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REVISIONS

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ABSTRACT AND LIST OF KEY WORDS

This document presents the postflight trajectory for the Apollo/Saturn V AS-507 flight. Included is an analysis of the orbital and powered flight trajectories of the launch vehicle, the free flight trajectories of the expended S-IC and S-II stages, and the slingshot trajectory of the S-IVB/IU. Trajectory dependent parameters are provided in earth-fixed launch site, launch vehicle navigation, and geographic polar coordinate systems. The time history of the trajectory parameters for the launch vehicle is presented from guidance reference release to Command/Service Module (CSM) separation.

Tables of engine cutoff, stage separation, parking orbit insertion, and translunar injection conditions are included in this document. The geocentric orbital parameters of the S-IVB/IU after lunar encounter are given. 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 powered flight trajectories are presented.

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

Apollo/Saturn V
AS-507
Postflight Trajectory
Powered Flight Trajectory
Orbital Trajectory
Spent Stage Trajectory
Slingshot Trajectory

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REFERENCES

1. NASA Document SE 008-001-1, "Project Apollo Coordinate System Standards," June, 1965.

2. NASA Document M-D E 8020.008B, "Natural Environment and Physical Standards for the Apollo Program," April, 1965.

3. Boeing Document D5-15551(F)-7, "Saturn V AS-507 'H-1' Mission Launch Vehicle Operational Flight Trajectory-November Launch Month," August 12, 1969.

4. Lockheed Document TM 54/30-150, "Manual for the GATE Program," September, 1967.

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R-AERO-P-#17	Tracking and Network Specifications	11/7/69
R-AERO-P-#35b	Transponder Locations	11/7/69
DRL-172F	Operational Trajectory Certified Data	11/7/69
I-MO-#4a	Insertion Point and/or Orbital Elements	11/16/69
I-MO-#4c	Six Seconds Raw Radar	11/16/69
I-MO-#4f	Meteorological Data (Final)	11/21/69
I-MO-#6	IP Raw MP	11/16/69
I-MO-#9	Pulse Radar	11/25/69
	Bermuda and Merritt Island USB	11/26/69
	Hawaii USB	12/3/69
I-MO-#17c	Final Significant Time of Events	12/15/69
I-MO-#18a	Preliminary Guidance Velocities	11/21/69
I-MO-#18c	Orbital Venting Accelerations Data Cards	12/1/69

SECTION 1

SUMMARY AND INTRODUCTION

The Apollo/Saturn V AS-507 vehicle was launched from Launch Complex 39, Pad A at the Kennedy Space Center on November 14, 1969, at 11:22:00 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 -16.968 seconds. First motion occurred at 0.3 second. At 12.8 seconds, a roll maneuver was initiated orienting the vehicle to a flight azimuth of 72.029 degrees east of north. This flight azimuth, dependent on the launch time, launch day and month, is calculated using polynomial coefficients taken from the guidance presettings in order to achieve the desired translunar targeting parameters. The translunar targeting parameters are functions of the moon position, earth parking orbit inclination, earth-moon distance, and moon travel rate.

The vehicle performed with only minor deviations throughout the entire flight. The vehicle was inserted into a parking orbit at 703.91 seconds at an altitude of 190.9 km (103.1 n mi) and a total space-fixed velocity of 7,792.5 m/s (25,565.9 ft/s). The vehicle remained in orbit for approximately one and one-half revolutions. The S-IVB stage was restarted during the second revolution approximately midway between Australia and Hawaii, at 10,042.8 seconds.

At 10,393.94 seconds, the vehicle was injected onto a circumlunar trajectory at an altitude of 368.6 km (199.0 n mi) and a total space-fixed velocity of 10,786.8 m/s (35,389.8 ft/s). At 11,884.9 seconds, the CSM separated from the launch vehicle at an altitude of 7,073.3 km (3,819.3 n mi) and a total space-fixed velocity of 7,579.0 m/s (24,865.5 ft/s).

Following LM extraction, the vehicle was maneuvered to an inertially fixed attitude as required for the evasive maneuver. The evasive maneuver was accomplished by an APS ullage burn, after which the vehicle was oriented to a slingshot attitude fixed relative to local horizontal. The slingshot maneuver velocity change was accomplished by a LOX dump, APS ullage burns, and LH_2 vent as planned in real time. The resultant S-IVB/IU's closest approach of 5,707 km (3,082 n mi) above the lunar surface did not provide sufficient energy to escape the earth-moon system.

The impact location of the expended S-IC stage was determined to be 30.273 degrees north latitude and 73.895 degrees west longitude at 554.5 seconds. The impact location of the expended S-II stage was determined to be 31.465 degrees north latitude and 34.214 degrees west longitude at 1,221.6 seconds.

SECTION 1 (Continued)

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

The postflight mass point trajectory related parameters and analytical procedures are presented in Sections 3 through 7. The trajectory is divided into six phases:

a. Ascent Phase
b. Orbital Phase
c. Second Burn Phase
d. Post TLI Phase
e. Free Flight Phase
f. Slingshot Phase

The ascent phase, covering the portion of flight from guidance reference release to orbital insertion (703.91 seconds), is discussed in Section 3. This trajectory was established from data provided by external C-band radars and telemetered onboard data obtained from the ST-124M inertial platform.

The second burn phase, discussed in Section 3, covers the portion of flight from S-IVB restart preparations to translunar injection (10,393.94 seconds). This trajectory was established by utilizing telemetered guidance velocities as generating parameters to fit the Hawaii tracking data and constrained to the state vectors obtained from the orbital and post TLI trajectory phases.

The orbital phase, discussed in Section 4, covers the portion of flight from orbital insertion to S-IVB restart preparations (9,464.5 seconds). The orbital trajectory was established from data provided by the C-band radars of the Manned Space Flight Network.

The post translunar injection (TLI) phase, discussed in Section 4, covers the portion of flight from the translunar injection to CSM separation (11,884.9 seconds). This trajectory was established from data provided by the C-band radars of the Manned Space Flight Network.

The error analysis of the reconstructed trajectory is discussed in Section 5. The criteria for error analysis are included and trajectory uncertainty limits are assigned to the ascent, parking orbit, second burn, and post TLI phases.

The free flight phase, discussed in Section 6, covers the trajectories of the expended S-IC and S-II stages. These trajectories are based on initial conditions obtained from the postflight trajectory at separation. The nominal separation impulses for both stages were used in the simulation.

SECTION 1 (Continued)

The slingshot phase, discussed in Section 7, covers the trajectory of the S-IVB/IU after it was separated from the CSM/LM. This trajectory was produced by integrating orbital model equations forward from a state vector at 22.33 hours GMT, November 14, 1969, which was established by the Manned Spacecraft Center from Unified S-band (USB) tracking data.

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

Appendix B tabulates the time history of the trajectory parameters in metric units.

Appendix C tabulates the time history of the trajectory parameters in English units.

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SECTION 2

COORDINATE SYSTEMS AND LAUNCH PARAMETERS

The time history of Observed Mass Point Trajectory parameters in both metric and English units is tabulated in Appendices B and C, respectively. These tabulations are in earth-fixed launch site, launch vehicle navigation, and geographic polar coordinate systems. These coordinate systems are defined in Reference 1, "Project Apollo Coordinate System Standards," (PACSS) and are designated PACSS10, PACSS13, and PACSS1, respectively. The trajectory symbols and terminology used in this document are defined in Appendix A.

The Fischer Ellipsoid of 1960 (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 as follows:

Geodetic Latitude	28.608422 degrees north
Longitude	80.604133 degrees west

The height of the center of gravity of the launch vehicle above the reference ellipsoid is 59.8 m (196.2 ft).

The azimuth alignments are as follows:

Launch Azimuth	90.0 degrees east of north
Flight Azimuth	72.029 degrees east of north
ST-124M Platform Azimuth	72.029 degrees east of north

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SECTION 3

POWERED FLIGHT TRAJECTORY RECONSTRUCTION

3.1 POWERED FLIGHT TRAJECTORY

3.1.1 Ascent Phase

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 Reference 3.

The tracking stations and the vehicle ground track for the ascent phase 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 space-fixed velocity vector and the associated flight path angle are shown in Figure 3-5. The magnitude of the total inertial acceleration vector is shown in Figure 3-6. Mach number and dynamic pressure are shown during the S-IC phase of the ascent trajectory in Figure 3-7.

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

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

The ascent trajectory, from guidance reference release to parking orbit insertion, is tabulated in Tables B-I through B-III in metric units, and in Tables C-I through C-III in English units. These tables present the trajectory in the earth-fixed launch site (PACSS10), launch vehicle navigation (PACSS13), and geographic polar (PACSS1) coordinate systems. The definitions pertaining to the trajectory symbols and the coordinate systems are given in Appendix A.

3.1.2 Second Burn Phase

A comparison of actual and nominal times for significant flight events pertaining to the second burn phase is included in Table 3-I.

The actual altitude is shown in Figure 3-8. The magnitude of the total space-fixed velocity vector and the associated flight path angle are shown in Figure 3-9. The magnitude of the total

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3.1.2 (Continued)

inertial acceleration vector is shown in Figure 3-10. The maximum total inertial acceleration and earth-fixed velocity are shown in Table 3-II.

The second burn trajectory, from the time of S-IVB restart preparations to CSM separation, is tabulated in Tables B-V through B-VII in metric units, and in Tables C-V through C-VII in English units. These tables present the trajectory in the earth-fixed launch site (PACSS10), launch vehicle navigation (PACSS13), and geographic polar (PACSS1) coordinate systems. The definitions pertaining to the trajectory symbols and the coordinate systems are given in Appendix A.

3.1.3 Targeting Parameters

The actual and nominal targeting parameters are given in Table 3-V. These nominal parameters are used in the guidance computer as terminal conditions for the powered flight phases. The actual parameters achieved were close to nominal.

3.2 DATA SOURCES

3.2.1 Ascent Phase

Tracking data and telemetered guidance velocity data were received during the period from first motion through orbital insertion. The time periods for which tracking system coverage was available are shown in Figure 3-11 and itemized 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 tracking system and the vehicle center of gravity are shown in Figure 3-12.

Considerable C-Band tracking data were furnished by the stations located at Patrick Air Force Base, Merritt Island, Grand Turk Island, and Bermuda Island. 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 the transponder location. The corrected position components were transformed into the measured parameters of PACSS3a. Differences or deviations (tracking data minus corresponding parameters derived from the ascent trajectory) were calculated, smoothed, and plotted as functions of time, and are shown in Figures 3-13 through 3-15.

3.2.1 (Continued)

Patrick (0.18) radar provided tracking data from 26 to 524 seconds. The azimuth angle measurements were of good quality except in the time intervals of 40 to 115 seconds and 435 to 450 seconds, where the measurements were noisy. They deviated considerably from the trajectory up to 225 seconds, but converged to the trajectory thereafter with a maximum deviation of 0.010 degree. The elevation angle measurements were noisy during the early portion (26 to 85 seconds) and the latter portion (430 to 524 seconds) of tracking. These measurements also deviated considerably from the trajectory up to about 125 seconds and agreed favorably with the trajectory within the time interval from 125 to 524 seconds with a maximum deviation of 0.019 degree. The slant range measurements were of good quality throughout the tracking period with a maximum deviation of 80 m (262 ft) from the trajectory.

Grand Turk (7.18) radar supplied data from 217 to 583 seconds. The azimuth angle measurements were of good quality from 240 to 515 seconds with a maximum deviation of 0.020 degree. The elevation angle measurements were noisy in the time interval of 240 to 515 seconds with a maximum deviation of 0.020 degree from the trajectory. The azimuth and elevation angle measurements were erratic outside of the time interval of 240 to 515 seconds. The slant range measurements throughout the time span of 225 to 575 seconds were of good quality with a maximum deviation of 120 m (394 ft).

Merritt Island (19.18) radar furnished data from 16 to 525 seconds. The azimuth and elevation angle measurements were erratic in the interval from 165 to 195 seconds. The azimuth angle measurements reached a maximum deviation in excess of 0.080 degree and decreased rapidly after 120 seconds with a maximum deviation of 0.004 degree after 300 seconds. The elevation angle measurements deviated a maximum of 0.024 degree from the trajectory at 54 seconds and oscillated about zero after 250 seconds. The slant range measurements were of good quality except in the time span of 160 to 185 seconds, where the data were erratic. The slant range measurements had a discontinuity at about 360 seconds, indicating a switch from beacon to skin tracking. The maximum deviation of slant range measurements from the trajectory was 115 m (377 ft).

Bermuda (67.16) radar provided data from 257 to 744 seconds. The azimuth and elevation angle measurements were noisy at the beginning from 257 to 325 seconds. A characteristic deviation was evident for all radar measurements in the time interval of 520 to 580 seconds. The azimuth angle measurements

3.2.1 (Continued)

from 325 to 500 seconds approached zero degree deviation from the trajectory and reached a maximum deviation of 0.001 degree. After 580 seconds the azimuth angle measurements oscillate about 0.015 degree. The elevation angle measurements were in good agreement with the trajectory with a maximum deviation of 0.041 degree. The elevation angle had a deviation of 0.005 degree at parking orbit insertion. The slant range measurements were of good quality throughout the tracking period with a maximum deviation of 90 m (295 ft). Approaching the end of the tracking period, the deviation in the slant range measurements decreased rapidly with a deviation of 15 m (49 ft) at parking orbit insertion.

Bermuda (67.18) radar provided data from 255 to 744 seconds. The azimuth angle measurements contained little noise during the first 75 seconds; however, the elevation angle measurements were very erratic during this time interval. All three measured parameters showed a characteristic deviation in the interval of 500 to 600 seconds. Except for the characteristic deviation the maximum difference of the azimuth and elevation angle measurements were 0.022 and 0.021 degree respectively. The slant range measurements were of good quality with a maximum deviation of 90 m (295 ft).

3.2.2 Second Burn Phase

Telemetered guidance velocity data during the S-IVB second burn period were received and were used as generating parameters in reconstructing the second burn trajectory. Also, C-band radar tracking data were obtained from Hawaii from 10,260 to 10,392 seconds. These tracking data were of good quality and were used in the trajectory reconstruction.

Comparisons between Hawaii tracking data and the S-IVB second burn trajectory were calculated using the same procedures as for the ascent phase. Differences or deviations (tracking data minus corresponding parameters derived from the second burn trajectory) are shown in Figure 3-16.

The azimuth and elevation angle measurements from Hawaii contained little noise and were in good agreement with the trajectory with maximum deviations of 0.004 and 0.007 degree, respectively. The slant range measurements were of good quality with a maximum deviation of 180 m (591 ft).

3.3 TRAJECTORY RECONSTRUCTION

3.3.1 Ascent Phase

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.

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

a. Inspecting for format and parity errors
b. Time editing
c. Data editing and filtering
d. Refraction correction
e. Reformatting
f. Coordinate transformation

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 20 seconds) was established by integrating the telemetered guidance accelerometer data and constraining it to the early portion of the ascent phase trajectory. The ascent phase (from 20 seconds to orbital insertion at 703.91 seconds) was based on a composite fit of external tracking data and telemetered onboard guidance velocity data and was constrained to the insertion vector obtained from the orbital analysis as described in Section 4. The reconstructed trajectory is referenced to the vehicle center of gravity.

In the above analysis, 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. Reference 4 gives a theoretical discussion of the GATE program.

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

The trajectory data in PACSS10 were then transformed to several coordinate systems. Various trajectory parameters were also calculated and are presented in Appendices B and C.

3.3.1 (Continued)

In calculating the Mach number and dynamic pressure, measured meteorological data were used up to an altitude of 54.8 km (29.6 n mi). Above this altitude the measured data were merged into the U.S. Standard Reference Atmosphere.

3.3.2 Second Burn Phase

The second burn trajectory was established by combining an orbital trajectory segment and a powered flight trajectory segment.

The orbital trajectory segment covers the portion of flight from the beginning of S-IVB restart preparations (9,464.5 seconds) to 9,840 seconds. This trajectory segment was obtained from the orbital solution as described in Section 4.

The powered flight trajectory segment covers the time span from 9,840 seconds to translunar injection (10,393.94 seconds). This trajectory segment was established by integrating the telemetered guidance velocities, which were used as generating parameters, to fit the Hawaii tracking data and constrained to the translunar injection vector (obtained from the post TLI trajectory of Section 4). The GATE program was utilized for the solution.

The position components, in PACSS10, were filtered, differentiated, shaped, and transformed in the same manner as described in Paragraph 3.3.1.

