97	1.89	45.24
406.0	363755	27038	3029495	-1643.4	290.1	15165.3	-21.09	1.90	45.58
408.0	360426	27622	3059917	-1685.7	294.0	15256.8	-21.22	1.91	45.94
410.0	357013	28213	3090523	-1728.3	297.8	15349.1	-21.35	1.92	46.32
412.0	353509	28813	3121312	-1771.2	301.5	15441.1	-21.48	1.93	45.23
S-II STAGE ENGINE NO.2 OUT									
412.920	351869	29091	3135538	-1790.8	302.9	15482.2	-21.51	1.93	35.08
414.0	349921	29418	3152280	-1813.6	304.1	15521.7	-21.43	1.94	30.39
416.0	346250	30028	3183385	-1854.4	305.8	15579.6	-19.38	1.94	25.48
418.0	342502	30642	3214594	-1890.9	307.6	15630.1	-16.92	1.94	24.63
420.0	338686	31259	3245903	-1922.6	309.7	15679.1	-14.66	1.94	24.23
422.0	334811	31881	3277310	-1951.7	312.5	15727.5	-14.30	1.93	24.19
424.0	330879	32509	3308814	-1980.3	316.4	15775.9	-14.34	1.93	24.28
426.0	326890	33147	3340414	-2010.0	321.2	15825.0	-15.31	1.92	24.82
428.0	322840	33795	3372114	-2041.6	326.6	15875.3	-16.21	1.91	25.39
430.0	318725	34453	3403916	-2075.3	331.8	15926.9	-17.25	1.90	25.93
432.0	314540	35122	3435822	-2110.7	336.6	15979.0	-18.09	1.88	26.34

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
434.0	310283	35799	3467833	-2147.5	340.4	16032.0	-18.74	1.87	26.69
436.0	305952	36482	3499951	-2185.5	343.3	16085.5	-19.37	1.84	27.01
438.0	301543	37171	3532176	-2225.1	345.9	16139.9	-20.19	1.82	27.33
440.0	297052	37866	3564511	-2266.5	348.6	16194.6	-20.79	1.81	27.65
442.0	292478	38566	3596956	-2309.1	351.6	16250.4	-21.36	1.79	27.94
444.0	287819	39273	3629513	-2353.1	355.3	16306.6	-21.90	1.77	28.16
446.0	283069	39987	3662183	-2397.2	359.1	16362.9	-22.40	1.75	28.33
448.0	278230	40710	3694966	-2442.4	363.3	16419.6	-22.76	1.74	28.50
450.0	273300	41440	3727862	-2488.3	367.3	16476.7	-23.06	1.73	28.68
452.0	268278	42178	3760873	-2534.6	370.9	16534.0	-23.30	1.72	28.84
454.0	263163	42924	3793999	-2581.5	374.2	16591.9	-23.57	1.71	29.02
456.0	257953	43675	3827241	-2628.9	377.0	16649.8	-23.78	1.70	29.18
458.0	252648	44432	3860599	-2676.6	379.7	16708.2	-23.93	1.69	29.34
460.0	247248	45193	3894074	-2724.5	382.4	16767.0	-24.05	1.68	29.46
462.0	241751	45961	3927667	-2772.7	385.4	16826.1	-24.15	1.67	29.59
464.0	236157	46735	3961378	-2821.1	388.7	16885.4	-24.24	1.67	29.74
466.0	230466	47516	3995209	-2869.6	392.3	16945.1	-24.30	1.66	29.89
468.0	224679	48304	4029159	-2918.2	396.0	17004.9	-24.32	1.65	30.04
470.0	218793	49100	4063229	-2966.8	399.6	17065.0	-24.34	1.64	30.18
472.0	212811	49903	4097419	-3015.6	403.1	17125.5	-24.35	1.64	30.29
474.0	206731	50712	4131731	-3064.3	406.4	17186.1	-24.36	1.63	30.41
476.0	200553	51528	4166163	-3113.0	409.3	17246.8	-24.35	1.62	30.56
478.0	194278	52350	4200718	-3161.7	412.2	17308.0	-24.33	1.61	30.71
480.0	187906	53177	4235395	-3210.4	415.2	17369.3	-24.31	1.60	30.88
482.0	181436	54011	4270195	-3259.0	418.6	17431.2	-24.28	1.60	30.94
484.0	174870	54852	4305120	-3307.5	422.0	17493.1	-24.24	1.59	30.94
486.0	168206	55699	4340168	-3355.9	425.6	17554.8	-24.20	1.59	30.81
488.0	161446	56554	4375339	-3404.3	429.1	17616.2	-24.15	1.58	30.62
490.0	154589	57415	4410632	-3452.5	432.4	17676.9	-24.12	1.58	30.26
492.0	147635	58283	4446046	-3500.7	435.4	17737.0	-24.07	1.57	29.77
494.0	140586	59157	4481580	-3549.0	438.2	17796.0	-24.02	1.57	29.20
496.0	133440	60036	4517230	-3596.9	440.9	17854.0	-23.95	1.57	28.71
498.0	126198	60921	4552995	-3644.8	443.7	17910.8	-23.87	1.56	28.19
500.0	118861	61811	4588872	-3692.3	446.7	17967.0	-23.74	1.56	27.86
502.0	111429	62708	4624862	-3739.6	449.9	18022.2	-23.61	1.56	27.60
504.0	103902	63611	4660961	-3786.6	453.2	18077.2	-23.37	1.55	27.43
506.0	96282	64520	4697170	-3833.0	456.4	18132.0	-23.12	1.55	27.32
508.0	88570	65436	4733489	-3878.9	459.6	18186.5	-22.87	1.54	27.21
510.0	80766	66359	4769916	-3924.4	462.9	18241.0	-22.59	1.54	27.13
512.0	72871	67288	4806453	-3969.2	465.9	18295.4	-22.30	1.54	27.04
514.0	64888	68222	4843097	-4013.3	468.8	18349.3	-21.72	1.53	26.94
516.0	56816	69163	4879850	-4056.0	471.7	18403.4	-20.73	1.53	26.87
518.0	48661	70109	4916709	-4096.7	474.7	18456.4	-19.90	1.53	26.89

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
520.0	40427	71062	4953575	-4133.7	477.7	18509.3	-19.27	1.53	26.90
522.0	32122	72020	4990747	-4173.5	480.7	18562.9	-19.24	1.53	26.92
524.0	23738	72985	5027927	-4211.7	483.8	18616.7	-19.22	1.53	26.91
526.0	15275	73955	5065214	-4250.2	486.8	18671.1	-19.20	1.54	26.97
528.0	6736	74932	5102612	-4288.8	490.0	18725.7	-19.18	1.54	27.05
530.0	-1880	75915	5140117	-4327.2	492.9	18780.1	-19.16	1.54	27.15
532.0	-10573	76904	5177732	-4365.4	495.8	18834.4	-19.14	1.54	27.17
534.0	-19341	77898	5215455	-4403.7	498.9	18888.9	-19.12	1.55	27.21
536.0	-28187	78899	5253287	-4442.0	502.0	18943.3	-19.10	1.55	27.27
538.0	-37109	79906	5291229	-4480.3	505.3	18997.9	-19.08	1.55	27.38
540.0	-46108	80920	5329280	-4518.6	508.5	19053.0	-19.06	1.54	27.48
542.0	-55183	81940	5367441	-4556.9	511.6	19108.1	-19.04	1.53	27.60
544.0	-64335	82967	5405713	-4595.0	514.6	19163.4	-19.02	1.52	27.70
546.0	-73563	83999	5444096	-4632.9	517.6	19219.0	-19.00	1.52	27.80
548.0	-82867	85037	5482589	-4671.0	520.6	19274.5	-18.98	1.53	27.92
550.0	-92247	86081	5521195	-4708.9	523.7	19330.6	-18.96	1.54	28.00
552.0	-101702	87132	5559912	-4746.7	526.7	19386.7	-18.95	1.56	28.09
554.0	-111234	88188	5598742	-4784.7	529.9	19442.9	-18.93	1.58	28.19
556.0	-120841	89251	5637685	-4822.5	533.1	19499.4	-18.91	1.60	28.32
558.0	-130523	90321	5676740	-4860.2	536.5	19556.2	-18.89	1.60	28.40
560.0	-140281	91397	5715910	-4897.8	539.7	19613.1	-18.87	1.61	28.46
562.0	-150114	92480	5755193	-4935.5	542.8	19670.2	-18.85	1.61	28.52
564.0	-160023	93569	5794591	-4973.0	546.2	19727.1	-18.84	1.61	28.52
566.0	-170006	94664	5834102	-5010.5	549.4	19784.4	-18.82	1.61	28.48
568.0	-180065	95766	5873728	-5048.0	552.5	19841.1	-18.81	1.61	28.42
570.0	-190198	96874	5913468	-5085.5	555.8	19897.9	-18.80	1.62	28.37
572.0	-200407	97989	5953320	-5123.0	559.0	19954.6	-18.79	1.62	28.32
574.0	-210690	99110	5993286	-5160.6	562.2	20011.2	-18.78	1.54	28.28
576.0	-221049	100238	6033365	-5198.6	565.4	20065.7	-18.76	1.48	28.24
S-II ENGINE CUTOFF									
576.330	-222539	100429	6039011	-5204.4	565.8	20071.5	-18.76	1.48	28.24
S-II/S-IVB SEPARATION COMMAND									
577.080	-226675	100850	6055052	-5223.2	567.0	20076.7	-25.79	1.47	0.98
578.0	-231483	101373	6073565	-5247.1	568.3	20071.5	-26.32	1.46	-6.87
580.0	-242033	102513	6113679	-5299.9	571.3	20057.2	-26.30	1.45	-6.88
582.0	-252683	103658	6153792	-5351.1	574.1	20051.6	-24.81	1.44	3.35
584.0	-263435	104809	6193901	-5400.9	576.7	20063.1	-25.03	1.44	9.76
586.0	-274287	105965	6234048	-5452.7	579.2	20082.6	-25.53	1.44	11.31
588.0	-285245	107126	6274236	-5505.6	582.3	20105.3	-26.13	2.26	12.10

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
590.0	-296309	108295	6314472	-5558.7	586.9	20129.9	-26.80	2.45	12.47
592.0	-307480	109475	6354757	-5613.1	592.1	20155.2	-27.63	2.47	12.58
594.0	-318762	110664	6395094	-5669.4	597.0	20180.6	-28.40	2.48	12.67
596.0	-330158	111863	6435481	-5726.8	602.0	20205.7	-29.05	2.50	12.73
598.0	-341670	113072	6475918	-5785.6	607.1	20231.2	-29.69	2.51	12.65
600.0	-353301	114291	6516406	-5845.7	612.3	20256.0	-30.40	2.53	12.54
602.0	-365054	115521	6556944	-5907.5	617.2	20280.9	-31.19	2.54	12.41
604.0	-376931	116760	6597531	-5970.6	622.3	20305.6	-31.85	2.55	12.27
606.0	-388937	118010	6638167	-6034.9	627.3	20329.8	-32.59	2.56	12.11
608.0	-401072	119269	6678852	-6100.7	632.4	20353.8	-33.26	2.57	11.95
610.0	-413340	120539	6719584	-6167.8	637.5	20377.3	-33.97	2.58	11.69
612.0	-425744	121819	6760362	-6236.5	642.7	20400.3	-34.68	2.59	11.43
614.0	-438287	123110	6801186	-6306.5	647.8	20422.9	-35.39	2.61	11.12
616.0	-450970	124411	6842054	-6377.8	653.1	20444.9	-36.09	2.62	10.80
618.0	-463798	125722	6882967	-6450.4	658.3	20466.2	-36.67	2.64	10.45
620.0	-476773	127044	6923920	-6524.2	663.7	20486.6	-37.39	2.65	10.15
622.0	-489897	128377	6964914	-6599.7	669.0	20506.7	-38.01	2.67	9.75
624.0	-503173	129720	7005947	-6676.2	674.3	20525.7	-38.61	2.69	9.38
626.0	-516603	131074	7047018	-6754.1	679.7	20543.9	-39.29	2.70	8.96
628.0	-530191	132439	7088124	-6833.4	685.1	20561.4	-39.85	2.72	8.46
630.0	-543938	133815	7129264	-6913.7	690.6	20577.8	-40.50	2.74	7.98
632.0	-557847	135201	7170436	-6995.3	696.1	20593.3	-41.08	2.75	7.45
634.0	-571920	136599	7211638	-7078.2	701.7	20607.8	-41.71	2.77	6.93
636.0	-586160	138008	7252868	-7162.2	707.3	20621.3	-42.27	2.78	6.40
638.0	-600570	139429	7294124	-7247.3	712.9	20633.7	-42.85	2.80	5.84
640.0	-615151	140860	7335403	-7333.6	718.6	20644.9	-43.37	2.81	5.23
642.0	-629905	142303	7376703	-7420.7	724.2	20654.9	-43.88	2.82	4.60
644.0	-644835	143757	7418023	-7508.9	729.8	20663.8	-44.38	2.83	4.04
646.0	-659942	145222	7459357	-7598.2	735.4	20671.4	-44.74	2.85	3.72
648.0	-675229	146698	7500708	-7687.8	741.0	20679.0	-44.75	2.86	3.92
650.0	-690693	148186	7542074	-7777.2	746.7	20687.3	-44.50	2.86	4.22
652.0	-706336	149685	7583457	-7865.7	752.5	20696.2	-44.29	2.86	4.52
654.0	-722156	151196	7624859	-7954.0	758.3	20705.7	-44.05	2.86	4.83
656.0	-738152	152718	7666280	-8042.0	764.0	20715.8	-43.82	2.86	5.13
658.0	-754323	154252	7707722	-8129.3	769.7	20726.3	-43.58	2.85	5.43
660.0	-770669	155797	7749186	-8216.3	775.5	20737.5	-43.36	2.84	5.74
662.0	-787187	157354	7790672	-8302.7	781.2	20749.2	-43.09	2.83	6.04
664.0	-803879	158922	7832183	-8388.8	786.9	20761.6	-42.92	2.81	6.36
666.0	-820742	160502	7873719	-8474.5	792.6	20774.7	-42.70	2.80	6.67
668.0	-837776	162092	7915281	-8559.7	798.2	20788.5	-42.48	2.77	6.98
670.0	-854980	163694	7956872	-8644.4	803.7	20802.7	-42.18	2.75	7.29
672.0	-872353	165307	7998492	-8728.5	809.2	20817.7	-41.87	2.72	7.61
674.0	-889894	166931	8040142	-8811.9	814.6	20833.2	-41.57	2.70	7.92

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
676.0	-907601	168566	8081925	-8894.9	820.0	20849.5	-41.27	2.67	8.23
678.0	-925473	170211	8123540	-8977.2	825.4	20866.4	-40.95	2.64	8.55
680.0	-943509	171867	8165290	-9058.7	830.7	20883.9	-40.60	2.61	8.86
682.0	-961707	173534	8207075	-9139.6	836.0	20902.0	-40.21	2.59	9.17
684.0	-980066	175211	8248897	-9219.5	841.2	20920.7	-39.75	2.56	9.49
686.0	-998585	176899	8290757	-9298.7	846.4	20940.1	-39.35	2.54	9.80
688.0	-1017260	178597	8332657	-9376.9	851.5	20960.1	-38.89	2.51	10.11
690.0	-1036092	180305	8374597	-9454.2	856.5	20980.6	-38.45	2.48	10.42
692.0	-1055077	182022	8416579	-9530.6	861.4	21001.9	-37.99	2.45	10.74
694.0	-1074214	183750	8458604	-9606.1	866.3	21024.1	-37.52	2.42	11.05
696.0	-1093500	185488	8500674	-9680.4	871.1	21046.5	-36.92	2.39	11.36
698.0	-1112935	187235	8542790	-9753.4	875.9	21069.6	-36.30	2.36	11.68
700.0	-1132513	188991	8584952	-9825.1	880.6	21093.4	-35.53	2.32	11.98
702.0	-1152234	190757	8627163	-9895.3	885.1	21117.8	-34.76	2.29	12.28
704.0	-1172094	192532	8669423	-9963.9	889.7	21142.8	-33.98	2.25	12.57
706.0	-1192089	194316	8711733	-10030.9	894.3	21168.3	-33.10	2.22	12.86
708.0	-1212216	196109	8754095	-10096.2	898.7	21194.2	-32.26	2.18	13.16
710.0	-1232473	197911	8796509	-10159.9	903.1	21221.0	-31.44	2.13	13.42
712.0	-1252855	199721	8838978	-10221.9	907.4	21248.2	-30.64	2.07	13.68
714.0	-1273359	201540	8881502	-10282.2	911.5	21275.8	-29.69	1.99	13.95
716.0	-1293983	203367	8924081	-10340.7	915.6	21303.8	-28.76	1.91	14.18
718.0	-1314721	205202	8966716	-10397.4	919.4	21332.3	-27.91	1.88	14.39
720.0	-1335572	207045	9009409	-10452.4	922.9	21361.0	-27.07	1.87	14.51
722.0	-1356530	208894	9052159	-10505.7	926.7	21390.1	-26.18	1.87	14.64
724.0	-1377593	210751	9094968	-10556.9	930.4	21419.3	-25.23	1.87	14.73
726.0	-1398757	212616	9137836	-10606.4	934.2	21448.8	-24.24	1.87	14.76
728.0	-1420018	214488	9180762	-10654.0	938.0	21478.3	-23.36	1.88	14.80
730.0	-1441373	216368	9223748	-10699.9	941.8	21508.0	-22.35	1.88	14.77
732.0	-1462816	218255	9266793	-10743.7	945.5	21537.4	-21.44	1.88	14.73
734.0	-1484347	220150	9309897	-10785.7	949.2	21566.7	-20.47	1.89	14.62
736.0	-1505959	222052	9353059	-10825.7	953.0	21595.7	-19.46	1.89	14.52
738.0	-1527650	223962	9396279	-10863.9	956.8	21624.6	-18.56	1.89	14.37
740.0	-1549414	225879	9439556	-10900.3	960.5	21652.7	-17.63	1.89	14.20
742.0	-1571250	227804	9482889	-10934.7	964.2	21680.8	-16.66	1.90	13.94
744.0	-1593152	229736	9526278	-10967.1	968.0	21708.3	-15.80	1.90	13.71
746.0	-1615118	231676	9569721	-10997.8	971.8	21735.2	-14.93	1.90	13.38
	S-IVB VELOCITY CUTOFF COMMAND								
747.040	-1626564	232687	9592333	-11013.7	973.8	21749.0	-14.46	1.88	13.23
748.0	-1637147	233623	9613208	-11034.2	975.5	21743.0	-20.52	1.75	-10.06
750.0	-1659261	235577	9656678	-11082.3	978.8	21720.7	-24.41	1.64	-12.24
752.0	-1681476	237538	9700090	-11131.0	982.1	21696.0	-24.37	1.64	-12.34

TABLE B-IV. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
754.0	-1703787	239505	9743458	-11179.6	985.3	21671.3	-24.35	1.64	-12.39
756.0	-1726195	241479	9786776	-11228.3	988.6	21646.5	-24.32	1.63	-12.45
ORBITAL INSERTION									
757.040	-1737898	242505	9809283	-11253.6	990.3	21633.5	-24.30	1.63	-12.48

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
GUIDANCE REFERENCE RELEASE									
-16.845	-516.199	2981.467	1639.263	-1321.0	-228.7	0.0	0.02	-0.10	0.0
-16.0	-516.383	2981.435	1639.263	-1321.0	-228.8	0.0	0.02	-0.10	0.0
-15.0	-516.601	2981.398	1639.263	-1321.0	-228.9	0.0	0.02	-0.10	0.0
-14.0	-516.818	2981.360	1639.263	-1321.0	-229.0	0.0	0.02	-0.10	0.0
-13.0	-517.035	2981.322	1639.263	-1321.0	-229.1	0.0	0.02	-0.10	0.0
-12.0	-517.253	2981.284	1639.263	-1320.9	-229.2	0.0	0.02	-0.10	0.0
-11.0	-517.470	2981.247	1639.263	-1320.9	-229.3	0.0	0.02	-0.10	0.0
-10.0	-517.688	2981.209	1639.263	-1320.9	-229.4	0.0	0.02	-0.10	0.0
-9.0	-517.905	2981.171	1639.263	-1320.9	-229.5	0.0	0.02	-0.10	0.0
-8.0	-518.122	2981.133	1639.263	-1320.9	-229.6	0.0	0.02	-0.10	0.0
-7.0	-518.340	2981.096	1639.263	-1320.9	-229.7	0.0	0.02	-0.10	0.0
-6.0	-518.557	2981.058	1639.263	-1320.8	-229.8	0.0	0.02	-0.10	0.0
-5.0	-518.775	2981.020	1639.263	-1320.8	-229.9	0.0	0.02	-0.10	0.0
-4.0	-518.992	2980.982	1639.263	-1320.8	-230.0	0.0	0.02	-0.10	0.0
-3.0	-519.209	2980.944	1639.263	-1320.8	-230.1	0.0	0.02	-0.10	0.0
-2.0	-519.427	2980.907	1639.263	-1320.8	-230.1	0.0	0.02	-0.10	0.0
-1.0	-519.644	2980.869	1639.263	-1320.8	-230.2	0.0	0.02	-0.10	0.0
0.0	-519.861	2980.831	1639.263	-1320.7	-230.3	0.0	0.02	-0.10	0.0
FIRST MOTION									
0.380	-519.944	2980.816	1639.263	-1320.7	-230.4	-0.0	-0.48	2.74	1.57
IU UMBILICAL DISCONNECT									
0.690	-520.011	2980.805	1639.263	-1320.9	-229.3	0.6	-0.76	4.52	2.56
1.0	-520.079	2980.793	1639.263	-1321.2	-227.5	1.6	-1.26	7.38	4.13
2.0	-520.296	2980.757	1639.264	-1322.5	-220.1	5.8	-1.27	7.54	4.18
3.0	-520.514	2980.721	1639.265	-1323.7	-212.4	10.0	-1.23	7.72	4.21
4.0	-520.732	2980.687	1639.268	-1324.9	-204.6	14.2	-1.18	7.91	4.22
5.0	-520.950	2980.653	1639.270	-1326.1	-196.6	18.4	-1.16	8.10	4.23
6.0	-521.169	2980.622	1639.274	-1327.3	-188.4	22.6	-1.28	8.25	4.27
7.0	-521.387	2980.591	1639.277	-1328.5	-180.1	26.9	-1.09	8.50	4.21
8.0	-521.606	2980.563	1639.283	-1329.5	-171.4	31.1	-0.87	8.77	4.15
9.0	-521.825	2980.534	1639.287	-1330.4	-162.6	35.2	-0.90	8.97	4.19
10.0	-522.044	2980.509	1639.294	-1331.3	-153.5	39.5	-1.03	9.15	4.30
11.0	-522.263	2980.484	1639.301	-1332.5	-144.3	43.9	-1.35	9.25	4.49
12.0	-522.483	2980.462	1639.309	-1334.0	-135.0	48.5	-1.65	9.34	4.71
13.0	-522.702	2980.440	1639.317	-1335.8	-125.6	53.3	-1.96	9.41	4.97
14.0	-522.922	2980.421	1639.326	-1337.9	-116.2	58.4	-2.06	9.54	5.25

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
15.0	-523.142	2980.403	1639.336	-1339.8	-106.5	63.8	-1.81	9.66	5.65
16.0	-523.343	2980.384	1639.347	-1341.5	-97.5	69.5	-1.79	9.67	6.21
17.0	-523.584	2980.369	1639.358	-1343.5	-87.9	75.8	-2.48	9.59	6.61
18.0	-523.805	2980.355	1639.372	-1346.4	-78.2	82.7	-3.25	9.50	6.99
19.0	-524.027	2980.343	1639.386	-1350.0	-68.8	89.8	-3.84	9.52	7.29
20.0	-524.250	2980.333	1639.401	-1354.1	-59.2	97.2	-4.32	9.58	7.55
21.0	-524.473	2980.324	1639.418	-1358.6	-49.5	105.0	-4.70	9.69	7.75
22.0	-524.697	2980.316	1639.436	-1363.5	-39.7	112.8	-4.98	9.87	7.92
23.0	-524.922	2980.311	1639.455	-1369.7	-29.7	120.8	-5.43	10.02	8.13
24.0	-525.147	2980.307	1639.476	-1374.4	-19.7	129.1	-6.09	10.09	8.39
25.0	-525.374	2980.304	1639.498	-1380.8	-9.5	137.6	-6.64	10.18	8.63
26.0	-525.602	2980.304	1639.521	-1387.6	0.7	146.3	-6.94	10.36	8.80
27.0	-525.831	2980.305	1639.546	-1394.6	11.1	155.2	-7.17	10.51	8.93
28.0	-526.061	2980.307	1639.572	-1401.8	21.8	164.2	-7.41	10.67	9.08
29.0	-526.292	2980.312	1639.600	-1409.5	32.3	173.3	-7.96	10.73	9.33
30.0	-526.525	2980.318	1639.629	-1417.6	43.0	182.7	-8.27	10.88	9.52
31.0	-526.759	2980.326	1639.660	-1426.1	53.8	192.2	-8.68	11.01	9.74
32.0	-526.994	2980.336	1639.693	-1434.9	64.8	202.0	-9.10	11.20	9.83
33.0	-527.231	2980.348	1639.727	-1444.3	76.2	211.9	-9.52	11.30	10.02
34.0	-527.470	2980.361	1639.762	-1454.1	87.5	222.0	-10.00	11.36	10.23
35.0	-527.710	2980.377	1639.800	-1464.3	98.9	232.3	-10.50	11.40	10.46
36.0	-527.952	2980.394	1639.839	-1475.2	110.5	242.9	-10.98	11.47	10.69
37.0	-528.195	2980.413	1639.880	-1486.5	122.0	253.7	-11.55	11.51	10.95
38.0	-528.441	2980.435	1639.922	-1498.3	133.7	264.9	-12.11	11.54	11.20
39.0	-528.688	2980.458	1639.967	-1510.8	145.0	276.1	-12.59	11.59	11.42
40.0	-528.937	2980.483	1640.013	-1524.1	156.8	287.8	-13.12	11.65	11.68
41.0	-529.189	2980.510	1640.062	-1537.8	168.4	299.9	-13.75	11.67	11.95
42.0	-529.443	2980.538	1640.112	-1552.1	180.0	312.0	-14.48	11.63	12.25
43.0	-529.700	2980.569	1640.164	-1566.7	191.7	324.4	-15.06	11.65	12.50
44.0	-529.958	2980.602	1640.219	-1582.2	203.5	337.1	-15.62	11.69	12.76
45.0	-530.220	2980.637	1640.275	-1598.2	215.3	350.1	-16.22	11.71	13.03
46.0	-530.484	2980.673	1640.334	-1615.0	227.0	363.2	-16.86	11.71	13.31
47.0	-530.751	2980.712	1640.395	-1632.2	238.6	376.6	-17.41	11.74	13.56
48.0	-531.021	2980.752	1640.458	-1650.0	250.5	390.3	-18.04	11.72	13.82
49.0	-531.294	2980.795	1640.523	-1668.5	262.4	404.4	-18.64	11.70	14.08
50.0	-531.570	2980.839	1640.591	-1687.5	274.2	418.7	-19.43	11.64	14.40
51.0	-531.849	2980.885	1640.661	-1707.3	285.8	433.2	-20.24	11.64	14.76
52.0	-532.131	2980.933	1640.734	-1728.0	297.5	448.4	-20.96	11.57	15.05
53.0	-532.417	2980.984	1640.809	-1749.1	309.2	463.9	-21.55	11.52	15.28
54.0	-532.707	2981.036	1640.886	-1771.0	320.5	479.6	-22.22	11.42	15.52
55.0	-533.000	2981.090	1640.967	-1793.3	331.5	495.5	-22.93	11.30	15.78
56.0	-533.297	2981.145	1641.050	-1816.8	342.7	511.8	-23.69	11.15	16.05
57.0	-533.597	2981.203	1641.135	-1840.7	354.0	528.0	-24.50	11.00	16.33