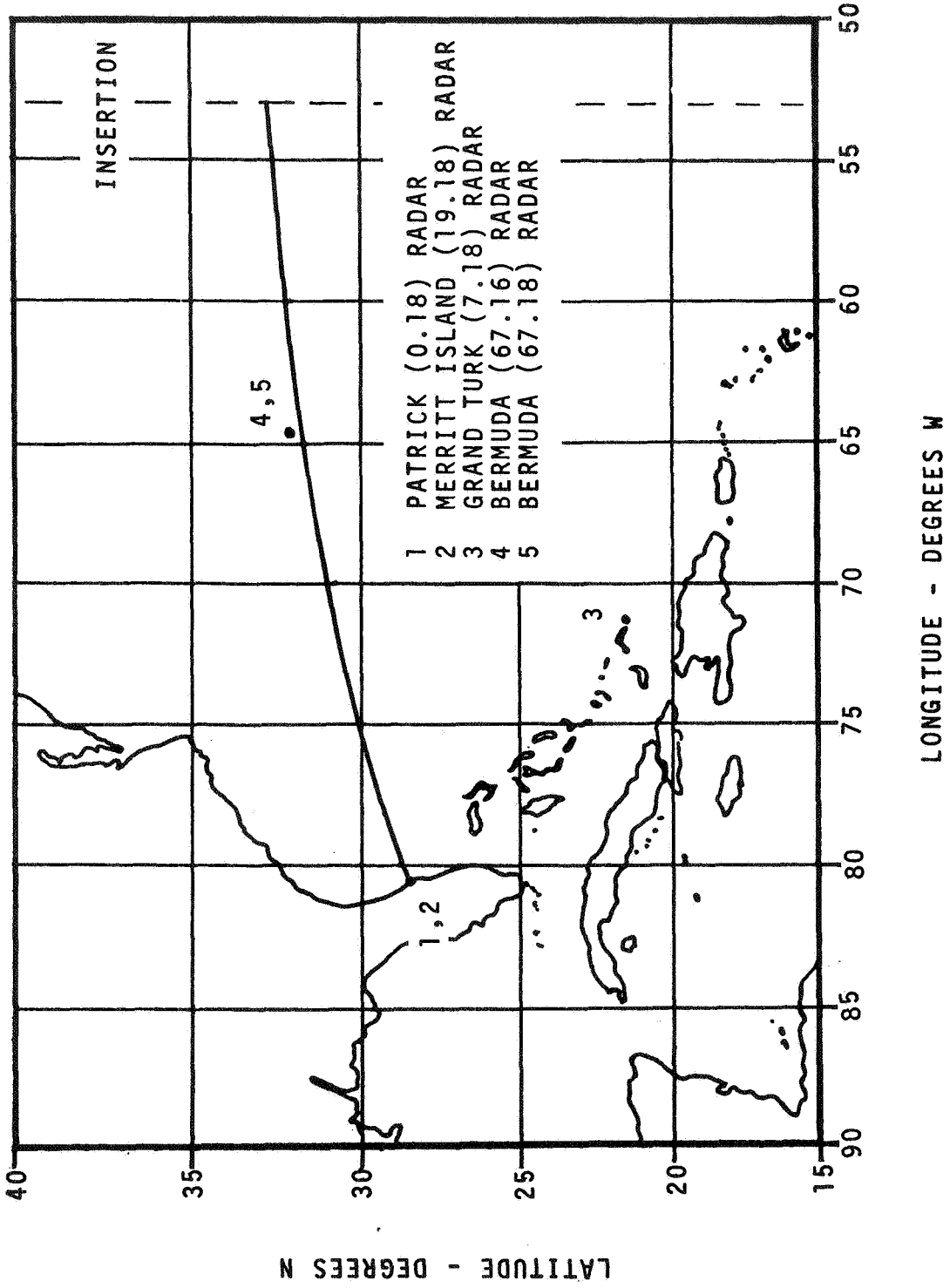

FIGURE 3-1. GROUND TRACK AND TRACKING STATIONS - ASCENT PHASE

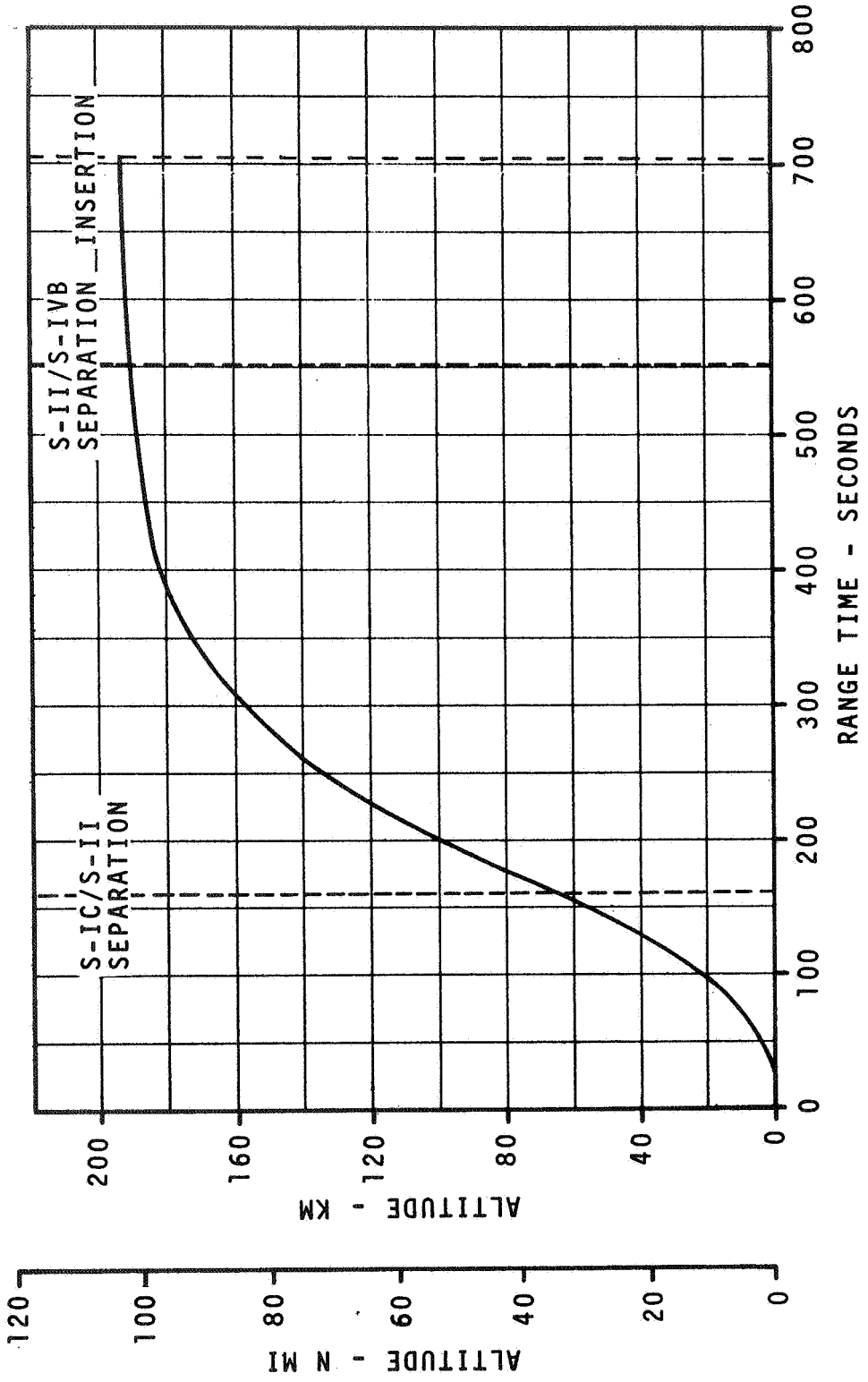

FIGURE 3-2. ALTITUDE - ASCENT PHASE

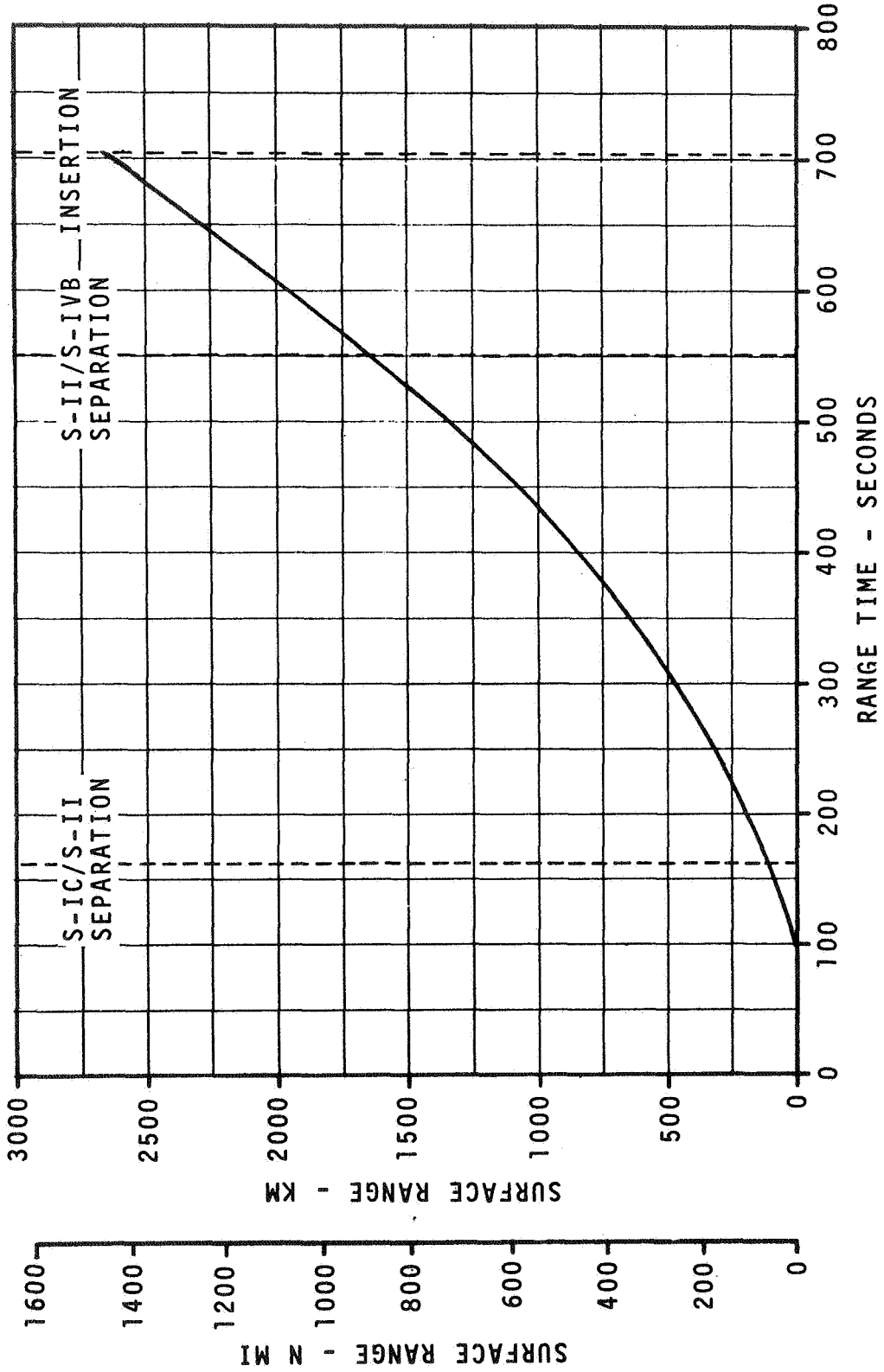

FIGURE 3-3. SURFACE RANGE - ASCENT PHASE

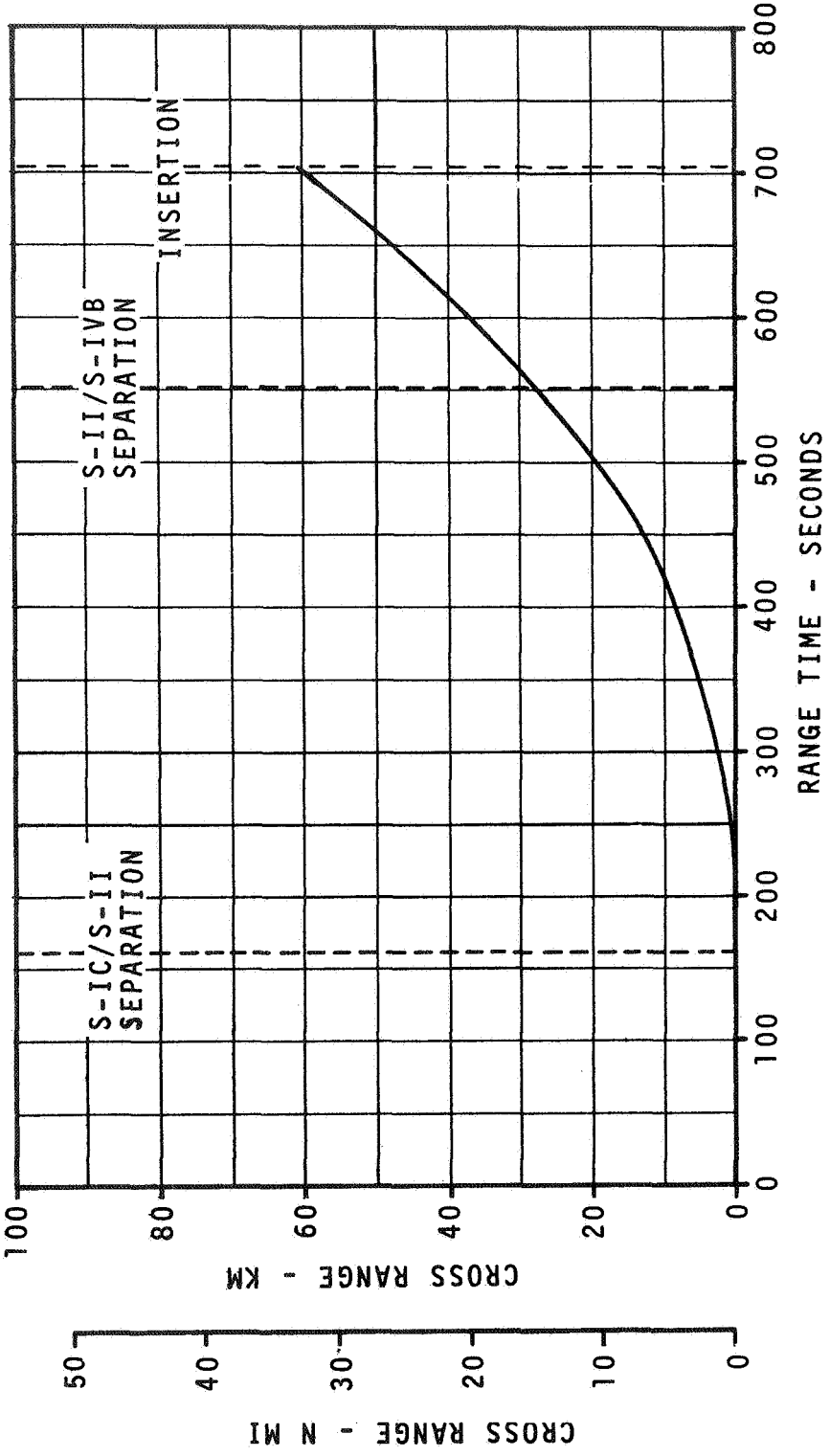

FIGURE 3-4. CROSS RANGE - ASCENT PHASE

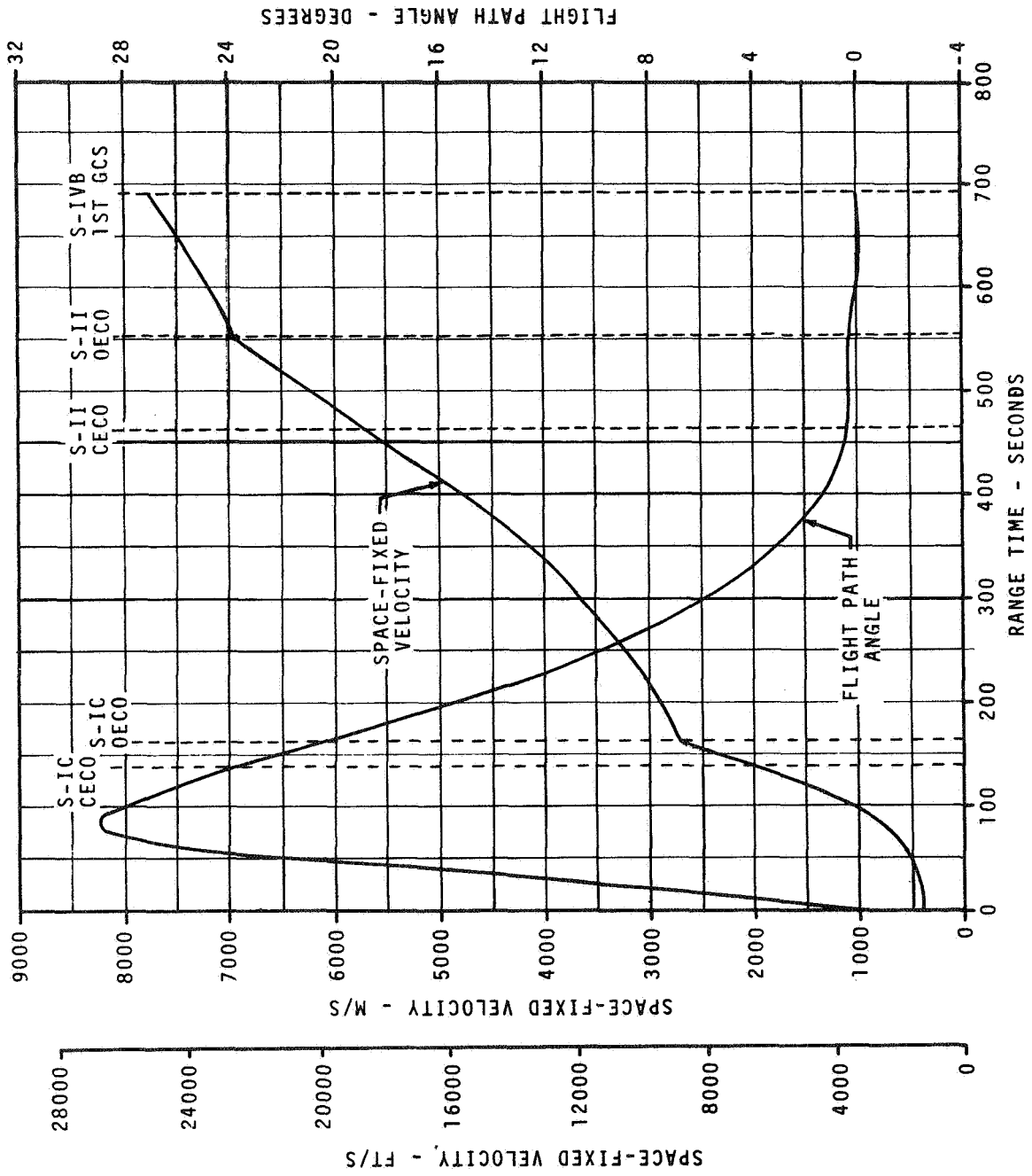

FIGURE 3-5. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - ASCENT PHASE

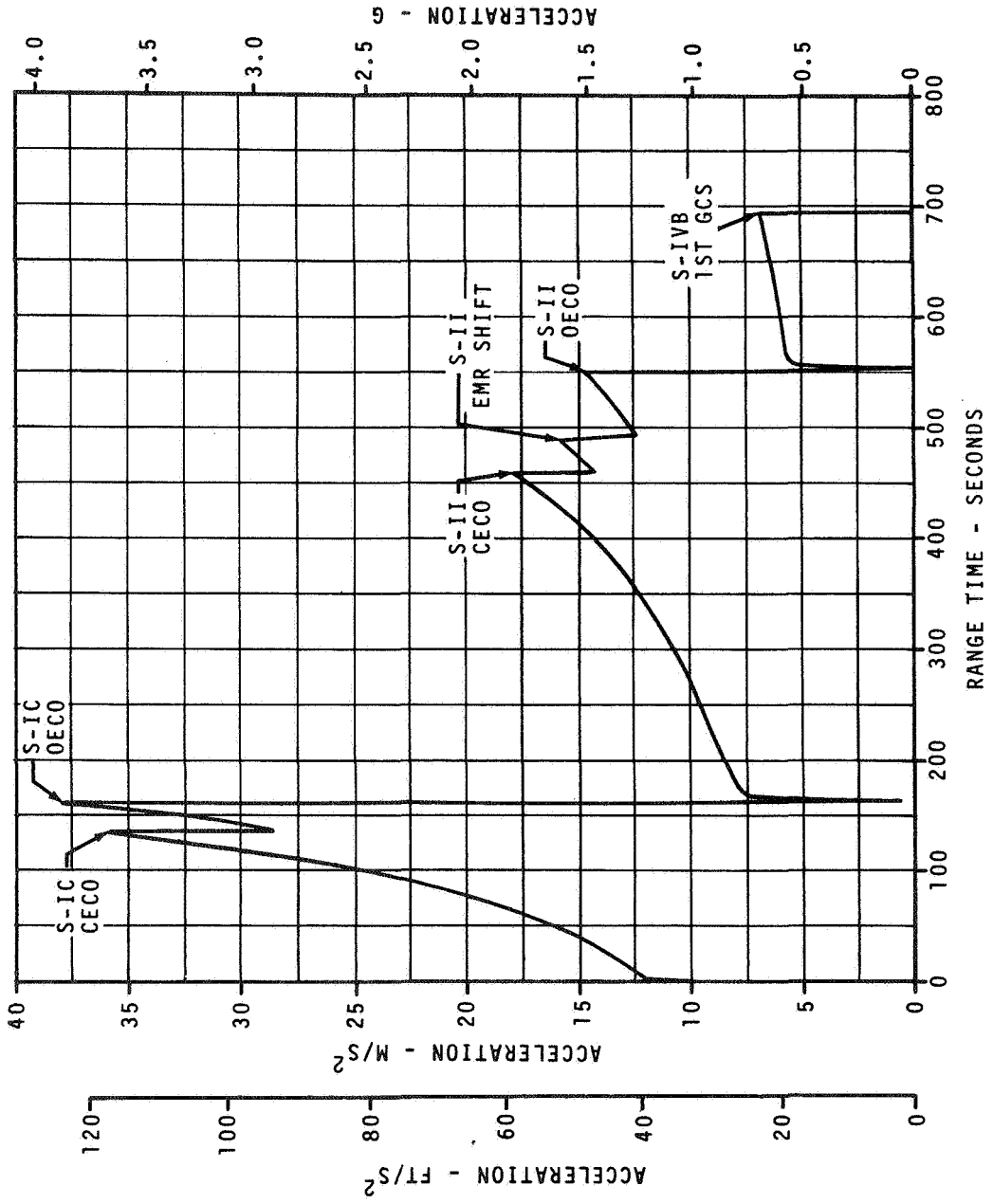

FIGURE 3-6. TOTAL INERTIAL ACCELERATION - ASCENT PHASE

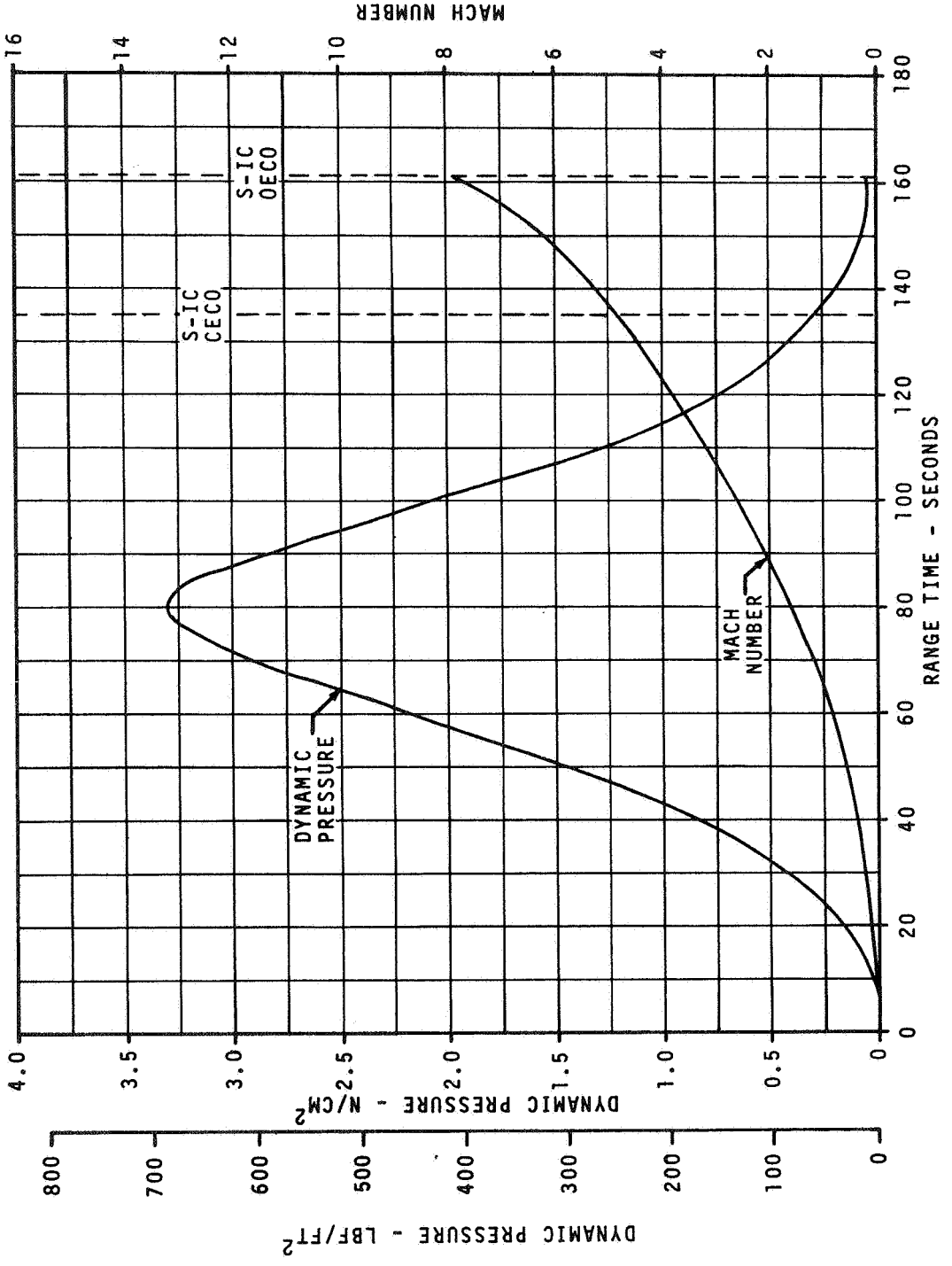

FIGURE 3-7. MACH NUMBER AND DYNAMIC PRESSURE - S-IC PHASE

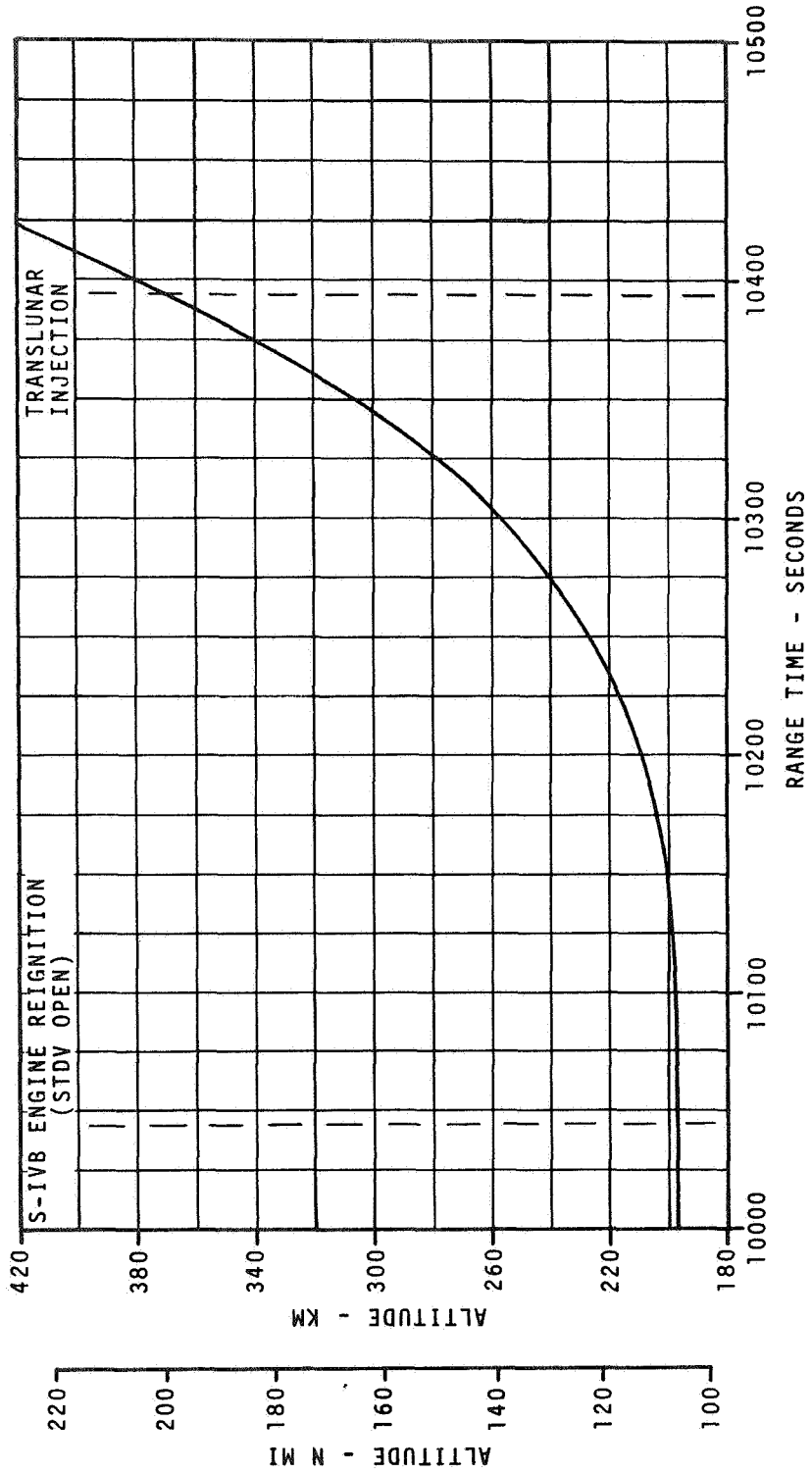

FIGURE 3-8. ALTITUDE - SECOND BURN PHASE

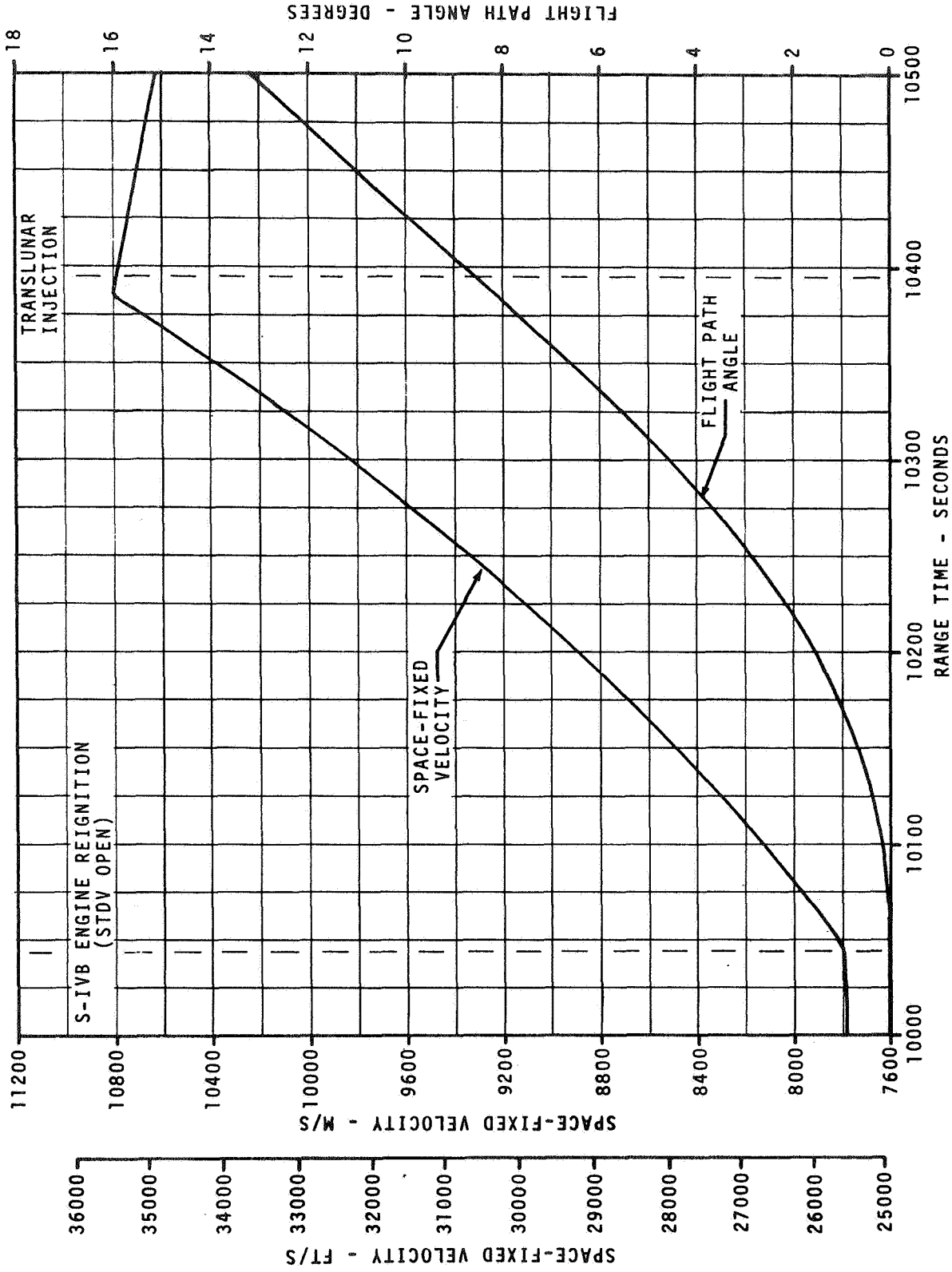

FIGURE 3-9. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - SECOND BURN PHASE