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
58.0	-533.902	2981.262	1641.223	-1865.8	365.1	544.6	-25.09	10.92	16.56
59.0	-534.211	2981.323	1641.314	-1891.1	375.4	561.9	-25.65	10.85	16.77
60.0	-534.524	2981.386	1641.408	-1917.4	385.6	579.1	-26.13	10.79	16.94
MACH 1									
60.500	-534.682	2981.418	1641.456	-1930.6	391.2	587.8	-26.44	10.74	17.05
61.0	-534.842	2981.451	1641.505	-1943.8	396.5	596.4	-26.77	10.69	17.18
62.0	-535.164	2981.517	1641.605	-1971.0	406.5	613.4	-27.43	10.62	17.43
63.0	-535.490	2981.585	1641.707	-1999.0	416.8	630.8	-28.15	10.54	17.71
64.0	-535.821	2981.655	1641.812	-2027.6	427.5	648.6	-28.88	10.45	17.99
65.0	-536.157	2981.726	1641.921	-2056.9	437.7	666.5	-29.60	10.36	18.27
66.0	-536.498	2981.800	1642.032	-2086.8	447.8	684.7	-30.24	10.30	18.52
67.0	-536.844	2981.874	1642.146	-2117.3	458.0	703.1	-31.10	10.19	18.85
68.0	-537.195	2981.951	1642.263	-2148.9	468.0	722.2	-31.85	10.20	19.20
69.0	-537.551	2982.029	1642.384	-2181.0	478.1	741.5	-32.57	10.17	19.49
70.0	-537.912	2982.109	1642.508	-2214.4	488.1	761.3	-33.15	10.13	19.73
71.0	-538.279	2982.190	1642.635	-2248.4	498.1	781.2	-33.80	10.07	19.99
72.0	-538.652	2982.273	1642.765	-2282.3	507.7	801.3	-34.64	9.94	20.29
73.0	-539.030	2982.358	1642.899	-2318.3	517.5	822.0	-35.68	9.66	20.61
74.0	-539.415	2982.444	1643.036	-2354.7	527.2	842.8	-36.89	9.33	20.99
75.0	-539.805	2982.532	1643.176	-2392.3	536.1	863.7	-38.14	8.99	21.38
MAXIMUM DYNAMIC PRESSURE									
75.200	-539.884	2982.550	1643.205	-2399.9	537.9	868.0	-38.38	8.92	21.46
76.0	-540.202	2982.621	1643.320	-2431.0	544.8	885.5	-39.25	8.66	21.71
77.0	-540.605	2982.712	1643.468	-2470.8	553.2	907.7	-40.46	8.28	22.07
78.0	-541.015	2982.804	1643.619	-2512.5	561.3	929.8	-41.56	7.92	22.38
79.0	-541.432	2982.897	1643.774	-2555.3	569.2	952.3	-42.64	7.54	22.67
80.0	-541.856	2982.993	1643.933	-2598.3	576.3	975.2	-43.81	7.12	22.98
81.0	-542.287	2983.087	1644.095	-2642.4	582.6	998.5	-45.10	6.65	23.32
82.0	-542.725	2983.184	1644.261	-2688.2	588.8	1021.8	-46.29	6.18	23.61
83.0	-543.171	2983.281	1644.432	-2735.1	594.8	1045.7	-47.63	5.57	23.91
84.0	-543.625	2983.380	1644.606	-2783.4	600.0	1069.7	-49.12	4.89	24.24
85.0	-544.087	2983.480	1644.784	-2833.2	604.6	1093.8	-50.64	4.15	24.56
86.0	-544.558	2983.580	1644.966	-2884.0	608.8	1117.9	-51.94	3.47	24.81
87.0	-545.037	2983.680	1645.152	-2935.8	612.2	1142.7	-53.11	2.81	25.03
88.0	-545.524	2983.782	1645.342	-2989.0	614.5	1167.8	-54.35	2.09	25.35
89.0	-546.020	2983.883	1645.537	-3043.5	616.2	1193.7	-55.13	1.33	25.97
90.0	-546.526	2983.985	1645.735	-3098.5	617.2	1219.5	-56.34	0.55	26.56
91.0	-547.040	2984.087	1645.938	-3155.0	617.7	1246.2	-57.50	-0.12	26.95
92.0	-547.564	2984.189	1646.146	-3212.5	617.4	1273.0	-58.65	-0.70	27.28

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
93.0	-543.037	2984.293	1646.357	-3271.6	616.7	1300.5	-59.71	-1.21	27.58
94.0	-543.641	2984.392	1646.574	-3331.0	615.6	1328.2	-60.72	-1.72	27.84
95.0	-549.194	2984.494	1646.795	-3393.1	613.6	1356.3	-61.67	-2.12	28.09
96.0	-549.757	2984.595	1647.020	-3455.2	611.1	1384.1	-62.70	-2.50	28.32
97.0	-550.331	2984.695	1647.251	-3518.9	608.2	1412.5	-63.63	-2.81	28.54
98.0	-550.916	2984.795	1647.486	-3583.0	605.3	1441.0	-64.61	-3.11	28.80
99.0	-551.511	2984.895	1647.725	-3648.5	601.8	1470.2	-65.55	-3.37	29.07
100.0	-552.117	2984.994	1647.970	-3715.0	598.1	1499.6	-66.44	-3.54	29.33
101.0	-552.733	2985.092	1648.219	-3781.9	594.4	1529.1	-67.42	-3.73	29.66
102.0	-553.361	2985.190	1648.473	-3850.3	590.6	1559.0	-68.43	-3.85	30.03
103.0	-554.001	2985.287	1648.732	-3919.7	586.6	1589.4	-69.38	-3.96	30.39
104.0	-554.652	2985.384	1648.997	-3989.8	582.4	1620.1	-70.40	-4.13	30.76
105.0	-555.314	2985.479	1649.266	-4060.9	578.0	1651.0	-71.42	-4.34	31.13
106.0	-555.988	2985.574	1649.540	-4133.1	573.5	1682.4	-72.41	-4.57	31.47
107.0	-556.675	2985.668	1649.820	-4206.2	568.8	1714.2	-73.49	-4.83	31.85
108.0	-557.373	2985.762	1650.105	-4280.4	563.7	1746.3	-74.63	-5.11	32.24
109.0	-558.084	2985.854	1650.395	-4355.8	558.4	1778.9	-75.82	-5.40	32.65
110.0	-558.807	2985.946	1650.691	-4432.4	552.9	1811.9	-77.01	-5.78	33.01
111.0	-559.543	2986.037	1650.992	-4510.0	547.0	1845.1	-78.13	-6.15	33.34
112.0	-560.291	2986.126	1651.298	-4588.5	540.4	1878.4	-79.30	-6.59	33.68
113.0	-561.053	2986.215	1651.610	-4668.7	533.4	1912.3	-80.46	-7.06	34.01
114.0	-561.828	2986.302	1651.928	-4749.8	526.2	1946.4	-81.85	-7.64	34.43
115.0	-562.617	2986.389	1652.251	-4832.6	518.4	1981.2	-83.21	-8.24	34.87
116.0	-563.419	2986.473	1652.580	-4916.4	509.8	2016.2	-84.57	-8.82	35.31
117.0	-564.235	2986.557	1652.915	-5001.5	500.8	2051.7	-85.80	-9.39	35.76
118.0	-565.065	2986.639	1653.256	-5087.6	491.1	2087.5	-87.06	-9.92	36.12
119.0	-565.910	2986.719	1653.602	-5175.4	481.0	2123.9	-88.29	-10.38	36.49
120.0	-566.769	2986.797	1653.955	-5264.0	470.4	2160.6	-89.57	-10.84	36.88
121.0	-567.643	2986.874	1654.314	-5353.9	459.4	2197.4	-90.85	-11.29	37.28
122.0	-568.532	2986.949	1654.679	-5445.5	447.8	2235.1	-92.20	-11.76	37.70
123.0	-569.436	2987.022	1655.050	-5538.5	435.9	2273.0	-93.49	-12.20	38.10
124.0	-570.355	2987.092	1655.427	-5632.8	423.4	2311.2	-94.88	-12.66	38.53
125.0	-571.290	2987.161	1655.811	-5729.7	410.2	2350.5	-96.27	-13.13	38.96
126.0	-572.241	2987.228	1656.201	-5828.0	396.3	2390.2	-97.76	-13.62	39.43
127.0	-573.208	2987.292	1656.598	-5926.3	382.3	2429.9	-99.42	-14.13	39.98
128.0	-574.192	2987.354	1657.001	-6025.7	368.1	2469.8	-101.06	-14.62	40.53
129.0	-575.192	2987.413	1657.411	-6127.9	353.1	2510.6	-102.69	-15.06	41.10
130.0	-576.209	2987.470	1657.828	-6231.8	337.8	2552.3	-104.13	-15.45	41.63
131.0	-577.244	2987.525	1658.251	-6336.9	322.2	2594.3	-105.68	-15.88	42.22
132.0	-578.296	2987.577	1658.682	-6444.0	306.1	2636.9	-107.24	-16.33	42.84
133.0	-579.365	2987.626	1659.119	-6552.2	289.1	2679.8	-109.30	-16.89	43.55
134.0	-580.453	2987.672	1659.564	-6662.5	271.8	2723.7	-111.11	-17.42	44.20
135.0	-581.558	2987.715	1660.016	-6774.7	254.3	2768.3	-112.80	-17.91	44.82

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
136.0	-582.633	2987.756	1660.476	-6888.6	236.1	2813.5	-115.01	-18.55	45.58
137.0	-583.926	2987.793	1660.943	-7004.4	217.6	2859.5	-116.97	-19.07	46.30
138.0	-584.949	2987.827	1661.417	-7122.4	198.4	2906.1	-118.81	-19.54	46.97
139.0	-585.171	2987.859	1661.899	-7242.0	178.5	2953.4	-120.90	-20.11	47.72
140.0	-587.373	2987.886	1662.390	-7363.5	158.3	3001.4	-122.98	-20.69	48.48
141.0	-588.595	2987.911	1662.888	-7487.6	137.3	3050.3	-125.09	-21.13	49.28
142.0	-589.838	2987.932	1663.394	-7614.4	115.8	3100.2	-127.19	-21.69	50.02
143.0	-591.102	2987.949	1663.908	-7743.2	93.7	3150.8	-129.29	-22.23	50.76
144.0	-592.387	2987.963	1664.431	-7873.3	71.2	3201.8	-131.40	-22.78	51.49
S-IC INBOARD ENGINE CUTOFF									
144.720	-593.326	2987.970	1664.813	-7965.2	54.8	3237.7	-132.92	-23.14	52.03
145.0	-593.694	2987.973	1664.962	-7998.6	48.2	3250.5	-119.13	-22.00	46.17
146.0	-595.020	2987.979	1665.501	-8112.3	24.6	3293.5	-104.99	-23.78	38.76
147.0	-596.363	2987.981	1666.046	-8218.7	0.6	3332.9	-107.03	-24.23	39.47
148.0	-597.725	2987.979	1666.598	-8329.0	-24.6	3373.6	-109.16	-24.61	39.95
S-IC OUTBOARD ENGINE CUTOFF									
148.410	-598.293	2987.977	1666.828	-8371.8	-33.8	3389.3	-110.17	-24.59	39.89
149.0	-599.109	2987.974	1667.159	-8410.8	-54.4	3398.1	-5.51	-25.09	-8.87
S-IC/S-II SEPARATION COMMAND									
149.080	-599.220	2987.975	1667.205	-8411.4	-56.8	3397.5	8.97	-27.44	-17.15
150.0	-600.493	2987.967	1667.710	-8412.3	-80.6	3387.4	8.25	-28.02	-16.67
152.0	-603.258	2987.929	1668.827	-8404.2	-132.8	3359.5	-2.50	-27.03	-11.31
154.0	-606.022	2987.877	1669.928	-8416.9	-183.5	3342.0	-15.33	-26.59	-5.24
156.0	-608.787	2987.808	1671.026	-8446.1	-236.1	3331.1	-16.97	-26.23	-4.39
158.0	-611.582	2987.722	1672.121	-8480.0	-288.5	3322.3	-17.53	-26.17	-4.18
160.0	-614.379	2987.618	1673.213	-8514.9	-340.7	3314.0	-17.76	-26.15	-4.07
162.0	-617.188	2987.498	1674.303	-8550.3	-392.9	3305.8	-18.00	-26.12	-3.96
164.0	-620.008	2987.360	1675.390	-8586.1	-445.1	3298.0	-18.09	-26.08	-3.90
166.0	-622.840	2987.205	1676.474	-8622.0	-497.2	3290.3	-18.14	-26.04	-3.86
168.0	-625.694	2987.032	1677.555	-8658.4	-549.2	3282.7	-18.23	-26.05	-3.82
170.0	-628.560	2986.843	1678.635	-8694.9	-601.4	3275.2	-18.27	-26.01	-3.78
172.0	-631.438	2986.637	1679.712	-8731.7	-653.4	3267.9	-18.30	-25.98	-3.76
174.0	-634.328	2986.413	1680.786	-8768.5	-705.3	3260.7	-18.49	-25.99	-3.67
176.0	-637.181	2986.172	1681.858	-8805.5	-757.2	3253.5	-18.63	-25.97	-3.59
178.0	-640.225	2985.915	1682.928	-8842.7	-809.1	3246.5	-18.75	-25.94	-3.52
180.0	-643.222	2985.640	1683.995	-8880.3	-861.1	3239.6	-18.80	-25.88	-3.47
182.0	-646.231	2985.348	1685.061	-8918.1	-912.8	3233.0	-19.13	-25.92	-3.34

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
184.0	-643.873	2985.039	1686.124	-8956.3	-964.6	3226.4	-19.18	-25.87	-3.29
186.0	-651.827	2984.713	1687.185	-8994.7	-1016.2	3220.1	-19.38	-25.89	-3.20
188.0	-654.794	2984.370	1688.244	-9033.4	-1067.8	3213.9	-19.47	-25.84	-3.13
190.0	-657.774	2984.010	1689.300	-9072.3	-1119.3	3207.8	-19.59	-25.81	-3.06
192.0	-660.767	2983.633	1690.355	-9111.2	-1170.9	3201.7	-19.62	-25.68	-2.99
194.0	-663.772	2983.239	1691.408	-9150.3	-1221.9	3195.8	-19.55	-25.31	-2.88
196.0	-666.791	2982.828	1692.459	-9189.7	-1272.0	3190.3	-19.46	-24.64	-2.70
198.0	-669.822	2982.401	1693.508	-9228.4	-1320.7	3185.1	-19.34	-23.61	-2.32
200.0	-672.866	2981.958	1694.556	-9267.1	-1366.8	3181.0	-19.33	-22.70	-1.91
202.0	-675.923	2981.500	1695.602	-9305.6	-1412.3	3177.0	-19.13	-21.93	-1.66
204.0	-678.992	2981.028	1696.647	-9343.7	-1456.0	3173.7	-19.08	-21.43	-1.45
206.0	-682.074	2980.542	1697.691	-9381.9	-1499.0	3170.8	-19.18	-21.27	-1.33
208.0	-685.168	2980.042	1698.734	-9420.3	-1541.8	3168.0	-19.18	-21.28	-1.34
210.0	-688.275	2979.527	1699.777	-9458.6	-1584.6	3165.3	-19.27	-21.37	-1.34
212.0	-691.395	2978.998	1700.818	-9497.2	-1627.7	3162.5	-19.44	-21.51	-1.34
214.0	-694.528	2978.456	1701.859	-9536.0	-1670.8	3159.9	-19.58	-21.64	-1.34
216.0	-697.673	2977.899	1702.898	-9575.4	-1714.2	3157.2	-19.77	-21.77	-1.33
218.0	-700.831	2977.327	1703.937	-9615.1	-1757.9	3154.6	-19.92	-21.91	-1.34
220.0	-704.003	2976.741	1704.975	-9655.1	-1801.8	3151.9	-20.08	-22.03	-1.33
222.0	-707.187	2976.141	1706.012	-9695.3	-1845.9	3149.2	-20.22	-22.17	-1.33
224.0	-710.385	2975.526	1707.048	-9735.9	-1890.6	3146.5	-20.39	-22.30	-1.33
226.0	-713.597	2974.897	1708.084	-9776.5	-1935.2	3143.8	-20.51	-22.40	-1.32
228.0	-716.822	2974.252	1709.118	-9817.9	-1980.3	3141.2	-20.59	-22.48	-1.33
230.0	-720.060	2973.593	1710.152	-9859.2	-2025.4	3138.5	-20.75	-22.59	-1.31
232.0	-723.312	2972.919	1711.184	-9900.8	-2070.7	3135.9	-20.88	-22.70	-1.30
234.0	-726.579	2972.230	1712.216	-9942.8	-2116.2	3133.2	-20.99	-22.77	-1.29
236.0	-729.858	2971.526	1713.247	-9984.9	-2162.0	3130.6	-21.08	-22.85	-1.28
238.0	-733.151	2970.807	1714.277	-10027.4	-2207.8	3128.1	-21.22	-22.93	-1.25
240.0	-736.459	2970.073	1715.306	-10070.2	-2253.8	3125.7	-21.37	-23.02	-1.22
242.0	-739.781	2969.323	1716.335	-10113.1	-2300.0	3123.3	-21.53	-23.10	-1.19
244.0	-743.116	2968.559	1717.363	-10156.4	-2346.3	3121.0	-21.66	-23.18	-1.16
246.0	-746.467	2967.779	1718.390	-10200.0	-2392.7	3118.9	-21.78	-23.25	-1.14
248.0	-749.831	2966.984	1719.416	-10243.6	-2439.3	3116.5	-21.90	-23.32	-1.12
250.0	-753.210	2966.173	1720.441	-10287.6	-2486.0	3114.4	-22.05	-23.40	-1.09
252.0	-756.604	2965.347	1721.466	-10331.9	-2532.9	3112.4	-22.20	-23.47	-1.06
254.0	-760.012	2964.506	1722.490	-10376.4	-2579.8	3110.5	-22.32	-23.55	-1.03
256.0	-763.435	2963.649	1723.514	-10421.3	-2627.1	3108.4	-22.49	-23.63	-0.99
258.0	-766.873	2962.776	1724.537	-10466.5	-2674.4	3106.5	-22.66	-23.72	-0.96
260.0	-770.325	2961.888	1725.559	-10511.9	-2721.7	3104.5	-22.81	-23.81	-0.93
262.0	-773.793	2960.984	1726.581	-10557.8	-2769.4	3102.9	-22.94	-23.89	-0.90
264.0	-777.276	2960.065	1727.602	-10603.9	-2817.4	3101.0	-23.08	-23.98	-0.88
266.0	-780.774	2959.130	1728.622	-10650.0	-2865.4	3099.3	-23.24	-24.08	-0.85
268.0	-784.287	2958.179	1729.642	-10696.5	-2913.6	3097.5	-23.42	-24.20	-0.82

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
270.0	-787.815	2957.212	1730.661	-10743.2	-2962.0	3095.9	-23.58	-24.30	-0.79
272.0	-791.359	2956.229	1731.680	-10790.3	-3010.7	3094.4	-23.73	-24.40	-0.77
274.0	-794.919	2955.230	1732.698	-10837.8	-3059.5	3092.8	-23.88	-24.51	-0.75
276.0	-798.494	2954.215	1733.716	-10885.7	-3108.7	3091.4	-23.99	-24.59	-0.74
278.0	-802.085	2953.194	1734.734	-10933.9	-3157.9	3090.0	-24.13	-24.69	-0.72
280.0	-805.692	2952.136	1735.750	-10982.3	-3207.4	3088.5	-24.32	-24.82	-0.69
282.0	-809.315	2951.072	1736.767	-11031.0	-3257.2	3087.1	-24.50	-24.93	-0.66
284.0	-812.954	2949.992	1737.783	-11079.8	-3307.0	3085.7	-24.66	-25.04	-0.64
286.0	-816.609	2948.895	1738.798	-11129.1	-3357.2	3084.4	-24.82	-25.15	-0.62
288.0	-820.281	2947.782	1739.813	-11178.7	-3407.6	3083.1	-24.97	-25.26	-0.60
290.0	-823.968	2946.652	1740.828	-11228.8	-3458.2	3082.0	-25.12	-25.36	-0.58
292.0	-827.673	2945.505	1741.842	-11279.2	-3509.0	3080.8	-25.27	-25.47	-0.56
294.0	-831.394	2944.342	1742.856	-11329.7	-3560.0	3079.6	-25.43	-25.58	-0.54
296.0	-835.131	2943.162	1743.870	-11380.6	-3611.3	3078.5	-25.57	-25.68	-0.53
298.0	-838.886	2941.965	1744.883	-11431.9	-3662.8	3077.4	-25.72	-25.79	-0.51
300.0	-842.657	2940.751	1745.896	-11483.4	-3714.6	3076.4	-25.86	-25.89	-0.49
302.0	-846.446	2939.519	1746.908	-11535.2	-3766.5	3075.4	-26.01	-26.00	-0.48
304.0	-850.251	2938.271	1747.920	-11587.3	-3818.6	3074.5	-26.19	-26.12	-0.45
306.0	-854.074	2937.006	1748.932	-11640.0	-3871.1	3073.6	-26.38	-26.25	-0.42
308.0	-857.914	2935.723	1749.944	-11693.0	-3923.7	3072.7	-26.56	-26.37	-0.39
310.0	-861.772	2934.423	1750.955	-11746.1	-3976.5	3071.8	-26.76	-26.50	-0.36
312.0	-865.647	2933.105	1751.966	-11799.9	-4029.6	3071.2	-26.93	-26.61	-0.34
314.0	-869.540	2931.770	1752.977	-11853.8	-4083.0	3070.5	-27.09	-26.72	-0.32
316.0	-873.450	2930.417	1753.988	-11908.0	-4136.5	3070.0	-27.22	-26.83	-0.31
318.0	-877.379	2929.047	1754.998	-11962.8	-4190.5	3069.5	-27.36	-26.95	-0.30
320.0	-881.326	2927.659	1756.008	-12017.6	-4244.5	3068.9	-27.52	-27.07	-0.29
322.0	-885.291	2926.253	1757.018	-12072.7	-4298.9	3068.3	-27.68	-27.21	-0.27
324.0	-889.273	2924.829	1758.028	-12127.9	-4353.3	3067.7	-27.85	-27.34	-0.26
326.0	-893.275	2923.387	1759.038	-12183.8	-4408.0	3067.3	-28.02	-27.47	-0.24
328.0	-897.294	2921.927	1760.048	-12239.9	-4463.1	3066.8	-28.21	-27.62	-0.22
330.0	-901.332	2920.449	1761.057	-12296.4	-4518.6	3066.3	-28.40	-27.76	-0.20
332.0	-905.389	2918.952	1762.066	-12353.4	-4574.2	3066.0	-28.57	-27.90	-0.19
334.0	-909.465	2917.437	1763.076	-12410.6	-4630.2	3065.6	-28.76	-28.05	-0.17
336.0	-913.560	2915.904	1764.085	-12468.2	-4686.5	3065.3	-28.93	-28.19	-0.15
338.0	-917.673	2914.352	1765.094	-12526.4	-4743.1	3065.0	-29.12	-28.32	-0.13
340.0	-921.806	2912.782	1766.103	-12585.1	-4799.9	3064.3	-29.32	-28.46	-0.10
342.0	-925.958	2911.193	1767.111	-12643.9	-4856.9	3064.6	-29.53	-28.61	-0.07
344.0	-930.130	2909.584	1768.120	-12703.1	-4914.4	3064.6	-29.72	-28.76	-0.05
346.0	-934.321	2907.957	1769.129	-12762.8	-4972.1	3064.5	-29.90	-28.90	-0.04
348.0	-938.532	2906.311	1770.137	-12822.8	-5030.1	3064.4	-30.12	-29.06	-0.01
350.0	-942.763	2904.646	1771.146	-12883.2	-5088.5	3064.5	-30.32	-29.21	0.02
352.0	-947.013	2902.961	1772.155	-12944.1	-5147.2	3064.6	-30.56	-29.38	0.05
354.0	-951.284	2901.258	1773.164	-13005.4	-5206.1	3064.8	-30.81	-29.55	0.09