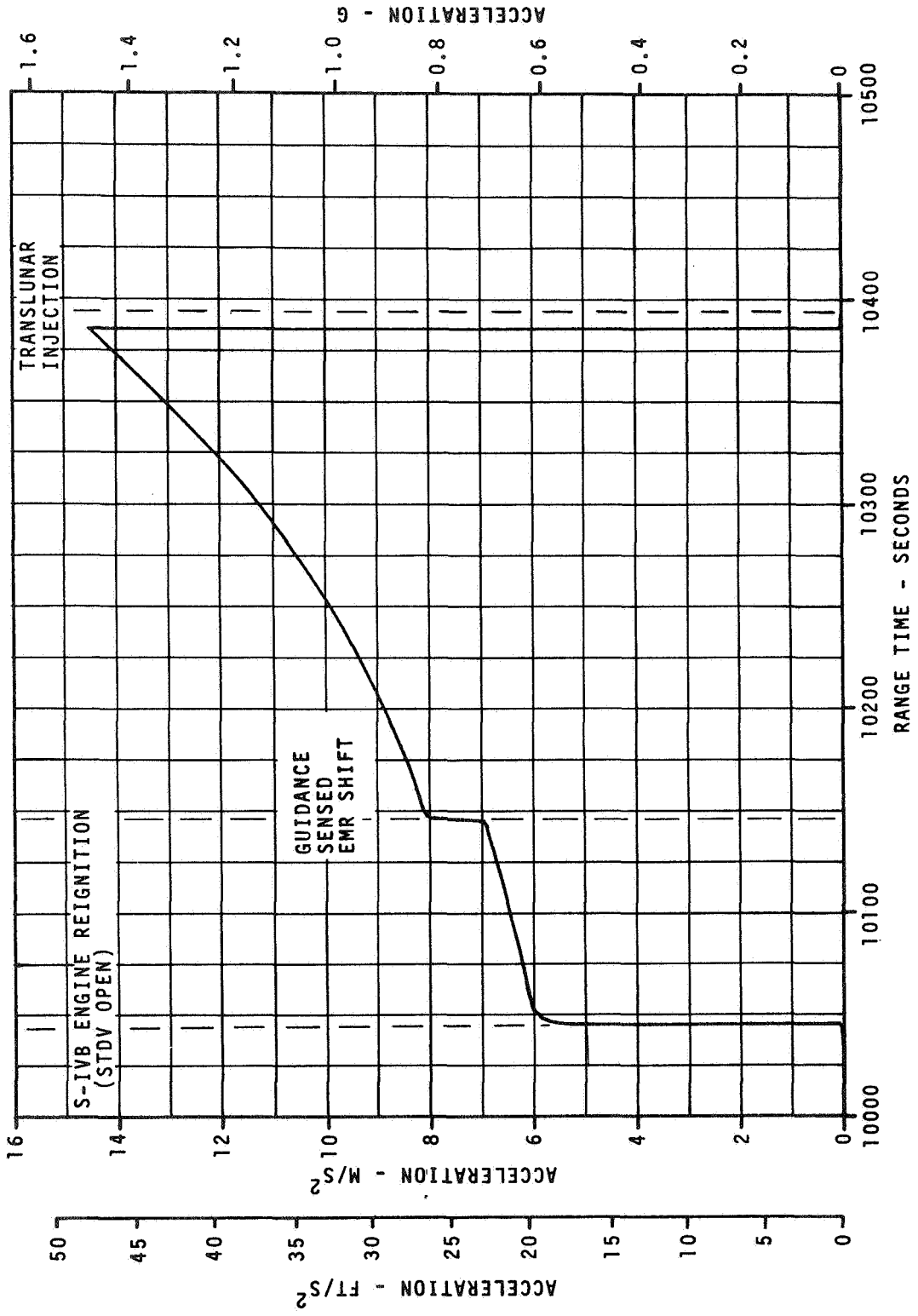

FIGURE 3-10. TOTAL INERTIAL ACCELERATION - SECOND BURN PHASE

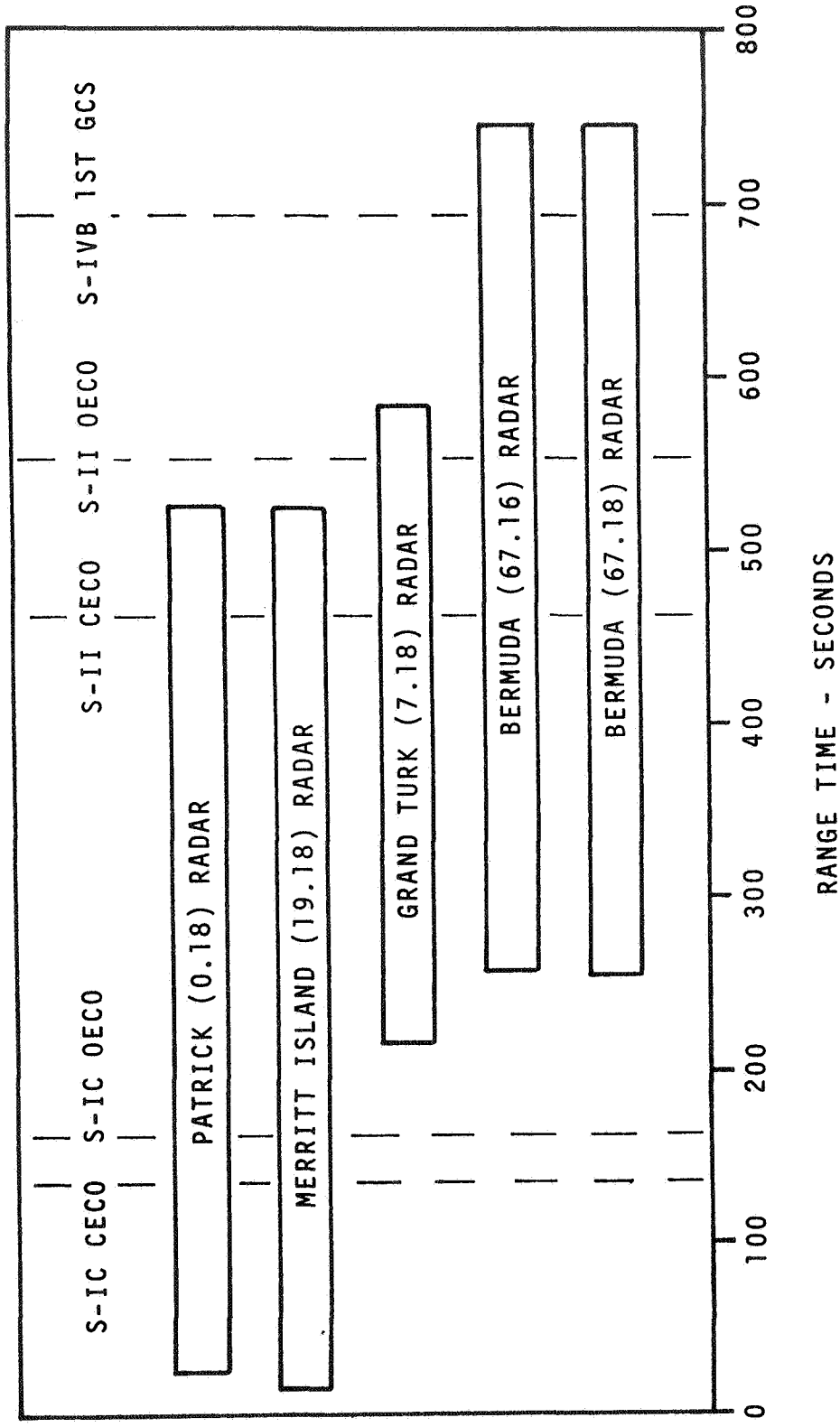

FIGURE 3-11. AVAILABLE TRACKING DATA - ASCENT PHASE

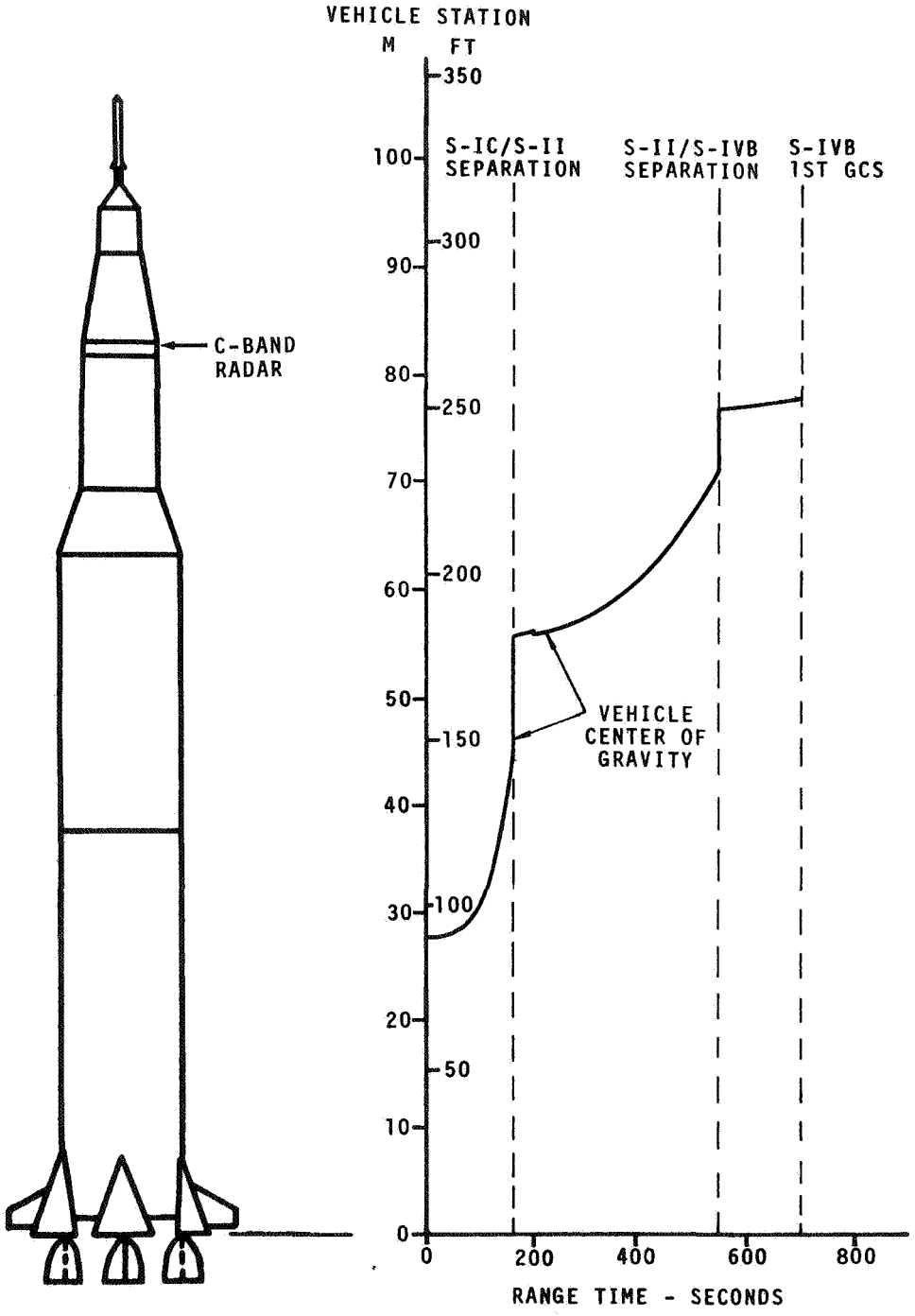

FIGURE 3-12. ANTENNA LOCATIONS AND CENTER OF GRAVITY

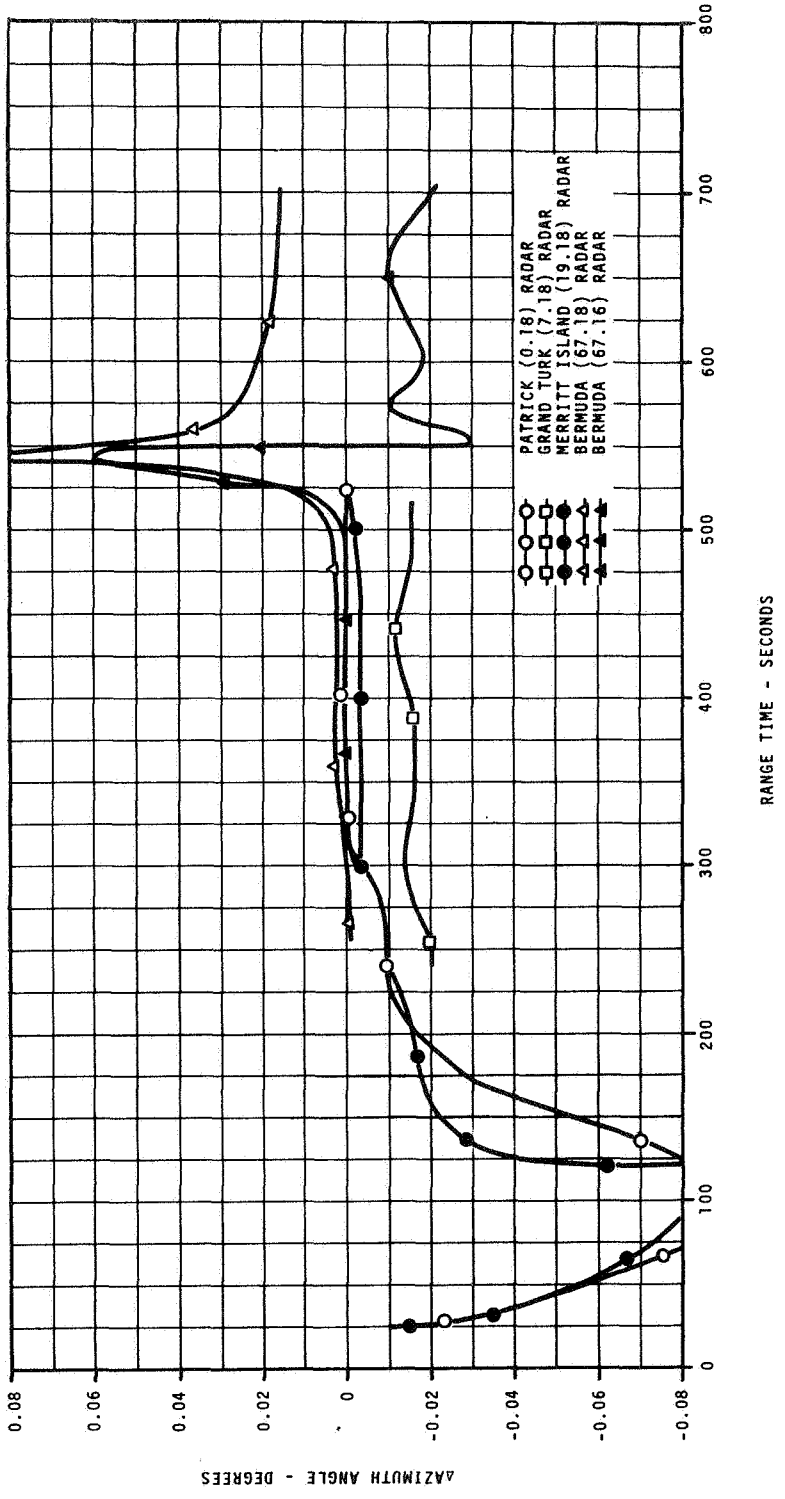

FIGURE 3-13. AZIMUTH ANGLE TRACKING DEVIATIONS - ASCENT PHASE

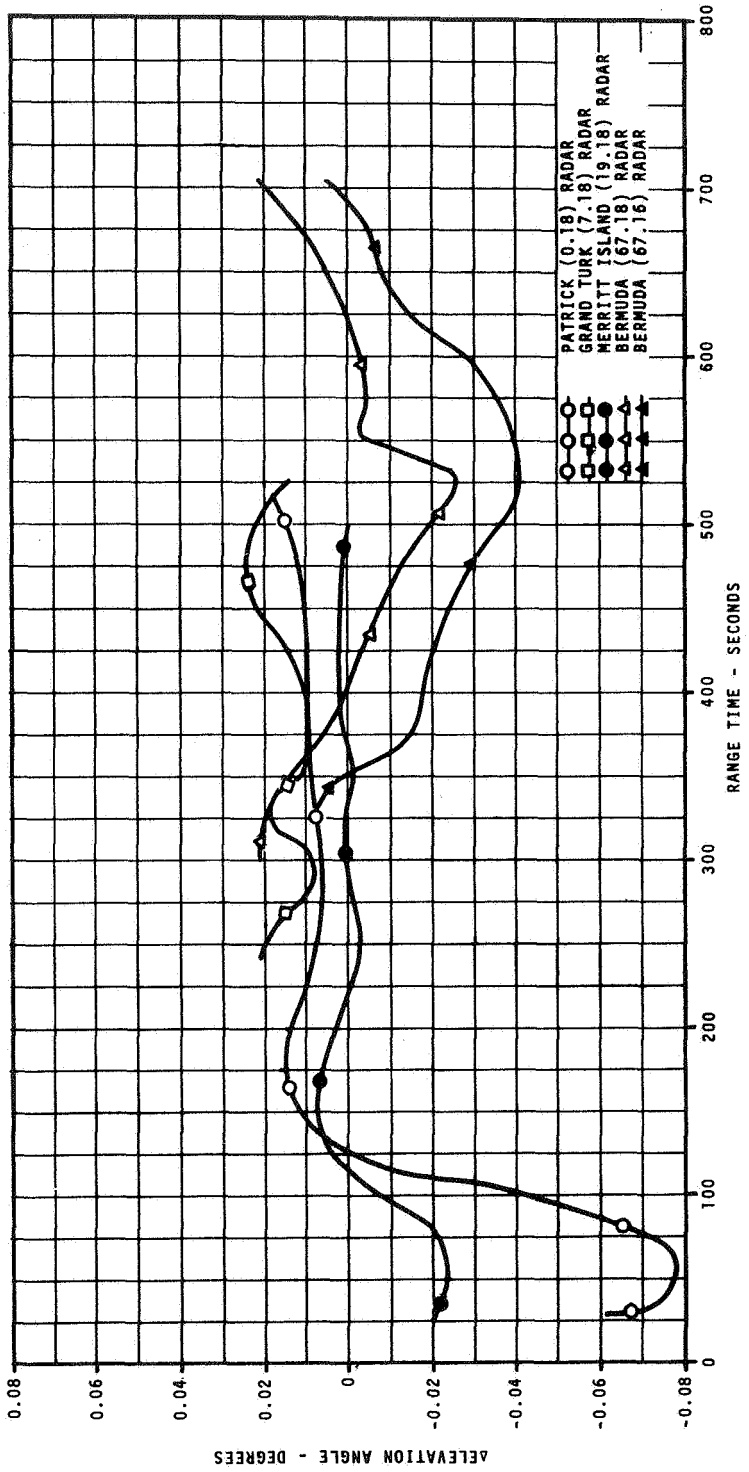

FIGURE 3-14. ELEVATION ANGLE TRACKING DEVIATIONS - ASCENT PHASE

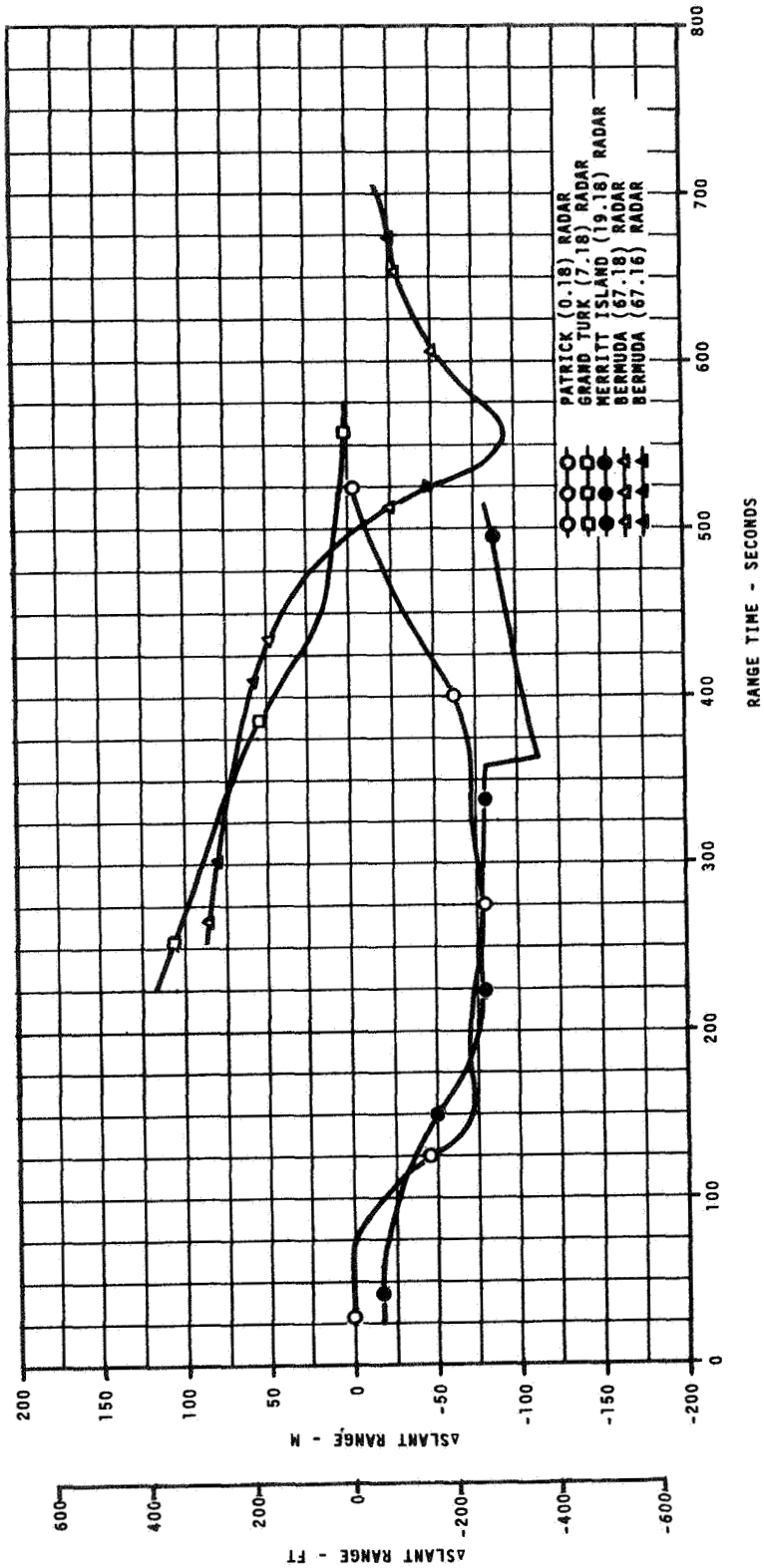

FIGURE 3-15. SLANT RANGE TRACKING DEVIATIONS - ASCENT PHASE

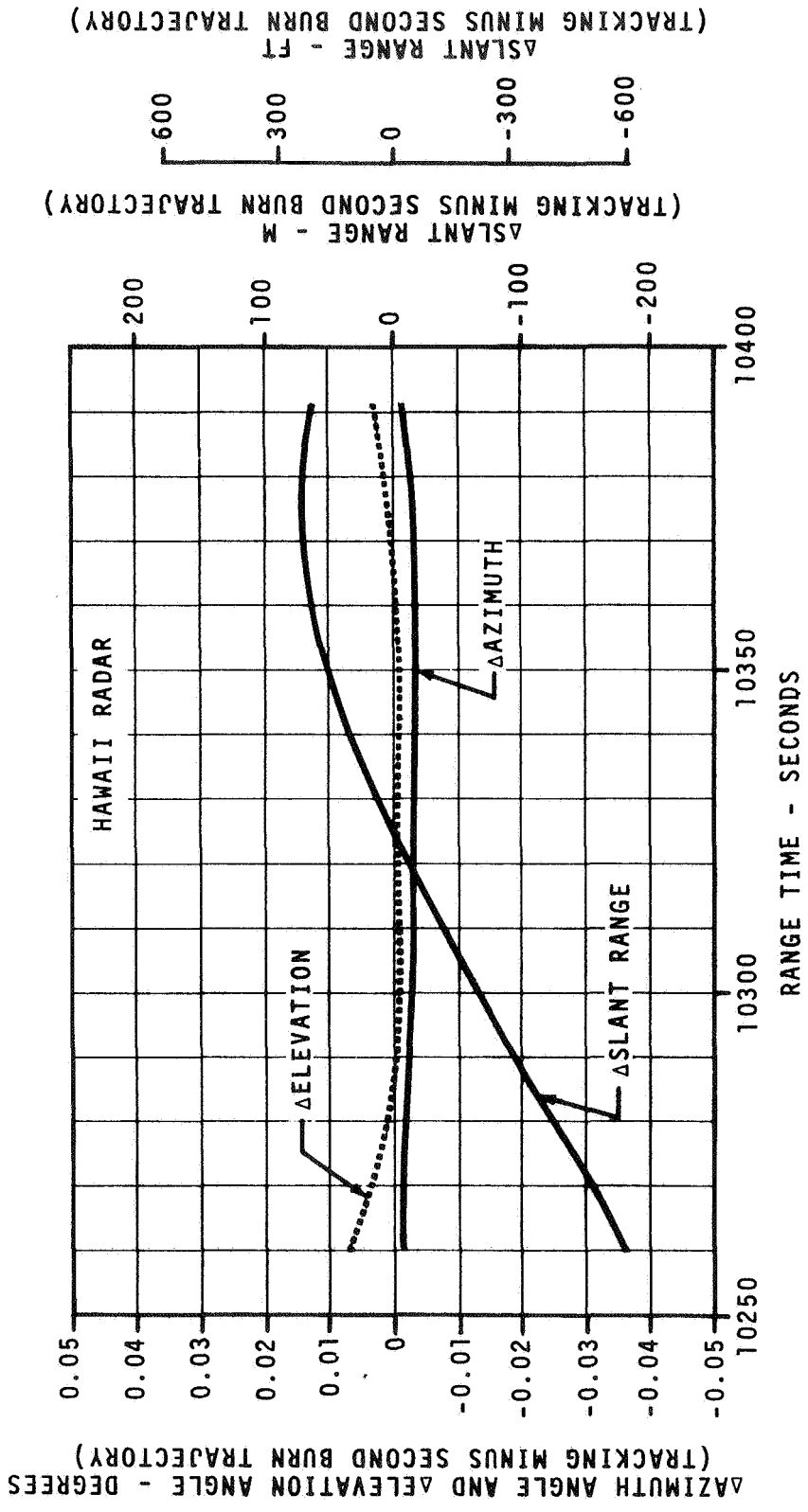

FIGURE 3-16. MEASURED PARAMETER TRACKING DEVIATIONS - SECOND BURN PHASE

TABLE 3-I. TIMES OF SIGNIFICANT EVENTS

EVENT	RANGE TIME, SECONDS		
	ACTUAL	NOMINAL	ACT-NOM
Guidance Reference Release	-16.968	-16.996	0.028
First Motion	0.3	0.3	0.0
Start of Time Base 1	0.7	0.7	0.0
Mach 1	66.1	67.1	-1.0
Maximum Dynamic Pressure	81.1	83.8	-2.7
S-IC Center Engine Cutoff	135.24	135.27	-0.03
S-IC Outboard Engine Cutoff	161.74	162.48	-0.74
S-IC/S-II Separation Command	162.4	163.2	-0.8
S-II Center Engine Cutoff	460.75	461.49	-0.74
S-II Outboard Engine Cutoff	552.34	550.98	1.36
S-II/S-IVB Separation Command	553.2	551.9	1.3
S-IVB 1st Guidance Cutoff	693.91	689.86	4.05
Parking Orbit Insertion	703.91	699.86	4.05
Begin S-IVB Restart Preparations	9,464.5	9,462.0	2.5
S-IVB Engine Reignition (STDV Open)	10,042.8	10,040.0	2.8
S-IVB 2nd Guidance Cutoff	10,383.94	10,385.01	-1.07
Translunar Injection	10,393.94	10,395.01	-1.07
CSM Separation	11,884.9	11,885.2	-0.3
Start of Time Base 8	16,000.2	15,885.0	115.2

TABLE 3-II. SIGNIFICANT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
First Motion	Range Time, sec	0.3
	Total Inertial Acceleration, m/s^2 (ft/s^2) (g)	10.74 (35.24) (1.10)
Mach 1	Range Time, sec	66.1
	Altitude, km (n mi)	7.8 (4.2)
Maximum Dynamic Pressure	Range Time, sec	81.1
	Dynamic Pressure, N/cm^2 (lbf/ft^2)	3.27 (683.0)
	Altitude, km (n mi)	12.8 (6.9)
Maximum Total Inertial Acceleration: S-IC	Range Time, sec	161.82
	Acceleration, m/s^2 (ft/s^2) (g)	38.34 (125.79) (3.91)
S-II	Range Time, sec	460.83
	Acceleration, m/s^2 (ft/s^2) (g)	17.92 (58.79) (1.83)
S-IVB 1st Burn	Range Time, sec	693.99
	Acceleration, m/s^2 (ft/s^2) (g)	6.77 (22.21) (0.69)
S-IVB 2nd Burn	Range Time, sec	10,384.02
	Acceleration, m/s^2 (ft/s^2) (g)	14.55 (47.74) (1.48)
Maximum Earth-Fixed Velocity: S-IC	Range Time, sec	162.18
	Velocity, m/s (ft/s)	2,393.3 (7,852.0)
S-II	Range Time, sec	553.20
	Velocity, m/s (ft/s)	6,558.6 (21,517.7)
S-IVB 1st Burn	Range Time, sec	703.91
	Velocity, m/s (ft/s)	7,389.1 (24,242.5)
S-IVB 2nd Burn	Range Time, sec	10,384.32
	Velocity, m/s (ft/s)	10,382.4 (34,063.0)

TABLE 3-III. ENGINE CUTOFF CONDITIONS

PARAMETER	S-IC CECO	S-IC OECO	S-II CECO	S-II OECO	S-IVB 1ST GUIDANCE CUTOFF	S-IVB 2ND GUIDANCE CUTOFF
Range Time, sec	135.24	161.74	460.75	552.34	693.91	10,383.94
Altitude, km (n mi)	44.7 (24.1)	68.1 (36.8)	186.1 (100.5)	190.4 (102.8)	190.9 (103.1)	352.8 (190.5)
Surface Range, km (n mi)	47.1 (25.4)	93.7 (50.6)	1,109.7 (599.2)	1,638.5 (884.7)	2,592.6 (1,399.9)	
Space-Fixed Velocity, m/s (ft/s)	1,979.5 (6,494.4)	2,750.7 (9,024.6)	5,722.7 (18,775.3)	6,959.1 (22,831.7)	7,790.8 (25,560.4)	10,795.8 (35,419.3)
Flight Path Angle, deg	23.944	20.513	0.502	0.442	-0.015	8.137
Heading Angle, deg	76.115	75.231	79.632	82.501	88.146	63.664
Cross Range, km (n mi)	-0.2 (-0.1)	-0.2 (-0.1)	13.6 (7.3)	26.9 (14.5)	58.6 (31.6)	
Cross Range Velocity, m/s (ft/s)	-1.2 (-3.9)	2.6 (8.5)	115.9 (380.2)	178.8 (586.6)	272.1 (892.7)	
Eccentricity						0.96829
C_3*, m^2/s^2 (ft^2/s^2)						-1,917,435 (-20,639,099)
Inclination, deg						30.360
Descending Node, deg						120.344

* Twice the specific energy of orbit

$$C_3 = V^2 - \frac{2\mu}{R}$$

where V = Inertial Velocity
μ = Gravitational Constant
R = Radius from center of earth

TABLE 3-IV. STAGE SEPARATION CONDITIONS

PARAMETER	S-IC/S-II SEPARATION COMMAND	S-II/S-IVB SEPARATION COMMAND
Range Time, sec	162.4	553.2
Altitude, km (n mi)	68.7 (37.1)	190.4 (102.8)
Surface Range, km (n mi)	95.2 (51.4)	1,644.0 (887.7)
Space-Fixed Velocity, m/s (ft/s)	2,759.7 (9,054.1)	6,961.9 (22,840.9)
Flight Path Angle, deg	20.430	0.432
Heading Angle, deg	75.228	82.533
Cross Range, km (n mi)	-0.2 (-0.1)	27.0 (14.6)
Cross Range Velocity, m/s (ft/s)	2.7 (8.9)	179.3 (588.3)
Geodetic Latitude, deg N	28.871	31.925
Longitude, deg E	-79.677	-63.934

TABLE 3-V. TARGETING PARAMETERS

PARAMETER	ACTUAL	NOMINAL	ACT-NOM
S-IVB 1ST GUIDANCE CUTOFF			
Range Time, sec	693.91	689.86	4.05
Altitude, km (n mi)	190.9 (103.1)	191.4 (103.3)	-0.5 (-0.2)
Space-Fixed Velocity, m/s (ft/s)	7,790.8 (25,560.4)	7,791.4 (25,562.3)	-0.6 (-1.9)
Flight Path Angle, deg	-0.015	-0.001	-0.014
TRANSLUNAR INJECTION			
Range, Time, sec	10,393.94	10,395.01	-1.07
Eccentricity	0.96966	0.97066	-0.00100
C_3, m^2/s^2	-1,834,425	-1,773,597	-60,828
(ft^2/s^2)	(-19,745,586)	(-19,090,839)	(-654,747)
Inclination, deg	30.355	30.336	0.019
Descending Node, deg	120.338	120.371	-0.033

TABLE 3-VI. AVAILABLE TRACKING DATA - POWERED FLIGHT TRAJECTORY

DATA SOURCE*	TIME AVAILABLE (SEC)
ASCENT PHASE	
Patrick (0.18) Radar (FPQ-6)	26 - 524
Merritt Island (19.18) Radar (TPQ-18)	16 - 525
Grand Turk (7.18) Radar (TPQ-18)	217 - 583
Bermuda (67.16) Radar (FPS-16M)	257 - 744
Bermuda (67.18) Radar (FPQ-6)	255 - 744
SECOND BURN PHASE	
Hawaii (FPS-16M)	10,260 - 10,392

*Measured parameters in azimuth angle, elevation angle, and slant range (PACSS3a)

SECTION 4

ORBITAL TRAJECTORY RECONSTRUCTION

4.1 ORBITAL TRAJECTORIES

The S-IVB/LM/CSM was inserted into a near circular parking orbit at 703.91 seconds. While in parking orbit, vehicle subsystem checkout was carried out from the tracking stations and Mission Control Center at Houston. During the second revolution, approximately midway between Australia and Hawaii, the S-IVB stage was restarted and the vehicle was placed onto a translunar trajectory.

The parking orbit insertion conditions were close to nominal. The space-fixed velocity at insertion was 0.5 m/s (1.7 ft/s) less than nominal, and the flight path angle was 0.014 degree less than nominal. The eccentricity was 0.00032 greater than nominal. The apogee was 0.2 km (0.1 n mi) greater than nominal, and the perigee was 4.0 km (2.2 n mi) less than nominal.

The translunar injection (TLI) conditions were also close to nominal. The eccentricity was 0.00100 less than nominal, the inclination was 0.019 degree greater than nominal, and the node was 0.033 degree lower than nominal. The space-fixed velocity was 1.6 m/s (5.2 ft/s) less than nominal, the altitude was 1.6 km (0.9 n mi) less than nominal, and C_3 was 60,828 m^2/s^2 (654,747 ft^2/s^2) less than nominal. Although these parameters were close to nominal, the deviations did significantly affect the slingshot trajectory. (See Section 7.)

The parking orbit trajectory spans the interval from insertion to begin S-IVB restart preparations (9,464.5 seconds). The post TLI trajectory covers the period from translunar injection (10,393.94 seconds) to CSM separation (11,884.9 seconds). These two orbital trajectories were established by the integration of the orbital model equations using the insertion/injection vector as the initial conditions.

The insertion/injection conditions, as determined by the Orbital Correction Program (OCP), were obtained by a differential correction procedure which adjusted the estimated insertion/injection 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, the stations and passes providing the better quality data were used in the determination of the insertion/injection conditions.

4.2 ORBITAL DATA SOURCES

4.2.1 Orbital Tracking Data

Orbital tracking was conducted by the NASA Manned Space Flight Network (MSFN). A summary of the orbital tracking data is given in Table 4-I. The Unified S-band (USB) tracking data available during these periods of flight were not used due to the adequate C-band radar data. The hour-angle/declination data from the Jet Propulsion Laboratory (JPL) Wing-Sites were not used due to the ample C-band radar data and lack of confidence in data conversion and application to the orbit solution.

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 model 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.

4.3 TRAJECTORY RECONSTRUCTION

4.3.1 Parking Orbit Insertion Conditions

The Orbital Correction Program (OCP) was used to solve for the parking orbit insertion conditions utilizing C-band tracking data and the above-mentioned vent model. The insertion conditions are given in Table 4-III. The parking orbit solution was based on a composite fit of the two Bermuda stations at insertion, pass one of Carnarvon, pass two of MILA, pass two of Bermuda (FPQ-6), and pass two of Carnarvon. This combination of trackers is geometrically spaced to insure adequate coverage of the parking orbit. The Bermuda data at insertion were also used in the trajectory reconstruction of the ascent phase. The use of Bermuda data in the ascent phase solution and also in the orbital phase solution aids in assuring the continuity of the trajectory. The orbital solution, with the exception of the FPS-16M Bermuda radar, is based on the higher quality FPQ-6 or TPQ-18 radars. The ground track from parking orbit insertion to CSM separation is given in Figure 4-2. The parking orbit trajectory in PACSS1 is given in Tables B-IV AND C-IV.

4.3.2 Translunar Injection Conditions

The translunar injection (TLI) conditions were determined by the Orbital Correction Program (OCP) utilizing the post injection C-band tracking data. The Hawaii data at TLI were utilized in the second burn and orbital trajectory reconstruction. The use of the Hawaii data in the second burn and post TLI phases aided in insuring the continuity of the trajectory. The TLI conditions are given in Table 4-IV. The TLI state vector obtained by the GATE program from the integration of the guidance velocity data agreed favorably with the OCP determined TLI vector. The post TLI trajectory is included in Tables B-V through B-VII in metric units and Tables C-V through C-VII in English units. The CSM separation conditions are given in Table 4-V.

4.4 ORBITAL TRACKING ANALYSIS

The stations used to obtain the parking orbit insertion conditions and translunar injection conditions are given by Tables 4-VI and 4-VII, respectively. These two tables also include the number of data points and the Root-Mean-Square (RMS) errors of the residuals for each data type. 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 for the parking orbit was 18 m (59 ft) in slant range, 0.065 degree in elevation angle, and 0.021 degree in azimuth angle. The maximum RMS error of the radar residuals for the post TLI trajectory was 10 m (33 ft) in slant range, 0.031 degree in elevation angle, and 0.019 in azimuth angle. The magnitudes of these RMS errors are reasonable and indicate the validity of the parking orbit and post TLI trajectory.

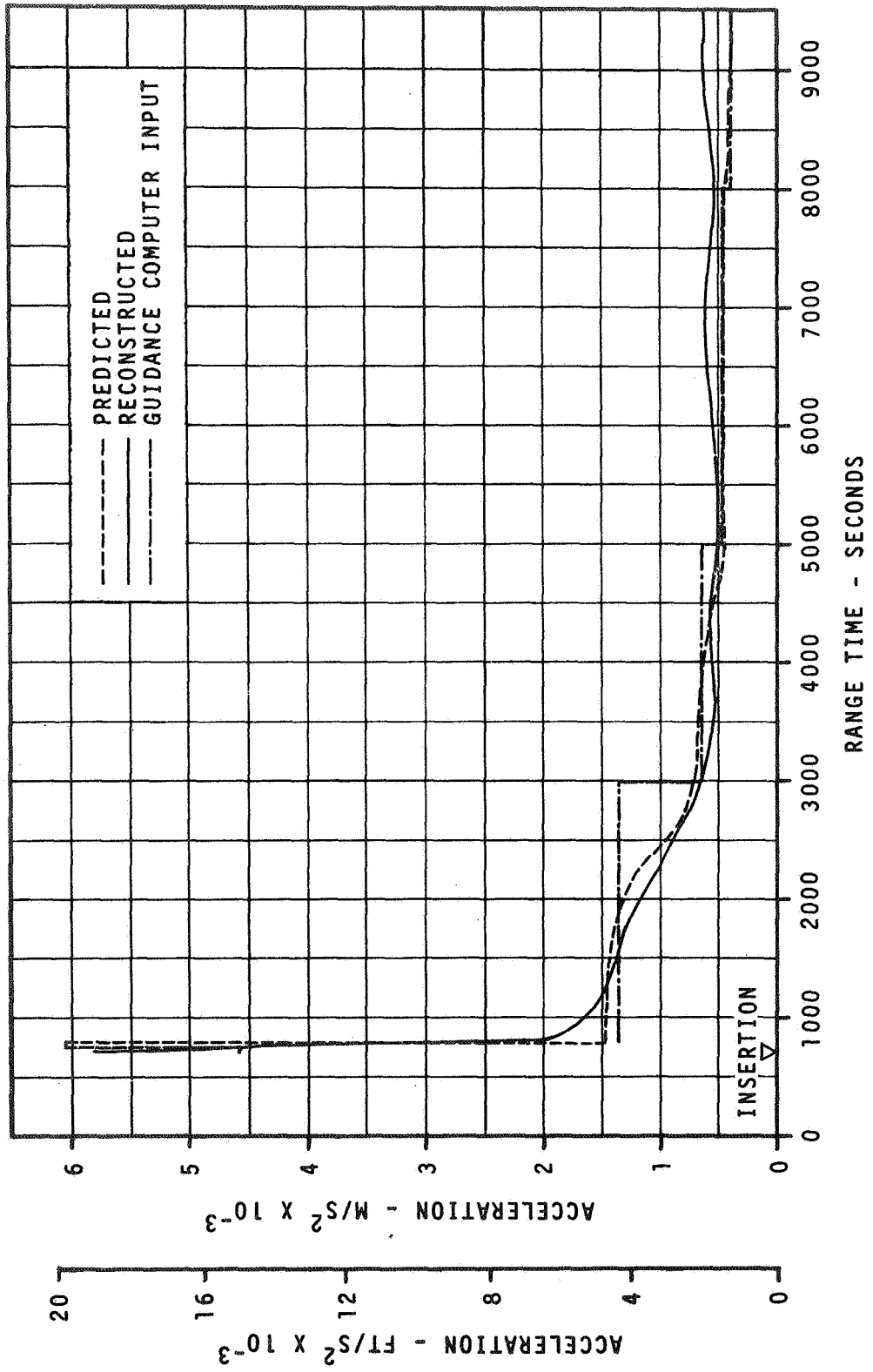

FIGURE 4-1. ORBITAL ACCELERATION DUE TO VENTING

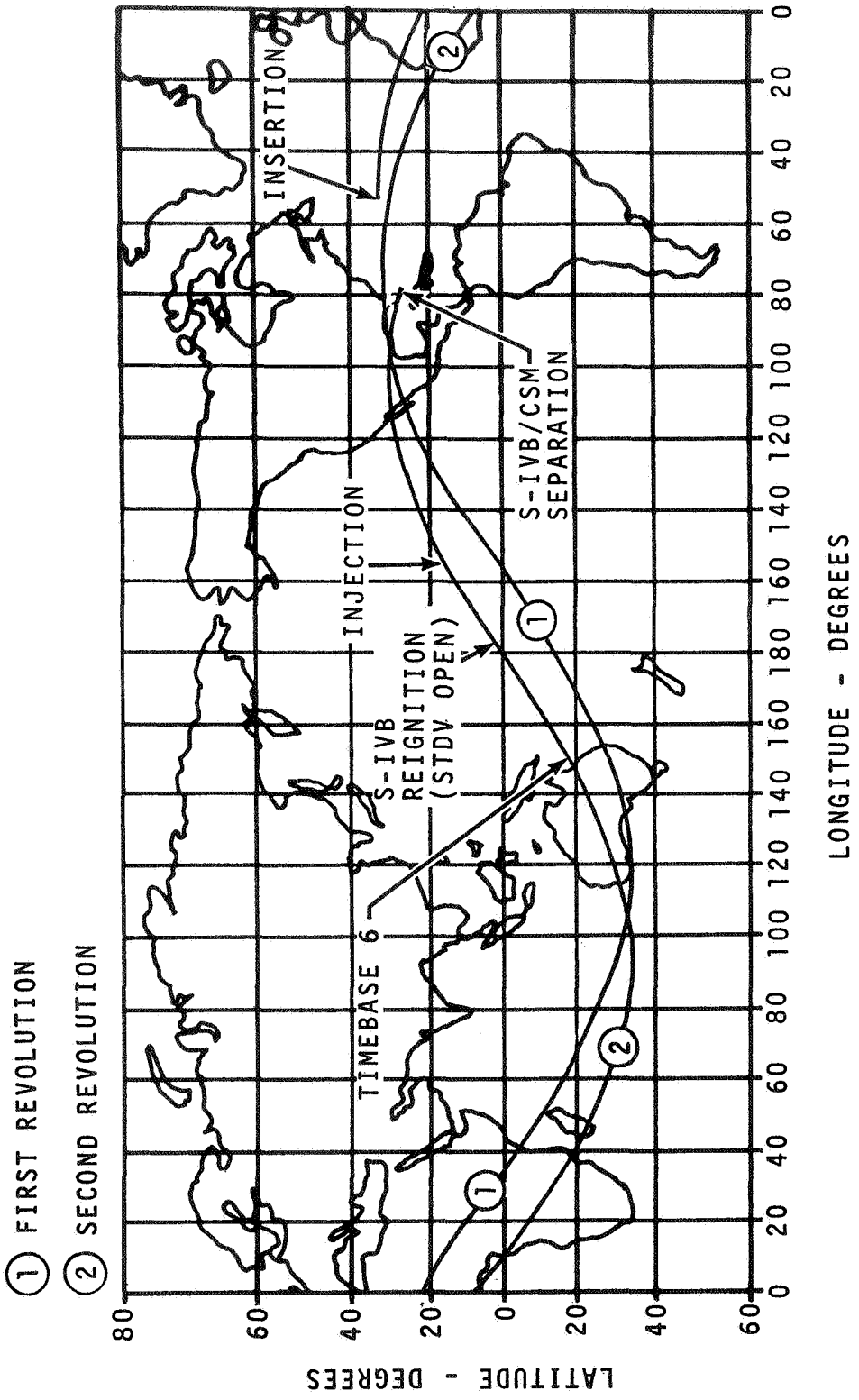

FIGURE 4-2. GROUND TRACK

TABLE 4-I. SUMMARY OF ORBITAL TRACKING DATA AVAILABLE

STATION	TYPE OF RADARS	REV 1	REV 2	POST TLI
Bermuda	FPS-16M	X		
Bermuda	FPQ-6	X	X	X
Canary Island	USB-30'	X		
Carnarvon	FPQ-6	X	X	
Guaymas	USB-30'	X		X
Merritt Island	TPQ-18		X	X
Merritt Island	USB-30'			X
Hawaii	FPS-16M			X
Hawaii	USB-30'			X
Goldstone *	USB-85'			X
Madrid *	USB-85'			X

* Jet Propulsion Laboratory Wing Sites measuring hour angle, declination, and range rate (PACSS3b).

TABLE 4-II. ORBITAL VENTING ACCELERATION POLYNOMIALS*

		$\ddot{X}$**	
T_b	694	776	9,998
T_e	776	9,998	10,038
C_0	$-0.20279528 \times 10^{-5}$	$-0.64264928 \times 10^{-6}$	$0.41160138 \times 10^{-5}$
C_1	$0.64362164 \times 10^{-8}$	$-0.22097516 \times 10^{-8}$	$0.63389358 \times 10^{-7}$
C_2	0	$0.23323228 \times 10^{-11}$	0
C_3	0	$-0.71371573 \times 10^{-15}$	0
C_4	0	$0.86095737 \times 10^{-19}$	0
C_5	0	$-0.35962882 \times 10^{-23}$	0

		$\ddot{Y}$
T_b	694	
T_e	10,038	
C_0	0	
C_1	0	
C_2	0	
C_3	0	
C_4	0	
C_5	0	

		$\ddot{Z}$	
T_b	694	776	9,998
T_e	776	9,998	10,038
C_0	$0.56827597 \times 10^{-5}$	$0.17857083 \times 10^{-5}$	$0.21055642 \times 10^{-5}$
C_1	$-0.30046257 \times 10^{-7}$	$-0.32719881 \times 10^{-8}$	$0.42529823 \times 10^{-7}$
C_2	$-0.25272404 \times 10^{-11}$	$0.13328860 \times 10^{-11}$	0
C_3	0	$-0.16969575 \times 10^{-15}$	0
C_4	0	$0.20704430 \times 10^{-20}$	0
C_5	0	$0.51515270 \times 10^{-24}$	0

* Polynomials are of the form $a=C_0+C_1t+C_2t^2+C_3t^3+C_4t^4+C_5t^5$ where a is the acceleration component (km/s^2) and $t = T-T_b$ where $T_b \leq T < T_e$. The begin time (T_b) and the end time (T_e) for the polynomial segments are expressed in seconds.

** The acceleration components are expressed in the launch vehicle platform-accelerometer system (PACSS12).

TABLE 4-III. PARKING ORBIT INSERTION CONDITIONS

PARAMETER	VALUE
Range Time, sec	703.91
Altitude, km (n mi)	190.9 (103.1)
Space-Fixed Velocity, m/s (ft/s)	7,792.5 (25,565.9)
Flight Path Angle, deg	-0.014
Heading Angle, deg	88.580
Inclination, deg	32.540
Descending Node, deg	123.126
Eccentricity	0.00032
Apogee*, km (n mi)	185.4 (100.1)
Perigee*, km (n mi)	181.2 (97.8)
Period, min	88.16
Geodetic Latitude, deg N	32.682
Longitude, deg E	-53.131

*Based on a spherical earth of radius 6,378.165 km (3,443.934 n mi)

TABLE 4-IV. TRANSLUNAR INJECTION CONDITIONS

PARAMETER	VALUE
Range Time, sec	10,393.94
Altitude, km (n mi)	368.6 (199.0)
Space-Fixed Velocity, m/s (ft/s)	10,786.8 (35,389.8)
Flight Path Angle, deg	8.584
Heading Angle, deg	63.902
Inclination, deg	30.355
Descending Node, deg	120.338
Eccentricity	0.96966
C_3*, m^2/s^2 (ft^2/s^2)	-1,834,425 (-19,745,586)
Geodetic Latitude, deg N	16.176
Longitude, deg E	-154.280

*Twice the specific energy of orbit

$$C_3 = V^2 - \frac{2\mu}{R}$$

where V = Inertial Velocity
μ = Gravitational Constant
R = Radius from center of earth

TABLE 4-V. CSM SEPARATION CONDITIONS

PARAMETER	VALUE
Range Time, sec	11,884.9
Altitude, km (n mi)	7,073.3 (3,819.3)
Space-Fixed Velocity, m/s (ft/s)	7,579.0 (24,865.5)
Flight Path Angle, deg	45.092
Heading Angle, deg	100.194
Geodetic Latitude, deg N	28.815
Longitude, deg E	-79.537

TABLE 4-VI. PARKING ORBIT TRACKING UTILIZATION SUMMARY

STATION	TIME OF TRACK (SECONDS) BEGIN	END	DATA TYPE	VALID OBSERVATIONS	RMS ERROR OF RESIDUALS
Bermuda (FPS-16M)	708	750	Azimuth Angle Elevation Angle Slant Range	8 8 8	0.021 deg 0.060 deg 7 m (23 ft)
Bermuda (FPQ-6)	708	750	Azimuth Angle Elevation Angle Slant Range	8 8 8	0.017 deg 0.065 deg 5 m (16 ft)
Carnarvon (FPQ-6)	3,168	3,474	Azimuth Angle Elevation Angle Slant Range	46 46 47	0.004 deg 0.018 deg 13 m (43 ft)
Merritt Island (TPQ-18)	5,730	6,108	Azimuth Angle Elevation Angle Slant Range	53 62 62	0.006 deg 0.029 deg 8 m (26 ft)
Bermuda (FPQ-6)	5,934	6,336	Azimuth Angle Elevation Angle Slant Range	51 47 54	0.010 deg 0.009 deg 18 m (59 ft)
Carnarvon (FPQ-6)	8,748	9,096	Azimuth Angle Elevation Angle Slant Range	56 47 58	0.005 deg 0.004 deg 6 m (20 ft)

TABLE 4-VII. POST TLI TRACKING UTILIZATION SUMMARY

STATION	TIME OF TRACK (SECONDS) BEGIN	END	DATA TYPE	VALID OBSERVATIONS	RMS ERROR OF RESIDUALS
Hawaii (FPS-16M)	10,398	10,980	Azimuth Angle Elevation Angle Slant Range	81 76 84	0.019 deg 0.015 deg 6 m (20 ft)
Merritt Island (TPQ-18)	10,854	12,078	Azimuth Angle Elevation Angle Slant Range	59 81 75	0.017 deg 0.031 deg 4 m (13 ft)
Bermuda (FPQ-6)	10,968	12,078	Azimuth Angle Elevation Angle Slant Range	76 81 77	0.005 deg 0.004 deg 10 m (33 ft)

SECTION 5

TRAJECTORY ERROR ANALYSIS

5.1 ERROR ANALYSIS

The confidence level or uncertainty that is assigned to a reconstructed trajectory depends on the degree of fulfillment of the following criteria:

a. Quantity of Tracking Data
b. Quality of Tracking Data
c. Consistency between Tracking and Guidance Velocity Data
d. Continuity between Trajectory Segments

These criteria vary from flight to flight. Therefore, a rigorous statistical error analysis of the reconstructed trajectory is difficult to obtain. The following paragraphs summarize the results for this flight, and lead to the position and velocity uncertainties for the reconstructed trajectory.

5.1.1 Quantity of Tracking Data

The available tracking data for the powered flight phases are given in Figure 3-11 and Table 3-VI. The tracking coverages for the parking orbit and post TLI phases are given in Table 4-I.

The tracking stations for the ascent and post TLI phases provided extensive redundant coverage. The available tracking data during parking orbit provided adequate coverage. The Hawaii C-band tracking data were available for a portion of the second burn phase.

5.1.2 Quality of Tracking Data

The tracking data were of good quality. Comparisons of the tracking data in measured parameters (PACSS3a) with the ascent trajectory are shown in Figures 3-13 through 3-15. These plots indicate that the tracking data from the different stations were mutually consistent and the data deviations were of acceptable magnitude. The Hawaii C-band second burn tracking data comparisons, Figure 3-16, show good agreement with the reconstructed trajectory. The tracking data obtained during the parking orbit and post TLI phases were of good quality. The RMS errors of residuals for each data type are given in Tables 4-VI and 4-VII, respectively.

5.1.2 (Continued)

The tracking data were transformed into the earth-fixed launch site coordinate system (PACSS10) and differenced with the reconstructed trajectory to provide a more direct indication of the spread of the tracking data. The tracking data spreads for the ascent and second burn, parking orbit, and post TLI phases are given in Tables 5-I through 5-III, respectively.

5.1.3 Consistency Between Tracking and Guidance Velocity Data

The consistency between tracking and guidance velocity data can be obtained by examining the guidance velocity error plots during powered flight trajectory segments. These error plots give the differences between the guidance velocities from the ST-124M platform and those derived from the reconstructed trajectory.

The guidance velocity error plots for the ascent phase had reasonable shapes and magnitudes. The maximum error amounted to 0.8 m/s (2.6 ft/s) in the X-direction, 1.8 m/s (5.9 ft/s) in the Y-direction, and 1.3 m/s (4.3 ft/s) in the Z-direction, referenced to launch vehicle platform-accelerometer coordinate system (PACSS12).

The guidance velocity error plots for the second burn phase also had reasonable shapes and magnitudes. The maximum error amounted to 1.0 m/s (3.3 ft/s) in the X-direction, 2.1 m/s (6.9 ft/s) in the Y-direction, and 3.8 m/s (12.5 ft/s) in the Z-direction, referenced to PACSS12.

5.1.4 Continuity Between Trajectory Segments

The continuity between trajectory segments can be obtained by examining the orbital and powered flight solutions at parking orbit insertion and translunar injection before the trajectory segments were merged together.

Comparisons of the state vector differences at parking orbit insertion obtained independently by the powered flight and orbital analyses yielded good agreement. The position and velocity components of the solutions had a spread of 60 m (197 ft) and 0.6 m/s (2.0 ft/s) in the downrange direction, 60 m (197 ft) and 0.5 m/s (1.6 ft/s) in the vertical direction, and 30 m (98 ft) and 0.1 m/s (0.3 ft/s) in the crossrange direction, referenced to the earth-fixed launch site coordinate system (PACSS10).

5.1.4 (Continued)

Comparisons of the TLI vectors determined independently from the powered flight and orbital analyses also yielded good agreement. The TLI vector from the powered flight analysis was obtained by propagating forward the state vector at 9,840 seconds (from parking orbit analysis) to 10,393.94 seconds based on the telemetered guidance velocity data. The TLI vector from the orbital analysis was determined separately by using the post TLI tracking data. The position and velocity components of the two solutions had respectively a difference of 600 m (1,969 ft) and 0.7 m/s (2.3 ft/s) in the X-direction, 40 m (131 ft) and 2.2 m/s (7.2 ft/s) in the Y-direction, and 630 m (2,067 ft) and 0.3 m/s (1.0 ft/s) in the Z-direction, referenced to the earth-fixed launch site coordinate system (PACSS10).

A dispersion analysis was performed for the post TLI trajectory. Three solutions were obtained by judiciously selecting various tracking data combinations. The TLI vectors had a spread in position and velocity components respectively of 160 m (525 ft) and 0.1 m/s (0.3 ft/s) in downrange (Z), 400 m (1,312 ft) and 0.4 m/s (1.3 ft/s) in vertical (X), and 500 m (1,640 ft) and 0.3 m/s (1.0 ft/s) in crossrange (Y), referenced to the earth-fixed launch site coordinate system (PACSS10).

5.2 TRAJECTORY UNCERTAINTIES

Based on the information of Paragraph 5.1, past experience, and engineering judgment, the trajectory uncertainties were estimated.

The trajectory uncertainties for the ascent phase are shown in Figure 5-1. At S-IC OECO, the uncertainties in position and velocity components in PACSS10 are ±70 m (±230 ft) and ±0.4 m/s (±1.3 ft/s), respectively. At S-II OECO, the uncertainties in position and velocity components in PACSS10 are ±360 m (±1,181 ft) and ±0.7 m/s (±2.3 ft/s), respectively. At insertion and throughout the parking orbit, the uncertainties in position and velocity components in PACSS10 are ±500 m(±1,640 ft) and ±1.0 m/s (±3.3 ft/s), respectively. The trajectory uncertainties increased to ±750 m (±2,461 ft) in position components and ±1.5 m/s (±4.9 ft/s) in velocity components at TLI and throughout the post TLI trajectory.

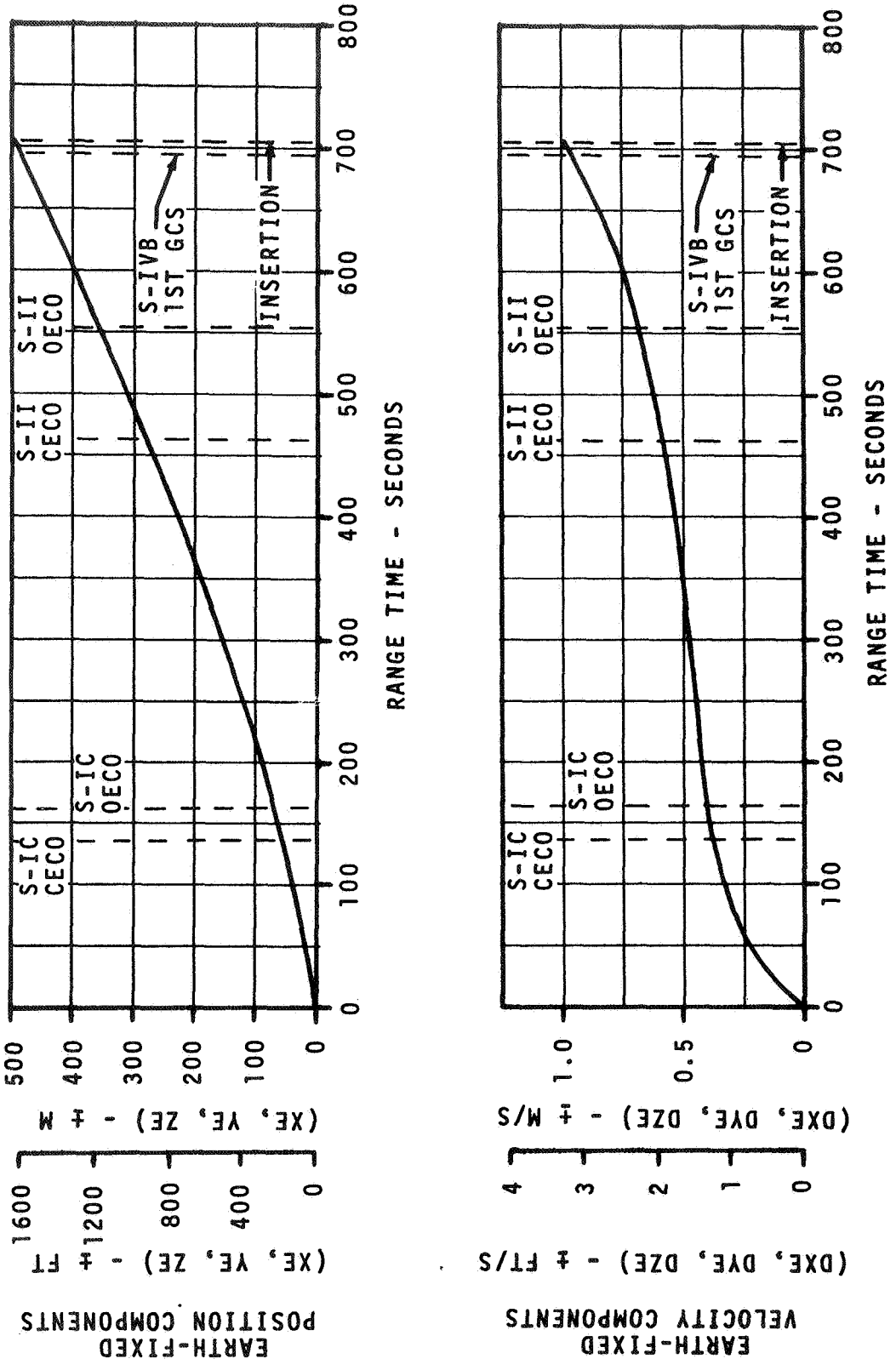

FIGURE 5-1. ESTIMATED TRAJECTORY UNCERTAINTY - ASCENT PHASE

TABLE 5-I. TRACKING DATA SPREAD* - POWERED FLIGHT PHASE

ASCENT			
STATION	ΔX	ΔY	ΔZ
Patrick (0.18) Radar (FPQ-6)	70 m (230 ft)	30 m (98 ft)	60 m (197 ft)
Merritt Island (19.18) Radar (TPQ-18)	30 m (98 ft)	40 m (131 ft)	80 m (262 ft)
Grand Turk (7.18) Radar (TPQ-18)	250 m (820 ft)	50 m (164 ft)	150 m (492 ft)
Bermuda (67.18) Radar (FPQ-6)	40 m (131 ft)	100 m (328 ft)	50 m (164 ft)
Bermuda (67.16) Radar (FPS-16M)	150 m (492 ft)	80 m (262 ft)	70 m (230 ft)
SECOND BURN			
Hawaii Radar (FPS-16M)	100 m (328 ft)	80 m (262 ft)	100 m (328 ft)

*Expressed in PACSS10

TABLE 5-II. TRACKING DATA SPREAD* - PARKING ORBIT PHASE

STATION	ΔX	ΔY	ΔZ
Bermuda (FPQ-6) Rev 1 **	800 m (2,625 ft)	350 m (1,148 ft)	250 m (820 ft)
Bermuda (FPS-16M) Rev 1 **	800 m (2,625 ft)	350 m (1,148 ft)	250 m (820 ft)
Carnarvon (FPQ-6) Rev 1	280 m (919 ft)	50 m (164 ft)	80 m (262 ft)
Merritt Island (TPQ-18) Rev 2	300 m (984 ft)	100 m (328 ft)	80 m (262 ft)
Bermuda (FPQ-6) Rev 2	170 m (558 ft)	180 m (591 ft)	100 m (328 ft)
Carnarvon (FPQ-6) Rev 2	130 m (427 ft)	80 m (262 ft)	130 m (427 ft)

* Expressed in PACSS10

** Elevation angle less than 5.0 degrees

TABLE 5-III. TRACKING DATA SPREAD* - POST TLI PHASE

STATION	SLANT RANGE MIN	SLANT RANGE MAX	ΔX	ΔY	ΔZ
Hawaii (FPS-16M)	980 km (529 n mi)	5,950 km (3,213 n mi)	350 m (1,148 ft)	650 m (2,133 ft)	600 m (1,969 ft)
Merritt Island (TPQ-18)	4,670 km (2,522 n mi)	8,140 km (4,395 n mi)	1,050 m (3,445 ft)	980 m (3,215 ft)	1,500 m (4,921 ft)
Bermuda (FPQ-6)	5,760 km (3,110 n mi)	8,300 km (4,482 n mi)	250 m (820 ft)	400 m (1,312 ft)	300 m (984 ft)

* Expressed in PACSS10

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SECTION 6

SPENT STAGE TRAJECTORIES

6.1 S-IC SPENT STAGE 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 burnout 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.

Results of the three computed S-IC spent stage trajectories are summarized in Table 6-I. The ground track is shown in Figure 6-1.

6.2 S-II SPENT STAGE 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 tracking coverage of the spent S-II stage was available.

Results of the three computed S-II spent-stage trajectories are summarized in Table 6-II. The ground track is shown in Figure 6-1.

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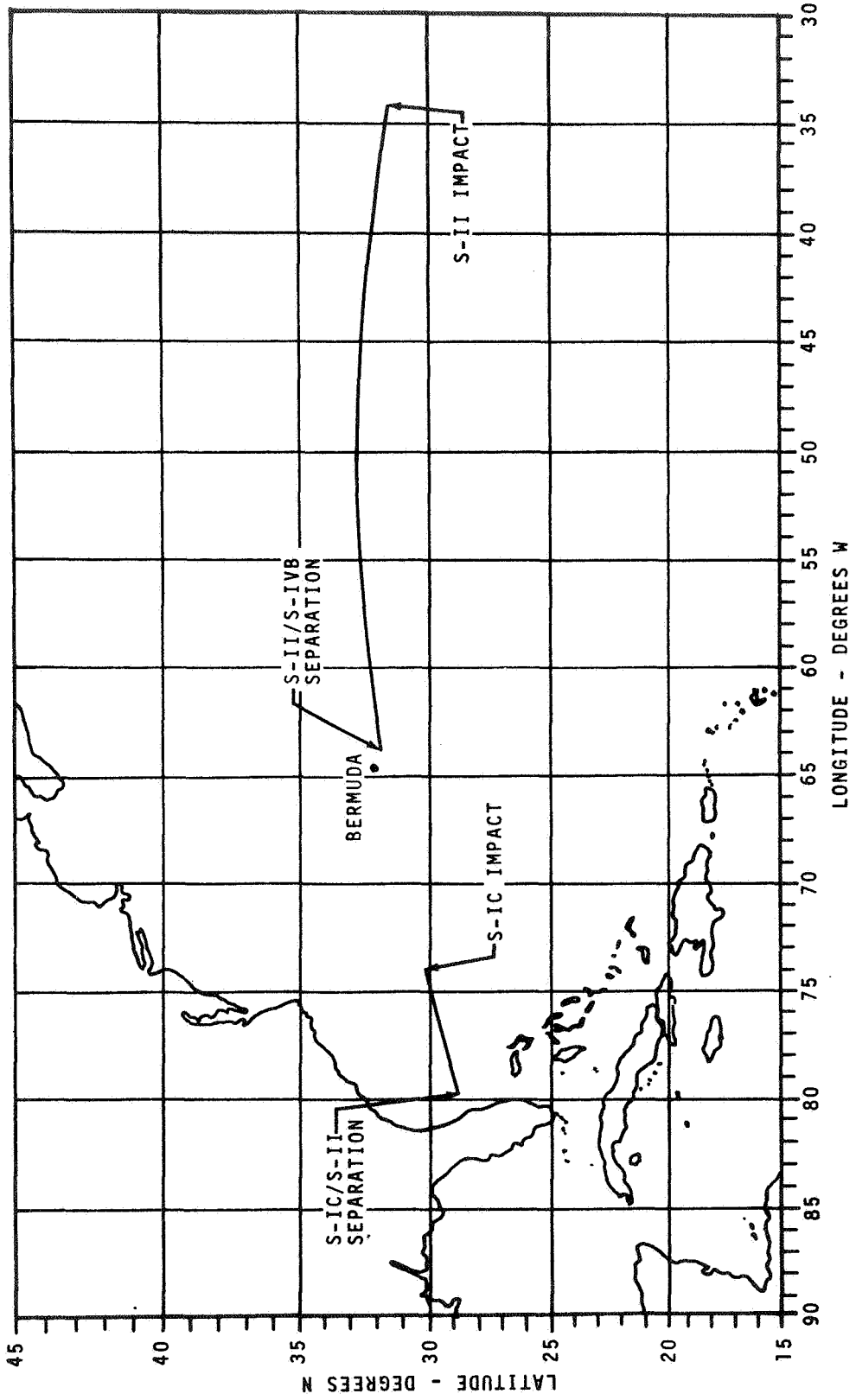

FIGURE 6-1. GROUND TRACKS FOR S-IC AND S-II SPENT STAGES

TABLE 6-I. S-IC SPENT STAGE TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Range Time, sec	554.5
	Latitude, deg N	30.273
	Longitude, deg E	-73.895
	Surface Range, km (n mi)	676.4 (365.2)
Impact: 0° Angle-of-Attack	Range Time, sec	514.2
	Latitude, deg N	30.291
	Longitude, deg E	-73.808
	Surface Range, km (n mi)	685.1 (369.9)
Impact: 90° Angle-of-Attack	Range Time, sec	588.7
	Latitude, deg N	30.261
	Longitude, deg E	-73.954
	Surface Range, km (n mi)	670.6 (362.1)
Apex: Tumbling Case	Range Time, sec	275.6
	Altitude, km (n mi)	123.0 (66.4)
	Surface Range, km (n mi)	336.0 (181.4)

TABLE 6-II. S-II SPENT STAGE TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Range Time, sec	1,221.6
	Latitude, deg N	31.465
	Longitude, deg E	-34.214
	Surface Range, km (n mi)	4,452.9 (2,404.4)
Impact: 0° Angle-of-Attack	Range Time, sec	1,187.9
	Latitude, deg N	31.425
	Longitude, deg E	-33.946
	Surface Range, km (n mi)	4,478.8 (2,418.4)
Impact: 90° Angle-of-Attack	Range Time, sec	1,260.5
	Latitude, deg N	31.506
	Longitude, deg E	-34.490
	Surface Range, km (n mi)	4,426.3 (2,390.0)
Apex: Tumbling Case	Range Time, sec	581.7
	Altitude, km (n mi)	191.2 (103.2)
	Surface Range, km (n mi)	1,824.8 (985.3)

SECTION 7

S-IVB/IU SLINGSHOT TRAJECTORY

After LM extraction by the CSM, the S-IVB/IU was oriented by a yaw command to an evasive maneuver attitude. An 80-second APS ullage burn provided the velocity change to accomplish evasive separation of the S-IVB from the CSM.

Following the evasive maneuver, the S-IVB/IU was slowed down and placed on a lunar slingshot trajectory by the combined effects of a 58-second LOX dump, two separate APS burns, and continuous LH_2 venting. However, the slingshot trajectory did not pass sufficiently close to the trailing edge of the moon to gain the required energy to attain the desired heliocentric orbit.

A time history of the actual velocity change along the vehicle longitudinal axis for the evasive and the slingshot maneuvers is presented in Figure 7-1. Table 7-I presents an attitude and velocity change timeline for the maneuvers executed after TLI. The nominal (real-time predicted) longitudinal velocity change is included.

The S-IVB/IU's closest approach altitude of 5,707 km (3,082 n mi) above the lunar surface occurred 85.8 hours into the mission. The actual and nominal (real-time predicted) conditions at the closest approach to the moon are presented in Table 7-II. Actual trajectory parameters were determined by integrating a state vector computed by the Manned Spacecraft Center from USB tracking data obtained during the active lifetime of the S-IVB/IU. Figure 7-2 illustrates the effect of the moon as the S-IVB/IU passes through the lunar sphere of influence. Table 7-III presents the geocentric orbit parameters for the S-IVB/IU and the moon.

The actual longitudinal velocity change during the slingshot maneuver was very close to nominal; however, the vehicle navigator state vector used to target the S-IVB/IU in real time did not reflect an existing underspeed condition at TLI. This underspeed condition coupled with the slingshot maneuver caused the S-IVB/IU's lunar radius of closest approach, 7,445 km (4,020 n mi), to be greater than the maximum allowable radius for escape from the earth-moon system, viz., 5,100 km (2,754 n mi) for the AS-507 mission.

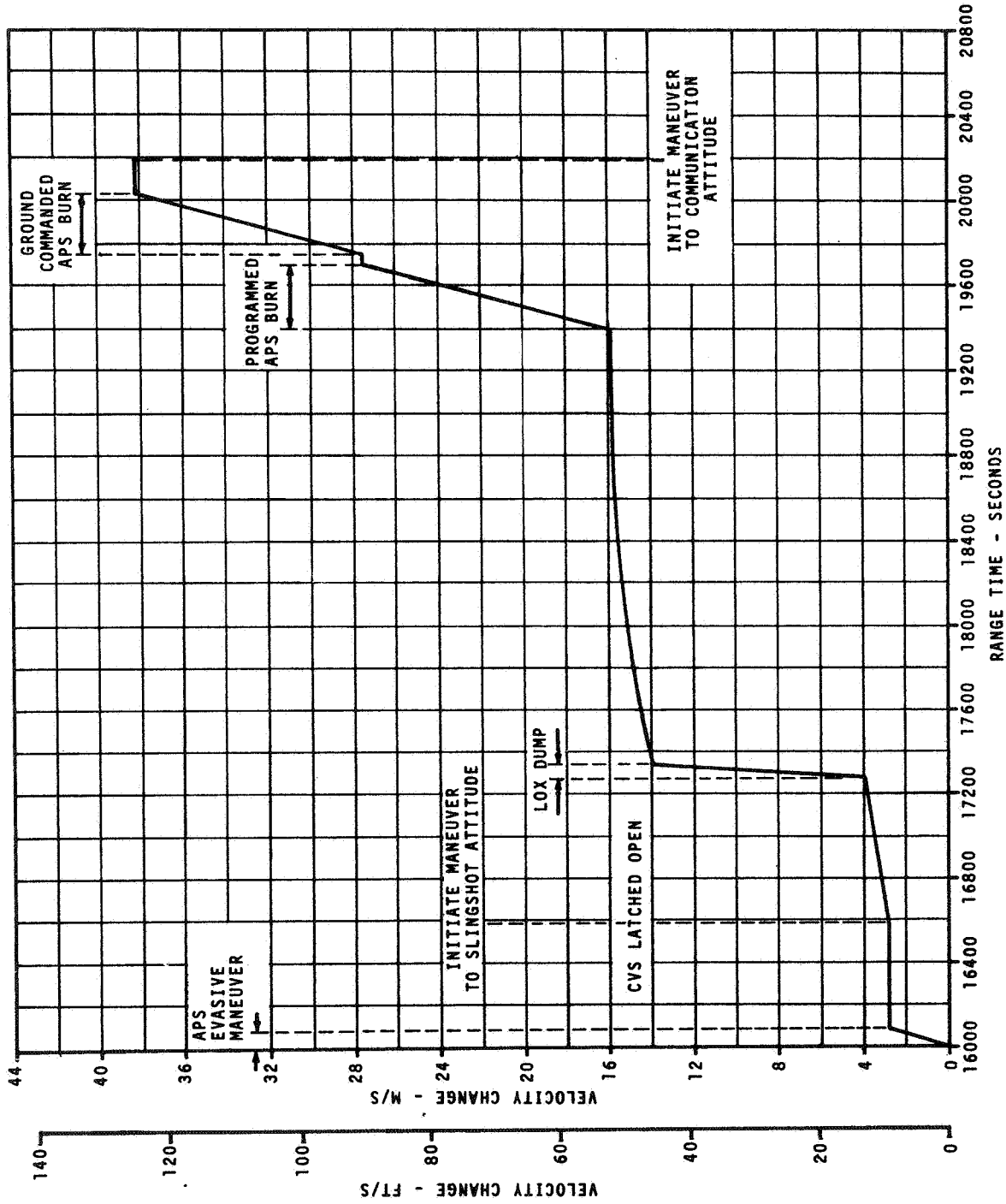

FIGURE 7-1. SLINGSHOT AND EVASIVE MANEUVER LONGITUDINAL VELOCITY CHANGE

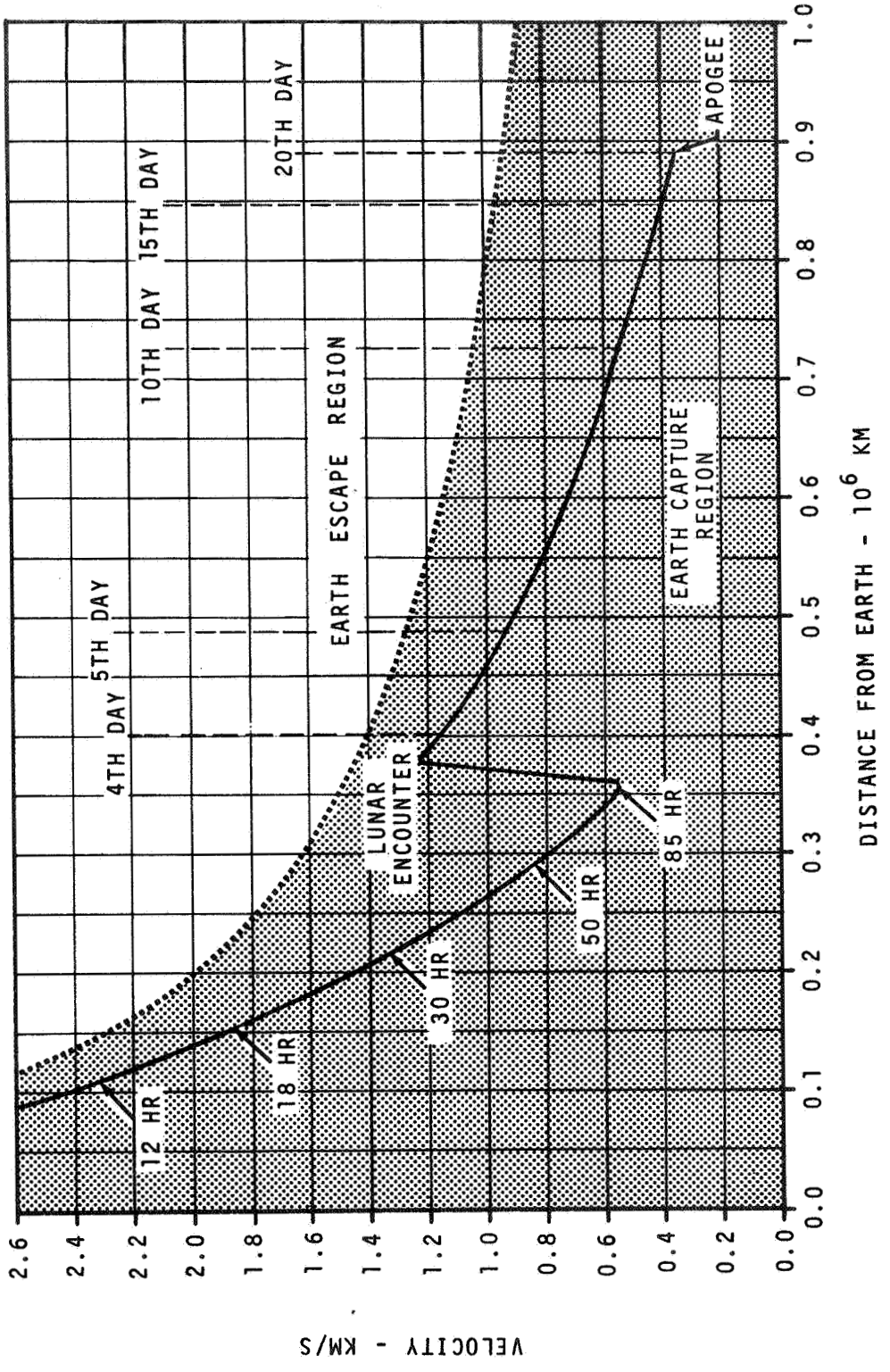

FIGURE 7-2. S-IVB/IU VELOCITY RELATIVE TO EARTH DISTANCE

TABLE 7-I. POST TLI ATTITUDE AND VELOCITY CHANGE TIMELINE

SOURCE	INITIATION OF MANEUVER	ATTITUDE	VELOCITY CHANGE	
			ACTUAL	NOMINAL†
TRANSPOSITION AND DOCKING MANEUVER				
APS Attitude Control	11,284 sec	120° Pitch, -30° Yaw, 180° Roll *	0.0 m/s	0.0 m/s
EVASIVE MANEUVER				
APS Attitude Control	15,520 sec	120° Pitch, 30° Yaw, 180° Roll *	0.0 m/s	0.0 m/s
APS Ullage (80 sec)	16,000 sec		2.9 m/s (9.5 ft/s)	3.0 m/s (9.8 ft/s)
SLINGSHOT MANEUVER				
APS Attitude Control	16,580 sec	191° Pitch, 0° Yaw, 180° Roll **	0.0 m/s	0.0 m/s
Continuous Venting System (Latched Open)	16,580 sec		2.8 m/s (9.2 ft/s)	1.5 m/s (4.9 ft/s)
LOX Dump (58 sec)	17,280 sec		10.0 m/s (32.8 ft/s)	9.7 m/s (31.8 ft/s)
Programmed APS Ullage (300 sec)	19,400 sec		11.8 m/s (38.7 ft/s)	12.7 m/s (41.7 ft/s)
Ground Commanded APS Ullage (270 sec)	19,752 sec		10.7 m/s (35.1 ft/s)	11.2 m/s (36.7 ft/s)
COMMUNICATION ATTITUDE MANEUVER				
APS Attitude Control	20,200 sec	180° Pitch, 0° Yaw, 180° Roll **	0.0 m/s	0.0 m/s
Total Velocity Change			38.2 m/s (125.3 ft/s)	38.1 m/s (125.0 ft/s)

† Real-time predicted

* Relative to PACSS13

** Relative to local horizontal reference system

TABLE 7-II. COMPARISON OF LUNAR CLOSEST APPROACH PARAMETERS

PARAMETER	ACTUAL	NOMINAL*
Selenocentric Distance, km (n mi)	7,445 (4,020)	3,400 (1,836)
Altitude Above Lunar Surface, km (n mi)	5,707 (3,082)	1,662 (897)
Range Time, hr	85.8	84.1
Velocity Increase Relative to Earth from Lunar Encounter, km/s (n mi/s)	0.548 (0.296)	0.850 (0.459)

* Real-time predicted

TABLE 7-III. GEOCENTRIC ORBIT PARAMETERS

PARAMETER*	S-IVB/IU	MOON
Semimajor Axis, km (n mi)	508,350 (274,487)	381,520 (206,004)
Apogee, km (n mi)	895,600 (483,585)	406,670 (219,584)
Perigee, km (n mi)	121,090 (65,383)	356,380 (192,430)
Inclination**, deg	29.3	28.5
Eccentricity	0.762	0.059
Period, days	42.6	27.3

* Osculating orbital elements calculated for launch plus 21 days

** Relative to the earth's equatorial plane

APPENDIX A

DEFINITIONS OF TRAJECTORY SYMBOLS AND COORDINATE SYSTEMS

SYMBOL	DEFINITION
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 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.
XS, YS, ZS DXS, DYS, DZS DDXS, DDYS, DDZS	Position, velocity, and acceleration components of vehicle center of gravity in Launch Vehicle Navigation Coordinate System. The origin of this system is at the center of the earth. The X axis is parallel to Fischer Ellipsoid normal through the launch site, positive upward. The Z axis is parallel to the flight azimuth, positive downrange. The Y axis completes a right-handed system. The direction of the coordinate axes remains fixed in space at guidance reference release. This coordinate system is identical to Standard Coordinate System Standards, abbreviated as PACSS13.
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 of the subvehicle point and the equatorial plane, positive north of the

APPENDIX A (Continued)

SYMBOL	DEFINITION
	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 of 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 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	DEFINITION
ALTITUDE	Perpendicular distance from vehicle center of gravity to Fischer Ellipsoid, positive above Fischer Ellipsoid.
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 - METRIC UNITS

The postflight trajectory, from guidance reference release to CSM separation, is tabulated in metric units in Tables B-I through B-VII.

Table B-I gives the earth-fixed launch site position, velocity, and acceleration components for the ascent phase of the flight.

Table B-II gives the launch vehicle navigation position, velocity, and acceleration components for the ascent phase of the flight.

Table B-III gives the geographic polar coordinates for the ascent phase of flight.

Table B-IV gives the geographic polar coordinates for the parking orbit phase of flight.

Table B-V gives the earth-fixed launch site position, velocity, and acceleration components for the second burn phase of the flight.

Table B-VI gives the launch vehicle navigation position, velocity, and acceleration components for the second burn phase of flight.

Table B-VII gives the geographic polar coordinates for the second burn phase of flight.

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

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									
-16.968	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
ALL HOLDDOWN ARMS RELEASED									
0.300	60	0	0	0.1	0.0	-0.0	0.94	0.02	-0.00
START OF TIME BASE 1									
0.700	60	0	0	0.5	0.0	-0.0	1.57	0.03	0.00
1.0	60	0	0	1.1	0.0	0.0	2.19	0.04	0.01
2.0	62	0	0	3.3	0.1	0.0	2.29	0.06	0.02
3.0	67	0	0	5.6	0.2	0.0	2.37	0.11	0.03
4.0	74	0	0	8.1	0.3	0.1	2.45	0.22	0.03
5.0	83	1	0	10.5	0.6	0.1	2.52	0.31	0.03
6.0	95	2	0	13.1	0.9	0.1	2.57	0.35	0.02
7.0	109	3	0	15.7	1.3	0.1	2.62	0.37	0.01
8.0	126	4	1	18.3	1.6	0.1	2.67	0.36	0.00
9.0	146	6	1	21.0	2.0	0.1	2.70	0.32	-0.02
10.0	168	8	1	23.7	2.3	0.1	2.75	0.30	-0.03
11.0	193	11	1	26.5	2.6	0.1	2.79	0.26	-0.05
12.0	221	13	1	29.3	2.7	0.0	2.83	0.10	-0.07
13.0	252	16	1	32.2	2.8	-0.1	2.86	-0.03	-0.05
14.0	286	19	1	35.0	2.7	-0.1	2.89	-0.08	0.00

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	322	21	1	38.0	2.6	-0.1	2.96	-0.11	0.04
16.0	361	24	1	41.0	2.5	-0.0	3.03	-0.13	0.08
17.0	404	26	1	44.0	2.4	0.1	3.11	-0.15	0.11
18.0	450	29	1	47.2	2.2	0.2	3.20	-0.16	0.17
19.0	498	31	1	50.4	2.0	0.4	3.27	-0.17	0.23
20.0	550	33	2	53.7	1.9	0.7	3.36	-0.13	0.29
21.0	606	35	3	57.1	1.8	1.0	3.43	-0.13	0.35
22.0	665	36	4	60.6	1.6	1.4	3.50	-0.14	0.43
23.0	727	38	5	64.1	1.5	1.9	3.58	-0.14	0.50
24.0	793	39	8	67.7	1.4	2.4	3.66	-0.13	0.58
25.0	862	41	10	71.4	1.2	3.0	3.74	-0.13	0.65
26.0	936	42	14	75.2	1.1	3.7	3.81	-0.12	0.74
27.0	1013	43	18	79.1	1.0	4.5	3.88	-0.11	0.83
28.0	1094	44	23	83.0	0.9	5.4	3.96	-0.10	0.94
29.0	1179	44	28	87.0	0.8	6.4	4.03	-0.09	1.05
30.0	1268	45	35	91.0	0.7	7.5	4.10	-0.09	1.16
31.0	1361	46	43	95.2	0.6	8.7	4.18	-0.08	1.29
32.0	1458	46	53	99.4	0.5	10.0	4.26	-0.07	1.41
33.0	1560	47	64	103.7	0.5	11.5	4.34	-0.07	1.54
34.0	1666	47	76	108.1	0.4	13.1	4.42	-0.07	1.68
35.0	1776	48	90	112.5	0.3	14.9	4.49	-0.07	1.82
36.0	1891	48	106	117.1	0.2	16.8	4.55	-0.07	1.96
37.0	2010	48	123	121.6	0.2	18.8	4.63	-0.06	2.11
38.0	2134	48	143	126.3	0.1	21.0	4.69	-0.04	2.26
39.0	2263	48	165	131.0	0.1	23.3	4.76	-0.03	2.42
40.0	2396	49	190	135.8	0.1	25.8	4.84	-0.01	2.58
41.0	2535	49	217	140.7	0.1	28.5	4.92	-0.01	2.75
42.0	2678	49	247	145.7	0.1	31.3	4.99	-0.01	2.93
43.0	2826	49	280	150.7	0.1	34.3	5.07	-0.01	3.11
44.0	2979	49	316	155.8	0.0	37.5	5.14	-0.02	3.29
45.0	3138	49	355	161.0	0.0	40.9	5.21	-0.02	3.46
46.0	3301	49	398	166.2	-0.0	44.4	5.28	-0.03	3.63
47.0	3470	49	444	171.5	-0.0	48.2	5.36	-0.04	3.79
48.0	3644	49	494	176.9	-0.1	52.0	5.43	-0.05	3.96
49.0	3824	49	548	182.4	-0.1	56.1	5.51	-0.05	4.13
50.0	4009	49	606	187.9	-0.2	60.3	5.58	-0.06	4.30
51.0	4200	48	669	193.6	-0.2	64.7	5.65	-0.07	4.48
52.0	4396	48	736	199.2	-0.3	69.3	5.72	-0.09	4.66
53.0	4598	48	807	205.0	-0.4	74.0	5.80	-0.10	4.86
54.0	4806	47	884	210.8	-0.5	79.0	5.87	-0.12	5.06
55.0	5020	47	965	216.8	-0.7	84.2	5.94	-0.14	5.28
56.0	5240	46	1052	222.7	-0.8	89.5	6.01	-0.15	5.49
57.0	5466	45	1144	228.8	-1.0	95.1	6.06	-0.16	5.68