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
356.0	-955.575	2899.534	1774.173	-13067.4	-5265.4	3065.1	-31.02	-29.70	0.12
358.0	-959.886	2897.791	1775.182	-13129.5	-5325.0	3065.4	-31.22	-29.87	0.13
360.0	-964.218	2896.029	1776.191	-13192.1	-5385.0	3065.8	-31.41	-30.03	0.15
362.0	-968.571	2894.246	1777.200	-13255.1	-5445.2	3066.2	-31.62	-30.20	0.17
364.0	-972.945	2892.444	1778.209	-13318.4	-5505.7	3066.6	-31.81	-30.37	0.18
366.0	-977.339	2890.622	1779.219	-13382.5	-5566.8	3067.1	-32.04	-30.54	0.21
368.0	-981.755	2888.779	1780.228	-13446.9	-5628.3	3067.5	-32.29	-30.73	0.24
370.0	-986.191	2886.917	1781.238	-13511.7	-5690.1	3068.1	-32.54	-30.92	0.27
372.0	-990.650	2885.034	1782.248	-13577.1	-5752.2	3068.8	-32.79	-31.12	0.30
374.0	-995.130	2883.130	1783.259	-13642.8	-5814.7	3069.4	-33.04	-31.33	0.32
376.0	-999.631	2881.206	1784.269	-13709.2	-5877.4	3070.1	-33.30	-31.54	0.34
378.0	-1004.155	2879.261	1785.280	-13776.0	-5940.8	3070.8	-33.53	-31.74	0.35
380.0	-1008.700	2877.295	1786.291	-13843.3	-6004.7	3071.6	-33.77	-31.94	0.37
382.0	-1013.268	2875.308	1787.302	-13911.1	-6068.8	3072.2	-34.03	-32.15	0.40
384.0	-1017.858	2873.300	1788.313	-13979.5	-6133.4	3073.1	-34.29	-32.36	0.42
386.0	-1022.471	2871.270	1789.325	-14048.1	-6198.4	3073.9	-34.51	-32.57	0.43
388.0	-1027.107	2869.219	1790.337	-14117.4	-6263.7	3074.9	-34.79	-32.78	0.46
390.0	-1031.765	2867.146	1791.349	-14187.5	-6329.5	3075.8	-35.04	-32.99	0.48
392.0	-1036.447	2865.052	1792.362	-14257.7	-6395.9	3076.9	-35.28	-33.20	0.49
394.0	-1041.152	2862.936	1793.375	-14328.8	-6462.7	3077.9	-35.54	-33.42	0.52
396.0	-1045.880	2860.798	1794.388	-14400.0	-6529.5	3079.0	-35.79	-33.64	0.54
398.0	-1050.631	2858.637	1795.402	-14471.8	-6597.0	3080.0	-36.10	-33.88	0.58
400.0	-1055.407	2856.455	1796.416	-14544.5	-6665.0	3081.1	-36.39	-34.11	0.61
402.0	-1060.206	2854.250	1797.430	-14617.7	-6733.5	3082.4	-36.64	-34.32	0.63
404.0	-1065.030	2852.022	1798.445	-14691.1	-6802.2	3083.7	-36.90	-34.55	0.65
406.0	-1069.878	2849.772	1799.461	-14765.4	-6871.6	3085.0	-37.17	-34.78	0.68
408.0	-1074.751	2847.498	1800.476	-14840.0	-6941.4	3086.4	-37.47	-35.03	0.71
410.0	-1079.648	2845.202	1801.493	-14915.3	-7011.8	3087.9	-37.77	-35.28	0.73
412.0	-1084.569	2842.882	1802.509	-14990.7	-7082.4	3089.3	-38.75	-35.04	0.37
S-II STAGE ENGINE NO.2 OUT									
412.520	-1086.842	2841.807	1803.976	-15023.4	-7114.5	3089.9	-27.59	-31.66	-2.40
414.0	-1089.515	2840.539	1803.525	-15054.4	-7149.2	3088.6	-23.37	-30.01	-3.63
416.0	-1094.477	2838.176	1804.541	-15098.0	-7207.3	3083.3	-19.30	-26.61	-3.99
418.0	-1099.453	2835.794	1805.555	-15135.7	-7259.2	3078.0	-18.95	-24.22	-3.04
420.0	-1104.441	2833.397	1806.567	-15173.1	-7306.4	3074.4	-18.88	-22.15	-2.06
422.0	-1109.442	2830.984	1807.578	-15210.7	-7350.9	3071.3	-19.00	-21.83	-1.90
424.0	-1114.455	2828.558	1808.588	-15248.6	-7394.6	3067.5	-19.06	-21.91	-1.89
426.0	-1119.480	2826.116	1809.598	-15287.4	-7439.1	3062.5	-19.26	-22.94	-2.20
428.0	-1124.519	2823.659	1810.605	-15327.2	-7485.5	3056.5	-19.70	-23.92	-2.47
430.0	-1129.571	2821.188	1811.610	-15367.6	-7534.2	3050.0	-19.99	-25.01	-2.81
432.0	-1134.636	2818.701	1812.613	-15408.1	-7584.6	3043.3	-20.20	-25.88	-3.09

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
434.0	-1139.714	2816.196	1813.614	-15448.7	-7637.0	3036.9	-20.38	-26.58	-3.29
436.0	-1144.806	2813.673	1814.613	-15489.1	-7691.0	3030.7	-20.53	-27.25	-3.49
438.0	-1149.911	2811.133	1815.609	-15529.8	-7746.8	3024.3	-20.66	-28.07	-3.78
440.0	-1155.030	2808.574	1816.604	-15570.6	-7804.2	3017.1	-20.82	-28.71	-3.96
442.0	-1160.162	2805.995	1817.596	-15612.3	-7862.9	3009.4	-20.96	-29.31	-4.14
444.0	-1165.308	2803.398	1818.585	-15654.4	-7922.7	3000.5	-21.04	-29.87	-4.32
446.0	-1170.467	2800.780	1819.571	-15696.4	-7982.6	2991.4	-21.09	-30.39	-4.50
448.0	-1175.641	2798.143	1820.554	-15738.8	-8043.5	2981.7	-21.16	-30.75	-4.62
450.0	-1180.828	2795.485	1821.534	-15781.3	-8105.1	2971.9	-21.24	-31.09	-4.70
452.0	-1186.030	2792.807	1822.511	-15823.8	-8167.4	2962.2	-21.33	-31.36	-4.76
454.0	-1191.246	2790.108	1823.485	-15866.5	-8230.5	2952.7	-21.42	-31.66	-4.84
456.0	-1196.475	2787.339	1824.455	-15909.0	-8294.3	2943.4	-21.52	-31.92	-4.88
458.0	-1201.719	2784.648	1825.422	-15951.7	-8358.5	2934.2	-21.61	-32.11	-4.91
460.0	-1206.977	2781.886	1826.387	-15994.8	-8423.1	2924.9	-21.69	-32.27	-4.92
462.0	-1212.248	2779.103	1827.348	-16038.1	-8487.9	2915.3	-21.77	-32.41	-4.93
464.0	-1217.535	2776.299	1828.306	-16081.7	-8552.9	2905.5	-21.87	-32.55	-4.93
466.0	-1222.835	2773.473	1829.261	-16125.7	-8618.0	2895.4	-21.98	-32.67	-4.91
468.0	-1228.150	2770.625	1830.212	-16169.8	-8683.2	2885.4	-22.09	-32.75	-4.88
470.0	-1233.480	2767.756	1831.160	-16214.1	-8748.6	2875.4	-22.19	-32.83	-4.84
472.0	-1238.825	2764.866	1832.105	-16258.7	-8814.3	2865.4	-22.28	-32.89	-4.81
474.0	-1244.184	2761.954	1833.046	-16303.2	-8880.1	2855.8	-22.37	-32.95	-4.77
476.0	-1249.557	2759.020	1833.985	-16347.7	-8946.1	2846.5	-22.48	-33.00	-4.72
478.0	-1254.945	2756.064	1834.920	-16392.6	-9012.2	2837.4	-22.61	-33.05	-4.66
480.0	-1260.349	2753.087	1835.853	-16437.6	-9078.5	2828.2	-22.75	-33.10	-4.60
482.0	-1265.767	2750.088	1836.782	-16483.3	-9144.6	2819.0	-22.79	-33.11	-4.56
484.0	-1271.200	2747.067	1837.709	-16529.0	-9210.7	2809.6	-22.79	-33.10	-4.54
486.0	-1276.648	2744.024	1838.632	-16574.5	-9276.7	2800.2	-22.65	-33.03	-4.55
488.0	-1282.111	2740.960	1839.552	-16619.8	-9342.5	2790.8	-22.48	-32.93	-4.58
490.0	-1287.589	2737.874	1840.469	-16664.3	-9408.1	2781.4	-22.14	-32.79	-4.66
492.0	-1293.081	2734.766	1841.383	-16708.2	-9473.6	2772.1	-21.70	-32.60	-4.76
494.0	-1298.588	2731.637	1842.294	-16751.0	-9538.8	2762.7	-21.18	-32.37	-4.89
496.0	-1304.109	2728.487	1843.202	-16792.8	-9603.5	2753.2	-20.73	-32.15	-4.99
498.0	-1309.643	2725.315	1844.106	-16833.5	-9667.7	2743.3	-20.26	-31.91	-5.09
500.0	-1315.190	2722.122	1845.008	-16873.8	-9731.2	2733.3	-19.98	-31.70	-5.11
502.0	-1320.751	2718.909	1845.906	-16913.4	-9794.4	2723.0	-19.76	-31.51	-5.11
504.0	-1326.325	2715.675	1846.800	-16952.8	-9857.1	2712.7	-19.63	-31.26	-5.05
506.0	-1331.911	2712.420	1847.691	-16992.1	-9919.2	2702.6	-19.56	-31.02	-4.95
508.0	-1337.511	2709.145	1848.579	-17031.2	-9980.9	2692.7	-19.49	-30.77	-4.86
510.0	-1343.123	2705.849	1849.464	-17070.4	-10042.2	2683.1	-19.46	-30.52	-4.74
512.0	-1348.749	2702.534	1850.346	-17109.4	-10103.0	2673.8	-19.42	-30.25	-4.62
514.0	-1354.386	2699.198	1851.224	-17148.1	-10163.0	2664.9	-19.42	-29.72	-4.37
516.0	-1360.037	2695.843	1852.100	-17187.3	-10222.0	2656.7	-19.52	-28.85	-3.91
518.0	-1365.701	2692.469	1852.973	-17225.7	-10278.8	2649.1	-19.68	-28.16	-3.51

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
520.0	-1371.377	2689.076	1853.843	-17264.7	-10332.5	2643.2	-19.80	-27.63	-3.20
522.0	-1377.066	2685.666	1854.713	-17303.9	-10388.9	2636.2	-19.81	-27.62	-3.19
524.0	-1382.759	2682.237	1855.579	-17343.6	-10443.7	2629.9	-19.80	-27.61	-3.18
526.0	-1388.484	2678.790	1856.444	-17383.6	-10499.3	2623.7	-19.94	-27.62	-3.16
528.0	-1394.213	2675.325	1857.306	-17423.8	-10554.9	2617.4	-19.91	-27.64	-3.13
530.0	-1399.954	2671.842	1858.167	-17463.8	-10610.4	2611.4	-19.99	-27.67	-3.10
532.0	-1405.709	2668.341	1859.026	-17503.8	-10665.7	2605.3	-20.00	-27.66	-3.08
534.0	-1411.477	2664.821	1859.882	-17543.9	-10721.0	2599.2	-20.02	-27.67	-3.07
536.0	-1417.259	2661.283	1860.737	-17583.9	-10776.4	2593.0	-20.08	-27.68	-3.04
538.0	-1423.053	2657.726	1861.589	-17624.1	-10831.8	2586.8	-20.16	-27.71	-3.00
540.0	-1428.861	2654.152	1862.440	-17664.8	-10887.5	2580.7	-20.24	-27.74	-2.96
542.0	-1434.682	2650.559	1863.288	-17705.4	-10943.1	2574.8	-20.34	-27.78	-2.91
544.0	-1440.517	2646.948	1864.135	-17746.1	-10998.8	2569.0	-20.41	-27.81	-2.86
546.0	-1446.365	2643.318	1864.979	-17787.2	-11054.4	2563.4	-20.50	-27.83	-2.83
548.0	-1452.227	2639.671	1865.822	-17828.0	-11110.1	2557.7	-20.60	-27.86	-2.79
550.0	-1458.102	2636.004	1866.663	-17869.4	-11165.9	2552.2	-20.67	-27.88	-2.77
552.0	-1463.990	2632.320	1867.503	-17910.9	-11221.6	2546.8	-20.75	-27.90	-2.75
554.0	-1469.893	2628.617	1868.340	-17952.4	-11277.5	2541.2	-20.84	-27.92	-2.74
556.0	-1475.809	2624.896	1869.176	-17994.2	-11333.3	2535.7	-20.95	-27.95	-2.71
558.0	-1481.739	2621.156	1870.009	-18036.3	-11389.1	2530.3	-21.02	-27.97	-2.68
560.0	-1487.682	2617.398	1870.841	-18078.4	-11444.9	2525.1	-21.07	-27.99	-2.66
562.0	-1493.640	2613.622	1871.672	-18120.7	-11500.9	2519.9	-21.11	-28.00	-2.63
564.0	-1499.612	2609.827	1872.500	-18163.0	-11556.7	2514.6	-21.11	-27.99	-2.63
566.0	-1505.597	2606.014	1873.327	-18205.4	-11612.7	2509.5	-21.07	-27.98	-2.63
568.0	-1511.596	2602.182	1874.152	-18247.3	-11668.4	2504.3	-21.00	-27.95	-2.64
570.0	-1517.610	2598.332	1874.976	-18289.2	-11724.2	2499.0	-20.95	-27.93	-2.65
572.0	-1523.637	2594.464	1875.797	-18331.1	-11780.0	2493.7	-20.90	-27.92	-2.67
574.0	-1529.677	2590.577	1876.617	-18372.8	-11835.8	2488.4	-20.82	-27.94	-2.60
576.0	-1535.732	2586.672	1877.436	-18412.6	-11891.4	2482.3	-20.75	-27.94	-2.56
S-II ENGINE CUTOFF									
576.330	-1536.595	2586.114	1877.544	-18416.4	-11899.0	2480.8	-20.75	-27.94	-2.56
S-II/S-IVB SEPARATION COMMAND									
577.080	-1539.006	2584.556	1877.876	-18416.7	-11918.4	2472.2	5.05	-24.51	-13.31
578.0	-1541.801	2582.748	1878.252	-18406.5	-11939.1	2458.2	12.20	-22.24	-15.68
580.0	-1547.853	2578.812	1879.055	-18381.6	-11983.5	2426.5	12.22	-22.22	-15.67
582.0	-1553.902	2574.860	1879.850	-18364.7	-12029.5	2398.2	2.77	-24.50	-12.17
584.0	-1559.945	2570.892	1880.635	-18363.2	-12080.4	2375.3	-2.93	-26.91	-10.54
586.0	-1565.991	2566.907	1881.413	-18368.6	-12135.9	2353.7	-4.22	-27.87	-10.36
588.0	-1572.039	2562.903	1882.185	-18376.9	-12193.2	2331.9	-5.13	-28.35	-11.11

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATION - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
590.0	-1578.089	2558.880	1882.940	-18387.4	-12250.8	2309.4	-5.40	-29.00	-11.49
592.0	-1584.144	2554.839	1883.705	-18398.4	-12309.4	2285.8	-5.34	-29.74	-11.88
594.0	-1590.201	2550.776	1884.453	-18409.0	-12369.9	2261.7	-5.27	-30.43	-12.23
596.0	-1596.263	2546.694	1885.194	-18419.3	-12431.2	2236.9	-5.19	-31.00	-12.54
598.0	-1602.327	2542.592	1885.926	-18429.6	-12493.7	2211.4	-4.99	-31.52	-12.88
600.0	-1608.395	2538.469	1886.650	-18439.1	-12557.2	2185.0	-4.75	-32.09	-13.26
602.0	-1614.466	2534.325	1887.364	-18448.1	-12622.3	2158.0	-4.48	-32.72	-13.68
604.0	-1620.540	2530.160	1888.070	-18456.8	-12688.2	2130.3	-4.21	-33.23	-14.05
606.0	-1626.617	2525.972	1888.767	-18464.8	-12755.2	2101.9	-3.92	-33.81	-14.46
608.0	-1632.696	2521.762	1889.454	-18472.3	-12823.3	2072.6	-3.64	-34.33	-14.83
610.0	-1638.777	2517.530	1890.131	-18479.1	-12892.3	2042.6	-3.26	-34.84	-15.25
612.0	-1644.861	2513.275	1890.799	-18485.1	-12962.5	2011.7	-2.89	-35.36	-15.67
614.0	-1650.947	2508.997	1891.456	-18490.4	-13033.6	1979.9	-2.47	-35.85	-16.10
616.0	-1657.034	2504.695	1892.102	-18495.1	-13105.8	1947.4	-2.04	-36.34	-16.54
618.0	-1663.122	2500.369	1892.738	-18498.7	-13178.7	1914.0	-1.60	-36.71	-16.93
620.0	-1669.212	2496.019	1893.362	-18501.5	-13252.3	1879.9	-1.19	-37.22	-17.36
622.0	-1675.302	2491.644	1893.975	-18503.5	-13327.3	1844.7	-0.70	-37.60	-17.79
624.0	-1681.393	2487.245	1894.576	-18504.4	-13402.7	1808.7	-0.25	-37.98	-18.18
626.0	-1687.484	2482.821	1895.166	-18504.2	-13479.1	1771.9	0.26	-38.41	-18.64
628.0	-1693.575	2478.371	1895.743	-18503.2	-13556.3	1734.1	0.83	-38.71	-19.06
630.0	-1699.665	2473.896	1896.307	-18500.9	-13634.1	1695.5	1.39	-39.10	-19.51
632.0	-1705.754	2469.396	1896.859	-18497.6	-13712.6	1656.1	1.99	-39.40	-19.95
634.0	-1711.842	2464.869	1897.397	-18493.2	-13791.8	1615.6	2.59	-39.75	-20.40
636.0	-1717.929	2460.316	1897.922	-18487.5	-13871.7	1574.4	3.18	-40.04	-20.83
638.0	-1724.013	2455.737	1898.434	-18480.7	-13952.1	1532.3	3.80	-40.33	-21.27
640.0	-1730.095	2451.131	1898.931	-18472.6	-14033.1	1489.3	4.46	-40.55	-21.69
642.0	-1736.174	2446.498	1899.414	-18463.2	-14114.3	1445.7	5.13	-40.77	-22.12
644.0	-1742.249	2441.839	1899.882	-18452.5	-14196.2	1401.1	5.75	-40.99	-22.52
646.0	-1748.321	2437.153	1900.336	-18440.4	-14278.5	1355.7	6.12	-41.18	-22.79
648.0	-1754.389	2432.439	1900.775	-18428.2	-14361.0	1310.2	5.95	-41.25	-22.75
650.0	-1760.453	2427.699	1901.199	-18416.8	-14443.6	1264.9	5.65	-41.14	-22.55
652.0	-1766.513	2422.931	1901.608	-18405.9	-14525.5	1220.1	5.35	-41.06	-22.37
654.0	-1772.570	2418.136	1902.002	-18395.8	-14607.6	1175.6	5.05	-40.97	-22.17
656.0	-1778.623	2413.315	1902.382	-18386.0	-14689.5	1131.4	4.76	-40.87	-21.97
658.0	-1784.674	2408.466	1902.747	-18376.8	-14771.1	1087.7	4.46	-40.78	-21.77
660.0	-1790.721	2403.591	1903.098	-18368.2	-14852.6	1044.2	4.17	-40.70	-21.58
662.0	-1796.766	2398.688	1903.434	-18360.2	-14933.9	1001.3	3.86	-40.58	-21.35
664.0	-1802.808	2393.759	1903.757	-18352.7	-15015.0	958.7	3.57	-40.55	-21.18
666.0	-1808.848	2388.804	1904.066	-18345.9	-15096.1	916.4	3.27	-40.47	-20.97
668.0	-1814.885	2383.822	1904.360	-18339.8	-15177.0	874.7	2.98	-40.40	-20.76
670.0	-1820.921	2378.813	1904.641	-18334.1	-15257.7	833.4	2.67	-40.26	-20.51
672.0	-1826.955	2373.777	1904.909	-18329.1	-15338.1	792.6	2.36	-40.12	-20.26
674.0	-1832.987	2368.715	1905.163	-18324.7	-15418.2	752.3	2.05	-39.99	-20.01

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATION - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
676.0	-1839.019	2363.627	1905.404	-18321.1	-15498.2	712.5	1.74	-39.85	-19.76
678.0	-1845.048	2358.513	1905.632	-18318.0	-15577.8	673.2	1.42	-39.69	-19.49
680.0	-1851.077	2353.372	1905.848	-18315.6	-15657.0	634.5	1.10	-39.51	-19.22
682.0	-1857.106	2348.206	1906.050	-18313.0	-15735.9	596.3	0.77	-39.30	-18.93
684.0	-1863.133	2343.013	1906.240	-18312.7	-15814.2	558.7	0.43	-39.03	-18.60
686.0	-1869.161	2337.795	1906.419	-18312.3	-15892.1	521.7	0.10	-38.81	-18.30
688.0	-1875.189	2332.551	1906.584	-18312.5	-15969.4	485.5	-0.24	-38.53	-17.97
690.0	-1881.216	2327.282	1906.739	-18313.4	-16046.2	449.9	-0.58	-38.28	-17.65
692.0	-1887.244	2321.988	1906.880	-18315.0	-16122.5	414.9	-0.92	-38.01	-17.33
694.0	-1893.273	2316.669	1907.011	-18317.5	-16198.4	380.7	-1.26	-37.73	-16.99
696.0	-1899.303	2311.325	1907.130	-18320.5	-16273.3	347.2	-1.63	-37.34	-16.59
698.0	-1905.334	2305.956	1907.239	-18324.2	-16347.4	314.6	-2.01	-36.93	-16.18
700.0	-1911.366	2300.563	1907.338	-18328.8	-16420.7	282.7	-2.40	-36.40	-15.70
702.0	-1917.400	2295.146	1907.425	-18334.1	-16492.9	251.9	-2.78	-35.86	-15.22
704.0	-1923.436	2289.706	1907.503	-18340.2	-16564.0	222.0	-3.17	-35.31	-14.74
706.0	-1929.473	2284.242	1907.572	-18347.0	-16633.9	193.1	-3.57	-34.68	-14.21
708.0	-1935.514	2278.755	1907.631	-18354.6	-16702.6	165.1	-3.97	-34.08	-13.69
710.0	-1941.556	2273.246	1907.680	-18363.1	-16770.1	138.2	-4.33	-33.49	-13.19
712.0	-1947.602	2267.715	1907.722	-18372.2	-16836.5	112.3	-4.68	-32.92	-12.69
714.0	-1953.651	2262.163	1907.754	-18382.0	-16901.7	87.5	-5.07	-32.24	-12.09
716.0	-1959.703	2256.589	1907.779	-18392.4	-16965.4	63.7	-5.41	-31.56	-11.52
718.0	-1965.759	2250.995	1907.796	-18403.4	-17027.8	41.0	-5.74	-30.92	-11.03
720.0	-1971.818	2245.380	1907.806	-18414.9	-17089.1	19.6	-6.00	-30.25	-10.59
722.0	-1977.882	2239.745	1907.809	-18427.1	-17148.8	-1.1	-6.27	-29.54	-10.13
724.0	-1983.949	2234.090	1907.806	-18439.8	-17206.9	-20.8	-6.53	-28.76	-9.65
726.0	-1990.021	2228.417	1907.796	-18453.1	-17263.6	-39.7	-6.74	-27.93	-9.17
728.0	-1996.097	2222.726	1907.779	-18466.7	-17318.7	-57.7	-6.93	-27.19	-8.73
730.0	-2002.178	2217.016	1907.758	-18480.9	-17372.4	-74.8	-7.10	-26.32	-8.26
732.0	-2008.263	2211.289	1907.730	-18495.1	-17424.3	-90.9	-7.23	-25.53	-7.84
734.0	-2014.353	2205.546	1907.698	-18509.5	-17474.5	-106.2	-7.31	-24.66	-7.41
736.0	-2020.448	2199.786	1907.660	-18524.1	-17523.0	-120.6	-7.41	-23.76	-6.96
738.0	-2026.548	2194.010	1907.618	-18538.9	-17569.8	-134.2	-7.45	-22.94	-6.57
740.0	-2032.652	2188.219	1907.573	-18553.4	-17614.9	-147.1	-7.47	-22.09	-6.17
742.0	-2038.762	2182.414	1907.522	-18568.1	-17658.2	-159.0	-7.42	-21.17	-5.78
744.0	-2044.876	2176.595	1907.467	-18582.9	-17699.7	-170.2	-7.38	-20.35	-5.43
746.0	-2050.995	2170.762	1907.410	-18597.3	-17739.5	-180.8	-7.25	-19.49	-5.11
S-IVB VELOCITY CUTOFF COMMAND									
747.040	-2054.170	2167.724	1907.378	-18604.7	-17760.0	-186.3	-7.19	-19.05	-4.91
748.0	-2057.117	2164.917	1907.348	-18593.5	-17777.2	-199.2	14.86	-15.93	-14.02
750.0	-2063.233	2159.059	1907.277	-18569.4	-17814.4	-231.0	17.64	-18.51	-14.38
752.0	-2069.336	2153.139	1907.195	-18524.9	-17851.3	-263.8	17.73	-18.44	-14.39

TABLE B-V. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATION - ASCENT TRAJECTORY

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
754.0	-2075.427	2147.337	1907.103	-18489.5	-17888.1	-296.5	17.78	-18.40	-16.39
756.0	-2081.507	2141.413	1907.000	-18453.9	-17924.8	-329.3	17.83	-18.34	-16.38
ORBITAL INSERTION									
757.040	-2084.654	2139.342	1906.942	-18435.3	-17943.9	-346.3	17.86	-18.31	-16.38