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	5697	44	1242	234.8	-1.1	100.9	6.12	-0.16	5.88
59.0	5935	43	1346	241.0	-1.3	106.9	6.18	-0.15	6.07
60.0	6179	41	1456	247.2	-1.4	113.0	6.24	-0.12	6.25
61.0	6430	40	1572	253.5	-1.5	119.4	6.30	-0.09	6.43
62.0	6686	38	1695	259.8	-1.6	125.9	6.36	-0.07	6.62
63.0	6949	37	1824	266.2	-1.7	132.6	6.41	-0.05	6.84
64.0	7219	35	1960	272.6	-1.7	139.6	6.44	-0.03	7.06
65.0	7495	33	2104	279.1	-1.7	146.8	6.44	-0.01	7.31
66.0	7777	32	2254	285.5	-1.7	154.2	6.44	0.01	7.57
MACH 1									
66.100	7806	31	2270	286.1	-1.7	155.0	6.44	0.01	7.59
67.0	8066	30	2412	291.9	-1.7	161.9	6.44	0.03	7.83
68.0	8361	28	2578	298.4	-1.7	169.9	6.45	0.04	8.09
69.0	8662	26	2752	304.9	-1.6	178.1	6.46	0.04	8.35
70.0	8970	25	2934	311.3	-1.6	186.5	6.50	0.04	8.60
71.0	9285	23	3125	317.9	-1.6	195.3	6.55	0.02	8.85
72.0	9606	22	3325	324.4	-1.6	204.2	6.60	-0.01	9.09
73.0	9934	20	3534	331.1	-1.6	213.5	6.66	-0.06	9.34
74.0	10268	18	3752	337.8	-1.7	222.9	6.71	-0.11	9.60
75.0	10609	17	3980	344.5	-1.8	232.7	6.78	-0.17	9.85
76.0	10957	15	4217	351.3	-2.0	242.6	6.84	-0.21	10.11
77.0	11312	13	4465	358.2	-2.2	252.9	6.90	-0.25	10.36
78.0	11674	10	4723	365.1	-2.5	263.3	6.97	-0.28	10.60
79.0	12042	8	4992	372.1	-2.8	274.0	7.04	-0.29	10.85
80.0	12418	5	5271	379.2	-3.1	285.0	7.10	-0.29	11.10
81.0	12801	2	5562	386.3	-3.4	296.3	7.15	-0.28	11.39
MAXIMUM DYNAMIC PRESSURE									
81.100	12839	1	5592	387.0	-3.4	297.4	7.16	-0.28	11.42
82.0	13191	-2	5864	393.5	-3.6	307.8	7.19	-0.26	11.71
83.0	13588	-6	6177	400.7	-3.9	319.7	7.20	-0.23	12.06
84.0	13992	-10	6503	407.9	-4.1	332.0	7.19	-0.20	12.44
85.0	14403	-14	6842	415.0	-4.3	344.6	7.17	-0.18	12.84
86.0	14822	-18	7193	422.2	-4.4	357.6	7.14	-0.14	13.23
87.0	15248	-23	7557	429.3	-4.6	371.1	7.12	-0.12	13.61
88.0	15681	-27	7935	436.4	-4.7	384.8	7.11	-0.10	13.97
89.0	16121	-32	8327	443.5	-4.8	399.0	7.11	-0.09	14.30
90.0	16568	-37	8733	450.7	-4.9	413.4	7.12	-0.08	14.61
91.0	17022	-42	9154	457.8	-4.9	428.2	7.15	-0.05	14.92
92.0	17483	-47	9589	465.0	-5.0	443.3	7.19	-0.02	15.22

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	17952	-52	10040	472.2	-5.0	458.6	7.22	-0.00	15.50
94.0	18428	-57	10507	479.4	-5.0	474.3	7.25	0.03	15.81
95.0	18911	-62	10989	486.7	-4.9	490.2	7.28	0.05	16.11
96.0	19401	-67	11487	494.0	-4.9	506.5	7.30	0.07	16.42
97.0	19899	-71	12002	501.3	-4.8	523.1	7.32	0.08	16.74
98.0	20404	-76	12534	508.6	-4.7	540.0	7.33	0.08	17.07
99.0	20916	-81	13082	515.9	-4.6	557.2	7.35	0.08	17.40
100.0	21436	-85	13648	523.3	-4.6	574.8	7.36	0.07	17.74
101.0	21962	-90	14232	530.7	-4.5	592.7	7.37	0.08	18.07
102.0	22497	-94	14834	538.0	-4.4	610.9	7.37	0.10	18.40
103.0	23039	-99	15454	545.4	-4.3	629.5	7.38	0.11	18.73
104.0	23588	-103	16093	552.8	-4.2	648.4	7.39	0.13	19.06
105.0	24144	-107	16751	560.2	-4.0	667.6	7.40	0.14	19.38
106.0	24708	-111	17428	567.6	-3.9	687.2	7.42	0.15	19.70
107.0	25279	-115	18125	575.0	-3.7	707.0	7.45	0.14	20.02
108.0	25858	-118	18842	582.5	-3.6	727.2	7.48	0.12	20.34
109.0	26444	-122	19580	590.0	-3.5	747.7	7.50	0.10	20.66
110.0	27038	-125	20338	597.5	-3.4	768.5	7.53	0.08	20.99
111.0	27639	-129	21117	605.0	-3.3	789.7	7.56	0.06	21.33
112.0	28248	-132	21917	612.6	-3.3	811.2	7.58	0.06	21.67
113.0	28864	-135	22739	620.2	-3.2	833.0	7.60	0.07	22.02
114.0	29488	-139	23583	627.8	-3.1	855.2	7.62	0.09	22.37
115.0	30120	-142	24450	635.4	-3.0	877.7	7.65	0.12	22.72
116.0	30759	-145	25339	643.1	-2.9	900.6	7.68	0.14	23.07
117.0	31406	-147	26251	650.8	-2.7	923.9	7.70	0.16	23.42
118.0	32061	-150	27187	658.5	-2.6	947.5	7.71	0.16	23.78
119.0	32723	-153	28146	666.2	-2.4	971.5	7.70	0.15	24.17
120.0	33393	-155	29130	673.9	-2.3	995.9	7.69	0.13	24.58
121.0	34071	-157	30138	681.6	-2.2	1020.7	7.66	0.11	25.01
122.0	34756	-159	31172	689.2	-2.1	1045.9	7.64	0.10	25.44
123.0	35449	-161	32230	696.9	-2.0	1071.5	7.63	0.09	25.87
124.0	36150	-163	33315	704.5	-1.9	1097.6	7.64	0.09	26.29
125.0	36858	-165	34426	712.2	-1.8	1124.1	7.67	0.10	26.69
126.0	37574	-167	35563	719.9	-1.7	1151.0	7.73	0.10	27.09
127.0	38298	-168	36728	727.6	-1.6	1178.2	7.80	0.10	27.47
128.0	39030	-170	37920	735.5	-1.5	1205.9	7.87	0.09	27.85
129.0	39769	-171	39140	743.0	-1.4	1233.9	7.95	0.05	28.28
130.0	40516	-173	40388	751.0	-1.3	1262.4	8.03	0.09	28.71
131.0	41272	-174	41665	759.1	-1.3	1291.4	8.11	0.01	29.15
132.0	42035	-175	42970	767.2	-1.2	1320.7	8.19	0.04	29.58
133.0	42807	-176	44306	775.4	-1.2	1350.5	8.26	0.01	30.01
134.0	43587	-178	45671	783.7	-1.2	1380.7	8.34	0.00	30.44
135.0	44375	-179	47067	792.1	-1.2	1411.4	8.41	-0.01	30.87

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
135.240	44566	-179	47408	794.1	-1.2	1418.8	8.43	-0.01	30.98
136.0	45170	-180	48492	798.9	-1.2	1439.6	4.73	-0.01	24.61
137.0	45971	-181	49942	803.6	-1.2	1464.3	4.76	0.01	24.90
138.0	46779	-182	51421	808.4	-1.2	1489.4	4.79	0.06	25.19
139.0	47590	-184	52923	813.2	-1.1	1514.7	4.82	0.06	25.49
140.0	48405	-185	54450	818.1	-1.0	1540.3	4.86	0.10	25.82
141.0	49226	-186	56003	822.9	-0.9	1566.3	4.89	0.17	26.16
142.0	50051	-186	57583	827.8	-0.7	1592.7	4.92	0.19	26.50
143.0	50881	-187	59189	832.8	-0.5	1619.3	4.96	0.19	26.84
144.0	51717	-187	60822	837.8	-0.4	1646.6	5.00	0.19	27.20
145.0	52557	-188	62482	842.8	-0.2	1674.0	5.04	0.18	27.58
146.0	53403	-188	64170	847.8	-0.0	1701.7	5.08	0.17	27.99
147.0	54253	-188	65886	852.9	0.2	1729.9	5.13	0.16	28.34
148.0	55109	-187	67630	858.2	0.3	1758.4	5.16	0.15	28.71
149.0	55970	-187	69403	863.4	0.5	1787.3	5.21	0.14	29.10
150.0	56836	-187	71205	868.6	0.6	1816.6	5.26	0.14	29.49
151.0	57707	-186	73036	873.9	0.8	1846.3	5.30	0.15	29.93
152.0	58583	-185	74898	879.2	0.9	1876.4	5.35	0.16	30.34
153.0	59465	-184	76789	884.6	1.1	1907.0	5.39	0.17	30.75
154.0	60353	-183	78712	890.0	1.3	1937.9	5.44	0.17	31.16
155.0	61245	-182	80665	895.2	1.4	1969.3	5.50	0.19	31.64
156.0	62144	-180	82651	900.7	1.6	2001.2	5.56	0.20	32.12
157.0	63047	-178	84668	906.3	1.8	2033.6	5.62	0.20	32.60
158.0	63957	-176	86717	912.0	2.0	2066.4	5.68	0.16	33.09
159.0	64872	-174	88800	917.7	2.1	2099.7	5.74	0.17	33.57
160.0	65793	-172	90917	923.5	2.4	2133.5	5.80	0.26	34.06
161.0	66720	-170	93067	929.3	2.5	2167.8	5.86	0.10	34.54
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.740	67409	-168	94680	933.6	2.6	2193.5	5.90	0.13	34.90
162.0	67651	-167	95250	934.5	2.7	2201.6	-0.14	0.14	20.34
S-IC/S-II SEPARATION COMMAND									
162.400	68026	-166	96134	932.4	2.7	2203.6	-8.28	0.15	0.36
164.0	69507	-161	99661	918.2	2.9	2204.2	-8.99	0.12	0.36
166.0	71333	-155	104088	901.4	3.2	2207.1	-7.19	0.10	3.90
168.0	73120	-149	108508	887.6	3.4	2217.1	-6.75	0.11	5.36
170.0	74882	-142	112956	874.3	3.7	2229.5	-6.17	0.15	6.64

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
172.0	76619	-134	117429	862.2	4.0	2242.9	-6.12	0.16	6.80
174.0	78331	-126	121929	849.9	4.3	2256.9	-6.08	0.15	6.85
176.0	80019	-117	126457	837.8	4.6	2270.6	-6.03	0.15	6.94
178.0	81682	-108	131012	825.7	4.9	2284.5	-6.02	0.16	6.94
180.0	83322	-97	135595	813.7	5.2	2298.4	-6.00	0.16	6.98
182.0	84937	-87	140205	801.7	5.5	2312.4	-5.98	0.16	7.02
184.0	86529	-75	144844	789.8	5.9	2326.5	-5.95	0.16	7.05
186.0	88096	-63	149511	777.9	6.2	2340.6	-5.93	0.17	7.07
188.0	89640	-51	154207	766.1	6.5	2354.8	-5.90	0.17	7.10
190.0	91161	-37	158930	754.3	6.9	2369.0	-5.87	0.17	7.14
192.0	92658	-23	163683	742.6	7.2	2383.3	-5.84	0.17	7.18
194.0	94131	-8	168464	730.9	7.6	2397.7	-5.82	0.18	7.21
196.0	95581	7	173274	719.3	7.9	2412.2	-5.81	0.19	7.24
198.0	97008	23	178113	707.7	8.3	2426.7	-5.77	0.18	7.27
200.0	98412	40	182980	696.2	8.6	2441.3	-5.76	0.18	7.31
202.0	99793	58	187878	684.7	9.0	2455.9	-5.74	0.19	7.36
204.0	101151	76	192804	673.3	9.4	2470.7	-5.69	0.20	7.39
206.0	102487	96	197760	662.0	9.8	2485.5	-5.59	0.20	7.39
208.0	103799	116	202746	650.9	10.2	2500.3	-5.47	0.20	7.38
210.0	105090	136	207761	640.1	10.6	2515.0	-5.40	0.21	7.39
212.0	106360	158	212806	629.3	11.0	2529.8	-5.39	0.22	7.43
214.0	107608	181	217881	618.5	11.5	2544.7	-5.41	0.22	7.47
216.0	108834	204	222985	607.7	11.9	2559.7	-5.42	0.23	7.51
218.0	110038	228	228120	596.8	12.4	2574.8	-5.42	0.23	7.55
220.0	111221	253	233284	586.0	12.8	2589.9	-5.41	0.23	7.59
222.0	112382	279	238479	575.2	13.3	2605.2	-5.41	0.23	7.64
224.0	113522	307	243705	564.3	13.8	2620.5	-5.43	0.24	7.67
226.0	114640	335	248961	553.5	14.2	2635.8	-5.44	0.24	7.71
228.0	115736	363	254248	542.6	14.7	2651.3	-5.45	0.25	7.74
230.0	116810	393	259567	531.7	15.2	2666.8	-5.44	0.25	7.79
232.0	117862	424	264916	520.8	15.7	2682.4	-5.44	0.25	7.83
234.0	118893	456	270296	510.0	16.2	2698.1	-5.44	0.25	7.87
236.0	119902	489	275708	499.1	16.7	2713.9	-5.44	0.26	7.91
238.0	120890	523	281152	488.2	17.3	2729.8	-5.44	0.27	7.95
240.0	121855	558	286628	477.3	17.8	2745.7	-5.44	0.27	7.99
242.0	122799	595	292135	466.4	18.3	2761.7	-5.43	0.27	8.03
244.0	123721	632	297675	455.6	18.9	2777.8	-5.43	0.27	8.07
246.0	124621	670	303246	444.7	19.4	2794.0	-5.44	0.27	8.12
248.0	125500	709	308851	433.8	20.0	2810.3	-5.45	0.27	8.16
250.0	126356	750	314488	422.9	20.5	2826.7	-5.45	0.27	8.20
252.0	127191	791	320157	412.0	21.0	2843.1	-5.45	0.27	8.24
254.0	128004	834	325860	401.1	21.6	2859.6	-5.45	0.28	8.28
256.0	128796	878	331596	390.2	22.1	2876.2	-5.45	0.29	8.33

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
258.0	129565	923	337365	379.3	22.7	2893.0	-5.46	0.29	8.38
260.0	130313	969	343168	368.4	23.3	2909.8	-5.46	0.28	8.42
262.0	131039	1016	349004	357.4	23.9	2926.6	-5.46	0.28	8.46
264.0	131743	1064	354875	346.5	24.4	2943.6	-5.47	0.28	8.51
266.0	132425	1113	360779	335.6	25.0	2960.7	-5.47	0.29	8.56
268.0	133085	1164	366717	324.6	25.6	2977.8	-5.48	0.30	8.62
270.0	133723	1216	372690	313.6	26.2	2995.1	-5.48	0.30	8.67
272.0	134340	1269	378698	302.7	26.8	3012.5	-5.49	0.30	8.71
274.0	134934	1323	384740	291.7	27.4	3030.0	-5.48	0.29	8.75
276.0	135506	1378	390818	280.8	28.0	3047.5	-5.47	0.30	8.80
278.0	136057	1435	396931	269.8	28.6	3065.2	-5.48	0.31	8.85
280.0	136586	1492	403079	258.8	29.2	3082.9	-5.52	0.32	8.90
282.0	137092	1551	409262	247.7	29.8	3100.8	-5.56	0.32	8.94
284.0	137576	1612	415482	236.6	30.5	3118.7	-5.56	0.32	8.99
286.0	138039	1673	421737	225.5	31.1	3136.7	-5.54	0.32	9.05
288.0	138479	1736	428029	214.5	31.8	3154.9	-5.53	0.32	9.10
290.0	138896	1800	434357	203.4	32.4	3173.1	-5.54	0.33	9.14
292.0	139292	1866	440721	192.3	33.1	3191.4	-5.55	0.33	9.18
294.0	139666	1932	447123	181.2	33.7	3209.9	-5.56	0.32	9.24
296.0	140017	2001	453561	170.1	34.4	3228.4	-5.57	0.32	9.29
298.0	140346	2070	460036	158.9	35.0	3247.0	-5.58	0.33	9.34
300.0	140652	2141	466549	147.7	35.7	3265.8	-5.59	0.34	9.39
302.0	140937	2213	473099	136.5	36.4	3284.6	-5.60	0.35	9.44
304.0	141199	2286	479688	125.3	37.1	3303.5	-5.60	0.35	9.50
306.0	141438	2361	486314	114.1	37.8	3322.6	-5.60	0.35	9.56
308.0	141655	2437	492978	102.9	38.5	3341.8	-5.60	0.35	9.61
310.0	141850	2515	499681	91.7	39.2	3361.0	-5.61	0.35	9.66
312.0	142022	2594	506422	80.5	39.9	3380.4	-5.63	0.35	9.72
314.0	142172	2675	513202	69.2	40.6	3399.9	-5.64	0.36	9.77
316.0	142299	2756	520022	57.9	41.3	3419.5	-5.65	0.37	9.83
318.0	142403	2840	526881	46.6	42.1	3439.2	-5.65	0.38	9.89
320.0	142485	2925	533779	35.3	42.8	3459.1	-5.66	0.37	9.96
322.0	142545	3011	540717	24.0	43.6	3479.1	-5.68	0.37	10.02
324.0	142581	3099	547695	12.6	44.3	3499.1	-5.70	0.38	10.07
326.0	142595	3189	554714	1.2	45.1	3519.4	-5.71	0.38	10.13
328.0	142586	3279	561773	-10.2	45.9	3539.7	-5.70	0.39	10.19
330.0	142554	3372	568872	-21.6	46.6	3560.1	-5.69	0.39	10.25
332.0	142499	3466	576013	-33.1	47.4	3580.7	-5.72	0.40	10.32
334.0	142422	3562	583195	-44.6	48.2	3601.4	-5.79	0.41	10.38
336.0	142321	3659	590419	-56.2	49.0	3622.2	-5.82	0.41	10.45
338.0	142197	3758	597684	-67.8	49.9	3643.2	-5.81	0.41	10.52
340.0	142050	3858	604992	-79.4	50.7	3664.3	-5.78	0.41	10.58
342.0	141880	3961	612342	-91.0	51.5	3685.5	-5.80	0.41	10.65

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
344.0	141686	4064	619734	-102.6	52.3	3706.9	-5.83	0.42	10.71
346.0	141469	4170	627169	-114.3	53.2	3728.4	-5.85	0.42	10.78
348.0	141229	4277	634648	-126.0	54.0	3750.0	-5.87	0.42	10.86
350.0	140965	4386	642169	-137.8	54.9	3771.8	-5.89	0.43	10.92
352.0	140678	4496	649735	-149.6	55.7	3793.7	-5.91	0.43	10.99
354.0	140367	4609	657344	-161.4	56.6	3815.8	-5.91	0.43	11.05
356.0	140032	4723	664998	-173.2	57.4	3837.9	-5.92	0.44	11.12
358.0	139674	4839	672696	-185.1	58.3	3860.2	-5.94	0.45	11.19
360.0	139292	4956	680439	-197.0	59.2	3882.7	-5.97	0.46	11.27
362.0	138886	5076	688227	-208.9	60.2	3905.3	-6.00	0.46	11.35
364.0	138456	5197	696061	-221.0	61.1	3928.1	-6.02	0.46	11.42
366.0	138002	5320	703940	-233.0	62.0	3951.0	-6.02	0.46	11.48
368.0	137524	5445	711865	-245.1	62.9	3974.0	-6.04	0.46	11.55
370.0	137022	5571	719836	-257.2	63.8	3997.2	-6.07	0.47	11.64
372.0	136495	5700	727854	-269.3	64.8	4020.6	-6.09	0.47	11.73
374.0	135945	5831	735918	-281.5	65.7	4044.1	-6.10	0.48	11.80
376.0	135369	5963	744030	-293.7	66.7	4067.8	-6.12	0.48	11.87
378.0	134770	6097	752190	-306.0	67.6	4091.6	-6.15	0.47	11.95
380.0	134145	6233	760397	-318.3	68.6	4115.6	-6.18	0.48	12.04
382.0	133496	6372	768652	-330.7	69.5	4139.7	-6.20	0.49	12.13
384.0	132822	6512	776956	-343.1	70.5	4164.1	-6.23	0.49	12.22
386.0	132124	6654	785308	-355.6	71.5	4188.6	-6.26	0.49	12.30
388.0	131400	6798	793710	-368.1	72.5	4213.3	-6.26	0.50	12.37
390.0	130651	6944	802162	-380.6	73.5	4238.1	-6.26	0.51	12.45
392.0	129877	7092	810663	-393.2	74.6	4263.1	-6.29	0.53	12.55
394.0	129078	7242	819214	-405.9	75.6	4288.3	-6.37	0.53	12.65
396.0	128254	7394	827816	-418.6	76.7	4313.7	-6.42	0.51	12.72
398.0	127404	7548	836469	-431.5	77.7	4339.2	-6.44	0.51	12.81
400.0	126528	7705	845173	-444.4	78.7	4364.9	-6.44	0.52	12.90
402.0	125626	7863	853929	-457.3	79.8	4390.8	-6.47	0.53	13.00
404.0	124698	8024	862737	-470.3	80.8	4416.9	-6.50	0.54	13.09
406.0	123745	8187	871597	-483.3	81.9	4443.2	-6.53	0.54	13.19
408.0	122765	8351	880510	-496.4	83.0	4469.7	-6.56	0.54	13.29
410.0	121759	8519	889475	-509.6	84.1	4496.3	-6.59	0.55	13.39
412.0	120727	8688	898495	-522.8	85.2	4523.2	-6.61	0.55	13.48
414.0	119668	8859	907568	-536.0	86.3	4550.3	-6.63	0.56	13.58
416.0	118583	9033	916696	-549.3	87.4	4577.5	-6.67	0.57	13.69
418.0	117471	9209	925879	-562.7	88.6	4605.0	-6.73	0.58	13.80
420.0	116332	9387	935117	-576.2	89.7	4632.7	-6.78	0.59	13.90
422.0	115166	9568	944410	-589.8	90.9	4660.6	-6.80	0.59	14.00
424.0	113973	9751	953759	-603.4	92.1	4688.7	-6.82	0.59	14.10
426.0	112752	9936	963165	-617.1	93.3	4717.1	-6.87	0.59	14.22
428.0	111505	10124	972628	-630.8	94.5	4745.6	-6.90	0.60	14.33

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XF 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
430.0	110229	10314	982148	-644.7	95.7	4774.4	-6.93	0.61	14.44
432.0	108926	10507	991725	-658.6	96.9	4803.4	-6.98	0.62	14.56
434.0	107595	10702	1001361	-672.6	98.1	4832.6	-7.02	0.63	14.69
436.0	106235	10899	1011056	-686.7	99.4	4862.1	-7.06	0.63	14.79
438.0	104848	11099	1020810	-700.8	100.7	4891.8	-7.11	0.63	14.88
440.0	103433	11302	1030623	-715.1	101.9	4921.7	-7.15	0.63	14.99
442.0	101992	11507	1040497	-729.4	103.2	4951.8	-7.19	0.64	15.14
444.0	100521	11715	1050430	-743.8	104.5	4982.2	-7.23	0.66	15.31
446.0	99020	11925	1060426	-758.4	105.8	5013.0	-7.28	0.67	15.45
448.0	97487	12138	1070483	-773.0	107.1	5044.0	-7.32	0.67	15.55
450.0	95924	12354	1080602	-787.6	108.5	5075.2	-7.36	0.67	15.64
452.0	94333	12572	1090783	-802.4	109.8	5106.6	-7.41	0.68	15.77
454.0	92714	12793	1101028	-817.3	111.2	5138.2	-7.45	0.69	15.92
456.0	91065	13017	1111337	-832.2	112.6	5170.2	-7.49	0.69	16.06
458.0	89386	13243	1121710	-847.2	114.0	5202.4	-7.53	0.70	16.21
460.0	87676	13473	1132147	-862.3	115.4	5235.0	-7.58	0.71	16.35
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
460.750	87027	13559	1136079	-867.9	115.9	5247.3	-7.72	0.64	16.40
462.0	85937	13705	1142648	-877.7	116.7	5264.3	-7.82	0.62	12.92
464.0	84166	13939	1153201	-893.4	117.8	5290.2	-7.85	0.55	12.99
466.0	82363	14176	1163808	-909.1	118.9	5316.2	-7.85	0.56	13.05
468.0	80529	14415	1174466	-924.7	120.1	5342.4	-7.74	0.58	13.13
470.0	78664	14656	1185177	-939.6	121.3	5368.7	-7.27	0.59	13.21
472.0	76768	14900	1195940	-954.0	122.4	5395.2	-7.18	0.59	13.29
474.0	74841	15146	1206757	-968.4	123.6	5421.9	-7.15	0.59	13.36
476.0	72884	15395	1217627	-982.6	124.8	5448.7	-7.13	0.60	13.43
478.0	70898	15646	1228551	-996.9	126.0	5475.4	-7.14	0.60	13.51
480.0	68885	15899	1239529	-1011.2	127.2	5502.6	-7.17	0.60	13.60
482.0	66847	16154	1250562	-1025.6	128.4	5529.9	-7.20	0.60	13.71
484.0	64782	16412	1261649	-1040.0	129.6	5557.4	-7.24	0.62	13.82
486.0	62690	16673	1272792	-1054.6	130.9	5585.1	-7.30	0.64	13.93
488.0	60570	16936	1283991	-1069.2	132.2	5613.1	-7.37	0.65	14.04
490.0	58423	17202	1295245	-1084.1	133.5	5641.0	-7.47	0.66	13.54
492.0	56246	17470	1306551	-1099.1	134.8	5665.4	-7.61	0.66	11.12
494.0	54037	17741	1317903	-1114.5	136.1	5687.0	-7.77	0.66	10.62
496.0	51795	18015	1329298	-1130.1	137.5	5708.2	-7.88	0.66	10.61
498.0	49519	18291	1340736	-1146.0	138.8	5729.4	-7.96	0.67	10.65
500.0	47211	18570	1352216	-1162.0	140.1	5750.8	-8.02	0.68	10.70
502.0	44871	18851	1363739	-1178.0	141.5	5772.2	-8.05	0.69	10.76
504.0	42498	19136	1375305	-1194.2	142.9	5793.8	-8.06	0.69	10.81
506.0	40094	19423	1386914	-1210.3	144.2	5815.5	-8.06	0.68	10.86

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
508.0	37657	19713	1398567	-1226.4	145.6	5837.2	-8.03	0.67	10.91
510.0	35188	20005	1410263	-1242.4	146.9	5859.1	-8.03	0.67	10.96
512.0	32687	20300	1422003	-1258.6	148.3	5881.1	-8.09	0.68	11.03
514.0	30154	20598	1433788	-1274.8	149.7	5903.2	-8.18	0.69	11.10
516.0	27588	20899	1445616	-1291.3	151.1	5925.5	-8.28	0.71	11.15
518.0	24989	21203	1457490	-1307.9	152.5	5947.8	-8.34	0.73	11.20
520.0	22356	21509	1469408	-1324.6	153.9	5970.3	-8.37	0.73	11.26
522.0	19690	21818	1481371	-1341.4	155.4	5992.9	-8.43	0.73	11.34
524.0	16990	22131	1493379	-1358.4	156.9	6015.6	-8.50	0.74	11.41
526.0	14257	22446	1505434	-1375.4	158.4	6038.5	-8.55	0.75	11.47
528.0	11489	22764	1517534	-1392.6	159.9	6061.5	-8.60	0.75	11.53
530.0	8686	23085	1529680	-1409.8	161.4	6084.6	-8.66	0.76	11.59
532.0	5849	23410	1541872	-1427.2	162.9	6107.9	-8.73	0.76	11.67
534.0	2977	23737	1554111	-1444.7	164.4	6131.3	-8.79	0.76	11.74
536.0	70	24067	1566397	-1462.4	165.9	6154.9	-8.83	0.76	11.81
538.0	-2872	24401	1578731	-1480.1	167.5	6178.5	-8.88	0.77	11.87
540.0	-5850	24737	1591112	-1497.9	169.0	6202.3	-8.93	0.78	11.93
542.0	-8864	25077	1603540	-1515.8	170.6	6226.3	-8.98	0.78	12.00
544.0	-11913	25420	1616017	-1533.8	172.1	6250.4	-9.03	0.78	12.07
546.0	-14999	25765	1628542	-1551.9	173.7	6274.6	-9.07	0.79	12.16
548.0	-18121	26114	1641115	-1570.1	175.3	6299.0	-9.12	0.80	12.26
550.0	-21279	26467	1653738	-1588.4	176.9	6323.6	-9.17	0.80	12.36
552.0	-24475	26822	1666415	-1606.8	178.5	6348.4	-9.22	0.78	12.45
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
552.340	-25022	26883	1668575	-1609.9	178.8	6352.6	-9.23	0.69	12.46
S-II/S-IVB SEPARATION COMMAND									
553.200	-26409	27037	1674038	-1617.2	179.3	6353.6	-8.16	0.52	-1.99
554.0	-27705	27181	1679124	-1623.7	179.7	6352.0	-8.16	0.48	-1.98
556.0	-30969	27541	1691818	-1640.0	180.6	6348.0	-8.16	0.48	-1.96
558.0	-34265	27903	1704513	-1656.4	181.6	6345.4	-8.33	0.54	1.20
560.0	-37595	28267	1717209	-1673.4	182.8	6350.6	-8.50	0.59	3.04
562.0	-40959	28634	1729916	-1690.4	183.9	6356.8	-8.47	0.59	3.15
564.0	-44357	29003	1742637	-1707.4	185.1	6363.2	-8.60	0.56	3.20
566.0	-47789	29374	1755370	-1725.0	186.2	6369.5	-8.83	0.54	3.20
568.0	-51257	29748	1768115	-1742.7	187.3	6376.2	-8.95	0.54	3.24
570.0	-54760	30123	1780874	-1760.6	188.4	6382.7	-8.96	0.56	3.29
572.0	-58299	30501	1793646	-1778.5	189.5	6389.3	-8.94	0.58	3.31
574.0	-61874	30881	1806432	-1796.4	190.7	6395.9	-8.95	0.59	3.31
576.0	-65485	31264	1819230	-1814.4	191.9	6402.5	-9.00	0.61	3.30

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
578.0	-69132	31649	1832042	-1832.4	193.1	6409.1	-9.04	0.62	3.29
580.0	-72815	32036	1844867	-1850.5	194.3	6415.7	-9.08	0.63	3.27
582.0	-76534	32426	1857704	-1868.7	195.6	6422.2	-9.11	0.63	3.25
584.0	-80290	32819	1870555	-1887.0	196.9	6428.7	-9.13	0.65	3.25
586.0	-84082	33214	1883419	-1905.3	198.2	6435.2	-9.15	0.66	3.25
588.0	-87911	33611	1896296	-1923.6	199.5	6441.7	-9.15	0.66	3.25
590.0	-91776	34012	1909186	-1941.9	200.8	6448.2	-9.15	0.66	3.25
592.0	-95678	34414	1922089	-1960.2	202.1	6454.7	-9.15	0.67	3.24
594.0	-99617	34820	1935005	-1978.5	203.5	6461.2	-9.17	0.67	3.24
596.0	-103592	35228	1947934	-1996.8	204.8	6467.7	-9.19	0.68	3.25
598.0	-107604	35639	1960876	-2015.2	206.2	6474.2	-9.20	0.68	3.26
600.0	-111653	36053	1973830	-2033.6	207.6	6480.7	-9.22	0.67	3.25
602.0	-115739	36470	1986798	-2052.1	208.9	6487.2	-9.22	0.68	3.24
604.0	-119861	36889	1999779	-2070.5	210.3	6493.6	-9.23	0.68	3.23
606.0	-124021	37311	2012773	-2089.0	211.6	6500.1	-9.25	0.69	3.22
608.0	-128218	37735	2025780	-2107.5	213.0	6506.6	-9.26	0.69	3.22
610.0	-132451	38163	2038799	-2126.1	214.4	6513.0	-9.27	0.69	3.22
612.0	-136722	38593	2051832	-2144.6	215.8	6519.4	-9.29	0.69	3.21
614.0	-141030	39026	2064877	-2163.2	217.2	6525.9	-9.29	0.69	3.21
616.0	-145375	39462	2077935	-2181.8	218.5	6532.3	-9.30	0.68	3.20
618.0	-149757	39900	2091006	-2200.4	219.9	6538.7	-9.30	0.68	3.20
620.0	-154176	40341	2104090	-2219.0	221.3	6545.1	-9.32	0.69	3.20
622.0	-158633	40785	2117186	-2237.7	222.6	6551.5	-9.33	0.69	3.20
624.0	-163127	41232	2130295	-2256.3	224.0	6557.9	-9.34	0.69	3.20
626.0	-167658	41681	2143418	-2275.0	225.4	6564.3	-9.35	0.70	3.21
628.0	-172227	42133	2156553	-2293.7	226.8	6570.7	-9.36	0.70	3.22
630.0	-176833	42588	2169700	-2312.4	228.2	6577.1	-9.37	0.70	3.22
632.0	-181477	43046	2182861	-2331.2	229.6	6583.6	-9.39	0.70	3.21
634.0	-186158	43507	2196035	-2350.0	231.0	6590.0	-9.41	0.69	3.20
636.0	-190877	43970	2209221	-2368.8	232.4	6596.4	-9.42	0.69	3.19
638.0	-195633	44436	2222420	-2387.7	233.8	6602.7	-9.43	0.69	3.19
640.0	-200427	44905	2235632	-2406.5	235.1	6609.1	-9.43	0.69	3.19
642.0	-205259	45377	2248857	-2425.4	236.5	6615.5	-9.43	0.69	3.19
644.0	-210129	45851	2262094	-2444.2	237.9	6621.8	-9.43	0.69	3.18
646.0	-215036	46329	2275344	-2463.1	239.3	6628.2	-9.44	0.69	3.18
648.0	-219981	46809	2288607	-2482.0	240.7	6634.6	-9.44	0.69	3.19
650.0	-224964	47291	2301882	-2500.9	242.0	6641.0	-9.45	0.68	3.18
652.0	-229985	47777	2315171	-2519.8	243.4	6647.3	-9.46	0.68	3.18
654.0	-235043	48265	2328472	-2538.7	244.8	6653.7	-9.47	0.68	3.18
656.0	-240140	48756	2341785	-2557.7	246.1	6660.0	-9.48	0.68	3.18
658.0	-245274	49249	2355112	-2576.6	247.5	6666.4	-9.48	0.68	3.18
660.0	-250446	49746	2368451	-2595.6	248.9	6672.8	-9.48	0.69	3.18
662.0	-255656	50245	2381803	-2614.6	250.2	6679.1	-9.50	0.68	3.18

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
664.0	-260905	50747	2395167	-2633.6	251.6	6685.5	-9.54	0.68	3.17
666.0	-266191	51251	2408545	-2652.7	253.0	6691.8	-9.58	0.67	3.16
668.0	-271515	51758	2421935	-2671.9	254.3	6698.1	-9.59	0.67	3.15
670.0	-276878	52268	2435337	-2691.1	255.6	6704.4	-9.58	0.67	3.16
672.0	-282280	52781	2448752	-2710.2	257.0	6710.8	-9.56	0.68	3.16
674.0	-287719	53296	2462180	-2729.3	258.4	6717.1	-9.57	0.69	3.17
676.0	-293197	53814	2475621	-2748.5	259.7	6723.4	-9.58	0.70	3.17
678.0	-298713	54335	2489074	-2767.6	261.1	6729.8	-9.57	0.69	3.17
680.0	-304268	54859	2502540	-2786.8	262.5	6736.1	-9.55	0.68	3.18
682.0	-309860	55385	2516018	-2805.9	263.9	6742.5	-9.55	0.68	3.18
684.0	-315491	55914	2529510	-2824.9	265.2	6748.8	-9.54	0.69	3.19
686.0	-321160	56446	2543014	-2844.0	266.6	6755.2	-9.54	0.69	3.20
688.0	-326867	56981	2556531	-2863.1	268.0	6761.6	-9.54	0.70	3.20
690.0	-332613	57518	2570060	-2882.2	269.4	6768.0	-9.54	0.70	3.20
692.0	-338396	58058	2583603	-2901.3	270.7	6774.4	-9.54	0.69	3.20
S-IVB 1ST GUIDANCE CUTOFF									
693.910	-343955	58577	2596548	-2919.5	272.1	6780.5	-9.53	0.64	3.20
694.0	-344218	58601	2597158	-2920.3	272.1	6780.8	-9.53	0.62	3.20
696.0	-350073	59147	2610713	-2936.1	273.2	6775.0	-7.64	0.52	-3.31
698.0	-355961	59694	2624258	-2951.2	274.2	6768.5	-7.63	0.51	-3.34
700.0	-361878	60243	2637788	-2966.4	275.2	6761.8	-7.62	0.51	-3.36
702.0	-367826	60795	2651305	-2981.6	276.3	6755.1	-7.62	0.51	-3.38
PARKING ORBIT INSERTION									
703.910	-373537	61323	2664200	-2996.2	277.2	6748.7	-7.61	0.51	-3.40