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EE VEL FT/S	HEAD DEG	FLT-PATH DEG	SE VEL FT/S	RANGE NM	ALTITUDE FT
GUIDANCE REFERENCE RELEASE											
-16.845	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-16.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-15.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-14.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-13.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-12.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-11.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-10.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-9.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-8.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-7.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-6.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-5.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-4.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-3.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-2.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
-1.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
0.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0	195
FIRST MOTION											
0.380	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.00	1340.7	0	195
IU UMBILICAL DISCONNECT											
0.690	3441.336	-80.6041	28.4470	321.34	89.66	1.3	90.00	0.06	1340.7	0	195
1.0	3441.336	-80.6041	28.4470	311.61	89.70	3.4	90.00	0.14	1340.7	0	196
2.0	3441.338	-80.6041	28.4470	292.10	89.78	12.1	90.00	0.52	1340.7	0	208
3.0	3441.340	-80.6041	28.4470	259.32	89.66	21.0	90.00	0.90	1340.7	0	220
4.0	3441.345	-80.6041	28.4470	245.51	89.40	30.0	90.01	1.28	1340.7	0	250
5.0	3441.350	-80.6041	28.4470	239.02	89.10	39.2	90.01	1.68	1340.7	0	280
6.0	3441.358	-80.6041	28.4470	233.21	88.88	48.6	90.02	2.08	1340.8	0	329
7.0	3441.366	-80.6041	28.4470	227.61	88.70	58.1	90.04	2.48	1341.0	0	378
8.0	3441.377	-80.6041	28.4470	227.59	88.24	67.9	90.06	2.90	1340.9	0	444
9.0	3441.388	-80.6041	28.4469	227.48	87.79	77.8	90.09	3.32	1340.7	0	510
10.0	3441.402	-80.6042	28.4469	226.76	87.45	87.9	90.11	3.75	1340.7	0	599
11.0	3441.417	-80.6042	28.4469	224.98	87.29	98.2	90.14	4.20	1341.0	0	689
12.0	3441.435	-80.6042	28.4469	222.36	87.32	108.8	90.16	4.65	1341.7	0	798
13.0	3441.453	-80.6042	28.4469	218.58	87.48	119.6	90.18	5.10	1342.8	0	906
14.0	3441.474	-80.6042	28.4469	214.37	87.73	130.6	90.18	5.57	1344.2	0	1037

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
15.0	3441.496	-80.6042	28.4469	212.33	87.98	141.9	90.18	6.05	1345.6	0	1167
16.0	3441.519	-80.6042	28.4469	215.41	88.29	152.8	90.16	6.51	1346.8	0	1310
17.0	3441.545	-80.6042	28.4469	218.75	88.74	164.4	90.12	7.00	1348.6	0	1469
18.0	3441.573	-80.6042	28.4469	214.59	89.37	176.6	90.07	7.51	1351.3	0	1639
19.0	3441.604	-80.6042	28.4469	98.33	89.77	188.8	90.00	8.01	1354.7	0	1822
20.0	3441.636	-80.6042	28.4469	63.19	89.02	201.3	89.93	8.52	1358.9	0	2017
21.0	3441.670	-80.6042	28.4469	60.17	88.20	214.3	89.86	9.04	1363.6	0	2225
22.0	3441.706	-80.6042	28.4469	59.62	87.41	227.5	89.78	9.56	1368.7	0	2446
23.0	3441.745	-80.6042	28.4469	59.83	86.64	241.0	89.70	10.08	1374.3	0	2680
24.0	3441.786	-80.6041	28.4469	60.48	85.83	254.8	89.61	10.61	1380.6	0	2928
25.0	3441.829	-80.6041	28.4469	61.30	84.99	269.1	89.53	11.14	1387.7	0	3189
26.0	3441.874	-80.6040	28.4470	62.06	84.16	283.6	89.43	11.67	1395.3	0	3465
27.0	3441.922	-80.6039	28.4470	62.70	83.38	298.6	89.34	12.20	1403.3	0	3755
28.0	3441.972	-80.6038	28.4470	63.26	82.65	313.9	89.25	12.74	1411.7	0	4059
29.0	3442.024	-80.6037	28.4471	63.76	81.93	329.3	89.15	13.27	1420.5	0	4378
30.0	3442.079	-80.6035	28.4471	64.24	81.20	345.2	89.05	13.80	1430.0	0	4712
31.0	3442.137	-80.6034	28.4472	64.66	80.49	361.3	88.95	14.33	1440.0	0	5061
32.0	3442.197	-80.6032	28.4473	65.09	79.80	378.0	88.85	14.86	1450.5	0	5426
33.0	3442.259	-80.6030	28.4474	65.67	79.13	395.2	88.75	15.40	1461.7	0	5807
34.0	3442.325	-80.6028	28.4474	66.14	78.46	412.6	88.65	15.93	1473.5	0	6203
35.0	3442.393	-80.6025	28.4475	66.54	77.78	430.5	88.54	16.45	1485.9	0	6616
36.0	3442.463	-80.6023	28.4476	66.97	77.10	448.9	88.43	16.97	1499.2	0	7047
37.0	3442.537	-80.6020	28.4477	67.35	76.43	467.6	88.32	17.48	1512.9	0	7493
38.0	3442.613	-80.6016	28.4479	67.64	75.75	486.9	88.20	18.00	1527.4	0	7957
39.0	3442.692	-80.6013	28.4480	67.96	75.05	506.2	88.08	18.48	1542.7	0	8438
40.0	3442.774	-80.6009	28.4481	68.24	74.34	526.6	87.95	18.98	1559.0	0	8937
41.0	3442.859	-80.6005	28.4483	68.46	73.63	547.2	87.82	19.46	1575.8	0	9454
42.0	3442.947	-80.6000	28.4484	68.69	72.93	568.2	87.68	19.93	1593.3	0	9989
43.0	3443.038	-80.5995	28.4486	68.91	72.25	589.6	87.55	20.39	1611.4	0	10542
44.0	3443.132	-80.5990	28.4488	69.10	71.56	611.7	87.40	20.85	1630.4	0	11114
45.0	3443.230	-80.5984	28.4490	69.30	70.87	634.3	87.26	21.29	1650.2	0	11704
46.0	3443.330	-80.5978	28.4492	69.51	70.18	657.3	87.12	21.72	1670.8	0	12314
47.0	3443.433	-80.5971	28.4494	69.67	69.49	680.7	86.97	22.14	1692.0	0	12943
48.0	3443.540	-80.5964	28.4496	69.82	68.82	704.8	86.82	22.55	1714.0	0	13592
49.0	3443.650	-80.5956	28.4498	69.97	68.16	729.6	86.67	22.95	1736.8	0	14260
50.0	3443.763	-80.5948	28.4501	70.09	67.50	754.7	86.51	23.34	1760.2	1	14948
51.0	3443.880	-80.5939	28.4504	70.21	66.83	780.4	86.35	23.71	1784.5	1	15657
52.0	3444.000	-80.5930	28.4506	70.29	66.15	807.1	86.18	24.07	1809.9	1	16386
53.0	3444.123	-80.5920	28.4509	70.34	65.50	834.1	86.01	24.42	1835.8	1	17136
54.0	3444.250	-80.5910	28.4513	70.40	64.83	861.7	85.83	24.75	1862.6	1	17906
55.0	3444.380	-80.5899	28.4516	70.43	64.16	889.4	85.65	25.06	1889.9	1	18698
56.0	3444.514	-80.5887	28.4520	70.50	63.50	918.2	85.47	25.36	1918.4	1	19511
57.0	3444.651	-80.5875	28.4523	70.58	62.86	947.4	85.30	25.65	1947.4	1	20345

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
58.0	3444.792	-80.5862	28.4527	70.68	62.19	977.5	85.13	25.92	1977.7	1	21200
59.0	3444.936	-80.5848	28.4532	70.67	61.53	1007.6	84.94	26.17	2008.2	1	22077
60.0	3445.084	-80.5834	28.4536	70.70	60.87	1038.5	84.75	26.41	2039.7	1	22974
MACH 1											
60.500	3445.159	-80.5826	28.4538	70.73	60.56	1054.3	84.67	26.53	2055.6	1	23432
61.0	3445.235	-80.5819	28.4540	70.77	60.26	1070.0	84.58	26.65	2071.6	1	23894
62.0	3445.390	-80.5803	28.4545	70.85	59.63	1101.4	84.41	26.85	2103.9	1	24836
63.0	3445.548	-80.5786	28.4550	70.92	59.01	1133.7	84.25	27.05	2137.2	1	25798
64.0	3445.710	-80.5768	28.4556	71.00	58.43	1167.0	84.09	27.25	2171.3	2	26783
65.0	3445.876	-80.5750	28.4561	71.08	57.83	1200.6	83.92	27.43	2206.0	2	27791
66.0	3446.045	-80.5731	28.4567	71.14	57.25	1234.8	83.76	27.60	2241.4	2	28820
67.0	3446.218	-80.5711	28.4573	71.21	56.69	1269.8	83.60	27.77	2277.5	2	29871
68.0	3446.395	-80.5690	28.4579	71.26	56.12	1305.8	83.43	27.92	2314.8	2	30946
69.0	3446.575	-80.5668	28.4585	71.30	55.57	1342.4	83.27	28.07	2352.7	2	32044
70.0	3446.760	-80.5645	28.4592	71.35	55.01	1380.2	83.10	28.21	2391.9	2	33165
71.0	3446.948	-80.5621	28.4599	71.41	54.46	1418.5	82.94	28.34	2431.8	2	34309
72.0	3447.140	-80.5597	28.4606	71.44	53.94	1456.9	82.78	28.46	2471.6	2	35477
73.0	3447.336	-80.5571	28.4614	71.49	53.40	1497.1	82.62	28.57	2513.6	3	36669
74.0	3447.536	-80.5544	28.4621	71.54	52.87	1537.9	82.47	28.67	2556.0	3	37886
75.0	3447.740	-80.5516	28.4630	71.58	52.33	1579.1	82.31	28.74	2599.3	3	39126
MAXIMUM DYNAMIC PRESSURE											
75.200	3447.782	-80.5510	28.4631	71.59	52.22	1587.6	82.28	28.76	2608.2	3	39377
76.0	3447.948	-80.5487	28.4638	71.61	51.79	1621.7	82.15	28.81	2644.0	3	40390
77.0	3448.160	-80.5457	28.4647	71.63	51.24	1665.3	81.98	28.87	2688.8	3	41679
78.0	3448.376	-80.5426	28.4656	71.69	50.68	1710.1	81.83	28.90	2737.2	3	42992
79.0	3448.596	-80.5393	28.4665	71.74	50.12	1755.8	81.68	28.93	2785.5	4	44330
80.0	3448.820	-80.5359	28.4675	71.77	49.56	1802.0	81.52	28.94	2834.5	4	45692
81.0	3449.049	-80.5324	28.4685	71.78	49.00	1848.8	81.36	28.93	2884.2	4	47078
82.0	3449.280	-80.5288	28.4695	71.82	48.43	1897.0	81.21	28.91	2935.5	4	48488
83.0	3449.516	-80.5250	28.4706	71.85	47.87	1946.5	81.06	28.89	2988.0	4	49922
84.0	3449.755	-80.5210	28.4717	71.88	47.30	1996.8	80.91	28.85	3041.6	5	51380
85.0	3449.999	-80.5170	28.4729	71.93	46.72	2048.3	80.76	28.79	3096.6	5	52862
86.0	3450.247	-80.5128	28.4741	71.98	46.14	2100.5	80.63	28.71	3152.4	5	54368
87.0	3450.498	-80.5084	28.4753	72.01	45.56	2153.8	80.48	28.63	3209.3	5	55897
88.0	3450.753	-80.5038	28.4766	72.03	44.98	2208.1	80.33	28.53	3267.3	6	57449
89.0	3451.012	-80.4991	28.4779	72.03	44.39	2263.8	80.18	28.42	3326.8	6	59024
90.0	3451.275	-80.4943	28.4793	72.04	43.81	2319.8	80.03	28.30	3386.6	6	60622
91.0	3451.542	-80.4892	28.4807	72.03	43.23	2377.4	79.87	28.18	3448.0	6	62242
92.0	3451.812	-80.4840	28.4822	72.02	42.65	2435.9	79.72	28.05	3510.3	7	63884

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
93.0	3452.085	-80.4787	28.4837	72.02	42.09	2496.0	79.57	27.91	3574.2	7	65549
94.0	3452.363	-80.4731	28.4853	72.01	41.52	2557.3	79.42	27.76	3639.3	7	67236
95.0	3452.644	-80.4673	28.4869	72.00	40.96	2619.4	79.27	27.61	3705.2	8	68945
96.0	3452.928	-80.4614	28.4886	72.00	40.40	2682.3	79.13	27.45	3771.9	8	70676
97.0	3453.217	-80.4553	28.4903	72.00	39.85	2746.9	78.99	27.29	3840.3	8	72429
98.0	3453.508	-80.4489	28.4921	72.00	39.33	2812.1	78.86	27.12	3909.1	9	74204
99.0	3453.804	-80.4424	28.4940	71.99	38.81	2878.8	78.72	26.96	3979.3	9	76000
100.0	3454.103	-80.4357	28.4959	71.99	38.30	2946.6	78.60	26.80	4050.6	9	77819
101.0	3454.405	-80.4289	28.4979	71.99	37.81	3015.1	78.47	26.64	4122.4	10	79660
102.0	3454.713	-80.4216	28.4999	72.00	37.33	3085.1	78.35	26.48	4195.7	10	81523
103.0	3455.022	-80.4143	28.5020	72.00	36.87	3156.4	78.24	26.33	4270.2	11	83409
104.0	3455.335	-80.4067	28.5041	72.00	36.42	3228.5	78.12	26.17	4345.4	11	85318
105.0	3455.653	-80.3989	28.5063	72.01	35.98	3301.8	78.01	26.02	4421.6	11	87250
106.0	3455.974	-80.3909	28.5086	72.02	35.56	3376.4	77.91	25.87	4499.1	12	89205
107.0	3456.300	-80.3827	28.5109	72.02	35.14	3452.1	77.80	25.73	4577.6	12	91185
108.0	3456.629	-80.3742	28.5133	72.02	34.74	3528.9	77.70	25.58	4657.2	13	93188
109.0	3456.962	-80.3656	28.5158	72.03	34.34	3607.1	77.60	25.43	4738.0	13	95214
110.0	3457.299	-80.3567	28.5183	72.03	33.95	3686.7	77.50	25.29	4820.2	14	97265
111.0	3457.640	-80.3475	28.5209	72.04	33.57	3767.4	77.41	25.14	4903.5	14	99340
112.0	3457.985	-80.3381	28.5235	72.05	33.19	3848.9	77.31	24.99	4987.5	15	101440
113.0	3458.334	-80.3285	28.5263	72.06	32.82	3932.1	77.22	24.84	5073.3	15	103563
114.0	3458.687	-80.3186	28.5291	72.06	32.46	4016.4	77.14	24.69	5160.0	16	105711
115.0	3459.044	-80.3085	28.5319	72.07	32.10	4102.4	77.05	24.54	5248.6	16	107883
116.0	3459.405	-80.2981	28.5349	72.08	31.74	4189.6	76.97	24.39	5338.1	17	110079
117.0	3459.770	-80.2874	28.5379	72.08	31.39	4278.2	76.88	24.23	5429.1	18	112300
118.0	3460.139	-80.2765	28.5410	72.08	31.04	4367.7	76.80	24.07	5521.1	18	114544
119.0	3460.512	-80.2653	28.5441	72.09	30.70	4459.2	76.72	23.92	5614.9	19	116813
120.0	3460.889	-80.2539	28.5474	72.09	30.36	4551.7	76.63	23.76	5709.6	19	119106
121.0	3461.270	-80.2422	28.5507	72.09	30.03	4645.3	76.56	23.61	5805.5	20	121423
122.0	3461.655	-80.2301	28.5541	72.09	29.70	4741.0	76.48	23.45	5903.4	21	123765
123.0	3462.043	-80.2178	28.5575	72.10	29.38	4838.0	76.41	23.29	6002.6	21	126132
124.0	3462.436	-80.2053	28.5611	72.10	29.06	4936.5	76.33	23.14	6103.3	22	128522
125.0	3462.833	-80.1924	28.5647	72.11	28.75	5037.8	76.26	22.98	6206.7	23	130938
126.0	3463.234	-80.1792	28.5684	72.11	28.44	5140.5	76.19	22.82	6311.5	24	133378
127.0	3463.639	-80.1657	28.5722	72.11	28.14	5243.5	76.12	22.67	6416.5	24	135843
128.0	3464.048	-80.1519	28.5761	72.12	27.84	5347.6	76.06	22.51	6522.6	25	138334
129.0	3464.462	-80.1378	28.5801	72.12	27.55	5454.7	75.99	22.36	6631.7	26	140849
130.0	3464.879	-80.1234	28.5842	72.13	27.26	5563.7	75.93	22.21	6742.6	27	143390
131.0	3465.301	-80.1086	28.5883	72.13	26.99	5674.2	75.87	22.06	6855.0	28	145958
132.0	3465.727	-80.0935	28.5926	72.14	26.71	5786.7	75.81	21.91	6969.3	28	148551
133.0	3466.159	-80.0781	28.5969	72.14	26.44	5900.5	75.75	21.77	7084.9	29	151171
134.0	3466.592	-80.0624	28.6014	72.15	26.17	6016.7	75.69	21.62	7202.9	30	153817
135.0	3467.031	-80.0463	28.6059	72.15	25.91	6135.0	75.63	21.48	7322.9	31	156489

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
136.0	3467.475	-80.0298	28.6105	72.16	25.66	6255.2	75.57	21.33	7444.8	32	159190
137.0	3467.923	-80.0130	28.6152	72.16	25.41	6377.5	75.52	21.19	7568.7	33	161918
138.0	3468.376	-79.9958	28.6201	72.17	25.16	6502.2	75.47	21.05	7695.0	34	164674
139.0	3468.833	-79.9783	28.6250	72.17	24.92	6628.7	75.41	20.91	7823.1	35	167459
140.0	3469.296	-79.9604	28.6300	72.18	24.68	6757.3	75.36	20.78	7953.3	36	170272
141.0	3469.762	-79.9421	28.6352	72.18	24.44	6888.7	75.31	20.64	8086.3	37	173114
142.0	3470.234	-79.9234	28.6404	72.19	24.21	7023.2	75.26	20.50	8222.2	38	175985
143.0	3470.711	-79.9043	28.6458	72.19	23.98	7159.7	75.21	20.37	8360.2	39	178886
144.0	3471.192	-79.8848	28.6513	72.20	23.76	7297.8	75.16	20.24	8499.7	40	181818
S-IC INBOARD ENGINE CUTOFF											
144.720	3471.542	-79.8705	28.6553	72.20	23.60	7395.3	75.13	20.14	8598.2	41	183947
145.0	3471.679	-79.8649	28.6568	72.20	23.54	7430.6	75.12	20.11	8634.0	41	184779
146.0	3472.169	-79.8447	28.6625	72.21	23.34	7550.6	75.08	19.98	8755.4	42	187767
147.0	3472.663	-79.8241	28.6683	72.22	23.14	7662.7	75.05	19.85	8868.8	43	190772
148.0	3473.160	-79.8031	28.6742	72.22	22.93	7778.9	75.01	19.71	8986.4	44	193801
S-IC OUTBOARD ENGINE CUTOFF											
148.410	3473.367	-79.7944	28.6766	72.23	22.86	7823.9	75.00	19.67	9031.9	45	195060
149.0	3473.664	-79.7818	28.6801	72.23	22.71	7862.3	75.00	19.54	9071.4	46	196869
S-IC/S-II SEPARATION COMMAND											
149.080	3473.706	-79.7801	28.6806	72.23	22.69	7862.7	75.00	19.53	9072.0	46	197120
150.0	3474.165	-79.7604	28.6861	72.24	22.53	7858.4	75.00	19.39	9069.0	47	199920
152.0	3475.144	-79.7177	28.6981	72.27	22.17	7838.1	75.02	19.07	9051.8	49	205876
154.0	3476.109	-79.6749	28.7100	72.30	21.82	7841.4	75.04	18.77	9058.0	52	211753
156.0	3477.062	-79.6319	28.7220	72.32	21.46	7862.9	75.05	18.47	9082.3	54	217557
158.0	3478.003	-79.5887	28.7340	72.35	21.10	7889.9	75.06	18.16	9112.2	56	223286
160.0	3478.932	-79.5452	28.7461	72.38	20.75	7918.3	75.08	17.87	9143.4	59	228945
162.0	3479.849	-79.5014	28.7582	72.41	20.39	7947.7	75.09	17.57	9175.5	61	234532
164.0	3480.755	-79.4574	28.7704	72.44	20.05	7978.0	75.10	17.28	9208.5	64	240049
166.0	3481.650	-79.4131	28.7826	72.47	19.70	8008.9	75.11	16.99	9241.9	66	245496
168.0	3482.533	-79.3685	28.7949	72.50	19.36	8040.6	75.13	16.70	9276.1	68	250875
170.0	3483.405	-79.3237	28.8073	72.53	19.02	8072.8	75.14	16.42	9310.7	71	256186
172.0	3484.266	-79.2785	28.8196	72.56	18.69	8105.7	75.15	16.14	9346.0	73	261428
174.0	3485.115	-79.2331	28.8321	72.60	18.36	8139.1	75.16	15.86	9381.7	76	266603
176.0	3485.954	-79.1875	28.8446	72.63	18.04	8172.9	75.18	15.59	9417.8	78	271710
178.0	3486.781	-79.1415	28.8571	72.66	17.71	8207.4	75.19	15.32	9454.5	81	276751
180.0	3487.598	-79.0953	28.8697	72.69	17.40	8242.7	75.21	15.05	9492.0	84	281726
182.0	3488.403	-79.0488	28.8824	72.72	17.08	8278.5	75.22	14.78	9529.8	86	286635

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	SF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
184.0	3489.199	-79.0020	28.8951	72.75	16.77	8315.1	75.23	14.52	9568.5	89	291480
186.0	3489.983	-78.9549	28.9078	72.78	16.47	8352.3	75.25	14.27	9607.6	91	296260
188.0	3490.757	-78.9075	28.9206	72.81	16.17	8390.2	75.26	14.01	9647.4	94	300976
190.0	3491.521	-78.8599	28.9335	72.85	15.87	8428.5	75.28	13.76	9687.6	96	305630
192.0	3492.274	-78.8119	28.9464	72.88	15.57	8467.2	75.29	13.51	9728.1	99	310220
194.0	3493.017	-78.7636	28.9593	72.91	15.29	8506.5	75.31	13.27	9769.1	102	314750
196.0	3493.750	-78.7151	28.9723	72.94	15.01	8546.2	75.33	13.04	9810.5	104	319216
198.0	3494.474	-78.6663	28.9854	72.98	14.75	8585.7	75.34	12.82	9851.6	107	323626
200.0	3495.188	-78.6171	28.9985	73.01	14.50	8625.3	75.36	12.61	9892.7	110	327982
202.0	3495.895	-78.5677	29.0117	73.05	14.27	8665.1	75.38	12.41	9933.9	113	332289
204.0	3496.594	-78.5180	29.0249	73.08	14.05	8704.8	75.40	12.23	9974.9	115	336551
206.0	3497.286	-78.4680	29.0381	73.12	13.84	8744.7	75.42	12.05	10016.0	118	340770
208.0	3497.971	-78.4178	29.0514	73.16	13.63	8785.1	75.44	11.88	10057.6	121	344946
210.0	3498.649	-78.3672	29.0647	73.19	13.43	8825.6	75.46	11.71	10099.3	124	349080
212.0	3499.320	-78.3164	29.0781	73.23	13.22	8866.5	75.48	11.53	10141.3	126	353171
214.0	3499.984	-78.2653	29.0915	73.26	13.02	8907.9	75.50	11.37	10183.9	129	357220
216.0	3500.641	-78.2139	29.1050	73.30	12.82	8950.0	75.52	11.20	10227.2	132	361228
218.0	3501.292	-78.1622	29.1185	73.34	12.62	8992.7	75.55	11.03	10270.9	135	365193
220.0	3501.935	-78.1102	29.1320	73.37	12.42	9035.8	75.57	10.86	10315.1	138	369116
222.0	3502.572	-78.0580	29.1456	73.41	12.23	9079.4	75.59	10.70	10359.7	140	372998
224.0	3503.201	-78.0054	29.1592	73.45	12.03	9123.5	75.61	10.53	10404.9	143	376837
226.0	3503.824	-77.9525	29.1729	73.49	11.84	9167.9	75.63	10.37	10450.3	146	380634
228.0	3504.439	-77.8993	29.1866	73.52	11.64	9213.2	75.66	10.20	10496.6	149	384389
230.0	3505.048	-77.8458	29.2004	73.56	11.45	9258.6	75.68	10.04	10543.1	152	388102
232.0	3505.650	-77.7920	29.2142	73.60	11.26	9304.6	75.70	9.88	10590.0	155	391773
234.0	3506.245	-77.7379	29.2280	73.64	11.08	9351.1	75.73	9.72	10637.5	158	395401
236.0	3506.832	-77.6835	29.2419	73.68	10.89	9397.9	75.75	9.57	10685.2	161	398988
238.0	3507.414	-77.6287	29.2559	73.72	10.71	9445.3	75.77	9.41	10733.5	164	402534
240.0	3507.988	-77.5737	29.2699	73.75	10.53	9493.2	75.80	9.26	10782.3	167	406038
242.0	3508.555	-77.5183	29.2839	73.79	10.35	9541.5	75.82	9.10	10831.4	170	409501
244.0	3509.116	-77.4626	29.2980	73.83	10.17	9590.3	75.84	8.95	10881.1	173	412923
246.0	3509.670	-77.4065	29.3121	73.87	10.00	9639.6	75.87	8.80	10931.2	176	416305
248.0	3510.218	-77.3502	29.3263	73.91	9.82	9689.2	75.89	8.66	10981.6	179	419646
250.0	3510.759	-77.2935	29.3405	73.95	9.65	9739.3	75.92	8.51	11032.5	182	422947
252.0	3511.293	-77.2364	29.3548	73.99	9.48	9789.9	75.94	8.37	11083.8	185	426209
254.0	3511.821	-77.1791	29.3691	74.03	9.32	9840.9	75.97	8.23	11135.6	188	429431
256.0	3512.342	-77.1214	29.3834	74.07	9.15	9892.4	75.99	8.09	11187.8	192	432613
258.0	3512.857	-77.0633	29.3978	74.11	8.99	9944.5	76.02	7.95	11240.6	195	435757
260.0	3513.365	-77.0049	29.4122	74.15	8.83	9996.7	76.04	7.81	11293.5	198	438862
262.0	3513.867	-76.9462	29.4267	74.19	8.68	10050.0	76.07	7.68	11347.5	201	441928
264.0	3514.363	-76.8871	29.4413	74.23	8.52	10103.5	76.10	7.54	11401.6	204	444956
266.0	3514.853	-76.8277	29.4558	74.27	8.36	10157.2	76.12	7.41	11455.9	208	447947
268.0	3515.336	-76.7679	29.4704	74.31	8.21	10211.4	76.15	7.28	11510.8	211	450898

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EE VEL FT/S	HEAD DEG	FLT-PATH DEG	SE VEL FT/S	RANGE NM	ALTITUDE FT
270.0	3515.813	-76.7078	29.4351	74.35	8.06	10266.1	76.17	7.15	11566.1	214	453813
272.0	3516.284	-76.6473	29.4998	74.39	7.91	10321.3	76.20	7.02	11622.0	217	456690
274.0	3516.749	-76.5864	29.5146	74.43	7.77	10377.2	76.23	6.90	11678.4	221	459529
276.0	3517.208	-76.5252	29.5294	74.47	7.62	10433.6	76.25	6.77	11735.4	224	462332
278.0	3517.660	-76.4636	29.5442	74.51	7.48	10490.5	76.28	6.65	11792.8	227	465098
280.0	3518.107	-76.4017	29.5591	74.55	7.34	10547.8	76.31	6.53	11850.7	231	467827
282.0	3518.548	-76.3393	29.5741	74.59	7.20	10605.5	76.34	6.41	11908.9	234	470520
284.0	3518.982	-76.2766	29.5890	74.64	7.06	10663.5	76.37	6.29	11967.4	237	473176
286.0	3519.411	-76.2135	29.6041	74.68	6.93	10722.2	76.39	6.17	12026.6	241	475797
288.0	3519.834	-76.1501	29.6191	74.72	6.79	10781.5	76.42	6.06	12086.4	244	478382
290.0	3520.251	-76.0862	29.6343	74.76	6.66	10841.4	76.45	5.94	12146.7	248	480931
292.0	3520.662	-76.0220	29.6494	74.80	6.53	10901.7	76.48	5.83	12207.5	251	483445
294.0	3521.067	-75.9574	29.6646	74.85	6.40	10962.3	76.51	5.72	12268.6	255	485924
296.0	3521.467	-75.8924	29.6799	74.89	6.28	11023.6	76.54	5.61	12330.3	258	488368
298.0	3521.861	-75.8269	29.6952	74.93	6.15	11085.4	76.57	5.50	12392.5	262	490778
300.0	3522.249	-75.7611	29.7105	74.97	6.03	11147.6	76.60	5.39	12455.2	265	493153
302.0	3522.631	-75.6949	29.7259	75.02	5.91	11210.3	76.63	5.29	12518.3	269	495495
304.0	3523.009	-75.6283	29.7414	75.06	5.79	11273.4	76.66	5.19	12581.8	272	497802
306.0	3523.380	-75.5613	29.7569	75.11	5.67	11337.3	76.69	5.08	12646.1	276	500076
308.0	3523.746	-75.4939	29.7724	75.15	5.56	11401.6	76.72	4.98	12710.7	280	502317
310.0	3524.107	-75.4260	29.7880	75.19	5.44	11466.3	76.75	4.88	12775.8	283	504526
312.0	3524.462	-75.3578	29.8036	75.24	5.33	11531.7	76.78	4.79	12841.6	287	506701
314.0	3524.812	-75.2891	29.8192	75.28	5.22	11597.6	76.82	4.69	12907.8	291	508845
316.0	3525.157	-75.2200	29.8349	75.33	5.11	11664.1	76.85	4.60	12974.6	295	510957
318.0	3525.497	-75.1504	29.8507	75.37	5.01	11731.0	76.88	4.50	13041.9	298	513037
320.0	3525.831	-75.0805	29.8665	75.41	4.90	11798.2	76.91	4.41	13109.4	302	515085
322.0	3526.160	-75.0101	29.8823	75.46	4.80	11866.0	76.94	4.32	13177.4	306	517103
324.0	3526.485	-74.9393	29.8982	75.51	4.70	11933.9	76.98	4.23	13245.6	310	519089
326.0	3526.804	-74.8680	29.9141	75.55	4.60	12002.8	77.01	4.14	13314.8	313	521045
328.0	3527.118	-74.7963	29.9301	75.60	4.50	12072.0	77.04	4.06	13384.3	317	522972
330.0	3527.427	-74.7242	29.9461	75.64	4.40	12141.8	77.08	3.97	13454.4	321	524868
332.0	3527.731	-74.6516	29.9622	75.69	4.31	12212.3	77.11	3.89	13525.2	325	526734
334.0	3528.031	-74.5785	29.9783	75.73	4.21	12283.2	77.14	3.81	13596.3	329	528571
336.0	3528.326	-74.5050	29.9944	75.78	4.12	12354.6	77.18	3.72	13668.0	333	530378
338.0	3528.615	-74.4311	30.0106	75.83	4.03	12426.8	77.21	3.64	13740.5	337	532157
340.0	3528.901	-74.3567	30.0268	75.87	3.94	12499.7	77.25	3.57	13813.6	341	533908
342.0	3529.181	-74.2818	30.0431	75.92	3.86	12572.9	77.28	3.49	13887.0	345	535630
344.0	3529.458	-74.2064	30.0594	75.97	3.77	12646.7	77.32	3.42	13961.0	349	537325
346.0	3529.729	-74.1306	30.0758	76.02	3.69	12721.1	77.35	3.34	14035.7	353	538992
348.0	3529.995	-74.0543	30.0922	76.06	3.60	12796.1	77.39	3.27	14110.8	357	540633
350.0	3530.259	-73.9775	30.1086	76.11	3.52	12871.7	77.43	3.20	14186.7	361	542246
352.0	3530.517	-73.9003	30.1251	76.16	3.45	12947.9	77.46	3.13	14263.1	365	543834
354.0	3530.771	-73.8225	30.1416	76.21	3.37	13024.7	77.50	3.06	14340.1	369	545395

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
356.0	3531.021	-73.7443	30.1582	76.26	3.29	13102.3	77.54	2.99	14417.9	374	546931
358.0	3531.267	-73.6655	30.1748	76.30	3.22	13180.3	77.57	2.93	14496.1	378	548442
360.0	3531.509	-73.5863	30.1914	76.35	3.15	13259.0	77.61	2.86	14574.9	382	549928
362.0	3531.746	-73.5065	30.2081	76.40	3.08	13338.2	77.65	2.80	14654.3	386	551390
364.0	3531.980	-73.4263	30.2248	76.45	3.01	13418.0	77.68	2.74	14734.2	391	552828
366.0	3532.210	-73.3455	30.2416	76.50	2.94	13498.7	77.72	2.68	14815.1	395	554242
368.0	3532.436	-73.2643	30.2584	76.55	2.87	13579.9	77.76	2.62	14896.5	399	555633
370.0	3532.658	-73.1825	30.2753	76.60	2.81	13661.8	77.80	2.56	14978.5	404	557001
372.0	3532.876	-73.1001	30.2922	76.65	2.74	13744.4	77.84	2.50	15061.3	408	558346
374.0	3533.091	-73.0173	30.3091	76.70	2.68	13827.5	77.88	2.45	15144.5	412	559669
376.0	3533.302	-72.9339	30.3261	76.75	2.62	13911.5	77.92	2.39	15228.7	417	560970
378.0	3533.510	-72.8500	30.3431	76.80	2.56	13996.2	77.96	2.34	15313.5	421	562251
380.0	3533.714	-72.7655	30.3601	76.85	2.50	14081.5	78.00	2.29	15399.0	426	563510
382.0	3533.915	-72.6805	30.3772	76.91	2.45	14167.5	78.04	2.24	15485.1	430	564748
384.0	3534.112	-72.5949	30.3943	76.96	2.39	14254.3	78.08	2.19	15572.0	435	565966
386.0	3534.307	-72.5088	30.4115	77.01	2.34	14341.6	78.12	2.14	15659.4	440	567164
388.0	3534.498	-72.4221	30.4287	77.06	2.29	14429.8	78.16	2.09	15747.7	444	568343
390.0	3534.685	-72.3349	30.4459	77.11	2.23	14518.9	78.20	2.05	15836.9	449	569503
392.0	3534.870	-72.2471	30.4632	77.17	2.18	14608.5	78.25	2.00	15926.6	453	570645
394.0	3535.052	-72.1587	30.4805	77.22	2.14	14699.1	78.29	1.96	16017.3	458	571768
396.0	3535.231	-72.0697	30.4978	77.27	2.09	14789.8	78.33	1.92	16108.2	463	572874
398.0	3535.407	-71.9801	30.5152	77.33	2.04	14881.5	78.38	1.88	16200.0	468	573962
400.0	3535.580	-71.8900	30.5326	77.38	2.00	14974.3	78.42	1.84	16292.9	472	575034
402.0	3535.751	-71.7993	30.5501	77.44	1.96	15067.9	78.46	1.80	16386.6	477	576091
404.0	3535.919	-71.7079	30.5675	77.49	1.92	15161.8	78.51	1.76	16480.6	482	577131
406.0	3536.085	-71.6160	30.5850	77.55	1.88	15256.8	78.55	1.73	16575.7	487	578156
408.0	3536.248	-71.5234	30.6026	77.60	1.84	15352.4	78.60	1.69	16671.4	492	579167
410.0	3536.409	-71.4302	30.6202	77.66	1.80	15449.0	78.64	1.66	16768.0	497	580165
412.0	3536.567	-71.3364	30.6378	77.71	1.76	15545.3	78.69	1.63	16864.4	502	581142
	S-II STAGE ENGINE NO.2 OUT										
412.920	3536.639	-71.2931	30.6459	77.74	1.75	15588.4	78.71	1.61	16907.6	504	581588
414.0	3536.723	-71.2421	30.6554	77.76	1.73	15630.3	78.73	1.59	16949.5	507	582108
416.0	3536.876	-71.1472	30.6731	77.81	1.69	15692.6	78.77	1.55	17011.8	512	583056
418.0	3537.026	-71.0520	30.6907	77.87	1.66	15747.0	78.82	1.53	17066.4	517	583990
420.0	3537.176	-70.9564	30.7083	77.92	1.65	15799.6	78.86	1.52	17118.9	522	584919
422.0	3537.326	-70.8604	30.7259	77.97	1.65	15851.2	78.91	1.53	17170.7	527	585849
424.0	3537.477	-70.7641	30.7435	78.03	1.66	15902.8	78.96	1.53	17222.4	532	586785
426.0	3537.629	-70.6675	30.7611	78.10	1.66	15955.4	79.02	1.53	17275.0	537	587726
428.0	3537.781	-70.5705	30.7786	78.16	1.65	16009.4	79.08	1.53	17329.1	542	588669
430.0	3537.933	-70.4731	30.7961	78.23	1.64	16064.9	79.13	1.52	17384.8	547	589611
432.0	3538.084	-70.3753	30.8135	78.29	1.63	16121.3	79.19	1.50	17441.2	552	590550

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-FL DEG	EE VEL FT/S	HEAD DEG	FLT-PATH DEG	SE VEL FT/S	RANGE NM	ALTITUDE FT
434.0	3538.234	-70.2772	30.8309	78.35	1.61	16178.8	79.24	1.49	17498.8	558	591482
436.0	3538.383	-70.1787	30.8483	78.41	1.59	16237.0	79.29	1.47	17557.0	563	592406
438.0	3538.531	-70.0798	30.8657	78.46	1.56	16296.2	79.34	1.44	17616.3	568	593321
440.0	3538.676	-69.9805	30.8830	78.52	1.53	16356.2	79.39	1.42	17676.4	573	594222
442.0	3538.819	-69.8808	30.9003	78.58	1.50	16417.4	79.44	1.39	17737.7	578	595109
444.0	3538.959	-69.7806	30.9176	78.64	1.46	16479.4	79.49	1.35	17799.7	584	595979
446.0	3539.096	-69.6801	30.9349	78.70	1.43	16541.4	79.54	1.32	17861.9	589	596831
448.0	3539.230	-69.5791	30.9522	78.76	1.39	16604.3	79.60	1.29	17924.8	594	597665
450.0	3539.362	-69.4778	30.9694	78.82	1.35	16667.5	79.65	1.25	17988.2	600	598480
452.0	3539.489	-69.3760	30.9866	78.88	1.31	16731.3	79.71	1.22	18052.0	605	599276
454.0	3539.614	-69.2737	31.0037	78.94	1.27	16795.6	79.76	1.18	18116.4	610	600052
456.0	3539.735	-69.1711	31.0209	79.00	1.23	16860.3	79.81	1.14	18181.1	616	600807
458.0	3539.853	-69.0680	31.0380	79.06	1.20	16925.5	79.86	1.11	18246.4	621	601542
460.0	3539.968	-68.9645	31.0551	79.12	1.16	16991.2	79.91	1.07	18312.2	627	602257
462.0	3540.079	-68.8605	31.0722	79.18	1.12	17057.3	79.96	1.04	18378.3	632	602953
464.0	3540.188	-68.7561	31.0892	79.24	1.08	17123.9	80.02	1.01	18444.9	637	603629
466.0	3540.293	-68.6512	31.1062	79.30	1.05	17190.8	80.07	0.97	18512.0	643	604286
468.0	3540.395	-68.5459	31.1232	79.36	1.01	17258.0	80.12	0.94	18579.2	648	604924
470.0	3540.494	-68.4401	31.1401	79.42	0.98	17325.6	80.18	0.91	18646.8	654	605545
472.0	3540.590	-68.3339	31.1571	79.48	0.95	17393.6	80.23	0.88	18714.9	659	606149
474.0	3540.684	-68.2273	31.1739	79.54	0.92	17461.9	80.29	0.86	18783.2	665	606735
476.0	3540.775	-68.1201	31.1908	79.61	0.89	17530.2	80.34	0.83	18851.6	671	607306
478.0	3540.863	-68.0126	31.2076	79.67	0.86	17599.2	80.39	0.80	18920.6	676	607862
480.0	3540.949	-67.9045	31.2244	79.73	0.84	17668.4	80.45	0.78	18989.8	682	608405
482.0	3541.033	-67.7960	31.2412	79.79	0.81	17738.2	80.50	0.76	19059.6	688	608933
484.0	3541.115	-67.6870	31.2579	79.85	0.79	17808.1	80.56	0.74	19129.6	693	609450
486.0	3541.195	-67.5776	31.2746	79.92	0.77	17877.7	80.62	0.72	19199.3	699	609955
488.0	3541.274	-67.4677	31.2912	79.98	0.75	17947.2	80.67	0.70	19268.9	705	610450
490.0	3541.351	-67.3573	31.3078	80.04	0.73	18016.1	80.73	0.68	19337.7	710	610934
492.0	3541.426	-67.2465	31.3244	80.10	0.72	18084.4	80.78	0.67	19406.1	716	611410
494.0	3541.500	-67.1352	31.3409	80.17	0.70	18151.8	80.84	0.65	19473.5	722	611876
496.0	3541.572	-67.0235	31.3574	80.23	0.68	18218.1	80.90	0.64	19539.8	728	612333
498.0	3541.643	-66.9113	31.3738	80.29	0.67	18283.3	80.95	0.63	19605.0	734	612783
500.0	3541.713	-66.7987	31.3902	80.36	0.66	18347.9	81.01	0.61	19669.6	740	613225
502.0	3541.782	-66.6856	31.4066	80.42	0.65	18411.6	81.07	0.60	19733.4	745	613661
504.0	3541.849	-66.5722	31.4228	80.49	0.64	18475.1	81.13	0.59	19796.9	751	614090
506.0	3541.917	-66.4582	31.4391	80.55	0.63	18538.3	81.18	0.59	19860.2	757	614516
508.0	3541.983	-66.3439	31.4552	80.62	0.62	18601.2	81.24	0.58	19923.1	763	614939
510.0	3542.050	-66.2291	31.4713	80.68	0.62	18664.1	81.30	0.58	19986.1	769	615361
512.0	3542.116	-66.1140	31.4874	80.75	0.62	18726.8	81.36	0.58	20048.7	775	615784
514.0	3542.183	-65.9983	31.5034	80.81	0.63	18788.9	81.42	0.58	20110.9	781	616208
516.0	3542.251	-65.8823	31.5193	80.88	0.63	18851.0	81.48	0.59	20173.0	787	616638
518.0	3542.320	-65.7659	31.5352	80.94	0.65	18911.6	81.54	0.61	20233.6	793	617075

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
520.0	3542.392	-65.6490	31.5510	81.01	0.67	18971.3	81.60	0.63	20293.3	799	617526
522.0	3542.467	-65.5317	31.5668	81.08	0.69	19032.3	81.66	0.65	20354.4	805	618000
524.0	3542.544	-65.4140	31.5825	81.14	0.72	19093.3	81.72	0.67	20415.4	811	618488
526.0	3542.625	-65.2959	31.5981	81.21	0.75	19154.9	81.78	0.70	20477.0	817	618993
528.0	3542.708	-65.1774	31.6136	81.28	0.77	19216.8	81.84	0.72	20538.9	824	619518
530.0	3542.795	-65.0585	31.6291	81.34	0.80	19278.5	81.90	0.75	20600.6	830	620063
532.0	3542.885	-64.9391	31.6445	81.41	0.83	19340.1	81.96	0.77	20662.2	836	620627
534.0	3542.979	-64.8193	31.6598	81.48	0.86	19401.8	82.03	0.80	20724.0	842	621213
536.0	3543.076	-64.6991	31.6751	81.55	0.89	19463.6	82.09	0.83	20785.8	848	621821
538.0	3543.177	-64.5785	31.6903	81.61	0.92	19525.6	82.15	0.86	20847.8	855	622451
540.0	3543.282	-64.4575	31.7054	81.68	0.95	19588.0	82.21	0.89	20910.3	861	623105
542.0	3543.391	-64.3360	31.7204	81.75	0.98	19650.6	82.27	0.92	20972.9	867	623783
544.0	3543.504	-64.2141	31.7354	81.82	1.02	19713.3	82.34	0.95	21035.6	873	624486
546.0	3543.621	-64.0918	31.7503	81.89	1.05	19776.3	82.40	0.99	21098.7	880	625216
548.0	3543.743	-63.9691	31.7651	81.96	1.09	19839.3	82.46	1.02	21161.7	886	625972
550.0	3543.870	-63.8459	31.7798	82.03	1.13	19902.8	82.53	1.06	21225.2	892	626757
552.0	3544.001	-63.7224	31.7944	82.10	1.16	19966.3	82.59	1.09	21288.8	899	627570
554.0	3544.137	-63.5983	31.8090	82.17	1.20	20030.0	82.65	1.13	21352.5	905	628413
556.0	3544.278	-63.4739	31.8234	82.24	1.24	20094.0	82.72	1.17	21416.5	912	629286
558.0	3544.424	-63.3490	31.8378	82.31	1.29	20158.2	82.78	1.21	21480.7	918	630191
560.0	3544.576	-63.2237	31.8521	82.38	1.33	20222.6	82.85	1.25	21545.1	924	631129
562.0	3544.733	-63.0980	31.8664	82.45	1.37	20287.2	82.91	1.29	21609.8	931	632099
564.0	3544.896	-62.9718	31.8805	82.52	1.42	20351.7	82.98	1.33	21674.3	937	633105
566.0	3545.065	-62.8452	31.8945	82.59	1.46	20416.4	83.05	1.37	21739.1	944	634145
568.0	3545.239	-62.7181	31.9085	82.66	1.51	20480.7	83.11	1.42	21803.4	950	635221
570.0	3545.420	-62.5907	31.9223	82.74	1.56	20545.0	83.18	1.46	21867.8	957	636334
572.0	3545.607	-62.4628	31.9361	82.81	1.60	20609.3	83.24	1.51	21932.1	964	637484
574.0	3545.800	-62.3344	31.9497	82.88	1.65	20673.5	83.31	1.55	21996.3	970	638672
576.0	3545.999	-62.2057	31.9633	82.95	1.70	20735.9	83.38	1.60	22058.8	977	639897
S-II ENGINE CUTOFF											
576.330	3546.023	-62.1875	31.9651	82.96	1.70	20743.0	83.39	1.60	22065.9	978	640047
S-II/S-IVB SEPARATION COMMAND											
577.080	3546.109	-62.1360	31.9706	82.99	1.70	20752.7	83.42	1.60	22075.6	980	640574
578.0	3546.205	-62.0765	31.9768	83.03	1.69	20753.8	83.45	1.58	22076.7	983	641165
580.0	3546.402	-61.9474	31.9900	83.11	1.64	20753.5	83.52	1.54	22076.5	990	642376
582.0	3546.597	-61.8182	32.0032	83.19	1.61	20761.3	83.59	1.52	22084.4	997	643572
584.0	3546.788	-61.6889	32.0162	83.26	1.60	20785.3	83.66	1.50	22108.6	1003	644748
586.0	3546.978	-61.5594	32.0291	83.33	1.58	20817.7	83.73	1.49	22141.0	1010	645919
588.0	3547.167	-61.4294	32.0419	83.41	1.57	20853.6	83.80	1.48	22177.0	1017	647081

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EE VEL FT/S	HEAD DEG	FLT-PATH DEG	SE VEL FT/S	RANGE NM	ALTITUDE FT
590.0	3547.355	-61.2996	32.0546	83.49	1.56	20891.6	83.88	1.47	22215.1	1023	648236
592.0	3547.541	-61.1693	32.0671	83.57	1.55	20930.6	83.95	1.45	22254.2	1030	649384
594.0	3547.726	-61.0387	32.0795	83.65	1.53	20970.3	84.03	1.44	22294.0	1037	650522
596.0	3547.909	-60.9078	32.0917	83.73	1.51	21010.3	84.10	1.42	22334.1	1043	651647
598.0	3548.090	-60.7767	32.1038	83.81	1.48	21050.9	84.18	1.40	22374.8	1050	652758
600.0	3548.268	-60.6453	32.1158	83.89	1.46	21091.6	84.26	1.37	22415.6	1057	653854
602.0	3548.443	-60.5135	32.1277	83.97	1.43	21132.8	84.33	1.34	22456.9	1063	654930
604.0	3548.615	-60.3815	32.1394	84.06	1.39	21174.3	84.41	1.31	22498.5	1070	655986
606.0	3548.783	-60.2492	32.1509	84.14	1.36	21215.9	84.48	1.28	22540.2	1077	657017
608.0	3548.946	-60.1166	32.1624	84.22	1.32	21257.8	84.56	1.24	22582.2	1084	658024
610.0	3549.105	-59.9838	32.1737	84.30	1.28	21299.9	84.64	1.20	22624.3	1090	659002
612.0	3549.259	-59.8506	32.1848	84.38	1.23	21342.0	84.71	1.16	22666.5	1097	659950
614.0	3549.407	-59.7171	32.1958	84.47	1.19	21384.2	84.79	1.12	22708.9	1104	660864
616.0	3549.550	-59.5833	32.2067	84.55	1.13	21426.5	84.87	1.07	22751.3	1111	661744
618.0	3549.687	-59.4493	32.2174	84.63	1.08	21468.7	84.95	1.02	22793.5	1118	662585
620.0	3549.817	-59.3149	32.2280	84.72	1.02	21510.6	85.03	0.96	22835.5	1125	663386
622.0	3549.939	-59.1802	32.2385	84.80	0.96	21552.9	85.10	0.91	22877.9	1131	664144
624.0	3550.055	-59.0453	32.2488	84.89	0.90	21594.7	85.18	0.85	22919.8	1138	664857
626.0	3550.163	-58.9100	32.2589	84.97	0.83	21636.4	85.26	0.79	22961.5	1145	665522
628.0	3550.262	-58.7745	32.2689	85.06	0.76	21678.0	85.34	0.72	23003.2	1152	666138
630.0	3550.353	-58.6387	32.2787	85.14	0.69	21719.2	85.42	0.65	23044.5	1159	666700
632.0	3550.435	-58.5026	32.2884	85.23	0.62	21760.1	85.50	0.58	23085.5	1166	667208
634.0	3550.507	-58.3662	32.2980	85.31	0.54	21800.8	85.58	0.51	23126.2	1173	667658
636.0	3550.569	-58.2295	32.3074	85.40	0.46	21841.1	85.66	0.43	23166.6	1180	668048
638.0	3550.622	-58.0925	32.3166	85.48	0.37	21881.1	85.74	0.35	23206.6	1187	668376
640.0	3550.663	-57.9553	32.3256	85.57	0.29	21920.5	85.82	0.27	23246.1	1194	668639
642.0	3550.694	-57.8178	32.3346	85.66	0.20	21959.4	85.90	0.19	23285.0	1201	668835
644.0	3550.713	-57.6800	32.3433	85.74	0.11	21997.9	85.99	0.10	23323.6	1208	668962
646.0	3550.721	-57.5419	32.3519	85.83	0.01	22035.9	86.07	0.01	23361.6	1215	669017
648.0	3550.716	-57.4036	32.3603	85.92	-0.08	22074.2	86.15	-0.08	23399.9	1222	669000
650.0	3550.700	-57.2650	32.3686	86.01	-0.17	22113.5	86.23	-0.16	23439.2	1229	668911
652.0	3550.672	-57.1261	32.3767	86.09	-0.26	22153.2	86.31	-0.25	23478.9	1236	668751
654.0	3550.634	-56.9870	32.3846	86.18	-0.35	22193.9	86.40	-0.33	23519.5	1243	668524
656.0	3550.584	-56.8475	32.3924	86.27	-0.43	22235.1	86.48	-0.41	23560.8	1250	668229
658.0	3550.523	-56.7078	32.4000	86.36	-0.51	22276.8	86.56	-0.49	23602.4	1257	667870
660.0	3550.452	-56.5678	32.4074	86.45	-0.59	22319.4	86.65	-0.56	23644.9	1264	667447
662.0	3550.371	-56.4275	32.4147	86.53	-0.67	22362.4	86.73	-0.63	23687.9	1272	666963
664.0	3550.280	-56.2869	32.4218	86.62	-0.74	22406.1	86.81	-0.70	23731.6	1279	666419
666.0	3550.180	-56.1460	32.4287	86.71	-0.81	22450.7	86.89	-0.77	23776.1	1286	665817
668.0	3550.071	-56.0048	32.4355	86.80	-0.88	22495.9	86.98	-0.83	23821.3	1293	665160
670.0	3549.952	-55.8633	32.4421	86.89	-0.95	22541.6	87.06	-0.89	23866.9	1300	664448
672.0	3549.825	-55.7214	32.4485	86.97	-1.01	22588.0	87.14	-0.95	23913.2	1307	663684
674.0	3549.690	-55.5793	32.4548	87.06	-1.07	22634.9	87.22	-1.01	23960.0	1315	662871