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
GUIDANCE REFERENCE RELEASE									
-16.968	6373.330	17.084	-5.541	0.0	126.1	388.7	-0.02	-0.01	0.00
-16.0	6373.330	17.206	-5.165	-0.0	126.1	388.7	-0.02	-0.01	0.00
-15.0	6373.330	17.332	-4.776	-0.1	126.1	388.7	-0.02	-0.01	0.00
-14.0	6373.330	17.458	-4.388	-0.1	126.0	388.7	-0.02	-0.01	0.00
-13.0	6373.330	17.584	-3.999	-0.1	126.0	388.7	-0.02	-0.01	0.00
-12.0	6373.330	17.710	-3.610	-0.1	126.0	388.7	-0.02	-0.01	0.00
-11.0	6373.329	17.836	-3.221	-0.2	126.0	388.7	-0.02	-0.01	0.00
-10.0	6373.329	17.962	-2.833	-0.2	126.0	388.7	-0.02	-0.01	0.00
-9.0	6373.329	18.088	-2.444	-0.2	126.0	388.7	-0.02	-0.01	0.00
-8.0	6373.329	18.214	-2.055	-0.2	126.0	388.7	-0.02	-0.01	0.00
-7.0	6373.329	18.340	-1.667	-0.3	125.9	388.7	-0.02	-0.01	0.00
-6.0	6373.328	18.466	-1.278	-0.3	125.9	388.7	-0.02	-0.01	0.00
-5.0	6373.328	18.592	-0.889	-0.3	125.9	388.8	-0.02	-0.01	0.00
-4.0	6373.328	18.718	-0.500	-0.3	125.9	388.8	-0.02	-0.01	0.00
-3.0	6373.327	18.844	-0.112	-0.4	125.9	388.8	-0.02	-0.01	0.00
-2.0	6373.327	18.969	0.277	-0.4	125.9	388.8	-0.02	-0.01	0.00
-1.0	6373.327	19.095	0.666	-0.4	125.9	388.8	-0.02	-0.01	0.00
0.0	6373.326	19.221	1.055	-0.4	125.8	388.8	-0.02	-0.01	0.00
ALL HOLDDOWN ARMS RELEASED									
0.300	6373.326	19.259	1.171	-0.4	125.8	388.8	0.92	0.01	-0.00
START OF TIME BASE 1									
0.700	6373.326	19.309	1.327	0.0	125.9	388.8	1.55	0.02	0.01
1.0	6373.326	19.347	1.444	0.6	125.9	388.8	2.17	0.03	0.01
2.0	6373.328	19.473	1.832	2.8	125.9	388.8	2.27	0.05	0.02
3.0	6373.332	19.599	2.221	5.1	126.0	388.8	2.35	0.10	0.03
4.0	6373.338	19.725	2.610	7.5	126.1	388.9	2.43	0.21	0.04
5.0	6373.347	19.851	2.999	10.0	126.4	388.9	2.50	0.30	0.03
6.0	6373.358	19.978	3.388	12.5	126.7	388.9	2.55	0.34	0.03
7.0	6373.372	20.105	3.777	15.1	127.0	389.0	2.59	0.36	0.02
8.0	6373.388	20.232	4.166	17.7	127.4	389.0	2.64	0.35	0.01
9.0	6373.407	20.359	4.555	20.3	127.7	389.0	2.68	0.31	-0.01
10.0	6373.429	20.487	4.944	23.0	128.0	389.0	2.73	0.29	-0.02
11.0	6373.453	20.615	5.333	25.8	128.3	388.9	2.77	0.25	-0.04
12.0	6373.480	20.744	5.722	28.6	128.4	388.9	2.80	0.09	-0.05
13.0	6373.510	20.872	6.111	31.4	128.5	388.8	2.83	-0.03	-0.03
14.0	6373.543	21.001	6.499	34.2	128.4	388.8	2.87	-0.09	0.01

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
15.0	6373.579	21.129	6.888	37.1	128.3	388.9	2.93	-0.11	0.05
16.0	6373.617	21.257	7.277	40.1	128.2	388.9	3.01	-0.14	0.09
17.0	6373.659	21.385	7.666	43.1	128.0	389.1	3.09	-0.16	0.13
18.0	6373.704	21.513	8.055	46.3	127.8	389.2	3.17	-0.17	0.19
19.0	6373.751	21.641	8.445	49.5	127.7	389.4	3.25	-0.17	0.24
20.0	6373.803	21.769	8.834	52.7	127.5	389.7	3.34	-0.14	0.30
21.0	6373.857	21.896	9.224	56.1	127.4	390.0	3.41	-0.14	0.37
22.0	6373.915	22.023	9.614	59.6	127.2	390.4	3.48	-0.15	0.45
23.0	6373.976	22.150	10.005	63.1	127.1	390.9	3.56	-0.14	0.52
24.0	6374.041	22.277	10.396	66.7	126.9	391.5	3.64	-0.14	0.60
25.0	6374.109	22.404	10.788	70.3	126.8	392.1	3.71	-0.13	0.67
26.0	6374.182	22.531	11.180	74.1	126.7	392.8	3.79	-0.13	0.76
27.0	6374.258	22.658	11.574	77.9	126.5	393.6	3.86	-0.12	0.85
28.0	6374.338	22.784	11.968	81.8	126.4	394.6	3.93	-0.11	0.96
29.0	6374.421	22.911	12.363	85.8	126.3	395.6	4.00	-0.10	1.07
30.0	6374.509	23.037	12.759	89.8	126.2	396.7	4.08	-0.09	1.19
31.0	6374.601	23.163	13.156	93.9	126.1	398.0	4.15	-0.08	1.31
32.0	6374.697	23.289	13.555	98.1	126.0	399.3	4.23	-0.08	1.44
33.0	6374.797	23.415	13.955	102.4	126.0	400.8	4.31	-0.08	1.57
34.0	6374.902	23.541	14.357	106.7	125.9	402.5	4.39	-0.08	1.71
35.0	6375.010	23.667	14.760	111.1	125.8	404.3	4.46	-0.08	1.85
36.0	6375.124	23.793	15.165	115.6	125.7	406.2	4.52	-0.07	2.00
37.0	6375.242	23.918	15.572	120.2	125.7	408.3	4.59	-0.06	2.14
38.0	6375.364	24.044	15.982	124.8	125.6	410.5	4.66	-0.05	2.29
39.0	6375.491	24.170	16.393	129.5	125.6	412.8	4.73	-0.04	2.45
40.0	6375.623	24.295	16.807	134.2	125.5	415.4	4.80	-0.02	2.62
41.0	6375.760	24.421	17.224	139.1	125.5	418.1	4.88	-0.02	2.79
42.0	6375.901	24.546	17.644	144.0	125.5	421.0	4.96	-0.02	2.97
43.0	6376.048	24.672	18.066	149.0	125.5	424.0	5.03	-0.02	3.15
44.0	6376.199	24.797	18.492	154.0	125.4	427.3	5.10	-0.03	3.33
45.0	6376.356	24.922	18.921	159.2	125.4	430.7	5.17	-0.03	3.50
46.0	6376.518	25.048	19.353	164.4	125.4	434.3	5.24	-0.04	3.67
47.0	6376.685	25.173	19.789	169.7	125.3	438.0	5.31	-0.05	3.84
48.0	6376.857	25.299	20.229	175.0	125.3	441.9	5.39	-0.06	4.01
49.0	6377.035	25.424	20.673	180.4	125.2	446.0	5.46	-0.06	4.18
50.0	6377.218	25.549	21.121	185.9	125.1	450.3	5.53	-0.07	4.35
51.0	6377.407	25.674	21.574	191.5	125.1	454.7	5.60	-0.08	4.53
52.0	6377.601	25.799	22.031	197.1	125.0	459.4	5.67	-0.10	4.71
53.0	6377.801	25.924	22.493	202.8	124.9	464.2	5.75	-0.11	4.91
54.0	6378.007	26.049	22.959	208.6	124.7	469.2	5.81	-0.13	5.12
55.0	6378.218	26.173	23.431	214.4	124.6	474.4	5.89	-0.15	5.33
56.0	6378.435	26.298	23.908	220.3	124.4	479.9	5.95	-0.17	5.54
57.0	6378.659	26.422	24.391	226.3	124.3	485.5	6.00	-0.18	5.74

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
58.0	6378.888	26.546	24.879	232.3	124.1	491.3	6.06	-0.18	5.94
59.0	6379.123	26.670	25.374	238.4	123.9	497.4	6.11	-0.16	6.13
60.0	6379.365	26.794	25.874	244.6	123.8	503.6	6.18	-0.14	6.31
61.0	6379.613	26.918	26.381	250.8	123.6	510.0	6.24	-0.11	6.50
62.0	6379.867	27.042	26.894	257.1	123.5	516.6	6.29	-0.09	6.69
63.0	6380.127	27.165	27.414	263.4	123.4	523.4	6.34	-0.07	6.90
64.0	6380.393	27.288	27.941	269.7	123.4	530.4	6.36	-0.05	7.13
65.0	6380.666	27.412	28.475	276.0	123.3	537.7	6.37	-0.03	7.38
66.0	6380.945	27.535	29.016	282.4	123.3	545.2	6.36	-0.02	7.64
MACH 1									
66.100	6380.974	27.547	29.071	283.0	123.3	545.9	6.36	-0.01	7.66
67.0	6381.231	27.658	29.565	288.8	123.3	552.9	6.36	0.00	7.90
68.0	6381.523	27.782	30.122	295.1	123.3	561.0	6.36	0.01	8.16
69.0	6381.821	27.905	30.688	301.5	123.3	569.3	6.37	0.02	8.43
70.0	6382.126	28.028	31.261	307.9	123.3	577.8	6.41	0.02	8.68
71.0	6382.437	28.152	31.843	314.3	123.3	586.6	6.46	-0.00	8.92
72.0	6382.755	28.275	32.434	320.8	123.3	595.7	6.51	-0.04	9.17
73.0	6383.079	28.398	33.035	327.3	123.2	605.0	6.56	-0.09	9.42
74.0	6383.409	28.522	33.644	333.9	123.1	614.5	6.61	-0.14	9.68
75.0	6383.746	28.645	34.264	340.5	122.9	624.3	6.67	-0.20	9.93
76.0	6384.090	28.767	34.893	347.2	122.7	634.4	6.73	-0.25	10.19
77.0	6384.441	28.890	35.533	354.0	122.5	644.7	6.79	-0.29	10.44
78.0	6384.798	29.012	36.182	360.8	122.2	655.2	6.85	-0.32	10.68
79.0	6385.163	29.134	36.843	367.7	121.8	666.0	6.92	-0.33	10.93
80.0	6385.534	29.256	37.515	374.6	121.5	677.1	6.98	-0.33	11.19
81.0	6385.912	29.377	38.197	381.6	121.2	688.4	7.03	-0.32	11.48
MAXIMUM DYNAMIC PRESSURE									
81.100	6385.950	29.389	38.267	382.3	121.1	689.6	7.03	-0.32	11.51
82.0	6386.297	29.498	38.892	388.7	120.9	700.1	7.06	-0.30	11.80
83.0	6386.689	29.619	39.598	395.7	120.6	712.1	7.07	-0.28	12.16
84.0	6387.088	29.739	40.316	402.8	120.3	724.4	7.06	-0.25	12.54
85.0	6387.495	29.860	41.047	409.8	120.1	737.2	7.03	-0.23	12.93
86.0	6387.908	29.980	41.790	416.8	119.8	750.3	7.00	-0.20	13.33
87.0	6388.328	30.099	42.547	423.8	119.6	763.8	6.96	-0.17	13.71
88.0	6388.756	30.219	43.318	430.7	119.5	777.7	6.95	-0.16	14.07
89.0	6389.190	30.338	44.103	437.7	119.3	791.9	6.94	-0.15	14.40
90.0	6389.631	30.458	44.902	444.6	119.2	806.5	6.96	-0.14	14.72
91.0	6390.079	30.577	45.716	451.6	119.0	821.4	6.98	-0.12	15.02
92.0	6390.534	30.696	46.545	458.6	118.9	836.5	7.01	-0.09	15.32

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
93.0	6390.996	30.815	47.389	465.6	118.9	852.0	7.04	-0.07	15.61
94.0	6391.465	30.933	48.249	472.7	118.8	867.8	7.07	-0.04	15.92
95.0	6391.942	31.052	49.125	479.7	118.8	883.8	7.09	-0.02	16.22
96.0	6392.425	31.171	50.017	486.8	118.7	900.2	7.10	-0.01	16.53
97.0	6392.915	31.290	50.925	493.9	118.7	916.9	7.11	-0.00	16.85
98.0	6393.413	31.408	51.851	501.0	118.7	933.9	7.12	-0.00	17.18
99.0	6393.917	31.527	52.793	508.2	118.7	951.3	7.14	-0.01	17.51
100.0	6394.429	31.646	53.754	515.3	118.7	969.0	7.14	-0.01	17.85
101.0	6394.948	31.765	54.732	522.4	118.7	987.0	7.14	-0.01	18.19
102.0	6395.474	31.883	55.728	529.6	118.7	1005.4	7.14	0.00	18.52
103.0	6396.007	32.002	56.742	536.7	118.7	1024.1	7.14	0.02	18.85
104.0	6396.547	32.121	57.776	543.8	118.7	1043.1	7.14	0.03	19.18
105.0	6397.095	32.239	58.829	551.0	118.8	1062.4	7.15	0.04	19.51
106.0	6397.649	32.358	59.901	558.2	118.8	1082.1	7.17	0.04	19.83
107.0	6398.211	32.477	60.993	565.3	118.8	1102.1	7.19	0.03	20.15
108.0	6398.780	32.596	62.105	572.5	118.9	1122.4	7.21	0.01	20.46
109.0	6399.356	32.715	63.238	579.7	118.9	1143.0	7.23	-0.01	20.79
110.0	6399.940	32.834	64.391	587.0	118.8	1164.0	7.25	-0.04	21.12
111.0	6400.530	32.952	65.566	594.2	118.8	1185.3	7.27	-0.06	21.46
112.0	6401.128	33.071	66.762	601.5	118.7	1206.9	7.28	-0.07	21.80
113.0	6401.733	33.190	67.980	608.8	118.7	1228.9	7.30	-0.06	22.15
114.0	6402.346	33.308	69.220	616.1	118.6	1251.2	7.32	-0.04	22.51
115.0	6402.965	33.427	70.482	623.4	118.6	1273.9	7.34	-0.01	22.86
116.0	6403.592	33.546	71.768	630.8	118.6	1296.9	7.36	0.01	23.21
117.0	6404.227	33.664	73.076	638.1	118.6	1320.3	7.37	0.02	23.56
118.0	6404.869	33.783	74.408	645.5	118.6	1344.1	7.38	0.02	23.93
119.0	6405.518	33.901	75.765	652.9	118.6	1368.2	7.36	0.00	24.32
120.0	6406.174	34.020	77.145	660.2	118.6	1392.7	7.34	-0.02	24.73
121.0	6406.838	34.139	78.550	667.5	118.6	1417.7	7.31	-0.04	25.16
122.0	6407.509	34.257	79.980	674.8	118.5	1443.0	7.28	-0.06	25.59
123.0	6408.188	34.376	81.436	682.1	118.4	1468.8	7.26	-0.07	26.02
124.0	6408.874	34.494	82.918	689.3	118.4	1495.1	7.26	-0.08	26.44
125.0	6409.566	34.612	84.427	696.6	118.3	1521.7	7.28	-0.08	26.84
126.0	6410.267	34.731	85.962	703.9	118.2	1548.7	7.33	-0.08	27.24
127.0	6410.974	34.849	87.524	711.3	118.1	1576.2	7.39	-0.08	27.62
128.0	6411.689	34.967	89.114	718.7	118.0	1604.0	7.46	-0.09	28.01
129.0	6412.412	35.085	90.732	725.8	117.9	1632.2	7.53	-0.14	28.44
130.0	6413.142	35.203	92.379	733.4	117.8	1660.8	7.60	-0.11	28.88
131.0	6413.879	35.320	94.054	741.0	117.7	1689.9	7.67	-0.19	29.31
132.0	6414.624	35.438	95.759	748.7	117.5	1719.5	7.73	-0.17	29.75
133.0	6415.377	35.555	97.493	756.4	117.3	1749.4	7.80	-0.20	30.18
134.0	6416.138	35.672	99.258	764.3	117.1	1779.8	7.87	-0.21	30.61
135.0	6416.906	35.789	101.053	772.2	116.9	1810.7	7.93	-0.23	31.05

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
135.240	6417.092	35.818	101.489	774.1	116.8	1818.1	7.95	-0.23	31.15
136.0	6417.682	35.906	102.876	778.5	116.6	1839.0	4.30	-0.21	24.75
137.0	6418.462	36.023	104.726	782.8	116.4	1863.9	4.33	-0.19	25.04
138.0	6419.248	36.139	106.605	787.1	116.3	1889.1	4.35	-0.15	25.34
139.0	6420.038	36.255	108.507	791.5	116.1	1914.5	4.38	-0.15	25.63
140.0	6420.831	36.371	110.433	795.9	116.0	1940.3	4.40	-0.11	25.96
141.0	6421.629	36.487	112.387	800.3	115.9	1966.5	4.42	-0.05	26.31
142.0	6422.432	36.603	114.367	804.7	115.9	1992.9	4.45	-0.04	26.65
143.0	6423.239	36.719	116.373	809.2	115.8	2019.8	4.48	-0.04	26.99
144.0	6424.050	36.835	118.407	813.7	115.8	2047.2	4.51	-0.04	27.35
145.0	6424.866	36.951	120.468	818.2	115.7	2074.7	4.54	-0.06	27.73
146.0	6425.687	37.066	122.556	822.7	115.6	2102.6	4.58	-0.07	28.14
147.0	6426.512	37.182	124.673	827.3	115.6	2131.0	4.61	-0.09	28.49
148.0	6427.342	37.297	126.818	832.0	115.5	2159.6	4.64	-0.10	28.87
149.0	6428.176	37.413	128.993	836.7	115.4	2188.7	4.67	-0.11	29.25
150.0	6429.015	37.528	131.196	841.4	115.2	2218.1	4.71	-0.12	29.65
151.0	6429.859	37.643	133.429	846.1	115.1	2248.0	4.75	-0.12	30.09
152.0	6430.707	37.758	135.692	850.9	115.0	2278.3	4.79	-0.11	30.50
153.0	6431.561	37.873	137.986	855.7	114.9	2309.0	4.82	-0.11	30.91
154.0	6432.419	37.988	140.310	860.5	114.8	2340.1	4.85	-0.11	31.33
155.0	6433.282	38.103	142.666	865.1	114.7	2371.7	4.90	-0.09	31.80
156.0	6434.149	38.217	145.054	870.0	114.6	2403.7	4.95	-0.09	32.29
157.0	6435.022	38.332	147.473	875.0	114.5	2436.2	5.00	-0.09	32.77
158.0	6435.900	38.446	149.926	880.0	114.3	2469.2	5.05	-0.15	33.26
159.0	6436.783	38.561	152.411	885.1	114.2	2502.7	5.10	-0.14	33.74
160.0	6437.671	38.675	154.931	890.2	114.1	2536.7	5.15	-0.06	34.23
161.0	6438.564	38.789	157.485	895.4	113.9	2571.2	5.20	-0.23	34.72
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.740	6439.228	38.873	159.396	899.2	113.8	2597.0	5.23	-0.20	35.08
162.0	6439.462	38.903	160.071	899.9	113.7	2605.1	-0.66	-0.12	20.45
S-IC/S-II SEPARATION COMMAND									
162.400	6439.822	38.948	161.116	897.7	113.7	2607.2	-8.57	-0.01	0.38
164.0	6441.248	39.130	165.289	883.0	113.7	2607.8	-9.28	-0.04	0.37
166.0	6443.003	39.357	170.523	865.6	113.5	2610.7	-7.53	-0.08	3.92
168.0	6444.717	39.584	175.750	851.1	113.4	2620.8	-7.10	-0.08	5.39
170.0	6446.406	39.811	181.006	837.1	113.3	2633.2	-6.54	-0.05	6.68

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
172.0	6448.067	40.037	186.287	824.2	113.2	2646.7	-6.50	-0.04	6.83
174.0	6449.702	40.263	191.594	811.2	113.0	2660.7	-6.45	-0.06	6.88
176.0	6451.312	40.489	196.930	798.3	112.9	2674.5	-6.41	-0.06	6.96
178.0	6452.895	40.715	202.293	785.4	112.8	2688.5	-6.40	-0.05	6.97
180.0	6454.453	40.941	207.684	772.6	112.7	2702.5	-6.39	-0.05	7.01
182.0	6455.986	41.166	213.103	759.9	112.6	2716.5	-6.37	-0.05	7.04
184.0	6457.493	41.391	218.550	747.2	112.5	2730.6	-6.35	-0.05	7.07
186.0	6458.975	41.616	224.025	734.5	112.4	2744.8	-6.32	-0.05	7.09
188.0	6460.431	41.841	229.529	721.8	112.3	2759.0	-6.30	-0.05	7.12
190.0	6461.862	42.065	235.062	709.3	112.2	2773.3	-6.27	-0.06	7.15
192.0	6463.268	42.289	240.622	696.7	112.0	2787.6	-6.25	-0.06	7.19
194.0	6464.649	42.513	246.212	684.2	111.9	2802.1	-6.23	-0.05	7.23
196.0	6466.005	42.737	251.831	671.8	111.8	2816.5	-6.22	-0.05	7.25
198.0	6467.336	42.961	257.478	659.4	111.7	2831.1	-6.18	-0.06	7.28
200.0	6468.643	43.184	263.155	647.0	111.6	2845.7	-6.17	-0.06	7.32
202.0	6469.924	43.407	268.861	634.7	111.5	2860.4	-6.16	-0.05	7.36
204.0	6471.181	43.630	274.597	622.4	111.4	2875.1	-6.11	-0.04	7.39
206.0	6472.414	43.853	280.362	610.2	111.3	2889.9	-6.01	-0.05	7.40
208.0	6473.622	44.075	286.156	598.3	111.2	2904.7	-5.90	-0.05	7.38
210.0	6474.807	44.298	291.980	586.6	111.1	2919.5	-5.83	-0.04	7.39
212.0	6475.969	44.520	297.834	574.9	111.0	2934.3	-5.82	-0.03	7.42
214.0	6477.107	44.742	303.718	563.3	111.0	2949.2	-5.84	-0.03	7.47
216.0	6478.222	44.964	309.631	551.5	110.9	2964.2	-5.86	-0.03	7.51
218.0	6479.313	45.185	315.574	539.8	110.9	2979.2	-5.86	-0.03	7.54
220.0	6480.381	45.407	321.548	528.1	110.8	2994.3	-5.85	-0.03	7.58
222.0	6481.425	45.629	327.552	516.4	110.7	3009.6	-5.86	-0.03	7.62
224.0	6482.446	45.850	333.586	504.6	110.7	3024.8	-5.88	-0.03	7.66
226.0	6483.444	46.071	339.651	492.8	110.6	3040.2	-5.90	-0.02	7.69
228.0	6484.418	46.292	345.747	481.0	110.6	3055.6	-5.91	-0.02	7.73
230.0	6485.368	46.513	351.874	469.2	110.5	3071.1	-5.90	-0.02	7.77
232.0	6486.294	46.734	358.031	457.3	110.4	3086.7	-5.90	-0.02	7.81
234.0	6487.197	46.955	364.220	445.5	110.4	3102.4	-5.91	-0.03	7.85
236.0	6488.076	47.176	370.441	433.7	110.3	3118.1	-5.91	-0.02	7.88
238.0	6488.932	47.397	376.693	421.8	110.3	3133.9	-5.92	-0.02	7.92
240.0	6489.764	47.617	382.976	410.0	110.3	3149.8	-5.92	-0.02	7.96
242.0	6490.572	47.838	389.292	398.1	110.2	3165.7	-5.92	-0.02	8.00
244.0	6491.356	48.058	395.639	386.3	110.2	3181.8	-5.92	-0.03	8.04
246.0	6492.117	48.278	402.019	374.4	110.1	3197.9	-5.93	-0.03	8.08
248.0	6492.854	48.499	408.431	362.5	110.1	3214.1	-5.94	-0.03	8.12
250.0	6493.567	48.719	414.875	350.6	110.0	3230.4	-5.95	-0.03	8.16
252.0	6494.257	48.938	421.353	338.7	109.9	3246.7	-5.95	-0.03	8.20
254.0	6494.922	49.158	427.862	326.8	109.9	3263.2	-5.96	-0.03	8.24
256.0	6495.564	49.378	434.405	314.9	109.8	3279.7	-5.96	-0.02	8.28

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
258.0	6496.182	49.598	440.981	302.9	109.8	3296.3	-5.97	-0.02	8.33
260.0	6496.775	49.817	447.591	290.9	109.7	3313.0	-5.98	-0.03	8.37
262.0	6497.345	50.036	454.233	279.0	109.6	3329.8	-5.99	-0.04	8.41
264.0	6497.891	50.255	460.910	267.0	109.5	3346.7	-5.99	-0.04	8.45
266.0	6498.413	50.474	467.620	255.0	109.5	3363.6	-6.00	-0.03	8.50
268.0	6498.911	50.693	474.364	242.9	109.4	3380.7	-6.01	-0.03	8.55
270.0	6499.385	50.912	481.143	230.9	109.3	3397.8	-6.02	-0.03	8.60
272.0	6499.835	51.131	487.956	218.8	109.3	3415.1	-6.03	-0.04	8.65
274.0	6500.260	51.349	494.803	206.8	109.2	3432.4	-6.03	-0.04	8.69
276.0	6500.662	51.567	501.685	194.7	109.1	3449.8	-6.02	-0.04	8.73
278.0	6501.039	51.786	508.603	182.6	109.0	3467.4	-6.03	-0.03	8.78
280.0	6501.392	52.004	515.555	170.5	109.0	3485.0	-6.08	-0.03	8.82
282.0	6501.721	52.221	522.543	158.3	108.9	3502.7	-6.12	-0.02	8.87
284.0	6502.025	52.439	529.566	146.1	108.8	3520.4	-6.12	-0.03	8.91
286.0	6502.305	52.657	536.624	133.8	108.8	3538.3	-6.11	-0.04	8.96
288.0	6502.561	52.874	543.719	121.6	108.7	3556.3	-6.10	-0.03	9.01
290.0	6502.792	53.092	550.850	109.3	108.6	3574.4	-6.12	-0.03	9.06
292.0	6502.998	53.309	558.017	97.1	108.6	3592.5	-6.13	-0.03	9.10
294.0	6503.180	53.526	565.220	84.8	108.5	3610.8	-6.15	-0.04	9.15
296.0	6503.337	53.743	572.460	72.5	108.4	3629.1	-6.16	-0.05	9.20
298.0	6503.470	53.960	579.737	60.1	108.3	3647.6	-6.18	-0.04	9.25
300.0	6503.578	54.176	587.050	47.7	108.2	3666.1	-6.19	-0.04	9.29
302.0	6503.661	54.392	594.401	35.3	108.1	3684.8	-6.20	-0.03	9.34
304.0	6503.719	54.609	601.789	22.9	108.1	3703.5	-6.21	-0.03	9.40
306.0	6503.752	54.825	609.215	10.5	108.0	3722.4	-6.21	-0.03	9.45
308.0	6503.761	55.041	616.679	-2.0	107.9	3741.3	-6.22	-0.04	9.50
310.0	6503.744	55.256	624.181	-14.4	107.8	3760.4	-6.24	-0.04	9.56
312.0	6503.703	55.472	631.721	-26.9	107.8	3779.6	-6.25	-0.04	9.61
314.0	6503.637	55.687	639.299	-39.5	107.7	3798.8	-6.27	-0.04	9.66
316.0	6503.545	55.903	646.916	-52.1	107.6	3818.2	-6.28	-0.03	9.71
318.0	6503.428	56.118	654.572	-64.6	107.5	3837.7	-6.29	-0.03	9.77
320.0	6503.286	56.333	662.267	-77.3	107.5	3857.3	-6.31	-0.04	9.84
322.0	6503.119	56.548	670.001	-89.9	107.4	3877.1	-6.33	-0.04	9.90
324.0	6502.927	56.762	677.775	-102.6	107.3	3896.9	-6.36	-0.04	9.95
326.0	6502.709	56.977	685.589	-115.4	107.2	3916.9	-6.37	-0.04	10.01
328.0	6502.465	57.191	693.443	-128.1	107.1	3936.9	-6.37	-0.04	10.06
330.0	6502.196	57.405	701.337	-140.9	107.0	3957.1	-6.36	-0.04	10.12
332.0	6501.902	57.619	709.271	-153.6	107.0	3977.4	-6.40	-0.03	10.19
334.0	6501.582	57.833	717.247	-166.5	106.9	3997.9	-6.47	-0.03	10.24
336.0	6501.236	58.047	725.263	-179.5	106.8	4018.4	-6.51	-0.03	10.31
338.0	6500.864	58.261	733.320	-192.5	106.8	4039.1	-6.50	-0.03	10.37
340.0	6500.466	58.474	741.419	-205.5	106.7	4059.9	-6.48	-0.04	10.44
342.0	6500.042	58.687	749.560	-218.5	106.6	4080.9	-6.50	-0.04	10.50

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
344.0	6499.591	58.900	757.743	-231.6	106.5	4101.9	-6.54	-0.04	10.56
346.0	6499.115	59.113	765.968	-244.7	106.4	4123.1	-6.56	-0.04	10.63
348.0	6498.613	59.326	774.236	-257.8	106.4	4144.5	-6.59	-0.04	10.70
350.0	6498.084	59.539	782.546	-271.1	106.3	4165.9	-6.62	-0.04	10.76
352.0	6497.528	59.751	790.900	-284.3	106.2	4187.5	-6.63	-0.04	10.83
354.0	6496.947	59.964	799.296	-297.6	106.1	4209.3	-6.65	-0.04	10.89
356.0	6496.338	60.176	807.737	-310.9	106.0	4231.1	-6.66	-0.04	10.96
358.0	6495.703	60.388	816.221	-324.3	105.9	4253.1	-6.68	-0.04	11.02
360.0	6495.041	60.599	824.749	-337.7	105.9	4275.2	-6.72	-0.03	11.09
362.0	6494.352	60.811	833.322	-351.2	105.8	4297.5	-6.76	-0.03	11.17
364.0	6493.636	61.023	841.939	-364.8	105.7	4319.9	-6.78	-0.04	11.24
366.0	6492.893	61.234	850.602	-378.3	105.6	4342.5	-6.79	-0.04	11.30
368.0	6492.122	61.445	859.309	-392.0	105.5	4365.2	-6.82	-0.04	11.37
370.0	6491.325	61.656	868.062	-405.7	105.4	4388.0	-6.85	-0.04	11.45
372.0	6490.500	61.867	876.861	-419.4	105.4	4411.0	-6.87	-0.04	11.54
374.0	6489.647	62.077	885.706	-433.2	105.3	4434.1	-6.89	-0.04	11.61
376.0	6488.767	62.288	894.598	-447.0	105.2	4457.4	-6.92	-0.04	11.67
378.0	6487.859	62.498	903.536	-460.9	105.1	4480.8	-6.95	-0.05	11.75
380.0	6486.924	62.708	912.521	-474.8	105.0	4504.4	-6.99	-0.05	11.83
382.0	6485.960	62.918	921.554	-488.9	104.9	4528.2	-7.02	-0.05	11.92
384.0	6484.968	63.128	930.634	-502.9	104.8	4552.1	-7.05	-0.05	12.01
386.0	6483.948	63.337	939.763	-517.1	104.6	4576.2	-7.09	-0.05	12.09
388.0	6482.900	63.546	948.939	-531.3	104.5	4600.5	-7.10	-0.05	12.16
390.0	6481.823	63.755	958.165	-545.5	104.4	4624.9	-7.10	-0.04	12.24
392.0	6480.718	63.964	967.439	-559.8	104.4	4649.5	-7.14	-0.03	12.33
394.0	6479.584	64.173	976.763	-574.2	104.3	4674.2	-7.22	-0.04	12.42
396.0	6478.421	64.381	986.136	-588.7	104.2	4699.2	-7.29	-0.06	12.50
398.0	6477.229	64.589	995.559	-603.3	104.1	4724.2	-7.31	-0.06	12.58
400.0	6476.008	64.797	1005.033	-617.9	104.0	4749.5	-7.32	-0.06	12.67
402.0	6474.757	65.005	1014.558	-632.6	103.8	4774.9	-7.35	-0.05	12.77
404.0	6473.477	65.213	1024.133	-647.4	103.7	4800.6	-7.39	-0.05	12.86
406.0	6472.168	65.420	1033.760	-662.2	103.6	4826.4	-7.43	-0.06	12.95
408.0	6470.828	65.627	1043.439	-677.1	103.5	4852.4	-7.47	-0.05	13.04
410.0	6469.459	65.834	1053.169	-692.1	103.4	4878.5	-7.51	-0.05	13.14
412.0	6468.060	66.041	1062.953	-707.2	103.3	4904.9	-7.53	-0.06	13.23
414.0	6466.630	66.247	1072.789	-722.3	103.1	4931.5	-7.56	-0.06	13.33
416.0	6465.171	66.453	1082.679	-737.5	103.0	4958.2	-7.61	-0.06	13.43
418.0	6463.680	66.659	1092.622	-752.8	102.9	4985.2	-7.67	-0.05	13.53
420.0	6462.159	66.865	1102.620	-768.2	102.8	5012.4	-7.73	-0.05	13.64
422.0	6460.608	67.070	1112.672	-783.7	102.7	5039.8	-7.76	-0.05	13.73
424.0	6459.025	67.276	1122.779	-799.2	102.6	5067.3	-7.79	-0.05	13.83
426.0	6457.411	67.481	1132.942	-814.9	102.5	5095.1	-7.84	-0.06	13.94
428.0	6455.765	67.686	1143.160	-830.6	102.4	5123.1	-7.89	-0.05	14.05