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
676.0	3549.548	-55.4368	32.4608	87.15	-1.13	22682.5	87.31	-1.06	24007.6	1322	662009
678.0	3549.397	-55.2940	32.4668	87.24	-1.18	22730.5	87.39	-1.11	24055.6	1329	661102
680.0	3549.240	-55.1509	32.4725	87.32	-1.23	22779.1	87.47	-1.16	24104.0	1336	660152
682.0	3549.076	-55.0074	32.4781	87.41	-1.28	22828.2	87.55	-1.21	24153.1	1344	659161
684.0	3548.905	-54.8636	32.4835	87.50	-1.32	22877.6	87.64	-1.25	24202.4	1351	658132
686.0	3548.729	-54.7195	32.4887	87.59	-1.36	22927.5	87.72	-1.28	24252.2	1358	657067
688.0	3548.547	-54.5751	32.4937	87.67	-1.39	22977.8	87.80	-1.32	24302.4	1366	655970
690.0	3548.361	-54.4303	32.4986	87.76	-1.43	23028.3	87.88	-1.35	24352.9	1373	654842
692.0	3548.170	-54.2851	32.5033	87.85	-1.46	23079.3	87.97	-1.38	24403.8	1380	653687
694.0	3547.975	-54.1396	32.5078	87.94	-1.48	23130.9	88.05	-1.40	24455.3	1388	652507
696.0	3547.777	-53.9938	32.5122	88.02	-1.50	23182.4	88.13	-1.42	24506.8	1395	651307
698.0	3547.575	-53.8476	32.5163	88.11	-1.52	23234.1	88.21	-1.44	24558.4	1402	650088
700.0	3547.372	-53.7011	32.5203	88.20	-1.53	23286.0	88.30	-1.45	24610.2	1410	648855
702.0	3547.166	-53.5542	32.5241	88.29	-1.54	23338.0	88.38	-1.45	24662.1	1417	647612
704.0	3546.960	-53.4070	32.5278	88.37	-1.54	23389.9	88.46	-1.46	24713.9	1425	646361
706.0	3546.753	-53.2594	32.5312	88.46	-1.54	23441.7	88.54	-1.45	24765.7	1432	645109
708.0	3546.547	-53.1115	32.5345	88.55	-1.53	23493.3	88.62	-1.45	24817.2	1440	643858
710.0	3546.341	-52.9632	32.5376	88.63	-1.51	23545.0	88.71	-1.43	24868.8	1447	642612
712.0	3546.137	-52.8146	32.5405	88.72	-1.50	23596.5	88.79	-1.42	24920.2	1455	641377
714.0	3545.936	-52.6657	32.5432	88.81	-1.47	23647.7	88.87	-1.39	24971.4	1462	640156
716.0	3545.737	-52.5164	32.5457	88.89	-1.44	23698.6	88.95	-1.37	25022.2	1470	638952
718.0	3545.543	-52.3667	32.5481	88.98	-1.41	23749.0	89.03	-1.34	25072.6	1477	637771
720.0	3545.352	-52.2168	32.5502	89.07	-1.37	23799.1	89.12	-1.30	25122.6	1485	636617
722.0	3545.167	-52.0665	32.5522	89.15	-1.33	23848.8	89.20	-1.26	25172.2	1493	635494
724.0	3544.988	-51.9159	32.5540	89.24	-1.28	23897.7	89.28	-1.22	25221.2	1500	634406
726.0	3544.815	-51.7649	32.5556	89.33	-1.23	23946.2	89.36	-1.17	25269.6	1508	633357
728.0	3544.649	-51.6136	32.5570	89.41	-1.17	23993.9	89.44	-1.11	25317.2	1515	632351
730.0	3544.491	-51.4620	32.5582	89.50	-1.11	24041.0	89.53	-1.06	25364.3	1523	631392
732.0	3544.341	-51.3102	32.5593	89.59	-1.05	24087.0	89.61	-0.99	25410.3	1531	630486
734.0	3544.201	-51.1580	32.5601	89.67	-0.98	24132.0	89.69	-0.93	25455.3	1539	629634
736.0	3544.071	-51.0055	32.5607	89.76	-0.90	24176.0	89.77	-0.86	25499.3	1546	628841
738.0	3543.950	-50.8527	32.5612	89.85	-0.82	24219.1	89.86	-0.78	25542.3	1554	628112
740.0	3543.841	-50.6997	32.5614	89.94	-0.74	24260.7	89.94	-0.70	25583.9	1562	627449
742.0	3543.744	-50.5463	32.5615	90.03	-0.66	24301.3	90.03	-0.62	25624.5	1570	626856
744.0	3543.658	-50.3928	32.5613	90.11	-0.56	24340.6	90.11	-0.54	25663.8	1577	626338
746.0	3543.586	-50.2389	32.5609	90.20	-0.47	24378.6	90.19	-0.45	25701.8	1585	625896
S-IVB VELOCITY CUTOFF COMMAND											
747.040	3543.553	-50.1589	32.5607	90.25	-0.47	24398.1	90.24	-0.40	25721.3	1589	625698
748.0	3543.525	-50.0849	32.5604	90.29	-0.41	24402.1	90.28	-0.39	25725.2	1593	625527
750.0	3543.469	-49.9308	32.5596	90.39	-0.40	24404.2	90.37	-0.38	25727.3	1601	625186
752.0	3543.412	-49.7767	32.5586	90.48	-0.40	24404.6	90.45	-0.38	25727.7	1608	624838

TABLE B-VI. GEOGRAPHIC POLAR COORDINATES - ASCENT TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
754.0	3543.356	-49.6226	32.5574	90.57	-0.40	24404.9	90.54	-0.38	25728.0	1616	624495
756.0	3543.300	-49.4685	32.5561	90.66	-0.40	24405.4	90.63	-0.38	25728.4	1624	624154
ORBITAL INSERTION											
757.040	3543.269	-49.3883	32.5553	90.71	-0.40	24405.6	90.67	-0.38	25728.7	1628	623967

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
ORBITAL INSERTION								
757.040	6562.135	-49.3883	32.5553	32.7300	90.67	-0.38	7842.1	190.185
800.0	6560.027	-46.0795	32.4724	32.6469	92.55	-0.34	7844.6	188.049
850.0	6557.847	-42.2390	32.2547	32.4286	94.73	-0.30	7847.3	185.796
900.0	6555.970	-38.4211	31.9981	32.0810	96.87	-0.25	7849.6	183.802
950.0	6554.402	-34.6368	31.4350	31.6065	98.97	-0.21	7851.6	182.075
1000.0	6553.147	-30.8960	30.8389	31.0085	101.02	-0.16	7853.3	180.623
1050.0	6552.210	-27.2074	30.1240	30.2913	103.00	-0.11	7854.6	179.453
1100.0	6551.594	-23.5784	29.2953	29.4597	104.91	-0.07	7855.5	178.570
1150.0	6551.301	-20.0145	28.3582	28.5194	106.74	-0.02	7856.1	177.980
1200.0	6551.331	-16.5201	27.3190	27.4762	108.47	0.03	7856.3	177.689
1250.0	6551.684	-13.0977	26.1838	26.3365	110.11	0.07	7856.1	177.701
1300.0	6552.358	-9.7487	24.9592	25.1068	111.65	0.12	7855.6	178.017
1350.0	6553.350	-6.4729	23.6520	23.7937	113.09	0.17	7854.7	178.642
1400.0	6554.656	-3.2692	22.2687	22.4039	114.42	0.21	7853.4	179.576
1450.0	6556.271	-0.1355	20.8159	20.9441	115.66	0.26	7851.8	180.819
1500.0	6558.189	2.9313	19.3003	19.4206	116.78	0.30	7849.8	182.371
1550.0	6560.403	5.9349	17.7281	17.8400	117.81	0.34	7847.4	184.230
1600.0	6562.903	8.8795	16.1057	16.2085	118.73	0.39	7844.7	186.392
1650.0	6565.682	11.7597	14.4389	14.5321	119.55	0.43	7841.7	188.853
1700.0	6568.728	14.6106	12.7336	12.8166	120.27	0.46	7838.4	191.607
1750.0	6572.031	17.4076	10.9955	11.0677	120.89	0.50	7834.7	194.647
1800.0	6575.578	20.1659	9.2299	9.2910	121.41	0.54	7830.7	197.966
1850.0	6579.357	22.8912	7.4421	7.4917	121.84	0.57	7826.4	201.553
1900.0	6583.355	25.5892	5.6373	5.6750	122.17	0.60	7821.9	205.397
1950.0	6587.557	28.2655	3.8203	3.8460	122.41	0.63	7817.1	209.487
2000.0	6591.948	30.9258	1.9961	2.0095	122.55	0.66	7812.0	213.809
2050.0	6596.514	33.5759	0.1693	0.1704	122.61	0.68	7806.7	218.349
2100.0	6601.238	36.2215	-1.6553	-1.6665	122.57	0.70	7801.2	223.091
2150.0	6606.105	38.8682	-3.4732	-3.4966	122.44	0.73	7795.6	228.018
2200.0	6611.097	41.5216	-5.2797	-5.3151	122.22	0.74	7789.7	233.114
2250.0	6616.197	44.1873	-7.0703	-7.1174	121.91	0.76	7783.7	238.358
2300.0	6621.389	46.8707	-8.8403	-8.8989	121.51	0.77	7777.6	243.732
2350.0	6626.656	49.5773	-10.5851	-10.6548	121.02	0.78	7771.4	249.216
2400.0	6631.979	52.3123	-12.3000	-12.3803	120.43	0.79	7765.1	254.790
2450.0	6637.341	55.0809	-13.9802	-14.0707	119.75	0.79	7758.7	260.431
2500.0	6642.725	57.8878	-15.6209	-15.7210	118.98	0.80	7752.3	266.118
2550.0	6648.113	60.7378	-17.2171	-17.3262	118.11	0.80	7745.9	271.831
2600.0	6653.487	63.6353	-18.7637	-18.8812	117.15	0.79	7739.5	277.546
2650.0	6658.831	66.5842	-20.2555	-20.3808	116.09	0.79	7733.2	283.241
2700.0	6664.126	69.5880	-21.6874	-21.8199	114.94	0.78	7726.9	288.896

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
2750.0	6669.357	72.6496	-23.0539	-23.1929	113.69	0.77	7720.7	294.487
2800.0	6674.507	75.7714	-24.3496	-24.4944	112.35	0.76	7714.5	299.994
2850.0	6679.559	78.9549	-25.5691	-25.7193	110.91	0.74	7708.5	305.395
2900.0	6684.497	82.2007	-26.7071	-26.8519	109.39	0.73	7702.7	310.670
2950.0	6689.306	85.5085	-27.7580	-27.9169	107.77	0.71	7697.0	315.800
3000.0	6693.971	88.8767	-28.7169	-28.8793	106.08	0.69	7691.5	320.764
3050.0	6698.478	92.3027	-29.5787	-29.7441	104.30	0.66	7686.1	325.545
3100.0	6702.812	95.7828	-30.3386	-30.5067	102.45	0.63	7681.0	330.126
3150.0	6706.961	99.3118	-30.9926	-31.1627	100.54	0.60	7676.2	334.489
3200.0	6710.910	102.8835	-31.5367	-31.7085	98.57	0.57	7671.6	338.619
3250.0	6714.649	106.4906	-31.9677	-32.1408	96.56	0.54	7667.2	342.502
3300.0	6718.145	110.1246	-32.2831	-32.4571	94.51	0.51	7663.1	346.124
3350.0	6721.447	113.7766	-32.4810	-32.6556	92.44	0.47	7659.4	349.474
3400.0	6724.486	117.4369	-32.5604	-32.7352	90.35	0.44	7655.9	352.540
3450.0	6727.273	121.0956	-32.5211	-32.6958	88.27	0.40	7652.7	355.313
3500.0	6729.797	124.7427	-32.3636	-32.5378	86.19	0.36	7649.9	357.784
3550.0	6732.053	128.3689	-32.0893	-32.2627	84.14	0.32	7647.4	359.947
3600.0	6734.032	131.9649	-31.7003	-31.8726	82.13	0.28	7645.2	361.796
3650.0	6735.728	135.5225	-31.1994	-31.3702	80.16	0.23	7643.4	363.325
3700.0	6737.137	139.0346	-30.5902	-30.7591	78.24	0.19	7641.9	364.533
3750.0	6738.253	142.4948	-29.8766	-30.0431	76.39	0.15	7640.8	365.417
3800.0	6739.073	145.8983	-29.0631	-29.2268	74.61	0.10	7640.0	365.976
3850.0	6739.594	149.2412	-28.1544	-28.3148	72.90	0.06	7639.6	366.211
3900.0	6739.815	152.5211	-27.1554	-27.3122	71.28	0.01	7639.5	366.124
3950.0	6739.733	155.7364	-26.0720	-26.2242	69.74	-0.03	7639.8	365.718
4000.0	6739.350	158.8870	-24.9083	-25.0562	68.29	-0.08	7640.5	364.996
4050.0	6738.667	161.9733	-23.6715	-23.8133	66.93	-0.13	7641.5	363.965
4100.0	6737.684	164.9969	-22.3653	-22.5011	65.66	-0.17	7642.8	362.630
4150.0	6736.405	167.9600	-20.9955	-21.1245	64.49	-0.21	7644.5	360.999
4200.0	6734.833	170.8656	-19.5673	-19.6891	63.40	-0.26	7646.5	359.079
4250.0	6732.973	173.7169	-18.0857	-18.1996	62.41	-0.30	7648.9	356.880
4300.0	6730.831	176.5180	-16.5556	-16.6610	61.51	-0.34	7651.5	354.411
4350.0	6728.413	179.2730	-14.9818	-15.0782	60.71	-0.38	7654.5	351.684
4400.0	6725.726	-178.0135	-13.3690	-13.4558	59.99	-0.42	7657.8	348.710
4450.0	6722.778	-175.3369	-11.7215	-11.7983	59.36	-0.46	7661.4	345.500
4500.0	6719.578	-172.6923	-10.0438	-10.1101	58.82	-0.50	7665.2	342.067
4550.0	6716.137	-170.0745	-8.3402	-8.3956	58.37	-0.53	7669.3	338.425
4600.0	6712.466	-167.4785	-6.6149	-6.6591	58.00	-0.56	7673.7	334.586
4650.0	6708.575	-164.8989	-4.8719	-4.9046	57.72	-0.60	7678.2	330.565
4700.0	6704.477	-162.3305	-3.1154	-3.1363	57.53	-0.63	7683.0	326.376
4750.0	6700.186	-159.7679	-1.3493	-1.3583	57.42	-0.65	7688.1	322.033
4800.0	6695.715	-157.2057	0.4223	0.4252	57.39	-0.68	7693.3	317.551
4850.0	6691.078	-154.6384	2.1253	2.2101	57.46	-0.70	7698.6	312.945

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
4900.0	6686.292	-152.0606	3.9657	3.9923	57.61	-0.72	7704.2	308.730
4950.0	6681.372	-149.4668	5.7292	5.7675	57.85	-0.74	7709.8	303.421
5000.0	6676.334	-146.8514	7.4815	7.5313	58.17	-0.76	7715.6	298.534
5050.0	6671.196	-144.2090	9.2183	9.2794	58.59	-0.77	7721.5	293.583
5100.0	6665.974	-141.5341	10.9350	11.0069	59.09	-0.78	7727.5	288.583
5150.0	6660.687	-138.8212	12.6270	12.7093	59.69	-0.79	7733.5	283.549
5200.0	6655.353	-136.0649	14.2893	14.3816	60.39	-0.79	7739.6	278.497
5250.0	6649.990	-133.2601	15.9169	16.0186	61.17	-0.79	7745.7	273.441
5300.0	6644.617	-130.4018	17.5042	17.6149	62.06	-0.79	7751.8	268.396
5350.0	6639.253	-127.4850	19.0460	19.1651	63.04	-0.79	7757.9	263.377
5400.0	6633.917	-124.5055	20.5365	20.6632	64.13	-0.78	7763.9	258.396
5450.0	6628.628	-121.4592	21.9696	22.1034	65.31	-0.78	7769.9	253.470
5500.0	6623.405	-118.3427	23.3392	23.4795	66.59	-0.76	7775.9	248.611
5550.0	6618.266	-115.1534	24.6390	24.7851	67.98	-0.75	7781.7	243.834
5600.0	6613.231	-111.8894	25.8624	26.0138	69.47	-0.73	7787.4	239.152
5650.0	6608.317	-108.5499	27.0030	27.1589	71.05	-0.71	7793.0	234.579
5700.0	6603.543	-105.1352	28.0541	28.2141	72.73	-0.69	7798.5	230.127
5750.0	6598.926	-101.6471	29.0093	29.1728	74.50	-0.67	7803.7	225.811
5800.0	6594.483	-98.0885	29.8625	30.0289	76.36	-0.64	7808.8	221.641
5850.0	6590.231	-94.4640	30.6075	30.7764	78.29	-0.61	7813.7	217.632
5900.0	6586.185	-90.7797	31.2390	31.4099	80.30	-0.58	7818.4	213.794
5950.0	6582.360	-87.0433	31.7520	31.9245	82.37	-0.54	7822.8	210.140
6000.0	6578.771	-83.2638	32.1423	32.3159	84.48	-0.51	7827.0	206.682
6050.0	6575.430	-79.4512	32.4065	32.5809	86.64	-0.47	7830.9	203.430
6100.0	6572.351	-75.6169	32.5422	32.7169	88.81	-0.43	7834.6	200.397
6150.0	6569.544	-71.7725	32.5479	32.7227	91.00	-0.39	7837.9	197.592
6200.0	6567.020	-67.9303	32.4233	32.5977	93.18	-0.35	7840.9	195.026
6250.0	6564.788	-64.1020	32.1690	32.3426	95.34	-0.30	7843.6	192.708
6300.0	6562.857	-60.2993	31.7867	31.9593	97.47	-0.26	7846.0	190.648
6350.0	6561.234	-56.5328	31.2793	31.4503	99.56	-0.21	7848.1	188.855
6400.0	6559.923	-52.8122	30.6504	30.8194	101.59	-0.17	7849.8	187.338
6450.0	6558.931	-49.1456	29.9043	30.0708	103.54	-0.12	7851.1	186.102
6500.0	6558.260	-45.5400	29.0461	29.2098	105.43	-0.07	7852.1	185.156
6550.0	6557.913	-42.0005	28.0817	28.2418	107.22	-0.03	7852.7	184.506
6600.0	6557.890	-38.5310	27.0169	27.1729	108.93	0.02	7852.9	184.156
6650.0	6558.192	-35.1336	25.8582	26.0096	110.54	0.07	7852.8	184.112
6700.0	6558.816	-31.8094	24.6122	24.7582	112.05	0.11	7852.3	184.376
6750.0	6559.760	-28.5579	23.2854	23.4255	113.46	0.16	7851.4	184.952
6800.0	6561.020	-25.3777	21.8846	22.0180	114.77	0.21	7850.1	185.840
6850.0	6562.591	-22.2664	20.4162	20.5423	115.97	0.25	7848.5	187.041
6900.0	6564.467	-19.2209	18.8867	19.0049	117.07	0.30	7846.5	188.553
6950.0	6566.640	-16.2373	17.3025	17.4120	118.06	0.34	7844.2	190.376
7000.0	6569.102	-13.3112	15.6636	15.7700	118.95	0.38	7841.5	192.504

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
7050.0	6571.843	-10.4380	13.9940	14.0946	119.75	0.42	7838.4	194.935
7100.0	6574.954	-7.6125	12.2815	12.3417	120.44	0.46	7835.1	197.661
7150.0	6578.122	-4.8294	10.5376	10.6070	121.03	0.50	7831.4	200.676
7200.0	6581.537	-2.0834	8.7676	8.8258	121.53	0.53	7827.4	203.971
7250.0	6585.384	0.6312	6.9768	7.0234	121.93	0.57	7823.1	207.537
7300.0	6589.351	3.3201	5.1702	5.2049	122.24	0.60	7818.6	211.361
7350.0	6593.523	5.9888	3.3528	3.3753	122.45	0.63	7813.7	215.432
7400.0	6597.886	8.6432	1.5292	1.5395	122.58	0.65	7808.7	219.736
7450.0	6602.423	11.2888	-0.2956	-0.2976	122.61	0.68	7803.4	224.259
7500.0	6607.119	13.9314	-2.1172	-2.1315	122.55	0.70	7797.9	228.984
7550.0	6611.958	16.5765	-3.9310	-3.9574	122.40	0.72	7792.2	233.895
7600.0	6616.923	19.2299	-5.7322	-5.7704	122.15	0.74	7786.4	238.973
7650.0	6621.998	21.8969	-7.5164	-7.5664	121.82	0.75	7780.4	244.200
7700.0	6627.163	24.5830	-9.2789	-9.3403	121.40	0.77	7774.2	249.557
7750.0	6632.404	27.2935	-11.0151	-11.0875	120.88	0.78	7768.0	255.024
7800.0	6637.701	30.0338	-12.7203	-12.8032	120.27	0.79	7761.7	260.578
7850.0	6643.038	32.8087	-14.3897	-14.4826	119.57	0.79	7755.4	266.200
7900.0	6648.396	35.6232	-16.0184	-16.1208	118.78	0.79	7749.0	271.868
7950.0	6653.759	38.4818	-17.6015	-17.7127	117.89	0.79	7742.6	277.559
8000.0	6659.109	41.3888	-19.1338	-19.2533	116.90	0.79	7736.2	283.252
8050.0	6664.427	44.3480	-20.6102	-20.7373	115.82	0.79	7729.9	288.925
8100.0	6669.699	47.3628	-22.0254	-22.1595	114.64	0.78	7723.6	294.556
8150.0	6674.906	50.4359	-23.3740	-23.5145	113.37	0.77	7717.4	300.123
8200.0	6680.032	53.5696	-24.6507	-24.7969	112.01	0.75	7711.2	305.604
8250.0	6685.061	56.7651	-25.8500	-26.0013	110.55	0.74	7705.2	310.980
8300.0	6689.977	60.0227	-26.9666	-27.1224	109.01	0.72	7699.4	316.229
8350.0	6694.764	63.3419	-27.9951	-28.1549	107.37	0.70	7693.7	321.331
8400.0	6699.408	66.7209	-28.9305	-29.0937	105.66	0.68	7688.2	326.268
8450.0	6703.994	70.1569	-29.7678	-29.9339	103.87	0.66	7682.9	331.022
8500.0	6708.207	73.6456	-30.5024	-30.6709	102.01	0.63	7677.8	335.574
8550.0	6712.335	77.1818	-31.1302	-31.3008	100.08	0.60	7673.0	339.909
8600.0	6716.265	80.7589	-31.6476	-31.8197	98.11	0.57	7668.4	344.011
8650.0	6719.984	84.3694	-32.0514	-32.2247	96.09	0.54	7664.0	347.866
8700.0	6723.481	88.0048	-32.3394	-32.5135	94.03	0.51	7660.0	351.460
8750.0	6726.746	91.6558	-32.5098	-32.6844	91.96	0.47	7656.2	354.782
8800.0	6729.767	95.3127	-32.5618	-32.7366	89.87	0.43	7652.7	357.821
8850.0	6732.535	98.9657	-32.4953	-32.6699	87.79	0.40	7649.6	360.567
8900.0	6735.042	102.6050	-32.3112	-32.4852	85.72	0.36	7646.7	363.012
8950.0	6737.291	106.2211	-32.0109	-32.1941	83.68	0.31	7644.2	365.148
9000.0	6739.243	109.8051	-31.5967	-31.7687	81.68	0.27	7642.1	366.972
9050.0	6740.922	113.3490	-31.0717	-31.2420	79.72	0.23	7640.3	368.477
9100.0	6742.314	116.8459	-30.4394	-30.6077	77.82	0.19	7638.8	369.660
9150.0	6743.413	120.2898	-29.7039	-29.8698	75.99	0.14	7637.7	370.521

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
9200.0	6744.216	123.6761	-28.8497	-29.0327	74.22	0.10	7636.9	371.058
9250.0	6744.721	127.0013	-27.9418	-28.1014	72.54	0.05	7636.5	371.272
9300.0	6744.924	130.2630	-26.9251	-27.0309	70.93	0.01	7636.5	371.164
9350.0	6744.826	133.4602	-25.8749	-25.9761	69.42	-0.04	7636.8	370.738
9400.0	6744.427	136.5927	-24.6466	-24.7928	67.99	-0.08	7637.4	369.998
9450.0	6743.726	139.6614	-23.3954	-23.5360	66.65	-0.13	7638.4	368.949
9500.0	6742.726	142.6679	-22.0767	-22.2111	65.40	-0.17	7639.8	367.597
9550.0	6741.431	145.6145	-20.6957	-20.8233	64.25	-0.22	7641.5	365.950
9600.0	6739.842	148.5044	-19.2575	-19.3777	63.19	-0.26	7643.5	364.015
9650.0	6737.965	151.3410	-17.7672	-17.8793	62.22	-0.30	7645.9	361.802
9700.0	6735.806	154.1282	-16.2295	-16.3330	61.34	-0.34	7648.5	359.320
9750.0	6733.371	156.8704	-14.6492	-14.7436	60.55	-0.39	7651.5	356.581
9800.0	6730.667	159.5720	-13.0309	-13.1157	59.85	-0.42	7654.8	353.595
9850.0	6727.703	162.2378	-11.3790	-11.4537	59.24	-0.46	7658.4	350.375
9900.0	6724.487	164.8728	-9.6980	-9.7621	58.72	-0.50	7662.2	346.932
9950.0	6721.030	167.4819	-7.9919	-8.0450	58.28	-0.53	7666.3	343.281
10000.0	6717.342	170.0705	-6.2650	-6.3068	57.94	-0.57	7670.7	339.433
10050.0	6713.435	172.6436	-4.5213	-4.5516	57.67	-0.60	7675.3	335.404
10100.0	6709.322	175.2067	-2.7649	-2.7835	57.50	-0.63	7680.1	331.207
10150.0	6705.015	177.7650	-0.9998	-1.0066	57.41	-0.66	7685.1	326.856
10200.0	6700.528	-179.6760	0.7699	0.7751	57.40	-0.68	7690.3	322.367
10250.0	6695.877	-177.1110	2.5403	2.5574	57.48	-0.70	7695.7	317.754
10300.0	6691.075	-174.5343	4.3072	4.3361	57.65	-0.72	7701.2	313.032
10350.0	6686.140	-171.9407	6.0664	6.1070	57.90	-0.74	7706.9	308.215
10400.0	6681.094	-169.3245	7.8137	7.8657	58.25	-0.76	7712.7	303.319
10450.0	6675.932	-166.6803	9.5446	9.6077	58.68	-0.77	7718.6	298.358
10500.0	6670.695	-164.0026	11.2547	11.3286	59.20	-0.78	7724.5	293.349
10550.0	6665.391	-161.2860	12.9391	13.0233	59.82	-0.79	7730.6	288.304
10600.0	6660.040	-158.5253	14.5930	14.6871	60.52	-0.80	7736.7	283.239
10650.0	6654.659	-155.7151	16.2113	16.3148	61.33	-0.80	7742.8	278.169
10700.0	6649.267	-152.8507	17.7897	17.9009	62.23	-0.80	7748.9	273.108
10750.0	6643.884	-149.9271	19.3195	19.4400	63.23	-0.79	7755.0	268.071
10800.0	6638.527	-146.9401	20.7981	20.9261	64.33	-0.79	7761.1	263.071
10850.0	6633.216	-143.8859	22.2184	22.3534	65.53	-0.78	7767.1	258.123
10900.0	6627.970	-140.7611	23.5743	23.7157	66.83	-0.77	7773.1	253.241
10950.0	6622.806	-137.5632	24.8594	25.0065	68.23	-0.75	7779.0	248.438
11000.0	6617.745	-134.2905	26.0672	26.2194	69.74	-0.74	7784.8	243.728
11050.0	6612.805	-130.9424	27.1913	27.3480	71.33	-0.72	7790.4	239.124
11100.0	6608.003	-127.5195	28.2251	28.3857	73.03	-0.69	7796.0	234.641
11150.0	6603.358	-124.0236	29.1621	29.3262	74.81	-0.67	7801.3	230.291
11200.0	6598.886	-120.4579	29.9963	30.1632	76.68	-0.64	7806.5	226.088
11250.0	6594.606	-116.8274	30.7217	30.8910	78.63	-0.61	7811.5	222.044
	INITIATE S-IVB RESTART SEQUENCE							
11287.730	6591.512	-114.0484	31.1038	31.3646	80.14	-0.59	7815.1	219.106

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
11290.0	6591.330	-113.8904	31.2201	31.3910	80.23	-0.59	7815.4	218.932
11300.0	6590.532	-113.1383	31.3330	31.5042	80.64	-0.58	7816.3	218.172
11310.0	6589.744	-112.3941	31.4411	31.6126	81.05	-0.57	7817.2	217.420
11320.0	6588.964	-111.6480	31.5445	31.7163	81.46	-0.57	7818.2	216.675
11330.0	6588.194	-110.8999	31.6430	31.8151	81.88	-0.56	7819.1	215.937
11340.0	6587.433	-110.1500	31.7366	31.9090	82.30	-0.55	7820.0	215.208
11350.0	6586.682	-109.3984	31.8253	31.9980	82.71	-0.55	7820.9	214.486
11360.0	6585.940	-108.6452	31.9091	32.0821	83.14	-0.54	7821.8	213.772
11370.0	6585.207	-107.8903	31.9880	32.1611	83.56	-0.53	7822.6	213.066
11380.0	6584.485	-107.1339	32.0619	32.2352	83.98	-0.53	7823.5	212.369
11390.0	6583.772	-106.3761	32.1308	32.3043	84.41	-0.52	7824.3	211.679
11400.0	6583.069	-105.6170	32.1946	32.3683	84.84	-0.51	7825.2	210.998
11410.0	6582.377	-104.8566	32.2534	32.4273	85.26	-0.50	7826.0	210.325
11420.0	6581.694	-104.0950	32.3071	32.4812	85.69	-0.50	7826.9	209.661
11430.0	6581.022	-103.3324	32.3557	32.5299	86.13	-0.49	7827.7	209.005
11440.0	6580.361	-102.5688	32.3992	32.5736	86.56	-0.48	7828.5	208.358
11450.0	6579.710	-101.8043	32.4376	32.6120	86.99	-0.47	7829.3	207.720
11460.0	6579.069	-101.0389	32.4708	32.6454	87.42	-0.46	7830.0	207.091
11470.0	6578.440	-100.2729	32.4989	32.6735	87.86	-0.46	7830.8	206.471
11480.0	6577.821	-99.5063	32.5218	32.6965	88.30	-0.45	7831.6	205.860
11490.0	6577.213	-98.7391	32.5395	32.7142	88.73	-0.44	7832.3	205.258
11500.0	6576.616	-97.9715	32.5520	32.7268	89.17	-0.43	7833.1	204.666
11510.0	6576.031	-97.2036	32.5594	32.7342	89.60	-0.42	7833.8	204.082
11520.0	6575.456	-96.4355	32.5615	32.7363	90.04	-0.42	7834.5	203.509
11530.0	6574.893	-95.6672	32.5584	32.7332	90.48	-0.41	7835.2	202.945
11540.0	6574.342	-94.8989	32.5501	32.7249	90.92	-0.40	7835.9	202.391
11550.0	6573.802	-94.1306	32.5366	32.7113	91.35	-0.39	7836.6	201.846
11560.0	6573.274	-93.3625	32.5179	32.6926	91.79	-0.38	7837.2	201.311
11570.0	6572.757	-92.5946	32.4940	32.6686	92.22	-0.37	7837.9	200.787
11580.0	6572.253	-91.8271	32.4649	32.6394	92.66	-0.36	7838.5	200.272
11590.0	6571.760	-91.0601	32.4306	32.6050	93.10	-0.36	7839.2	199.768
11600.0	6571.279	-90.2935	32.3911	32.5655	93.53	-0.35	7839.8	199.274
11610.0	6570.810	-89.5276	32.3465	32.5207	93.96	-0.34	7840.4	198.790
11620.0	6570.354	-88.7625	32.2967	32.4707	94.40	-0.33	7841.0	198.317
11630.0	6569.910	-87.9981	32.2417	32.4156	94.83	-0.32	7841.6	197.854
11640.0	6569.478	-87.2347	32.1817	32.3554	95.26	-0.31	7842.1	197.402
11650.0	6569.059	-86.4721	32.1165	32.2900	95.68	-0.30	7845.5	196.961
11660.0	6568.658	-85.7105	32.0462	32.2195	96.11	-0.29	7846.0	196.537
S-IVB/CSM PHYSICAL SEPARATION								
11667.800	6568.355	-85.1172	31.9979	32.1610	96.44	-0.28	7846.3	196.213

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
ORBITAL INSERTION								
757.040	3543.269	-49.3883	32.5553	32.7300	90.67	-0.38	25728.7	102.692
800.0	3542.131	-46.0795	32.4724	32.6469	92.55	-0.34	25737.0	101.538
850.0	3540.954	-42.2390	32.2547	32.4286	94.73	-0.30	25745.7	100.322
900.0	3539.941	-38.4211	31.9081	32.0810	96.87	-0.25	25753.4	99.245
950.0	3539.094	-34.6368	31.4350	31.6045	98.97	-0.21	25759.9	98.313
1000.0	3538.416	-30.8960	30.8389	31.0085	101.02	-0.16	25765.3	97.529
1050.0	3537.910	-27.2074	30.1240	30.2913	103.00	-0.11	25769.6	96.897
1100.0	3537.578	-23.5784	29.2953	29.4597	104.91	-0.07	25772.6	96.420
1150.0	3537.420	-20.0145	28.3582	28.5194	106.74	-0.02	25774.5	96.102
1200.0	3537.436	-16.5201	27.3190	27.4762	108.47	0.03	25775.2	95.945
1250.0	3537.626	-13.0977	26.1839	26.3365	110.11	0.07	25774.6	95.951
1300.0	3537.990	-9.7487	24.9592	25.1068	111.65	0.12	25772.9	96.122
1350.0	3538.526	-6.4729	23.6520	23.7937	113.09	0.17	25769.9	96.459
1400.0	3539.231	-3.2692	22.2687	22.4039	114.42	0.21	25765.8	96.963
1450.0	3540.103	-0.1355	20.8159	20.9441	115.66	0.26	25760.4	97.635
1500.0	3541.139	2.9313	19.3003	19.4206	116.78	0.30	25753.9	98.473
1550.0	3542.334	5.9349	17.7281	17.8400	117.81	0.34	25746.2	99.476
1600.0	3543.684	8.8795	16.1057	16.2085	118.73	0.39	25737.4	100.644
1650.0	3545.185	11.7697	14.4399	14.5321	119.55	0.43	25727.4	101.972
1700.0	3546.829	14.6106	12.7336	12.8166	120.27	0.46	25716.4	103.460
1750.0	3548.613	17.4076	10.9955	11.0677	120.89	0.50	25704.3	105.101
1800.0	3550.528	20.1659	9.2299	9.2910	121.41	0.54	25691.3	106.893
1850.0	3552.569	22.8912	7.4421	7.4917	121.84	0.57	25677.3	108.830
1900.0	3554.727	25.5892	5.6373	5.6750	122.17	0.60	25662.3	110.906
1950.0	3556.995	28.2655	3.8203	3.8460	122.41	0.63	25646.5	113.114
2000.0	3559.367	30.9258	1.9961	2.0095	122.55	0.66	25630.0	115.448
2050.0	3561.833	33.5759	0.1693	0.1704	122.61	0.68	25612.6	117.899
2100.0	3564.383	36.2215	-1.6553	-1.6665	122.57	0.70	25594.6	120.460
2150.0	3567.011	38.8682	-3.4732	-3.4966	122.44	0.73	25576.0	123.120
2200.0	3569.707	41.5216	-5.2797	-5.3151	122.22	0.74	25556.8	125.871
2250.0	3572.461	44.1873	-7.0703	-7.1174	121.91	0.76	25537.1	128.703
2300.0	3575.264	46.8707	-8.8403	-8.8989	121.51	0.77	25517.1	131.605
2350.0	3578.108	49.5773	-10.5851	-10.6548	121.02	0.78	25496.7	134.566
2400.0	3580.992	52.3123	-12.3000	-12.3803	120.43	0.79	25476.0	137.575
2450.0	3583.878	55.0809	-13.9802	-14.0707	119.75	0.79	25455.2	140.621
2500.0	3586.785	57.8878	-15.6209	-15.7210	118.98	0.80	25434.2	143.692
2550.0	3589.694	60.7379	-17.2171	-17.3262	118.11	0.80	25413.2	146.777
2600.0	3592.596	63.6353	-18.7637	-18.8812	117.15	0.79	25392.2	149.863
2650.0	3595.491	66.5843	-20.2555	-20.3908	116.09	0.79	25371.3	152.938
2700.0	3598.340	69.5880	-21.6874	-21.8198	114.94	0.78	25350.7	155.991

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
2750.0	3601.165	72.6496	-23.0539	-23.1928	113.69	0.77	25330.2	159.010
2800.0	3603.945	75.7714	-24.3496	-24.4944	112.35	0.76	25310.1	161.984
2850.0	3606.673	78.9549	-25.5691	-25.7193	110.91	0.74	25290.4	164.900
2900.0	3609.340	82.2007	-26.7071	-26.8619	109.39	0.73	25271.2	167.749
2950.0	3611.936	85.5085	-27.7580	-27.9169	107.77	0.71	25252.5	170.518
3000.0	3614.455	88.8767	-28.7169	-28.8793	106.08	0.68	25234.4	173.199
3050.0	3616.889	92.3027	-29.5787	-29.7441	104.30	0.66	25217.0	175.781
3100.0	3619.229	95.7828	-30.3386	-30.5067	102.45	0.63	25200.3	178.254
3150.0	3621.469	99.3118	-30.9926	-31.1627	100.54	0.60	25184.3	180.610
3200.0	3623.602	102.8835	-31.5367	-31.7085	98.57	0.57	25169.1	182.840
3250.0	3625.620	106.4906	-31.9677	-32.1408	96.56	0.54	25154.9	184.936
3300.0	3627.519	110.1246	-32.2831	-32.4571	94.51	0.51	25141.5	186.892
3350.0	3629.291	113.7766	-32.4810	-32.6556	92.44	0.47	25129.1	188.701
3400.0	3630.932	117.4369	-32.5604	-32.7352	90.35	0.44	25117.7	190.356
3450.0	3632.437	121.0956	-32.5211	-32.6958	88.27	0.40	25107.3	191.854
3500.0	3633.800	124.7427	-32.3636	-32.5378	86.19	0.36	25098.0	193.188
3550.0	3635.018	128.3689	-32.0893	-32.2627	84.14	0.32	25089.8	194.356
3600.0	3636.086	131.9649	-31.7003	-31.8726	82.13	0.28	25082.7	195.354
3650.0	3637.002	135.5225	-31.1994	-31.3702	80.16	0.23	25076.7	196.180
3700.0	3637.763	139.0346	-30.5902	-30.7591	78.24	0.19	25071.8	196.832
3750.0	3638.366	142.4948	-29.8766	-30.0431	76.39	0.15	25068.1	197.309
3800.0	3638.808	145.8983	-29.0631	-29.2268	74.61	0.10	25065.6	197.611
3850.0	3639.090	149.2412	-28.1544	-28.3148	72.90	0.06	25064.2	197.738
3900.0	3639.209	152.5211	-27.1556	-27.3122	71.28	0.01	25064.0	197.691
3950.0	3639.165	155.7364	-26.0720	-26.2242	69.74	-0.03	25065.0	197.472
4000.0	3638.958	158.8870	-24.9089	-25.0562	68.29	-0.08	25067.2	197.082
4050.0	3638.589	161.9733	-23.6715	-23.8133	66.93	-0.13	25070.4	196.525
4100.0	3638.058	164.9969	-22.3653	-22.5011	65.66	-0.17	25074.9	195.805
4150.0	3637.368	167.9600	-20.9955	-21.1246	64.49	-0.21	25080.4	194.924
4200.0	3636.519	170.8656	-19.5673	-19.6891	63.40	-0.26	25087.0	193.887
4250.0	3635.515	173.7169	-18.0857	-18.1996	62.41	-0.30	25094.7	192.700
4300.0	3634.358	176.5180	-16.5556	-16.6610	61.51	-0.34	25103.5	191.367
4350.0	3633.052	179.2730	-14.9818	-15.0782	60.71	-0.38	25113.3	189.894
4400.0	3631.601	-178.0135	-13.3690	-13.4558	59.99	-0.42	25124.0	188.288
4450.0	3630.010	-175.3369	-11.7215	-11.7983	59.36	-0.46	25135.7	186.555
4500.0	3628.283	-172.6923	-10.0438	-10.1101	58.82	-0.50	25148.3	184.702
4550.0	3626.424	-170.0745	-8.3402	-8.3956	58.37	-0.53	25161.8	182.735
4600.0	3624.443	-167.4785	-6.6149	-6.6591	58.00	-0.56	25176.0	180.662
4650.0	3622.341	-164.8989	-4.8719	-4.9046	57.72	-0.60	25191.1	178.491
4700.0	3620.123	-162.3305	-3.1154	-3.1363	57.53	-0.63	25206.9	176.229
4750.0	3617.811	-159.7679	-1.3493	-1.3583	57.42	-0.65	25223.3	173.884
4800.0	3615.397	-157.2057	0.4223	0.4252	57.39	-0.68	25240.4	171.464
4850.0	3612.893	-154.6384	2.1953	2.2101	57.46	-0.70	25258.0	168.977

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
4900.0	3610.309	-152.0606	3.9657	3.9923	57.61	-0.72	25276.1	166.431
4950.0	3607.652	-149.4668	5.7292	5.7575	57.85	-0.74	25294.7	163.834
5000.0	3604.932	-146.8514	7.4815	7.5313	58.17	-0.76	25313.7	161.195
5050.0	3602.158	-144.2090	9.2183	9.2794	58.59	-0.77	25333.0	158.522
5100.0	3599.338	-141.5341	10.9350	11.0069	59.09	-0.78	25352.6	155.822
5150.0	3596.483	-138.8212	12.6270	12.7093	59.69	-0.79	25372.4	153.104
5200.0	3593.603	-136.0649	14.2893	14.3816	60.39	-0.79	25392.3	150.377
5250.0	3590.707	-133.2601	15.9168	16.0186	61.17	-0.79	25412.4	147.647
5300.0	3587.806	-130.4018	17.5042	17.6149	62.06	-0.79	25432.4	144.922
5350.0	3584.910	-127.4850	19.0460	19.1651	63.04	-0.79	25452.4	142.212
5400.0	3582.029	-124.5055	20.5365	20.6632	64.13	-0.78	25472.2	139.523
5450.0	3579.173	-121.4592	21.9696	22.1034	65.31	-0.78	25491.9	136.863
5500.0	3576.352	-118.3427	23.3392	23.4795	66.59	-0.76	25511.4	134.239
5550.0	3573.578	-115.1534	24.6390	24.7851	67.98	-0.75	25530.5	131.660
5600.0	3570.859	-111.3894	25.8624	26.0138	69.47	-0.73	25549.3	129.132
5650.0	3568.206	-108.5499	27.0030	27.1589	71.05	-0.71	25567.7	126.663
5700.0	3565.628	-105.1352	28.0541	28.2141	72.73	-0.69	25585.5	124.259
5750.0	3563.135	-101.6471	29.0093	29.1728	74.50	-0.67	25602.8	121.928
5800.0	3560.736	-98.0885	29.8625	30.0289	76.36	-0.64	25619.5	119.677
5850.0	3558.440	-94.4640	30.6075	30.7764	78.29	-0.61	25635.6	117.512
5900.0	3556.256	-90.7797	31.2390	31.4099	80.30	-0.58	25650.9	115.440
5950.0	3554.190	-87.0433	31.7520	31.9245	82.37	-0.54	25665.5	113.467
6000.0	3552.252	-83.2638	32.1423	32.3159	84.48	-0.51	25679.2	111.599
6050.0	3550.448	-79.4512	32.4065	32.5809	86.64	-0.47	25692.0	109.844
6100.0	3548.786	-75.6169	32.5422	32.7169	88.81	-0.43	25703.9	108.206
6150.0	3547.270	-71.7725	32.5479	32.7227	91.00	-0.39	25714.9	106.691
6200.0	3545.907	-67.9303	32.4233	32.5977	93.18	-0.35	25724.8	105.305
6250.0	3544.702	-64.1020	32.1690	32.3426	95.34	-0.30	25733.7	104.054
6300.0	3543.659	-60.2993	31.7867	31.9593	97.47	-0.26	25741.5	102.942
6350.0	3542.783	-56.5328	31.2793	31.4503	99.56	-0.21	25748.2	101.974
6400.0	3542.075	-52.8122	30.6504	30.8194	101.59	-0.17	25753.8	101.154
6450.0	3541.539	-49.1456	29.9043	30.0708	103.54	-0.12	25758.2	100.487
6500.0	3541.177	-45.5400	29.0461	29.2098	105.43	-0.07	25761.4	99.976
6550.0	3540.990	-42.0005	28.0817	28.2418	107.22	-0.03	25763.4	99.625
6600.0	3540.978	-38.5310	27.0169	27.1729	108.93	0.02	25764.1	99.437
6650.0	3541.140	-35.1336	25.8582	26.0096	110.54	0.07	25763.7	99.413
6700.0	3541.477	-31.8094	24.6122	24.7582	112.05	0.11	25762.0	99.555
6750.0	3541.987	-28.5579	23.2854	23.4255	113.46	0.16	25759.1	99.866
6800.0	3542.668	-25.3777	21.8846	22.0180	114.77	0.21	25755.0	100.346
6850.0	3543.516	-22.2664	20.4162	20.5423	115.97	0.25	25749.7	100.994
6900.0	3544.529	-19.2209	18.8867	19.0049	117.07	0.30	25743.2	101.811
6950.0	3545.702	-16.2373	17.3025	17.4120	118.06	0.34	25735.5	102.795
7000.0	3547.031	-13.3112	15.6696	15.7700	118.95	0.38	25726.6	103.944

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
7050.0	3548.511	-10.4380	13.9940	14.0846	119.75	0.42	25716.7	105.256
7100.0	3550.137	-7.6125	12.2815	12.3617	120.44	0.46	25705.6	106.729
7150.0	3551.902	-4.8294	10.5376	10.6070	121.03	0.50	25693.6	108.357
7200.0	3553.800	-2.0834	8.7676	8.8258	121.53	0.53	25680.5	110.136
7250.0	3555.823	0.6312	6.9768	7.0234	121.93	0.57	25666.4	112.061
7300.0	3557.965	3.3201	5.1702	5.2049	122.24	0.60	25651.5	114.126
7350.0	3560.218	5.9888	3.3528	3.3753	122.45	0.63	25635.6	116.324
7400.0	3562.573	8.6432	1.5292	1.5395	122.58	0.65	25619.0	118.648
7450.0	3565.023	11.2888	-0.2956	-0.2976	122.61	0.68	25601.7	121.090
7500.0	3567.553	13.9314	-2.1172	-2.1315	122.55	0.70	25583.6	123.641
7550.0	3570.172	16.5765	-3.9310	-3.9574	122.40	0.72	25565.0	126.293
7600.0	3572.853	19.2299	-5.7322	-5.7706	122.15	0.74	25545.8	129.035
7650.0	3575.593	21.8969	-7.5164	-7.5664	121.82	0.75	25526.1	131.858
7700.0	3578.382	24.5830	-9.2789	-9.3403	121.40	0.77	25506.0	134.750
7750.0	3581.212	27.2935	-11.0151	-11.0875	120.88	0.78	25485.6	137.702
7800.0	3584.072	30.0338	-12.7203	-12.8032	120.27	0.79	25465.0	140.701
7850.0	3586.953	32.8087	-14.3897	-14.4826	119.57	0.79	25444.1	143.737
7900.0	3589.947	35.6232	-16.0184	-16.1208	118.78	0.79	25423.2	146.797
7950.0	3592.742	38.4818	-17.6015	-17.7127	117.89	0.79	25402.2	149.870
8000.0	3595.631	41.3888	-19.1338	-19.2533	116.90	0.79	25381.3	152.944
8050.0	3598.503	44.3480	-20.6102	-20.7373	115.82	0.79	25360.4	156.007
8100.0	3601.349	47.3628	-22.0254	-22.1595	114.64	0.78	25339.8	159.047
8150.0	3604.161	50.4359	-23.3740	-23.5145	113.37	0.77	25319.4	162.053
8200.0	3606.929	53.5696	-24.6507	-24.7969	112.01	0.75	25299.3	165.013
8250.0	3609.644	56.7651	-25.8500	-26.0013	110.55	0.74	25279.7	167.916
8300.0	3612.299	60.0227	-26.9666	-27.1224	109.01	0.72	25260.5	170.750
8350.0	3614.883	63.3419	-27.9951	-28.1549	107.37	0.70	25241.8	173.505
8400.0	3617.391	66.7209	-28.9305	-29.0937	105.66	0.68	25223.8	176.171
8450.0	3619.813	70.1569	-29.7678	-29.9339	103.87	0.66	25206.4	178.737
8500.0	3622.142	73.6456	-30.5024	-30.6709	102.01	0.63	25189.7	181.196
8550.0	3624.371	77.1818	-31.1302	-31.3008	100.09	0.60	25173.8	183.536
8600.0	3626.493	80.7589	-31.6476	-31.8197	98.11	0.57	25158.7	185.751
8650.0	3628.501	84.3694	-32.0514	-32.2247	96.09	0.54	25144.4	187.832
8700.0	3630.390	88.0048	-32.3394	-32.5135	94.03	0.51	25131.1	189.773
8750.0	3632.152	91.6558	-32.5098	-32.6844	91.96	0.47	25118.8	191.567
8800.0	3633.783	95.3127	-32.5618	-32.7366	89.87	0.43	25107.4	193.208
8850.0	3635.278	98.9657	-32.4953	-32.6699	87.79	0.40	25097.0	194.690
8900.0	3636.632	102.6050	-32.3112	-32.4852	85.72	0.36	25087.7	196.011
8950.0	3637.840	106.2211	-32.0109	-32.1841	83.68	0.31	25079.5	197.164
9000.0	3638.900	109.8051	-31.5967	-31.7687	81.68	0.27	25072.4	198.149
9050.0	3639.807	113.3490	-31.0717	-31.2420	79.72	0.23	25066.5	198.962
9100.0	3640.558	116.8459	-30.4394	-30.6077	77.82	0.19	25061.7	199.601
9150.0	3641.152	120.2898	-29.7039	-29.8698	75.99	0.14	25058.0	200.065