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
430.0	6454.088	67.890	1153.434	-846.5	102.2	5151.3	-7.93	-0.05	14.15
432.0	6452.379	68.095	1163.765	-862.4	102.1	5179.7	-7.98	-0.05	14.28
434.0	6450.638	68.299	1174.153	-878.4	102.0	5208.4	-8.03	-0.05	14.39
436.0	6448.865	68.503	1184.599	-894.5	101.9	5237.3	-8.08	-0.05	14.49
438.0	6447.060	68.706	1195.103	-910.7	101.8	5266.4	-8.13	-0.06	14.58
440.0	6445.224	68.910	1205.665	-927.1	101.7	5295.7	-8.18	-0.06	14.69
442.0	6443.356	69.113	1216.286	-943.5	101.6	5325.2	-8.23	-0.06	14.83
444.0	6441.455	69.316	1226.966	-960.0	101.4	5355.0	-8.29	-0.05	15.00
446.0	6439.520	69.519	1237.706	-976.7	101.3	5385.2	-8.34	-0.05	15.13
448.0	6437.548	69.722	1248.507	-993.4	101.2	5415.5	-8.39	-0.05	15.23
450.0	6435.542	69.924	1259.368	-1010.3	101.1	5446.1	-8.44	-0.05	15.31
452.0	6433.503	70.126	1270.291	-1027.2	101.0	5476.8	-8.49	-0.05	15.44
454.0	6431.432	70.328	1281.276	-1044.3	100.9	5507.8	-8.55	-0.05	15.59
456.0	6429.327	70.530	1292.323	-1061.5	100.8	5539.1	-8.60	-0.05	15.73
458.0	6427.187	70.731	1303.433	-1078.7	100.7	5570.7	-8.65	-0.05	15.87
460.0	6425.012	70.932	1314.606	-1096.1	100.6	5602.6	-8.71	-0.05	16.00
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
460.750	6424.188	71.008	1318.813	-1102.6	100.5	5614.6	-8.85	-0.12	16.05
462.0	6422.803	71.133	1325.842	-1113.6	100.4	5631.2	-8.85	-0.09	12.57
464.0	6420.558	71.334	1337.128	-1131.4	100.1	5656.4	-8.89	-0.16	12.63
466.0	6418.277	71.534	1348.466	-1149.2	99.8	5681.7	-8.89	-0.16	12.69
468.0	6415.961	71.733	1359.855	-1167.0	99.5	5707.2	-8.80	-0.14	12.77
470.0	6413.609	71.932	1371.294	-1184.0	99.2	5732.8	-8.33	-0.13	12.86
472.0	6411.222	72.130	1382.785	-1200.6	98.9	5758.6	-8.24	-0.14	12.94
474.0	6408.800	72.327	1394.328	-1217.1	98.7	5784.5	-8.22	-0.14	13.01
476.0	6406.343	72.524	1405.922	-1233.5	98.4	5810.6	-8.22	-0.14	13.08
478.0	6403.853	72.721	1417.569	-1250.0	98.1	5836.7	-8.23	-0.14	13.15
480.0	6401.332	72.917	1429.269	-1266.5	97.8	5863.1	-8.26	-0.15	13.23
482.0	6398.781	73.112	1441.021	-1283.1	97.5	5889.6	-8.31	-0.15	13.34
484.0	6396.199	73.307	1452.828	-1299.7	97.2	5916.4	-8.35	-0.14	13.45
486.0	6393.585	73.501	1464.688	-1316.5	96.9	5943.5	-8.42	-0.13	13.56
488.0	6390.939	73.694	1476.603	-1333.5	96.6	5970.7	-8.50	-0.12	13.66
490.0	6388.261	73.887	1488.572	-1350.6	96.4	5997.8	-8.59	-0.11	13.15
492.0	6385.549	74.080	1500.590	-1367.8	96.2	6021.5	-8.66	-0.07	10.73
494.0	6382.801	74.272	1512.654	-1385.3	96.1	6042.2	-8.80	-0.06	10.22
496.0	6380.015	74.465	1524.759	-1403.0	96.0	6062.6	-8.92	-0.07	10.20
498.0	6377.191	74.656	1536.905	-1421.0	95.8	6083.1	-9.01	-0.07	10.24
500.0	6374.331	74.848	1549.092	-1439.1	95.7	6103.6	-9.07	-0.06	10.29
502.0	6371.434	75.039	1561.319	-1457.3	95.6	6124.2	-9.11	-0.06	10.34
504.0	6368.501	75.230	1573.589	-1475.5	95.4	6145.0	-9.13	-0.06	10.39
506.0	6365.532	75.421	1585.899	-1493.8	95.3	6165.8	-9.12	-0.07	10.43

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
508.0	6362.526	75.611	1598.252	-1512.1	95.1	6186.7	-9.11	-0.08	10.48
510.0	6359.484	75.801	1610.646	-1530.3	95.0	6207.7	-9.11	-0.09	10.52
512.0	6356.405	75.991	1623.083	-1548.6	94.8	6228.8	-9.17	-0.09	10.59
514.0	6353.289	76.180	1635.562	-1567.1	94.6	6250.1	-9.27	-0.08	10.65
516.0	6350.136	76.369	1648.083	-1585.7	94.5	6271.4	-9.38	-0.06	10.70
518.0	6346.946	76.558	1660.647	-1604.6	94.3	6292.9	-9.44	-0.05	10.74
520.0	6343.718	76.747	1673.255	-1623.5	94.2	6314.4	-9.48	-0.05	10.80
522.0	6340.452	76.935	1685.905	-1642.5	94.1	6336.1	-9.54	-0.06	10.87
524.0	6337.148	77.123	1698.599	-1661.7	94.0	6357.9	-9.62	-0.05	10.94
526.0	6333.805	77.311	1711.337	-1681.0	93.9	6379.9	-9.68	-0.05	11.00
528.0	6330.423	77.499	1724.119	-1700.5	93.7	6401.9	-9.74	-0.05	11.05
530.0	6327.003	77.686	1736.945	-1720.0	93.6	6424.1	-9.80	-0.05	11.11
532.0	6323.543	77.873	1749.815	-1739.7	93.5	6446.4	-9.88	-0.06	11.18
534.0	6320.044	78.060	1762.731	-1759.6	93.4	6468.8	-9.94	-0.06	11.25
536.0	6316.505	78.247	1775.691	-1779.5	93.2	6491.4	-9.99	-0.07	11.31
538.0	6312.926	78.433	1788.696	-1799.6	93.1	6514.1	-10.04	-0.07	11.36
540.0	6309.306	78.619	1801.747	-1819.8	93.0	6536.9	-10.10	-0.06	11.42
542.0	6305.647	78.805	1814.844	-1840.0	92.8	6559.8	-10.15	-0.06	11.49
544.0	6301.946	78.990	1827.986	-1860.4	92.7	6582.8	-10.21	-0.07	11.54
546.0	6298.205	79.175	1841.175	-1880.9	92.6	6606.0	-10.27	-0.06	11.64
548.0	6294.422	79.360	1854.410	-1901.5	92.4	6629.4	-10.32	-0.06	11.73
550.0	6290.599	79.545	1867.692	-1922.2	92.3	6652.9	-10.38	-0.06	11.82
552.0	6286.733	79.730	1881.028	-1943.1	92.1	6676.6	-10.44	-0.09	11.90
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
552.340	6286.071	79.761	1883.298	-1946.6	92.1	6680.7	-10.44	-0.19	11.92
S-II/S-IVB SEPARATION COMMAND									
553.200	6284.394	79.840	1889.043	-1954.6	92.0	6681.2	-8.87	-0.06	-2.49
554.0	6282.828	79.914	1894.391	-1961.7	92.0	6679.2	-8.87	-0.09	-2.49
556.0	6278.887	80.098	1907.739	-1979.5	91.8	6674.2	-8.87	-0.10	-2.47
558.0	6274.910	80.281	1921.085	-1997.4	91.6	6670.6	-9.15	-0.10	0.69
560.0	6270.896	80.464	1934.431	-2016.1	91.4	6674.8	-9.39	-0.09	2.51
562.0	6266.845	80.646	1947.785	-2034.9	91.2	6679.9	-9.36	-0.09	2.62
564.0	6262.757	80.829	1961.151	-2053.7	91.0	6685.2	-9.50	-0.12	2.66
566.0	6258.630	81.010	1974.527	-2073.1	90.7	6690.5	-9.72	-0.15	2.65
568.0	6254.464	81.191	1987.913	-2092.7	90.3	6696.0	-9.84	-0.15	2.68
570.0	6250.259	81.371	2001.311	-2112.4	90.0	6701.4	-9.86	-0.14	2.73
572.0	6246.014	81.551	2014.719	-2132.2	89.7	6706.9	-9.84	-0.13	2.75
574.0	6241.730	81.730	2028.139	-2151.9	89.5	6712.4	-9.86	-0.11	2.74
576.0	6237.407	81.909	2041.569	-2171.7	89.3	6717.9	-9.90	-0.10	2.73

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
578.0	6233.044	82.088	2055.010	-2191.6	89.1	6723.4	-9.95	-0.09	2.71
580.0	6228.640	82.266	2068.462	-2211.5	88.9	6728.8	-9.99	-0.08	2.69
582.0	6224.157	82.443	2081.925	-2231.5	88.7	6734.1	-10.02	-0.08	2.67
584.0	6219.714	82.621	2095.399	-2251.6	88.6	6739.5	-10.04	-0.07	2.66
586.0	6215.191	82.798	2108.883	-2271.7	88.4	6744.8	-10.05	-0.06	2.65
588.0	6210.627	82.974	2122.378	-2291.9	88.3	6750.1	-10.06	-0.05	2.65
590.0	6206.023	83.151	2135.883	-2312.0	88.2	6755.4	-10.06	-0.06	2.64
592.0	6201.379	83.327	2149.399	-2332.2	88.1	6760.7	-10.07	-0.05	2.64
594.0	6196.695	83.503	2162.926	-2352.3	88.0	6766.0	-10.08	-0.05	2.63
596.0	6191.970	83.679	2176.463	-2372.5	87.9	6771.2	-10.10	-0.04	2.64
598.0	6187.205	83.855	2190.011	-2392.8	87.8	6776.5	-10.12	-0.05	2.64
600.0	6182.399	84.030	2203.569	-2413.1	87.7	6781.8	-10.13	-0.05	2.63
602.0	6177.552	84.205	2217.138	-2433.4	87.6	6787.1	-10.14	-0.05	2.62
604.0	6172.665	84.380	2230.717	-2453.7	87.4	6792.3	-10.15	-0.05	2.60
606.0	6167.738	84.555	2244.307	-2474.0	87.3	6797.5	-10.16	-0.04	2.59
608.0	6162.769	84.730	2257.907	-2494.4	87.2	6802.7	-10.18	-0.04	2.59
610.0	6157.760	84.904	2271.518	-2514.8	87.1	6807.8	-10.19	-0.04	2.58
612.0	6152.710	85.078	2285.139	-2535.2	87.0	6813.0	-10.21	-0.05	2.57
614.0	6147.619	85.252	2298.770	-2555.7	86.9	6818.1	-10.22	-0.05	2.56
616.0	6142.487	85.426	2312.411	-2576.1	86.8	6823.3	-10.22	-0.06	2.55
618.0	6137.315	85.600	2326.063	-2596.6	86.7	6828.4	-10.23	-0.06	2.54
620.0	6132.101	85.773	2339.725	-2617.1	86.6	6833.4	-10.24	-0.06	2.54
622.0	6126.846	85.946	2353.397	-2637.6	86.4	6838.5	-10.25	-0.05	2.53
624.0	6121.551	86.119	2367.079	-2658.1	86.3	6843.6	-10.26	-0.05	2.53
626.0	6116.214	86.291	2380.771	-2678.7	86.2	6848.7	-10.28	-0.05	2.54
628.0	6110.836	86.463	2394.474	-2699.3	86.1	6853.8	-10.29	-0.05	2.54
630.0	6105.417	86.635	2408.186	-2719.9	86.0	6858.9	-10.30	-0.05	2.54
632.0	6099.956	86.807	2421.909	-2740.6	85.8	6863.9	-10.32	-0.06	2.52
634.0	6094.454	86.979	2435.642	-2761.2	85.7	6869.0	-10.34	-0.06	2.51
636.0	6088.911	87.150	2449.385	-2782.0	85.6	6874.0	-10.35	-0.07	2.50
638.0	6083.327	87.321	2463.138	-2802.7	85.4	6879.0	-10.36	-0.07	2.49
640.0	6077.700	87.492	2476.901	-2823.4	85.2	6884.0	-10.36	-0.08	2.48
642.0	6072.033	87.662	2490.674	-2844.2	85.1	6888.9	-10.36	-0.07	2.48
644.0	6066.324	87.832	2504.457	-2864.9	84.9	6893.9	-10.36	-0.07	2.48
646.0	6060.573	88.002	2518.249	-2885.7	84.8	6898.9	-10.37	-0.08	2.47
648.0	6054.781	88.171	2532.052	-2906.5	84.6	6903.8	-10.38	-0.08	2.47
650.0	6048.947	88.340	2545.865	-2927.3	84.4	6908.8	-10.39	-0.09	2.46
652.0	6043.072	88.509	2559.687	-2948.1	84.2	6913.7	-10.40	-0.09	2.46
654.0	6037.155	88.677	2573.519	-2968.9	84.0	6918.6	-10.41	-0.09	2.45
656.0	6031.196	88.845	2587.362	-2989.8	83.8	6923.5	-10.42	-0.09	2.45
658.0	6025.196	89.012	2601.213	-3010.6	83.6	6928.4	-10.42	-0.09	2.45
660.0	6019.153	89.179	2615.075	-3031.5	83.4	6933.3	-10.43	-0.09	2.45
662.0	6013.070	89.346	2628.947	-3052.4	83.2	6938.2	-10.44	-0.10	2.44

TABLE B-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
664.0	6006.944	89.512	2642.828	-3073.4	83.0	6943.1	-10.48	-0.11	2.42
666.0	6000.776	89.678	2656.719	-3094.4	82.8	6947.9	-10.53	-0.12	2.41
668.0	5994.566	89.843	2670.620	-3115.5	82.5	6952.7	-10.54	-0.12	2.40
670.0	5988.314	90.008	2684.530	-3136.6	82.3	6957.5	-10.52	-0.12	2.40
672.0	5982.020	90.172	2698.450	-3157.6	82.0	6962.3	-10.51	-0.11	2.40
674.0	5975.683	90.336	2712.379	-3178.7	81.8	6967.1	-10.52	-0.10	2.40
676.0	5969.305	90.500	2726.319	-3199.8	81.6	6972.0	-10.53	-0.10	2.40
678.0	5962.884	90.663	2740.267	-3220.8	81.4	6976.8	-10.52	-0.11	2.40
680.0	5956.422	90.825	2754.226	-3241.9	81.1	6981.6	-10.50	-0.12	2.40
682.0	5949.917	90.987	2768.193	-3262.9	80.9	6986.4	-10.50	-0.12	2.40
684.0	5943.370	91.149	2782.171	-3283.9	80.7	6991.2	-10.50	-0.12	2.40
686.0	5936.781	91.310	2796.158	-3305.0	80.4	6996.0	-10.50	-0.11	2.41
688.0	5930.150	91.470	2810.155	-3326.0	80.2	7000.8	-10.50	-0.11	2.41
690.0	5923.477	91.631	2824.162	-3347.0	80.0	7005.6	-10.49	-0.11	2.40
692.0	5916.762	91.790	2838.178	-3368.0	79.7	7010.4	-10.49	-0.12	2.40
S-IVB 1ST GUIDANCE CUTOFF									
693.910	5910.310	91.942	2851.572	-3388.1	79.4	7015.0	-10.49	-0.18	2.40
694.0	5910.005	91.949	2852.203	-3389.0	79.4	7015.2	-10.49	-0.19	2.40
696.0	5903.210	92.108	2866.226	-3406.2	79.2	7008.0	-8.31	-0.10	-4.03
698.0	5896.381	92.266	2880.235	-3422.7	79.0	7000.1	-8.30	-0.11	-4.06
700.0	5889.520	92.424	2894.227	-3439.3	78.7	6991.9	-8.29	-0.11	-4.08
702.0	5882.624	92.581	2908.203	-3455.9	78.5	6983.8	-8.28	-0.11	-4.10
PARKING ORBIT INSERTION									
703.910	5876.007	92.730	2921.533	-3471.7	78.3	6976.0	-8.27	-0.11	-4.13

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

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											
-16.968	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-16.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-15.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-14.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-13.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-12.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-11.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-10.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-9.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-8.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-7.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-6.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-5.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-4.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-3.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-2.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-1.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
0.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
ALL HOLDDOWN ARMS RELEASED											
0.300	6373.355	-80.6041	28.4470	0.0	90.00	0.1	90.00	0.01	408.6	0	60
START OF TIME BASE 1											
0.700	6373.355	-80.6041	28.4470	164.79	88.75	0.5	90.00	0.07	408.6	0	60
1.0	6373.356	-80.6041	28.4470	156.65	88.90	1.1	90.00	0.15	408.6	0	60
2.0	6373.358	-80.6041	28.4470	147.43	88.87	3.3	90.01	0.47	408.7	0	62
3.0	6373.362	-80.6041	28.4470	145.44	88.52	5.7	90.02	0.79	408.8	0	67
4.0	6373.369	-80.6041	28.4470	148.56	87.82	8.1	90.04	1.13	408.9	0	74
5.0	6373.378	-80.6041	28.4470	151.76	86.92	10.6	90.07	1.48	409.0	0	83
6.0	6373.390	-80.6041	28.4470	153.82	86.10	13.1	90.11	1.83	409.2	1	95
7.0	6373.405	-80.6041	28.4469	155.25	85.46	15.7	90.16	2.20	409.5	2	109
8.0	6373.422	-80.6041	28.4469	156.43	85.01	18.4	90.21	2.56	409.7	4	126
9.0	6373.441	-80.6041	28.4469	157.56	84.75	21.1	90.25	2.94	409.9	5	146
10.0	6373.464	-80.6041	28.4469	158.72	84.65	23.8	90.29	3.32	410.1	8	168
11.0	6373.489	-80.6041	28.4469	159.98	84.62	26.6	90.33	3.70	410.4	10	193
12.0	6373.517	-80.6041	28.4469	161.31	84.81	29.4	90.35	4.10	410.6	12	221
13.0	6373.547	-80.6041	28.4468	162.74	85.23	32.3	90.36	4.49	410.7	15	252
14.0	6373.581	-80.6041	28.4468	163.20	85.71	35.1	90.35	4.89	410.9	18	286

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
15.0	6373.617	-80.6041	28.4468	162.72	86.20	38.0	90.34	5.30	411.2	20	322
16.0	6373.657	-80.6041	28.4468	161.28	86.65	41.0	90.32	5.71	411.5	23	361
17.0	6373.699	-80.6040	28.4467	158.72	87.08	44.1	90.29	6.14	411.8	25	404
18.0	6373.745	-80.6040	28.4467	154.48	87.46	47.2	90.26	6.57	412.3	27	450
19.0	6373.794	-80.6040	28.4467	147.96	87.77	50.4	90.23	7.01	412.8	29	498
20.0	6373.846	-80.6040	28.4467	139.18	87.98	53.8	90.20	7.47	413.4	31	550
21.0	6373.901	-80.6040	28.4467	128.46	88.08	57.1	90.17	7.93	414.1	33	606
22.0	6373.960	-80.6040	28.4467	117.19	88.06	60.6	90.13	8.40	414.9	35	665
23.0	6374.022	-80.6040	28.4467	106.47	87.93	64.2	90.09	8.87	415.9	36	727
24.0	6374.088	-80.6039	28.4467	97.54	87.71	67.8	90.05	9.35	416.9	38	793
25.0	6374.158	-80.6039	28.4467	90.60	87.41	71.5	90.00	9.84	418.1	40	862
26.0	6374.231	-80.6039	28.4467	85.39	87.06	75.3	89.96	10.33	419.3	42	936
27.0	6374.308	-80.6038	28.4467	81.59	86.66	79.2	89.91	10.83	420.8	44	1013
28.0	6374.389	-80.6038	28.4467	78.85	86.22	83.2	89.85	11.33	422.3	47	1094
29.0	6374.474	-80.6037	28.4467	76.84	85.75	87.2	89.80	11.84	424.0	51	1179
30.0	6374.563	-80.6036	28.4467	75.39	85.26	91.4	89.74	12.34	425.9	55	1268
31.0	6374.657	-80.6036	28.4467	74.33	84.73	95.6	89.67	12.85	427.9	61	1361
32.0	6374.754	-80.6035	28.4467	73.52	84.19	99.9	89.61	13.36	430.1	69	1458
33.0	6374.855	-80.6034	28.4468	72.89	83.62	104.3	89.53	13.87	432.5	77	1560
34.0	6374.961	-80.6032	28.4468	72.42	83.03	108.9	89.46	14.39	435.0	88	1666
35.0	6375.072	-80.6031	28.4468	72.08	82.42	113.5	89.38	14.90	437.7	101	1776
36.0	6375.186	-80.6030	28.4469	71.81	81.80	118.2	89.29	15.40	440.6	115	1891
37.0	6375.306	-80.6028	28.4469	71.63	81.17	123.1	89.20	15.91	443.7	132	2010
38.0	6375.430	-80.6026	28.4470	71.51	80.52	128.0	89.11	16.41	447.0	151	2134
39.0	6375.558	-80.6024	28.4471	71.44	79.86	133.1	89.01	16.91	450.5	172	2263
40.0	6375.692	-80.6021	28.4471	71.41	79.19	138.3	88.91	17.40	454.2	196	2396
41.0	6375.830	-80.6019	28.4472	71.42	78.51	143.6	88.80	17.88	458.1	223	2535
42.0	6375.973	-80.6016	28.4473	71.43	77.81	149.0	88.69	18.36	462.3	252	2678
43.0	6376.121	-80.6013	28.4474	71.44	77.11	154.6	88.58	18.84	466.6	285	2826
44.0	6376.274	-80.6009	28.4475	71.45	76.41	160.3	88.46	19.30	471.2	321	2979
45.0	6376.433	-80.6005	28.4476	71.46	75.69	166.1	88.33	19.76	476.0	360	3138
46.0	6376.596	-80.6001	28.4477	71.46	74.98	172.1	88.20	20.21	481.0	402	3301
47.0	6376.765	-80.5997	28.4479	71.44	74.27	178.2	88.06	20.66	486.2	448	3470
48.0	6376.939	-80.5992	28.4480	71.42	73.56	184.4	87.92	21.09	491.6	498	3644
49.0	6377.119	-80.5987	28.4482	71.40	72.86	190.8	87.78	21.52	497.2	552	3824
50.0	6377.304	-80.5981	28.4483	71.38	72.17	197.4	87.63	21.94	503.0	610	4009
51.0	6377.495	-80.5975	28.4485	71.36	71.48	204.1	87.48	22.34	509.0	673	4200
52.0	6377.691	-80.5968	28.4487	71.32	70.79	210.9	87.32	22.74	515.2	740	4396
53.0	6377.893	-80.5961	28.4489	71.28	70.10	218.0	87.16	23.13	521.7	811	4598
54.0	6378.101	-80.5954	28.4491	71.23	69.42	225.2	86.99	23.51	528.4	888	4806
55.0	6378.315	-80.5946	28.4494	71.19	68.74	232.5	86.82	23.88	535.3	969	5020
56.0	6378.534	-80.5938	28.4496	71.13	68.06	240.1	86.64	24.23	542.5	1056	5240
57.0	6378.760	-80.5929	28.4499	71.08	67.38	247.7	86.46	24.57	549.9	1148	5466

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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	6378.992	-80.5919	28.4502	71.04	66.71	255.6	86.28	24.91	557.5	1246	5697
59.0	6379.230	-80.5909	28.4505	71.01	66.04	263.6	86.09	25.22	565.3	1350	5935
60.0	6379.474	-80.5899	28.4508	70.99	65.39	271.8	85.91	25.53	573.4	1460	6180
61.0	6379.724	-80.5887	28.4511	70.98	64.75	280.2	85.73	25.83	581.6	1576	6430
62.0	6379.981	-80.5875	28.4515	70.99	64.11	288.7	85.55	26.12	590.1	1699	6687
63.0	6380.243	-80.5863	28.4519	71.01	63.48	297.4	85.38	26.39	598.8	1828	6950
64.0	6380.513	-80.5850	28.4523	71.04	62.85	306.3	85.20	26.65	607.7	1964	7219
65.0	6380.789	-80.5836	28.4527	71.07	62.22	315.3	85.03	26.89	616.8	2107	7495
66.0	6381.071	-80.5821	28.4531	71.11	61.59	324.5	84.86	27.11	626.2	2258	7777
MACH I											
66.100	6381.099	-80.5820	28.4532	71.12	61.53	325.4	84.84	27.13	627.2	2273	7806
67.0	6381.359	-80.5806	28.4536	71.16	60.96	333.8	84.68	27.32	635.9	2416	8066
68.0	6381.654	-80.5790	28.4541	71.21	60.32	343.4	84.51	27.51	645.8	2582	8361
69.0	6381.956	-80.5773	28.4546	71.25	59.68	353.1	84.34	27.69	655.9	2755	8663
70.0	6382.264	-80.5756	28.4551	71.30	59.04	362.9	84.17	27.85	666.2	2938	8971
71.0	6382.579	-80.5737	28.4557	71.33	58.41	373.0	83.99	28.00	676.8	3128	9286
72.0	6382.900	-80.5718	28.4562	71.36	57.79	383.4	83.82	28.14	687.7	3328	9607
73.0	6383.227	-80.5698	28.4568	71.38	57.17	393.9	83.64	28.27	698.8	3537	9935
74.0	6383.562	-80.5676	28.4574	71.38	56.56	404.7	83.45	28.39	710.1	3754	10269
75.0	6383.903	-80.5654	28.4581	71.37	55.95	415.7	83.27	28.51	721.7	3982	10611
76.0	6384.250	-80.5631	28.4588	71.35	55.35	426.9	83.08	28.61	733.5	4219	10959
77.0	6384.605	-80.5607	28.4595	71.33	54.77	438.4	82.89	28.71	745.6	4467	11314
78.0	6384.967	-80.5582	28.4602	71.29	54.19	450.2	82.69	28.79	757.9	4724	11675
79.0	6385.335	-80.5556	28.4610	71.26	53.62	462.1	82.50	28.88	770.5	4993	12044
80.0	6385.711	-80.5529	28.4618	71.23	53.06	474.4	82.31	28.95	783.3	5272	12420
81.0	6386.094	-80.5501	28.4627	71.21	52.51	486.8	82.12	29.02	796.4	5562	12803
MAXIMUM DYNAMIC PRESSURE											
81.100	6386.132	-80.5498	28.4627	71.20	52.46	488.1	82.10	29.02	797.8	5591	12842
82.0	6386.484	-80.5472	28.4635	71.19	51.96	499.6	81.94	29.07	809.8	5863	13193
83.0	6386.881	-80.5442	28.4644	71.17	51.41	512.6	81.76	29.11	823.5	6176	13591
84.0	6387.285	-80.5410	28.4654	71.17	50.86	525.9	81.58	29.14	837.6	6501	13995
85.0	6387.696	-80.5378	28.4664	71.17	50.30	539.5	81.40	29.16	851.9	6839	14407
86.0	6388.115	-80.5344	28.4674	71.17	49.74	553.3	81.23	29.16	866.6	7189	14826
87.0	6388.541	-80.5309	28.4684	71.18	49.18	567.5	81.06	29.15	881.7	7552	15252
88.0	6388.974	-80.5272	28.4695	71.19	48.61	581.9	80.89	29.12	897.0	7929	15686
89.0	6389.414	-80.5234	28.4707	71.21	48.05	596.6	80.73	29.09	912.7	8320	16126
90.0	6389.861	-80.5195	28.4718	71.23	47.49	611.6	80.57	29.05	928.6	8725	16574
91.0	6390.316	-80.5155	28.4730	71.25	46.94	626.9	80.42	29.00	944.9	9144	17029
92.0	6390.777	-80.5112	28.4743	71.27	46.40	642.4	80.27	28.94	961.4	9579	17491

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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	6391.246	-80.5069	28.4756	71.30	45.87	658.3	80.12	28.88	978.2	10028	17960
94.0	6391.722	-80.5024	28.4769	71.32	45.35	674.4	79.98	28.82	995.3	10493	18436
95.0	6392.206	-80.4977	28.4783	71.35	44.84	690.8	79.84	28.75	1012.6	10973	18920
96.0	6392.697	-80.4929	28.4797	71.38	44.33	707.5	79.70	28.68	1030.3	11470	19411
97.0	6393.195	-80.4880	28.4812	71.41	43.84	724.5	79.57	28.60	1048.2	11982	19910
98.0	6393.700	-80.4828	28.4827	71.44	43.35	741.8	79.44	28.52	1066.5	12512	20416
99.0	6394.213	-80.4775	28.4843	71.47	42.86	759.4	79.32	28.43	1085.0	13058	20929
100.0	6394.733	-80.4721	28.4859	71.50	42.38	777.3	79.19	28.34	1103.9	13622	21450
101.0	6395.261	-80.4664	28.4876	71.52	41.91	795.6	79.07	28.24	1123.0	14203	21978
102.0	6395.796	-80.4606	28.4893	71.55	41.45	814.1	78.95	28.14	1142.5	14802	22514
103.0	6396.339	-80.4546	28.4910	71.58	40.99	832.9	78.83	28.04	1162.2	15419	23057
104.0	6396.889	-80.4485	28.4928	71.61	40.54	852.1	78.72	27.93	1182.3	16055	23608
105.0	6397.447	-80.4421	28.4947	71.63	40.10	871.5	78.61	27.82	1202.7	16709	24166
106.0	6398.012	-80.4356	28.4966	71.66	39.66	891.3	78.50	27.71	1223.3	17383	24732
107.0	6398.584	-80.4288	28.4985	71.69	39.23	911.3	78.40	27.60	1244.3	18076	25305
108.0	6399.164	-80.4219	28.5006	71.71	38.81	931.7	78.29	27.48	1265.6	18789	25886
109.0	6399.752	-80.4148	28.5026	71.73	38.40	952.4	78.19	27.36	1287.1	19522	26474
110.0	6400.348	-80.4075	28.5047	71.75	37.99	973.5	78.09	27.25	1309.0	20276	27070
111.0	6400.951	-80.3999	28.5069	71.77	37.60	994.8	77.99	27.13	1331.2	21050	27674
112.0	6401.562	-80.3922	28.5092	71.78	37.21	1016.5	77.89	27.00	1353.7	21846	28286
113.0	6402.180	-80.3843	28.5115	71.80	36.82	1038.5	77.79	26.88	1376.5	22663	28905
114.0	6402.806	-80.3761	28.5138	71.82	36.44	1060.9	77.70	26.76	1399.7	23501	29532
115.0	6403.440	-80.3677	28.5162	71.83	36.07	1083.6	77.61	26.63	1423.2	24362	30167
116.0	6404.082	-80.3592	28.5187	71.85	35.71	1106.7	77.52	26.51	1447.0	25245	30810
117.0	6404.732	-80.3504	28.5212	71.87	35.35	1130.1	77.43	26.38	1471.2	26151	31460
118.0	6405.390	-80.3413	28.5238	71.89	34.99	1153.8	77.35	26.26	1495.7	27079	32119
119.0	6406.056	-80.3321	28.5265	71.91	34.64	1178.0	77.27	26.13	1520.6	28032	32785
120.0	6406.729	-80.3226	28.5292	71.93	34.30	1202.4	77.19	26.00	1545.8	29008	33460
121.0	6407.411	-80.3128	28.5320	71.94	33.95	1227.3	77.11	25.86	1571.4	30008	34142
122.0	6408.100	-80.3029	28.5349	71.96	33.61	1252.6	77.03	25.73	1597.4	31033	34832
123.0	6408.797	-80.2926	28.5378	71.97	33.28	1278.2	76.95	25.59	1623.8	32083	35531
124.0	6409.503	-80.2822	28.5408	71.99	32.94	1304.2	76.87	25.45	1650.6	33159	36237
125.0	6410.216	-80.2715	28.5438	72.00	32.61	1330.7	76.80	25.31	1677.7	34260	36951
126.0	6410.937	-80.2605	28.5470	72.02	32.29	1357.6	76.73	25.17	1705.3	35388	37673
127.0	6411.666	-80.2492	28.5502	72.03	31.98	1384.8	76.66	25.03	1733.3	36542	38403
128.0	6412.404	-80.2377	28.5534	72.04	31.67	1412.5	76.59	24.89	1761.6	37723	39142
129.0	6413.150	-80.2260	28.5568	72.05	31.35	1440.4	76.52	24.75	1790.2	38932	39889
130.0	6413.904	-80.2139	28.5602	72.07	31.06	1468.9	76.45	24.62	1819.4	40168	40644
131.0	6414.666	-80.2016	28.5637	72.08	30.77	1497.9	76.39	24.49	1849.0	41432	41407
132.0	6415.437	-80.1890	28.5673	72.09	30.49	1527.4	76.32	24.35	1879.1	42725	42179
133.0	6416.217	-80.1762	28.5709	72.09	30.21	1557.3	76.26	24.23	1909.6	44048	42960
134.0	6417.005	-80.1630	28.5747	72.10	29.94	1587.7	76.19	24.10	1940.5	45399	43750
135.0	6417.802	-80.1495	28.5785	72.11	29.67	1618.5	76.13	23.97	1971.9	46780	44548

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
135.240	6417.995	-80.1463	28.5794	72.11	29.61	1625.9	76.11	23.94	1979.5	47117	44741
136.0	6418.606	-80.1358	28.5824	72.12	29.41	1646.4	76.07	23.84	2000.4	48189	45354
137.0	6419.417	-80.1218	28.5863	72.13	29.15	1670.3	76.03	23.69	2024.9	49624	46166
138.0	6420.235	-80.1076	28.5904	72.14	28.90	1694.6	75.99	23.55	2049.8	51087	46985
139.0	6421.057	-80.0931	28.5945	72.15	28.65	1719.2	75.94	23.41	2074.9	52572	47808
140.0	6421.883	-80.0784	28.5986	72.16	28.41	1744.1	75.90	23.27	2100.4	54081	48636
141.0	6422.716	-80.0634	28.6028	72.17	28.17	1769.3	75.87	23.13	2126.2	55616	49470
142.0	6423.554	-80.0482	28.6071	72.19	27.93	1795.0	75.83	22.99	2152.4	57177	50309
143.0	6424.398	-80.0327	28.6115	72.20	27.69	1820.9	75.79	22.85	2178.9	58763	51154
144.0	6425.247	-80.0170	28.6159	72.22	27.46	1847.5	75.76	22.72	2206.0	60376	52005
145.0	6426.102	-80.0010	28.6204	72.23	27.23	1874.2	75.72	22.58	2233.2	62016	52861
146.0	6426.962	-79.9848	28.6250	72.25	27.01	1901.2	75.69	22.45	2260.8	63682	53723
147.0	6427.829	-79.9683	28.6296	72.26	26.78	1928.8	75.66	22.32	2288.8	65375	54591
148.0	6428.701	-79.9515	28.6344	72.28	26.57	1956.7	75.62	22.19	2317.3	67096	55464
149.0	6429.579	-79.9344	28.6391	72.29	26.35	1984.9	75.59	22.06	2346.0	68845	56344
150.0	6430.463	-79.9171	28.6440	72.30	26.14	2013.6	75.56	21.93	2375.2	70623	57230
151.0	6431.353	-79.8994	28.6489	72.32	25.93	2042.7	75.53	21.80	2404.7	72429	58121
152.0	6432.250	-79.8815	28.6539	72.33	25.72	2072.2	75.50	21.68	2434.7	74264	59019
153.0	6433.152	-79.8633	28.6590	72.35	25.52	2102.1	75.47	21.55	2465.1	76128	59923
154.0	6434.061	-79.8448	28.6642	72.36	25.32	2132.5	75.44	21.43	2495.9	78022	60834
155.0	6434.976	-79.8260	28.6694	72.37	25.11	2163.2	75.41	21.30	2527.1	79947	61751
156.0	6435.898	-79.8069	28.6747	72.39	24.92	2194.6	75.38	21.18	2558.9	81903	62674
157.0	6436.826	-79.7875	28.6801	72.40	24.73	2226.4	75.35	21.06	2591.1	83889	63604
158.0	6437.761	-79.7678	28.6856	72.42	24.54	2258.7	75.33	20.95	2623.9	85907	64540
159.0	6438.702	-79.7478	28.6912	72.43	24.35	2291.5	75.30	20.83	2657.1	87957	65484
160.0	6439.651	-79.7274	28.6968	72.45	24.16	2324.8	75.28	20.71	2690.8	90039	66434
161.0	6440.607	-79.7068	28.7026	72.46	23.98	2358.6	75.25	20.60	2725.0	92155	67392
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
161.740	6441.318	-79.6913	28.7069	72.47	23.85	2384.0	75.23	20.51	2750.7	93742	68104
162.0	6441.568	-79.6858	28.7084	72.47	23.80	2391.7	75.23	20.48	2758.5	94302	68355
S-IC/S-II SEPARATION COMMAND											
162.400	6441.955	-79.6773	28.7107	72.48	23.74	2392.8	75.23	20.43	2759.7	95171	68743
164.0	6443.487	-79.6434	28.7201	72.50	23.45	2387.8	75.25	20.17	2755.5	98639	70277
166.0	6445.379	-79.6008	28.7319	72.53	23.09	2384.1	75.27	19.86	2752.8	102989	72173
168.0	6447.234	-79.5584	28.7436	72.56	22.73	2388.2	75.28	19.55	2757.9	107331	74032
170.0	6449.069	-79.5157	28.7553	72.59	22.37	2394.8	75.29	19.24	2765.4	111699	75871