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
9200.0	3641.585	123.6761	-28.8697	-29.0327	74.22	0.10	25055.5	200.355
9250.0	3641.858	127.0013	-27.9418	-28.1014	72.54	0.05	25054.2	200.471
9300.0	3641.968	130.2630	-26.9251	-27.0808	70.93	0.01	25054.0	200.412
9350.0	3641.915	133.4602	-25.8249	-25.9761	69.42	-0.04	25055.0	200.183
9400.0	3641.699	136.5927	-24.6466	-24.7928	67.99	-0.08	25057.2	199.783
9450.0	3641.321	139.6614	-23.3954	-23.5360	66.65	-0.13	25060.5	199.216
9500.0	3640.781	142.6679	-22.0767	-22.2111	65.40	-0.17	25064.9	198.486
9550.0	3640.081	145.6145	-20.6957	-20.8233	64.25	-0.22	25070.5	197.597
9600.0	3639.224	148.5044	-19.2575	-19.3777	63.19	-0.26	25077.1	196.552
9650.0	3638.210	151.3410	-17.7673	-17.8793	62.22	-0.30	25084.9	195.357
9700.0	3637.044	154.1282	-16.2295	-16.3330	61.34	-0.34	25093.6	194.017
9750.0	3635.730	156.8704	-14.6492	-14.7436	60.55	-0.39	25103.4	192.538
9800.0	3634.270	159.5720	-13.0309	-13.1157	59.85	-0.42	25114.2	190.926
9850.0	3632.665	162.2378	-11.3790	-11.4537	59.24	-0.46	25125.9	189.187
9900.0	3630.933	164.8728	-9.6980	-9.7621	58.72	-0.50	25138.5	187.328
9950.0	3629.066	167.4819	-7.9919	-8.0450	58.28	-0.53	25152.0	185.357
10000.0	3627.075	170.0705	-6.2650	-6.3068	57.94	-0.57	25166.3	183.279
10050.0	3624.965	172.6436	-4.5213	-4.5516	57.67	-0.60	25181.3	181.104
10100.0	3622.744	175.2067	-2.7649	-2.7835	57.50	-0.63	25197.1	178.837
10150.0	3620.418	177.7650	-0.9998	-1.0066	57.41	-0.66	25213.5	176.488
10200.0	3617.996	-179.6760	0.7699	0.7751	57.40	-0.68	25230.6	174.064
10250.0	3615.484	-177.1110	2.5403	2.5574	57.48	-0.70	25248.3	171.573
10300.0	3612.892	-174.5343	4.3072	4.3361	57.65	-0.72	25266.4	169.024
10350.0	3610.227	-171.9407	6.0664	6.1070	57.90	-0.74	25285.0	166.423
10400.0	3607.498	-169.3245	7.8137	7.8657	58.25	-0.76	25304.0	163.779
10450.0	3604.715	-166.6803	9.5446	9.6077	58.68	-0.77	25323.3	161.101
10500.0	3601.887	-164.0026	11.2547	11.3286	59.20	-0.78	25342.9	158.396
10550.0	3599.023	-161.2860	12.9391	13.0233	59.82	-0.79	25362.7	155.672
10600.0	3596.134	-158.5253	14.5930	14.6871	60.52	-0.80	25382.7	152.937
10650.0	3593.228	-155.7151	16.2113	16.3148	61.33	-0.80	25402.8	150.199
10700.0	3590.317	-152.8507	17.7887	17.9009	62.23	-0.80	25422.9	147.467
10750.0	3587.410	-149.9271	19.3195	19.4400	63.23	-0.79	25442.9	144.747
10800.0	3584.518	-146.9401	20.7981	20.9261	64.33	-0.79	25462.9	142.047
10850.0	3581.650	-143.8859	22.2184	22.3534	65.53	-0.78	25482.7	139.375
10900.0	3578.817	-140.7611	23.5743	23.7157	66.83	-0.77	25502.3	136.739
10950.0	3576.029	-137.5532	24.8594	25.0065	68.23	-0.75	25521.6	134.146
11000.0	3573.297	-134.2905	26.0672	26.2194	69.74	-0.74	25540.6	131.602
11050.0	3570.628	-130.9424	27.1913	27.3480	71.33	-0.72	25559.1	129.117
11100.0	3568.036	-127.5195	28.2251	28.3857	73.03	-0.69	25577.3	126.696
11150.0	3565.528	-124.0336	29.1621	29.3242	74.81	-0.67	25594.9	124.347
11200.0	3563.114	-120.4579	29.9963	30.1632	76.68	-0.64	25611.9	122.078
11250.0	3560.802	-116.8274	30.7217	30.8910	78.63	-0.61	25628.3	119.894
	INITIATE S-IVB RESTART SEQUENCE							
11287.730	3559.132	-114.0486	31.1338	31.3646	80.14	-0.59	25640.2	118.308

TABLE B-VIII. GEOGRAPHIC POLAR COORDINATES - ORBITAL TRAJECTORY

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
11290.0	3559.033	-113.8804	31.2201	31.3910	80.23	-0.59	25640.9	118.214
11300.0	3558.603	-113.1383	31.3330	31.5042	80.64	-0.58	25644.0	117.804
11310.0	3558.177	-112.3941	31.4411	31.6126	81.05	-0.57	25647.1	117.397
11320.0	3557.756	-111.6480	31.5445	31.7163	81.46	-0.57	25650.1	116.995
11330.0	3557.340	-110.8999	31.6430	31.8151	81.88	-0.56	25653.1	116.597
11340.0	3556.929	-110.1500	31.7366	31.9090	82.30	-0.55	25656.1	116.203
11350.0	3556.524	-109.3984	31.8253	31.9980	82.71	-0.55	25659.0	115.813
11360.0	3556.123	-108.6452	31.9091	32.0821	83.14	-0.54	25661.9	115.428
11370.0	3555.728	-107.8903	31.9880	32.1611	83.56	-0.53	25664.8	115.047
11380.0	3555.337	-107.1339	32.0619	32.2352	83.98	-0.53	25667.6	114.670
11390.0	3554.953	-106.3761	32.1308	32.3043	84.41	-0.52	25670.4	114.298
11400.0	3554.573	-105.6170	32.1946	32.3683	84.84	-0.51	25673.2	113.930
11410.0	3554.199	-104.8566	32.2534	32.4273	85.26	-0.50	25675.9	113.566
11420.0	3553.831	-104.0950	32.3071	32.4812	85.69	-0.50	25678.7	113.208
11430.0	3553.468	-103.3324	32.3557	32.5299	86.13	-0.49	25681.3	112.854
11440.0	3553.111	-102.5688	32.3992	32.5736	86.56	-0.48	25684.0	112.504
11450.0	3552.759	-101.8043	32.4376	32.6120	86.99	-0.47	25686.6	112.160
11460.0	3552.413	-101.0389	32.4708	32.6454	87.42	-0.46	25689.1	111.820
11470.0	3552.073	-100.2729	32.4989	32.6735	87.86	-0.46	25691.7	111.485
11480.0	3551.739	-99.5063	32.5218	32.6965	88.30	-0.45	25694.1	111.155
11490.0	3551.411	-98.7391	32.5395	32.7142	88.73	-0.44	25696.6	110.830
11500.0	3551.089	-97.9715	32.5520	32.7268	89.17	-0.43	25699.0	110.511
11510.0	3550.772	-97.2036	32.5594	32.7342	89.60	-0.42	25701.4	110.196
11520.0	3550.462	-96.4355	32.5615	32.7363	90.04	-0.42	25703.7	109.886
11530.0	3550.159	-95.6672	32.5584	32.7332	90.48	-0.41	25706.0	109.581
11540.0	3549.861	-94.8989	32.5501	32.7249	90.92	-0.40	25708.3	109.282
11550.0	3549.569	-94.1306	32.5366	32.7113	91.35	-0.39	25710.5	108.988
11560.0	3549.284	-93.3625	32.5179	32.6926	91.79	-0.38	25712.7	108.699
11570.0	3549.005	-92.5946	32.4940	32.6686	92.22	-0.37	25714.9	108.416
11580.0	3548.732	-91.8271	32.4649	32.6394	92.66	-0.36	25717.0	108.138
11590.0	3548.466	-91.0601	32.4306	32.6050	93.10	-0.36	25719.1	107.866
11600.0	3548.207	-90.2935	32.3911	32.5655	93.53	-0.35	25721.1	107.599
11610.0	3547.954	-89.5276	32.3465	32.5207	93.96	-0.34	25723.1	107.338
11620.0	3547.707	-88.7625	32.2967	32.4707	94.40	-0.33	25725.0	107.083
11630.0	3547.467	-87.9981	32.2417	32.4156	94.83	-0.32	25726.9	106.833
11640.0	3547.234	-87.2347	32.1817	32.3554	95.26	-0.31	25728.8	106.589
11650.0	3547.008	-86.4721	32.1165	32.2900	95.68	-0.30	25739.7	106.351
11660.0	3546.792	-85.7105	32.0462	32.2195	96.11	-0.29	25741.3	106.121
S-IVB/CSM PHYSICAL SEPARATION								
11667.800	3546.628	-85.1172	31.9879	32.1610	96.44	-0.28	25742.5	105.947

TABLE B-IX. S-IC STAGE FREE FLIGHT TRAJECTORY (METRIC UNITS)

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	RANGE M	ALTITUDE M	LONG DEG E	LAT DEG N
150.0	60277	-138	87435	886.3	-3.7	2216.5	86664	60870	-79.7604	28.8500
160.0	68654	-169	109545	789.6	-2.5	2205.6	108427	69584	-79.5479	28.9096
170.0	76078	-187	131569	695.6	-1.2	2199.8	130066	77419	-79.3362	28.9685
180.0	82569	-193	153547	602.5	0.1	2196.0	151638	84392	-79.1251	29.0267
190.0	88130	-185	175490	509.8	1.4	2192.6	173132	90510	-78.9142	29.0842
200.0	92756	-164	197399	417.4	2.8	2189.2	194580	95775	-78.7035	29.1412
210.0	96478	-129	219272	325.2	4.2	2185.6	216006	100190	-78.4929	29.1976
220.0	99269	-81	241110	233.0	5.6	2181.9	237392	103754	-78.2824	29.2534
230.0	101139	-17	262909	141.0	7.1	2177.9	258752	106470	-78.0718	29.3087
240.0	102090	61	284668	49.0	8.6	2173.8	280093	108338	-77.8612	29.3635
250.0	102120	154	306385	-42.0	10.1	2169.5	301422	109357	-77.6504	29.4178
260.0	101232	262	328057	-134.7	11.6	2165.0	322746	109530	-77.4393	29.4715
270.0	99426	387	349684	-226.6	13.2	2160.2	344071	108855	-77.2280	29.5248
280.0	96700	527	371261	-318.5	14.8	2155.3	365404	107332	-77.0164	29.5776
290.0	93055	684	392788	-410.4	16.5	2150.1	386751	104962	-76.8043	29.6300
300.0	88491	857	414263	-502.4	18.2	2144.7	408113	101743	-76.5917	29.6819
310.0	83006	1048	435682	-594.5	19.9	2139.1	429515	97674	-76.3786	29.7333
320.0	76600	1255	457045	-686.7	21.6	2133.3	450944	92756	-76.1649	29.7844
330.0	69271	1481	478347	-779.0	23.4	2127.1	472414	86986	-75.9505	29.8350
340.0	61019	1724	499585	-871.3	25.2	2120.3	493928	80364	-75.7354	29.8851
350.0	51845	1985	520748	-963.7	27.0	2113.0	515486	72891	-75.5196	29.9349
360.0	41760	2264	541811	-1053.3	28.8	2099.4	537069	64575	-75.3033	29.9842
370.0	30800	2560	562695	-1136.3	30.4	2074.0	558608	55446	-75.0871	30.0328
380.0	19097	2870	583168	-1197.3	31.4	2009.7	579967	45613	-74.8735	30.0803
390.0	7135	3181	602448	-1169.3	30.0	1806.8	600035	35482	-74.6706	30.1248
400.0	-3442	3448	618139	-909.3	22.3	1262.3	616547	26444	-74.5043	30.1609
410.0	-10417	3615	627340	-511.3	11.6	618.7	626372	20400	-74.4053	30.1822
420.0	-14295	3697	631530	-290.0	5.4	266.0	630906	16963	-74.3596	30.1920
430.0	-16703	3735	633350	-214.0	2.8	123.8	632850	14737	-74.3389	30.1963
440.0	-18755	3757	634243	-197.9	1.7	64.1	634059	12785	-74.3277	30.1986
450.0	-20641	3770	634711	-193.4	1.0	28.6	634691	10933	-74.3213	30.1999
460.0	-22424	3777	634885	-160.3	0.5	8.2	635037	9197	-74.3178	30.2006
470.0	-24053	3781	634936	-156.3	0.3	-2.7	635219	7580	-74.3160	30.2010
480.0	-25555	3784	634849	-145.0	0.1	-8.1	635310	6077	-74.3151	30.2011
490.0	-26953	3785	634754	-135.1	0.1	-10.4	635354	4675	-74.3146	30.2012
500.0	-28262	3785	634646	-126.4	0.0	-11.1	635375	3364	-74.3144	30.2012
510.0	-29486	3785	634534	-118.4	0.0	-11.1	635385	2134	-74.3143	30.2012
520.0	-30637	3785	634424	-111.3	-0.0	-10.8	635389	978	-74.3142	30.2011
S-IC STAGE IMPACT										
528.53	-31611	3785	634330	-106.6	-0.0	-10.4	635391	0	-74.3142	30.2011

TABLE B-X. S-IC STAGE FREE FLIGHT TRAJECTORY (ENGLISH UNITS)

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	RANGE NM	ALTITUDE FT	LONG DEG E	LAT DEG N
150.0	197753	-453	286861	2906.9	-12.1	7271.8	47	199706	-79.7604	28.8500
160.0	225242	-554	359338	2590.6	-8.0	7236.3	59	228295	-79.5479	28.9096
170.0	249601	-614	431657	2282.0	-3.0	7217.3	70	254000	-79.3362	28.9685
180.0	270893	-632	503764	1976.7	0.3	7204.5	82	276877	-79.1251	29.0267
190.0	289139	-607	575754	1672.7	4.6	7193.5	93	296949	-78.9142	29.0842
200.0	304349	-539	647633	1369.5	9.1	7182.3	105	314224	-78.7035	29.1412
210.0	316530	-425	719398	1066.8	13.7	7170.6	117	328706	-78.4929	29.1976
220.0	325687	-265	791044	764.5	18.4	7158.4	128	340401	-78.2824	29.2534
230.0	331822	-57	862563	462.6	23.2	7145.5	140	349311	-78.0718	29.3087
240.0	334939	199	933951	160.0	28.1	7132.0	151	355438	-77.8612	29.3635
250.0	335041	504	1005200	-140.5	33.1	7117.8	163	358784	-77.6504	29.4178
260.0	332127	861	1076334	-442.1	38.2	7102.9	174	359350	-77.4393	29.4715
270.0	326200	1268	1147256	-743.5	43.4	7087.3	186	357135	-77.2280	29.5248
280.0	317258	1729	1218048	-1045.0	48.7	7071.1	197	352140	-77.0164	29.5776
290.0	305300	2243	1288675	-1346.6	54.2	7054.2	209	344363	-76.8043	29.6300
300.0	290325	2812	1359130	-1648.4	59.7	7036.6	220	333801	-76.5917	29.6819
310.0	272330	3437	1429404	-1950.4	65.3	7018.2	232	320454	-76.3786	29.7333
320.0	251312	4119	1499491	-2253.1	71.0	6999.0	243	304317	-76.1649	29.7844
330.0	227268	4858	1569380	-2555.0	76.8	6978.7	255	285387	-75.9505	29.8350
340.0	200195	5655	1639057	-2858.7	82.7	6956.3	267	263662	-75.7354	29.8851
350.0	170098	6512	1708491	-3160.2	88.6	6929.1	278	239145	-75.5196	29.9349
360.0	137009	7428	1777594	-3455.2	94.5	6887.8	290	211861	-75.3033	29.9842
370.0	101051	8400	1846112	-3724.4	99.7	6804.6	302	181911	-75.0871	30.0328
380.0	62654	9416	1913279	-3928.3	103.0	6593.4	313	149650	-74.8735	30.0803
390.0	23407	10435	1976535	-3835.1	98.5	5927.9	324	116412	-74.6706	30.1248
400.0	-11224	11314	2027318	-2946.7	73.1	4141.2	333	86759	-74.5043	30.1609
410.0	-34176	11863	2058231	-1679.4	38.1	2030.0	338	66930	-74.4053	30.1872
420.0	-46868	12129	2071948	-954.4	17.4	872.7	341	55652	-74.3596	30.1920
430.0	-54799	12254	2077920	-702.0	9.1	406.2	342	48350	-74.3389	30.1963
440.0	-61533	12326	2080914	-648.2	5.5	210.4	342	41947	-74.3277	30.1986
450.0	-67726	12368	2082384	-601.7	3.2	93.8	343	35870	-74.3213	30.1999
460.0	-73563	12393	2082955	-555.3	1.8	26.9	343	30172	-74.3178	30.2006
470.0	-78925	12406	2083025	-512.9	1.0	-8.9	343	24869	-74.3160	30.2010
480.0	-83843	12413	2082337	-475.6	0.5	-26.5	343	19937	-74.3151	30.2011
490.0	-88433	12417	2082528	-443.3	0.2	-34.1	343	15339	-74.3146	30.2012
500.0	-92722	12418	2082171	-414.8	0.1	-36.6	343	11036	-74.3144	30.2012
510.0	-96733	12419	2081905	-389.0	0.0	-36.5	343	7002	-74.3143	30.2012
520.0	-100515	12419	2081445	-366.7	-0.0	-35.4	343	3210	-74.3142	30.2011
S-IC STAGE IMPACT										
528.03	-103703	12419	2081135	-349.7	-0.0	-34.1	343	0	-74.3142	30.2011

TABLE B-XII. S-II STAGE FREE FLIGHT TRAJECTORY (ENGLISH UNITS)

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	RANGE NM	ALTITUDE FT	LONG DEG E	LAT DEG N
580.0	-242197	102510	6113500	-5281.8	569.3	19981.3	990	642167	-61.9478	32.1683
600.0	-353130	114190	6511501	-5811.0	598.7	19817.2	1056	652534	-60.6600	32.2931
620.0	-474611	126458	6906123	-6336.5	628.0	19643.4	1122	659731	-59.3698	32.4030
640.0	-606569	139309	7297174	-6858.6	657.1	19460.1	1188	663757	-58.0773	32.4977
660.0	-748930	152740	7684463	-7377.0	686.0	19267.2	1254	664612	-56.7824	32.5775
680.0	-901624	166747	8067798	-7891.8	714.6	19064.7	1319	662294	-55.4851	32.6421
700.0	-1064578	181323	8446988	-8403.0	743.0	18852.7	1385	656805	-54.1857	32.6915
720.0	-1237720	196464	8821841	-8910.6	771.0	18631.1	1451	648145	-52.8840	32.7257
740.0	-1420977	212162	9192166	-9414.5	798.7	18399.8	1517	636315	-51.5803	32.7447
760.0	-1614274	228410	9557770	-9914.7	826.0	18159.0	1583	621316	-50.2743	32.7483
780.0	-1817538	245199	9918462	-10411.1	852.9	17908.5	1649	603150	-48.9664	32.7365
800.0	-2030694	262521	10274047	-10903.8	879.3	17648.4	1716	581820	-47.6566	32.7092
820.0	-2253645	280365	10624332	-11392.7	905.1	17378.4	1782	557327	-46.3448	32.6664
840.0	-2486374	298722	10969120	-11877.6	930.5	17098.7	1849	529676	-45.0313	32.6080
860.0	-2728743	317580	11308215	-12358.7	955.2	16809.1	1916	498870	-43.7160	32.5338
880.0	-2980693	336927	11641419	-12835.7	979.4	16509.6	1983	464912	-42.3990	32.4439
900.0	-3242143	356750	11968531	-13308.6	1002.8	16200.0	2050	427808	-41.0803	32.3380
920.0	-3513000	377035	12289351	-13777.4	1025.5	15880.2	2118	387562	-39.7601	32.2162
940.0	-3793207	397767	12603671	-14241.5	1047.5	15549.9	2185	344180	-38.4384	32.0782
960.0	-4082622	418928	12911259	-14697.9	1068.4	15205.5	2254	297672	-37.1154	31.9241
980.0	-4380775	440474	13211509	-15093.3	1084.3	14794.7	2322	248103	-35.7928	31.7540
1000.0	-4683160	462067	13499976	-14952.7	1061.0	13872.8	2389	196126	-34.4897	31.5705
1020.0	-4951597	481673	13750957	-12156.4	847.4	10593.2	2450	145946	-33.3243	31.3930
1040.0	-5141068	493977	13901208	-5746.4	380.9	4484.9	2488	109453	-32.5990	31.2761
1060.0	-5214465	498566	13952910	-2232.8	123.4	1264.0	2502	88789	-32.3264	31.2303
1080.0	-5245683	500009	13965582	-1077.1	35.2	184.2	2507	73906	-32.2318	31.2142
1100.0	-5262579	500342	13964770	-690.3	3.6	-200.3	2509	60757	-32.1985	31.2084
1120.0	-5274211	500280	13959401	-486.4	-7.5	-304.8	2510	48502	-32.1969	31.2063
1140.0	-5282625	500099	13953312	-368.0	-9.8	-296.1	2510	38168	-32.1835	31.2057
1160.0	-5289330	499905	13947668	-308.7	-9.4	-268.0	2510	29404	-32.1827	31.2055
1180.0	-5295108	499724	13942594	-271.1	-8.6	-239.8	2510	21712	-32.1825	31.2054
1200.0	-5300238	499562	13938045	-243.1	-7.7	-215.9	2510	14854	-32.1825	31.2053
1220.0	-5304870	499414	13933929	-220.9	-7.0	-196.4	2510	8656	-32.1825	31.2053
1240.0	-5309103	499280	13930156	-203.1	-6.5	-180.5	2510	2991	-32.1824	31.2052
	S-II STAGE IMPACT									
1251.24	-5311333	499228	13928179	-194.7	-6.2	-173.2	2510	0	-32.1824	31.2052

TABLE B-XI. S-II STAGE FREE FLIGHT TRAJECTORY (METRIC UNITS)

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	RANGE M	ALTITUDE M	LONG DEG E	LAT DEG N
580.0	-73821	31245	1963335	-1539.9	173.5	6090.3	1833408	195733	-61.9478	32.1683
600.0	-107634	34805	1984705	-1771.2	182.5	6040.3	1955569	198892	-60.6600	32.2931
620.0	-144652	39544	2104986	-1931.4	191.4	5987.3	2077624	201086	-59.3698	32.4030
640.0	-184882	42461	2224179	-2090.5	200.3	5931.4	2199609	202313	-58.0773	32.4977
660.0	-228274	46555	2342224	-2248.5	209.1	5872.6	2321565	202574	-56.7824	32.5775
680.0	-274815	50824	2459065	-2405.4	217.8	5810.9	2443528	201867	-55.4851	32.6421
700.0	-324483	55267	2574642	-2561.2	226.5	5746.3	2565538	200194	-54.1857	32.6915
720.0	-377257	59882	2688897	-2715.9	235.0	5678.7	2687631	197554	-52.8840	32.7257
740.0	-433114	64667	2801772	-2869.5	243.4	5608.3	2809847	193949	-51.5803	32.7447
760.0	-492031	69619	2913208	-3022.0	251.8	5534.9	2932225	189377	-50.2743	32.7483
780.0	-553986	74737	3023147	-3173.3	260.0	5458.5	3054802	183840	-48.9664	32.7365
800.0	-618955	80016	3131530	-3323.5	268.0	5379.2	3177617	177339	-47.6566	32.7092
820.0	-686917	85455	3238296	-3472.5	275.9	5297.0	3300711	169873	-46.3448	32.6664
840.0	-757847	91051	3343388	-3620.3	283.6	5211.7	3424122	161445	-45.0313	32.6080
860.0	-831721	96798	3446744	-3766.9	291.2	5123.4	3547891	152055	-43.7160	32.5338
880.0	-908515	102695	3548304	-3912.3	298.5	5032.1	3672058	141705	-42.3990	32.4439
900.0	-988205	108737	3648008	-4056.5	305.7	4937.8	3796663	130396	-41.0803	32.3380
920.0	-1070765	114920	3745794	-4199.3	312.6	4840.3	3921748	118129	-39.7601	32.2162
940.0	-1156169	121239	3841599	-4340.8	319.3	4739.6	4047353	104906	-38.4384	32.0782
960.0	-1244383	127689	3935352	-4479.9	325.6	4634.6	4173511	90731	-37.1154	31.9241
980.0	-1335260	134256	4025968	-4609.4	330.5	4509.4	4300095	75622	-35.7928	31.7540
1000.0	-1427427	140838	4114793	-4557.6	323.4	4228.4	4425311	59779	-34.4897	31.5705
1020.0	-1512292	146814	4191232	-3705.3	258.3	3228.8	4537760	44484	-33.3243	31.3930
1040.0	-1566998	150564	4237088	-1751.5	116.1	1367.0	4607893	33361	-32.5999	31.2761
1060.0	-1589369	151963	4252347	-580.6	37.6	385.3	4634430	27063	-32.3264	31.2303
1080.0	-1598884	152403	4256709	-328.3	10.7	56.2	4643617	22526	-32.2318	31.2142
1100.0	-1604034	152504	4256462	-210.4	1.1	-61.0	4646853	18519	-32.1985	31.2084
1120.0	-1607580	152485	4254326	-148.2	-2.3	-92.9	4647990	14783	-32.1369	31.2063
1140.0	-1610144	152430	4252369	-112.2	-3.0	-90.2	4648311	11633	-32.1835	31.2057
1160.0	-1612188	152371	4251249	-94.1	-2.9	-81.7	4648387	8962	-32.1837	31.2055
1180.0	-1613949	152316	4249703	-83.6	-2.6	-73.1	4648406	6618	-32.1835	31.2054
1200.0	-1615513	152266	4248316	-74.1	-2.4	-65.8	4648412	4528	-32.1835	31.2053
1220.0	-1616925	152221	4247062	-67.3	-2.1	-59.8	4648415	2638	-32.1835	31.2053
1240.0	-1618215	152180	4245915	-61.9	-2.0	-55.0	4648418	911	-32.1834	31.2052
S-II STAGE IMPACT										
1251.24	-1618896	152159	4245309	-59.4	-1.9	-52.9	4648418	0	-32.1834	31.2052