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
172.0	6450.882	-79.4727	28.7671	72.62	22.02	2402.9	75.31	18.95	2774.4	116089	77687
174.0	6452.673	-79.4295	28.7790	72.64	21.67	2411.6	75.32	18.66	2783.9	120503	79482
176.0	6454.444	-79.3860	28.7909	72.67	21.33	2420.2	75.33	18.37	2793.4	124943	81257
178.0	6456.194	-79.3423	28.8028	72.70	20.99	2429.1	75.34	18.08	2803.1	129408	83010
180.0	6457.924	-79.2983	28.8148	72.73	20.65	2438.2	75.35	17.80	2813.0	133898	84744
182.0	6459.633	-79.2540	28.8269	72.76	20.32	2447.5	75.37	17.52	2823.0	138414	86458
184.0	6461.323	-79.2095	28.8390	72.79	19.99	2456.9	75.38	17.24	2833.2	142956	88151
186.0	6462.993	-79.1647	28.8511	72.82	19.66	2466.5	75.39	16.97	2843.6	147524	89824
188.0	6464.642	-79.1197	28.8633	72.85	19.34	2476.3	75.40	16.70	2854.1	152117	91478
190.0	6466.273	-79.0743	28.8755	72.88	19.02	2486.2	75.42	16.43	2864.7	156738	93112
192.0	6467.884	-79.0287	28.8878	72.91	18.71	2496.3	75.43	16.17	2875.6	161384	94727
194.0	6469.476	-78.9829	28.9001	72.94	18.40	2506.7	75.44	15.91	2886.6	166057	96323
196.0	6471.048	-78.9367	28.9125	72.97	18.09	2517.1	75.46	15.65	2897.7	170756	97900
198.0	6472.602	-78.8903	28.9250	73.00	17.79	2527.8	75.47	15.39	2909.0	175483	99457
200.0	6474.137	-78.8436	28.9374	73.04	17.49	2538.6	75.49	15.14	2920.4	180236	100996
202.0	6475.654	-78.7966	28.9500	73.07	17.19	2549.6	75.50	14.89	2932.0	185017	102517
204.0	6477.152	-78.7494	28.9625	73.10	16.90	2560.8	75.52	14.65	2943.8	189825	104019
206.0	6478.632	-78.7018	28.9752	73.13	16.61	2572.1	75.53	14.41	2955.7	194660	105503
208.0	6480.094	-78.6540	28.9878	73.16	16.34	2583.6	75.55	14.17	2967.8	199523	106969
210.0	6481.539	-78.6059	29.0006	73.19	16.07	2595.2	75.56	13.95	2979.9	204414	108418
212.0	6482.967	-78.5575	29.0133	73.23	15.80	2607.0	75.58	13.72	2992.1	209332	109850
214.0	6484.378	-78.5088	29.0262	73.26	15.54	2618.8	75.60	13.50	3004.5	214277	111266
216.0	6485.773	-78.4598	29.0390	73.29	15.28	2630.9	75.61	13.28	3017.1	219251	112664
218.0	6487.151	-78.4105	29.0519	73.33	15.02	2643.1	75.63	13.06	3029.8	224253	114046
220.0	6488.512	-78.3610	29.0649	73.36	14.76	2655.4	75.65	12.85	3042.6	229283	115412
222.0	6489.857	-78.3111	29.0779	73.39	14.51	2667.9	75.67	12.63	3055.5	234341	116761
224.0	6491.186	-78.2610	29.0910	73.43	14.26	2680.6	75.68	12.42	3068.6	239428	118094
226.0	6492.498	-78.2105	29.1041	73.46	14.01	2693.4	75.70	12.21	3081.9	244544	119410
228.0	6493.794	-78.1598	29.1172	73.50	13.76	2706.3	75.72	12.00	3095.2	249689	120710
230.0	6495.073	-78.1087	29.1304	73.53	13.52	2719.4	75.74	11.80	3108.7	254863	121994
232.0	6496.336	-78.0573	29.1437	73.56	13.28	2732.6	75.76	11.59	3122.3	260066	123261
234.0	6497.583	-78.0057	29.1570	73.60	13.04	2746.0	75.78	11.39	3136.1	265299	124512
236.0	6498.814	-77.9537	29.1703	73.63	12.80	2759.5	75.80	11.19	3150.0	270562	125747
238.0	6500.029	-77.9014	29.1837	73.67	12.57	2773.1	75.82	11.00	3164.1	275854	126967
240.0	6501.228	-77.8488	29.1972	73.70	12.34	2787.0	75.84	10.80	3178.3	281177	128170
242.0	6502.412	-77.7959	29.2107	73.74	12.11	2800.9	75.86	10.61	3192.6	286530	129358
244.0	6503.580	-77.7426	29.2242	73.78	11.89	2815.0	75.88	10.42	3207.0	291913	130530
246.0	6504.732	-77.6891	29.2378	73.81	11.67	2829.3	75.90	10.23	3221.6	297327	131686
248.0	6505.868	-77.6352	29.2514	73.85	11.45	2843.7	75.92	10.04	3236.3	302772	132827
250.0	6506.989	-77.5810	29.2651	73.88	11.23	2858.2	75.94	9.86	3251.2	308248	133953
252.0	6508.095	-77.5264	29.2788	73.92	11.02	2872.9	75.96	9.68	3266.2	313755	135063
254.0	6509.186	-77.4716	29.2926	73.96	10.81	2887.7	75.98	9.50	3281.3	319293	136158
256.0	6510.261	-77.4164	29.3064	73.99	10.60	2902.7	76.00	9.32	3296.6	324863	137237

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
258.0	6511.321	-77.3609	29.3203	74.03	10.39	2917.8	76.02	9.14	3312.0	330465	138302
260.0	6512.366	-77.3050	29.3342	74.07	10.19	2933.1	76.05	8.97	3327.6	336099	139351
262.0	6513.396	-77.2488	29.3482	74.10	9.99	2948.5	76.07	8.80	3343.3	341765	140386
264.0	6514.411	-77.1923	29.3622	74.14	9.79	2964.0	76.09	8.63	3359.1	347464	141406
266.0	6515.412	-77.1354	29.3763	74.18	9.59	2979.7	76.11	8.46	3375.0	353195	142411
268.0	6516.398	-77.0782	29.3904	74.21	9.40	2995.6	76.14	8.29	3391.2	358959	143401
270.0	6517.369	-77.0206	29.4045	74.25	9.21	3011.6	76.16	8.13	3407.4	364756	144377
272.0	6518.325	-76.9627	29.4188	74.29	9.02	3027.8	76.18	7.97	3423.8	370587	145338
274.0	6519.268	-76.9044	29.4330	74.33	8.83	3044.1	76.21	7.81	3440.4	376451	146285
276.0	6520.196	-76.8458	29.4473	74.36	8.65	3060.6	76.23	7.65	3457.1	382349	147217
278.0	6521.109	-76.7868	29.4617	74.40	8.47	3077.2	76.25	7.50	3473.9	388280	148136
280.0	6522.009	-76.7274	29.4761	74.44	8.29	3093.9	76.28	7.35	3490.8	394246	149040
282.0	6522.895	-76.6677	29.4905	74.48	8.12	3110.8	76.30	7.19	3507.9	400247	149930
284.0	6523.766	-76.6077	29.5051	74.52	7.94	3127.8	76.33	7.04	3525.2	406282	150806
286.0	6524.623	-76.5472	29.5196	74.56	7.77	3145.0	76.35	6.89	3542.5	412351	151668
288.0	6525.467	-76.4864	29.5342	74.59	7.60	3162.3	76.38	6.75	3560.0	418456	152517
290.0	6526.297	-76.4252	29.5488	74.63	7.44	3179.8	76.40	6.61	3577.7	424596	153351
292.0	6527.113	-76.3637	29.5635	74.67	7.27	3197.4	76.43	6.46	3595.5	430772	154172
294.0	6527.916	-76.3018	29.5783	74.71	7.11	3215.2	76.45	6.32	3613.4	436983	154980
296.0	6528.705	-76.2394	29.5931	74.75	6.95	3233.1	76.48	6.19	3631.5	443230	155774
298.0	6529.481	-76.1768	29.6079	74.79	6.79	3251.1	76.51	6.05	3649.7	449514	156554
300.0	6530.244	-76.1137	29.6228	74.83	6.64	3269.3	76.53	5.92	3668.0	455834	157322
302.0	6530.993	-76.0502	29.6377	74.87	6.49	3287.6	76.56	5.78	3686.5	462190	158076
304.0	6531.730	-75.9864	29.6527	74.91	6.34	3306.1	76.59	5.65	3705.2	468583	158817
306.0	6532.453	-75.9221	29.6677	74.95	6.19	3324.8	76.61	5.52	3724.0	475014	159545
308.0	6533.164	-75.8575	29.6828	74.99	6.04	3343.6	76.64	5.40	3742.9	481482	160261
310.0	6533.861	-75.7924	29.6980	75.03	5.90	3362.5	76.67	5.27	3762.0	487987	160964
312.0	6534.547	-75.7270	29.7131	75.08	5.76	3381.6	76.70	5.15	3781.2	494531	161654
314.0	6535.219	-75.6612	29.7283	75.12	5.62	3400.8	76.73	5.03	3800.6	501112	162331
316.0	6535.880	-75.5949	29.7436	75.16	5.49	3420.2	76.75	4.91	3820.1	507732	162996
318.0	6536.528	-75.5282	29.7589	75.20	5.35	3439.8	76.78	4.79	3839.8	514391	163649
320.0	6537.163	-75.4612	29.7743	75.24	5.22	3459.5	76.81	4.68	3859.6	521088	164290
322.0	6537.787	-75.3937	29.7897	75.28	5.09	3479.4	76.84	4.57	3879.6	527825	164919
324.0	6538.399	-75.3258	29.8051	75.33	4.96	3499.4	76.87	4.45	3899.7	534601	165535
326.0	6538.998	-75.2574	29.8206	75.37	4.84	3519.6	76.90	4.34	3920.0	541417	166140
328.0	6539.586	-75.1887	29.8362	75.41	4.72	3540.0	76.93	4.24	3940.5	548272	166733
330.0	6540.163	-75.1195	29.8518	75.46	4.60	3560.5	76.96	4.13	3961.1	555169	167314
332.0	6540.727	-75.0499	29.8674	75.50	4.48	3581.2	76.99	4.03	3981.8	562105	167884
334.0	6541.281	-74.9798	29.8831	75.54	4.36	3602.0	77.02	3.92	4002.8	569083	168443
336.0	6541.822	-74.9094	29.8988	75.59	4.24	3623.0	77.06	3.82	4023.9	576101	168989
338.0	6542.353	-74.8384	29.9146	75.63	4.13	3644.2	77.09	3.72	4045.1	583161	169525
340.0	6542.872	-74.7671	29.9304	75.67	4.02	3665.5	77.12	3.62	4066.5	590263	170049
342.0	6543.380	-74.6952	29.9463	75.72	3.91	3687.0	77.15	3.53	4088.1	597407	170563

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
344.0	6543.878	-74.6230	29.9622	75.76	3.80	3708.7	77.18	3.43	4109.9	604593	171065
346.0	6544.364	-74.5502	29.9782	75.81	3.70	3730.5	77.22	3.34	4131.8	611822	171557
348.0	6544.840	-74.4770	29.9942	75.85	3.59	3752.5	77.25	3.25	4153.9	619093	172038
350.0	6545.305	-74.4034	30.0102	75.90	3.49	3774.7	77.28	3.16	4176.1	626408	172508
352.0	6545.760	-74.3293	30.0263	75.94	3.39	3797.1	77.32	3.07	4198.5	633767	172968
354.0	6546.204	-74.2547	30.0425	75.99	3.30	3819.6	77.35	2.98	4221.1	641169	173417
356.0	6546.638	-74.1796	30.0586	76.04	3.20	3842.3	77.38	2.90	4243.8	648615	173857
358.0	6547.062	-74.1041	30.0749	76.08	3.11	3865.1	77.42	2.81	4266.8	656106	174286
360.0	6547.476	-74.0281	30.0911	76.13	3.01	3888.2	77.45	2.73	4289.8	663642	174705
362.0	6547.880	-73.9516	30.1075	76.18	2.92	3911.4	77.49	2.65	4313.1	671222	175114
364.0	6548.274	-73.8746	30.1238	76.22	2.84	3934.8	77.52	2.57	4336.6	678848	175514
366.0	6548.659	-73.7972	30.1402	76.27	2.75	3958.4	77.56	2.50	4360.2	686520	175904
368.0	6549.034	-73.7192	30.1567	76.32	2.67	3982.1	77.60	2.42	4384.0	694238	176284
370.0	6549.399	-73.6407	30.1731	76.37	2.58	4006.0	77.63	2.35	4407.9	702003	176655
372.0	6549.756	-73.5618	30.1897	76.41	2.50	4030.1	77.67	2.27	4432.1	709814	177017
374.0	6550.103	-73.4823	30.2062	76.46	2.42	4054.4	77.71	2.20	4456.5	717672	177370
376.0	6550.442	-73.4023	30.2228	76.51	2.35	4078.9	77.74	2.14	4481.0	725578	177714
378.0	6550.771	-73.3218	30.2395	76.56	2.27	4103.6	77.78	2.07	4505.7	733532	178049
380.0	6551.092	-73.2408	30.2562	76.61	2.20	4128.4	77.82	2.00	4530.6	741533	178375
382.0	6551.404	-73.1593	30.2729	76.66	2.12	4153.5	77.86	1.94	4555.7	749583	178693
384.0	6551.708	-73.0772	30.2897	76.71	2.05	4178.8	77.89	1.87	4581.0	757683	179002
386.0	6552.003	-72.9947	30.3065	76.76	1.99	4204.3	77.93	1.81	4606.5	765831	179303
388.0	6552.291	-72.9115	30.3234	76.81	1.92	4229.9	77.97	1.75	4632.2	774029	179595
390.0	6552.570	-72.8279	30.3403	76.86	1.85	4255.8	78.01	1.69	4658.1	782277	179880
392.0	6552.841	-72.7437	30.3572	76.91	1.79	4281.9	78.05	1.64	4684.2	790576	180157
394.0	6553.105	-72.6589	30.3742	76.96	1.73	4308.1	78.09	1.58	4710.5	798925	180427
396.0	6553.362	-72.5736	30.3912	77.01	1.67	4334.6	78.13	1.53	4737.0	807326	180688
398.0	6553.610	-72.4877	30.4082	77.06	1.61	4361.3	78.17	1.47	4763.7	815778	180943
400.0	6553.851	-72.4013	30.4253	77.11	1.55	4388.2	78.21	1.42	4790.7	824282	181189
402.0	6554.085	-72.3143	30.4424	77.16	1.50	4415.3	78.25	1.37	4817.8	832839	181429
404.0	6554.312	-72.2268	30.4596	77.22	1.44	4442.6	78.29	1.32	4845.1	841448	181662
406.0	6554.532	-72.1386	30.4768	77.27	1.39	4470.2	78.34	1.27	4872.7	850111	181887
408.0	6554.746	-72.0499	30.4940	77.32	1.34	4497.9	78.38	1.23	4900.5	858827	182106
410.0	6554.952	-71.9606	30.5113	77.37	1.29	4525.9	78.42	1.18	4928.5	867597	182319
412.0	6555.153	-71.8707	30.5286	77.43	1.24	4554.1	78.46	1.14	4956.7	876422	182525
414.0	6555.347	-71.7802	30.5460	77.48	1.20	4582.6	78.51	1.10	4985.2	885302	182724
416.0	6555.535	-71.6892	30.5633	77.54	1.15	4611.2	78.55	1.06	5013.9	894237	182918
418.0	6555.717	-71.5975	30.5807	77.59	1.11	4640.1	78.60	1.02	5042.8	903228	183106
420.0	6555.894	-71.5052	30.5982	77.65	1.07	4669.3	78.64	0.98	5072.0	912275	183289
422.0	6556.065	-71.4123	30.6157	77.70	1.03	4698.7	78.68	0.94	5101.4	921379	183465
424.0	6556.231	-71.3187	30.6332	77.76	0.99	4728.3	78.73	0.91	5131.0	930540	183637
426.0	6556.391	-71.2246	30.6507	77.81	0.95	4758.2	78.78	0.88	5160.9	939759	183803
428.0	6556.546	-71.1298	30.6683	77.87	0.91	4788.3	78.82	0.84	5191.0	949036	183964

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
430.0	6556.697	-71.0343	30.6859	77.92	0.88	4818.6	78.87	0.81	5221.4	958372	184120
432.0	6556.842	-70.9383	30.7035	77.98	0.85	4849.3	78.91	0.78	5252.0	967767	184272
434.0	6556.984	-70.8415	30.7212	78.04	0.82	4880.2	78.96	0.75	5283.0	977221	184419
436.0	6557.121	-70.7442	30.7389	78.10	0.79	4911.4	79.01	0.73	5314.1	986736	184562
438.0	6557.254	-70.6461	30.7566	78.15	0.76	4942.7	79.06	0.70	5345.5	996311	184700
440.0	6557.384	-70.5474	30.7743	78.21	0.73	4974.4	79.11	0.68	5377.2	1005948	184836
442.0	6557.512	-70.4481	30.7921	78.27	0.71	5006.3	79.15	0.65	5409.1	1015645	184970
444.0	6557.637	-70.3480	30.8099	78.33	0.68	5038.5	79.20	0.63	5441.4	1025405	185101
446.0	6557.756	-70.2473	30.8277	78.39	0.66	5071.1	79.25	0.61	5474.0	1035228	185226
448.0	6557.870	-70.1459	30.8456	78.45	0.64	5104.0	79.30	0.59	5506.8	1045115	185346
450.0	6557.979	-70.0438	30.8634	78.51	0.62	5137.1	79.35	0.57	5539.9	1055065	185461
452.0	6558.088	-69.9409	30.8813	78.57	0.60	5170.4	79.40	0.56	5573.3	1065080	185576
454.0	6558.196	-69.8374	30.8992	78.63	0.58	5204.0	79.46	0.54	5606.8	1075160	185689
456.0	6558.301	-69.7332	30.9172	78.69	0.57	5237.9	79.51	0.53	5640.8	1085305	185801
458.0	6558.405	-69.6282	30.9351	78.75	0.55	5272.2	79.56	0.52	5675.1	1095517	185910
460.0	6558.506	-69.5225	30.9531	78.81	0.54	5306.8	79.61	0.50	5709.7	1105795	186018
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
460.750	6558.544	-69.4827	30.9599	78.84	0.54	5319.8	79.63	0.50	5722.7	1109667	186057
462.0	6558.606	-69.4161	30.9711	78.88	0.52	5338.2	79.67	0.49	5741.1	1116139	186123
464.0	6558.701	-69.3091	30.9891	78.94	0.50	5366.4	79.72	0.46	5769.3	1126537	186225
466.0	6558.792	-69.2014	31.0071	79.00	0.47	5394.7	79.77	0.44	5797.6	1136992	186321
468.0	6558.880	-69.0932	31.0251	79.06	0.45	5423.2	79.82	0.42	5826.1	1147501	186415
470.0	6558.963	-68.9843	31.0431	79.12	0.44	5451.7	79.88	0.41	5854.6	1158066	186505
472.0	6559.045	-68.8749	31.0610	79.18	0.43	5480.3	79.93	0.41	5883.2	1168686	186592
474.0	6559.123	-68.7648	31.0790	79.25	0.43	5509.1	79.99	0.40	5912.0	1179363	186676
476.0	6559.200	-68.6540	31.0969	79.31	0.43	5538.0	80.04	0.40	5940.9	1190095	186759
478.0	6559.277	-68.5427	31.1149	79.37	0.43	5566.9	80.10	0.40	5969.8	1200884	186842
480.0	6559.358	-68.4307	31.1328	79.44	0.44	5596.1	80.16	0.41	5999.1	1211729	186929
482.0	6559.443	-68.3181	31.1507	79.50	0.44	5625.6	80.21	0.41	6028.6	1222631	187020
484.0	6559.531	-68.2049	31.1686	79.57	0.45	5655.3	80.27	0.42	6058.3	1233589	187114
486.0	6559.622	-68.0910	31.1865	79.63	0.45	5685.3	80.33	0.42	6088.3	1244605	187211
488.0	6559.717	-67.9765	31.2044	79.70	0.46	5715.6	80.38	0.43	6118.5	1255680	187312
490.0	6559.816	-67.8613	31.2222	79.76	0.47	5745.8	80.44	0.44	6148.8	1266812	187416
492.0	6559.916	-67.7456	31.2400	79.83	0.47	5772.6	80.50	0.44	6175.6	1277998	187522
494.0	6560.014	-67.6292	31.2578	79.90	0.46	5796.8	80.56	0.43	6199.7	1289235	187626
496.0	6560.109	-67.5124	31.2755	79.97	0.45	5820.6	80.62	0.42	6223.6	1300519	187726
498.0	6560.199	-67.3950	31.2932	80.04	0.44	5844.6	80.69	0.41	6247.6	1311849	187823
500.0	6560.288	-67.2770	31.3109	80.11	0.43	5868.7	80.75	0.40	6271.7	1323226	187918
502.0	6560.375	-67.1586	31.3284	80.18	0.42	5892.9	80.81	0.39	6295.9	1334650	188011
504.0	6560.461	-67.0396	31.3460	80.25	0.41	5917.3	80.87	0.39	6320.3	1346121	188103
506.0	6560.546	-66.9200	31.3635	80.32	0.41	5941.8	80.94	0.38	6344.9	1357639	188193

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
508.0	6560.630	-66.7999	31.3809	80.39	0.40	5966.5	81.00	0.38	6369.5	1369205	188283
510.0	6560.713	-66.6793	31.3983	80.46	0.40	5991.2	81.06	0.37	6394.2	1380819	188372
512.0	6560.797	-66.5581	31.4156	80.53	0.40	6016.1	81.13	0.37	6419.1	1392480	188461
514.0	6560.880	-66.4364	31.4328	80.60	0.40	6041.2	81.19	0.37	6444.2	1404190	188550
516.0	6560.963	-66.3141	31.4500	80.67	0.39	6066.4	81.26	0.37	6469.5	1415949	188640
518.0	6561.047	-66.1913	31.4672	80.74	0.39	6091.8	81.32	0.37	6494.9	1427757	188729
520.0	6561.130	-66.0679	31.4843	80.82	0.39	6117.4	81.39	0.37	6520.5	1439614	188818
522.0	6561.214	-65.9440	31.5013	80.89	0.39	6143.1	81.46	0.37	6546.2	1451521	188907
524.0	6561.298	-65.8194	31.5182	80.96	0.39	6169.1	81.52	0.37	6572.2	1463478	188997
526.0	6561.382	-65.6943	31.5351	81.04	0.39	6195.2	81.59	0.37	6598.3	1475485	189087
528.0	6561.467	-65.5686	31.5520	81.11	0.39	6221.5	81.66	0.37	6624.6	1487543	189177
530.0	6561.553	-65.4424	31.5687	81.19	0.40	6247.9	81.72	0.37	6651.1	1499652	189269
532.0	6561.640	-65.3155	31.5854	81.26	0.40	6274.5	81.79	0.37	6677.7	1511812	189361
534.0	6561.727	-65.1881	31.6020	81.33	0.40	6301.4	81.86	0.38	6704.5	1524024	189454
536.0	6561.816	-65.0601	31.6186	81.41	0.41	6328.4	81.93	0.38	6731.5	1536288	189549
538.0	6561.906	-64.9315	31.6350	81.49	0.41	6355.6	82.00	0.39	6758.7	1548605	189644
540.0	6561.998	-64.8023	31.6514	81.56	0.42	6382.9	82.07	0.39	6786.1	1560974	189741
542.0	6562.092	-64.6724	31.6677	81.64	0.42	6410.4	82.14	0.40	6813.6	1573396	189840
544.0	6562.187	-64.5420	31.6840	81.71	0.43	6438.1	82.21	0.40	6841.3	1585872	189941
546.0	6562.285	-64.4110	31.7001	81.79	0.44	6466.0	82.28	0.41	6869.2	1598402	190044
548.0	6562.384	-64.2793	31.7162	81.87	0.45	6494.1	82.35	0.42	6897.3	1610985	190149
550.0	6562.487	-64.1470	31.7322	81.95	0.46	6522.4	82.42	0.43	6925.7	1623623	190257
552.0	6562.593	-64.0141	31.7481	82.02	0.47	6551.0	82.49	0.44	6954.2	1636322	190369
S-II OUTBOARD ENGINE CUTOFF (ENGINE SCLENCID)											
552.340	6562.611	-63.9914	31.7508	82.04	0.47	6555.9	82.50	0.44	6959.1	1638486	190388
S-II/S-IVB SEPARATION CCMMAND											
553.200	6562.657	-63.9341	31.7576	82.07	0.46	6558.6	82.53	0.43	6961.9	1643960	190436
554.0	6562.700	-63.8807	31.7640	82.10	0.45	6558.7	82.56	0.42	6961.9	1649058	190481
556.0	6562.797	-63.7473	31.7796	82.18	0.41	6558.9	82.64	0.39	6962.2	1661788	190583
558.0	6562.889	-63.6138	31.7951	82.26	0.38	6560.6	82.71	0.36	6963.8	1674527	190680
560.0	6562.975	-63.4801	31.8105	82.34	0.37	6569.9	82.79	0.35	6973.2	1687275	190771
562.0	6563.057	-63.3462	31.8257	82.42	0.35	6580.3	82.86	0.33	6983.6	1700042	190859
564.0	6563.137	-63.2120	31.8408	82.50	0.34	6590.9	82.93	0.32	6994.1	1712830	190944
566.0	6563.213	-63.0776	31.8557	82.58	0.32	6601.6	83.01	0.30	7004.9	1725638	191025
568.0	6563.285	-62.9429	31.8706	82.66	0.30	6612.7	83.08	0.29	7016.0	1738467	191102
570.0	6563.353	-62.8080	31.8852	82.74	0.28	6623.8	83.15	0.27	7027.1	1751317	191175
572.0	6563.417	-62.6727	31.8998	82.81	0.27	6634.9	83.23	0.25	7038.2	1764189	191243
574.0	6563.476	-62.5372	31.9142	82.89	0.25	6646.2	83.30	0.23	7049.5	1777082	191308
576.0	6563.532	-62.4014	31.9285	82.98	0.23	6657.4	83.38	0.22	7060.8	1789997	191368

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
578.0	6563.584	-62.2654	31.9427	83.06	0.21	6668.7	83.45	0.20	7072.1	1802934	191425
580.0	6563.632	-62.1290	31.9567	83.14	0.20	6680.1	83.53	0.19	7083.4	1815893	191478
582.0	6563.676	-61.9924	31.9705	83.22	0.18	6691.4	83.61	0.17	7094.8	1828873	191526
584.0	6563.716	-61.8555	31.9842	83.30	0.16	6702.8	83.68	0.15	7106.2	1841876	191571
586.0	6563.752	-61.7184	31.9978	83.38	0.15	6714.3	83.76	0.14	7117.6	1854901	191612
588.0	6563.784	-61.5809	32.0113	83.46	0.13	6725.7	83.84	0.12	7129.1	1867948	191648
590.0	6563.813	-61.4432	32.0246	83.55	0.11	6737.2	83.91	0.11	7140.6	1881017	191681
592.0	6563.838	-61.3052	32.0377	83.63	0.10	6748.8	83.99	0.09	7152.2	1894108	191711
594.0	6563.859	-61.1670	32.0507	83.71	0.08	6760.4	84.07	0.08	7163.8	1907222	191736
596.0	6563.877	-61.0284	32.0636	83.79	0.07	6772.0	84.14	0.07	7175.4	1920359	191759
598.0	6563.892	-60.8896	32.0763	83.88	0.06	6783.7	84.22	0.05	7187.1	1933518	191778
600.0	6563.904	-60.7505	32.0888	83.96	0.04	6795.4	84.30	0.04	7198.8	1946699	191794
602.0	6563.912	-60.6111	32.1012	84.04	0.03	6807.2	84.38	0.03	7210.6	1959904	191806
604.0	6563.918	-60.4714	32.1135	84.13	0.02	6819.0	84.46	0.02	7222.4	1973131	191816
606.0	6563.920	-60.3315	32.1256	84.21	0.01	6830.8	84.54	0.00	7234.2	1986382	191823
608.0	6563.920	-60.1912	32.1375	84.30	-0.01	6842.7	84.62	-0.01	7246.1	1999655	191827
610.0	6563.917	-60.0507	32.1493	84.38	-0.02	6854.6	84.69	-0.02	7258.0	2012951	191828
612.0	6563.912	-59.9099	32.1610	84.47	-0.03	6866.5	84.77	-0.03	7269.9	2026270	191826
614.0	6563.904	-59.7688	32.1725	84.55	-0.04	6878.5	84.85	-0.04	7281.9	2039613	191822
616.0	6563.893	-59.6275	32.1838	84.63	-0.05	6890.5	84.93	-0.05	7293.9	2052979	191815
618.0	6563.881	-59.4858	32.1949	84.72	-0.06	6902.5	85.01	-0.05	7305.9	2066368	191806
620.0	6563.866	-59.3439	32.2060	84.80	-0.07	6914.5	85.09	-0.06	7318.0	2079780	191795
622.0	6563.849	-59.2017	32.2168	84.89	-0.07	6926.6	85.17	-0.07	7330.1	2093216	191782
624.0	6563.830	-59.0592	32.2275	84.97	-0.08	6938.8	85.25	-0.08	7342.2	2106676	191767
626.0	6563.809	-58.9164	32.2380	85.06	-0.09	6951.0	85.33	-0.08	7354.4	2120159	191749
628.0	6563.787	-58.7733	32.2484	85.15	-0.10	6963.2	85.41	-0.09	7366.7	2133666	191730
630.0	6563.763	-58.6299	32.2586	85.23	-0.10	6975.5	85.49	-0.10	7379.0	2147197	191710
632.0	6563.737	-58.4863	32.2686	85.32	-0.11	6987.9	85.57	-0.10	7391.3	2160752	191688
634.0	6563.710	-58.3423	32.2785	85.40	-0.11	7000.3	85.66	-0.11	7403.7	2174331	191664
636.0	6563.682	-58.1981	32.2882	85.49	-0.12	7012.7	85.74	-0.11	7416.1	2187934	191639
638.0	6563.653	-58.0536	32.2978	85.58	-0.12	7025.1	85.82	-0.12	7428.5	2201561	191613
640.0	6563.622	-57.9088	32.3071	85.66	-0.13	7037.5	85.90	-0.12	7441.0	2215212	191586
642.0	6563.591	-57.7637	32.3164	85.75	-0.13	7050.0	85.98	-0.12	7453.5	2228888	191557
644.0	6563.558	-57.6183	32.3254	85.84	-0.13	7062.6	86.06	-0.12	7466.0	2242588	191528
646.0	6563.526	-57.4726	32.3343	85.92	-0.13	7075.1	86.14	-0.13	7478.6	2256312	191499
648.0	6563.492	-57.3266	32.3430	86.01	-0.14	7087.7	86.23	-0.13	7491.2	2270061	191468
650.0	6563.459	-57.1804	32.3515	86.10	-0.14	7100.4	86.31	-0.13	7503.8	2283834	191438
652.0	6563.425	-57.0338	32.3598	86.18	-0.14	7113.0	86.39	-0.13	7516.5	2297632	191407
654.0	6563.391	-56.8870	32.3680	86.27	-0.14	7125.8	86.47	-0.13	7529.2	2311455	191375
656.0	6563.357	-56.7399	32.3760	86.36	-0.14	7138.5	86.55	-0.13	7541.9	2325302	191344
658.0	6563.324	-56.5924	32.3838	86.45	-0.13	7151.3	86.64	-0.13	7554.7	2339175	191313
660.0	6563.290	-56.4447	32.3915	86.53	-0.13	7164.1	86.72	-0.13	7567.6	2353072	191283
662.0	6563.258	-56.2967	32.3990	86.62	-0.13	7177.0	86.80	-0.12	7580.4	2366994	191252

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
664.0	6563.225	-56.1484	32.4062	86.71	-0.13	7189.9	86.89	-0.12	7593.4	2380942	191222
666.0	6563.194	-55.9998	32.4134	86.80	-0.12	7202.9	86.97	-0.12	7606.3	2394914	191193
668.0	6563.163	-55.8510	32.4203	86.89	-0.12	7215.9	87.05	-0.12	7619.3	2408912	191165
670.0	6563.132	-55.7018	32.4270	86.98	-0.12	7228.9	87.14	-0.11	7632.3	2422936	191137
672.0	6563.103	-55.5523	32.4336	87.06	-0.11	7241.9	87.22	-0.11	7645.4	2436984	191110
674.0	6563.075	-55.4025	32.4400	87.15	-0.11	7255.0	87.30	-0.10	7658.5	2451058	191084
676.0	6563.048	-55.2525	32.4462	87.24	-0.10	7268.2	87.39	-0.10	7671.6	2465158	191059
678.0	6563.023	-55.1021	32.4522	87.33	-0.10	7281.3	87.47	-0.09	7684.8	2479283	191036
680.0	6563.000	-54.9515	32.4580	87.42	-0.09	7294.5	87.56	-0.08	7698.0	2493433	191015
682.0	6562.978	-54.8006	32.4637	87.51	-0.08	7307.8	87.64	-0.08	7711.2	2507610	190995
684.0	6562.959	-54.6493	32.4691	87.60	-0.07	7321.0	87.72	-0.07	7724.5	2521812	190977
686.0	6562.942	-54.4978	32.4744	87.69	-0.06	7334.4	87.81	-0.06	7737.8	2536040	190962
688.0	6562.928	-54.3460	32.4795	87.78	-0.05	7347.7	87.89	-0.05	7751.1	2550294	190950
690.0	6562.916	-54.1939	32.4843	87.87	-0.04	7361.1	87.98	-0.04	7764.5	2564574	190940
692.0	6562.907	-54.0415	32.4890	87.96	-0.03	7374.5	88.06	-0.03	7777.9	2578880	190933
S-IVB 1ST GUIDANCE CUTOFF											
693.910	6562.902	-53.8956	32.4933	88.04	-0.02	7387.3	88.15	-0.02	7790.8	2592567	190928
694.0	6562.902	-53.8888	32.4935	88.05	-0.02	7387.9	88.15	-0.01	7791.4	2593212	190929
696.0	6562.898	-53.7359	32.4978	88.14	-0.02	7388.9	88.24	-0.02	7792.3	2607558	190926
698.0	6562.894	-53.5830	32.5019	88.23	-0.01	7389.0	88.32	-0.01	7792.4	2621906	190924
700.0	6562.891	-53.4301	32.5058	88.32	-0.01	7389.0	88.41	-0.01	7792.4	2636253	190922
702.0	6562.887	-53.2772	32.5094	88.41	-0.01	7389.0	88.50	-0.01	7792.5	2650600	190919
PARKING ORBIT INSERTION											
703.910	6562.881	-53.1311	32.5128	88.50	-0.01	7389.1	88.58	-0.01	7792.5	2664301	190914

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE

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
PARKING ORBIT INSERTION								
703.910	6562.881	-53.1311	32.5128	32.6823	88.58	-0.01	7792.5	190.914
750.0	6562.792	-49.6047	32.5356	32.7053	90.58	-0.01	7792.8	190.833
800.0	6562.690	-45.7922	32.4365	32.6058	92.75	-0.02	7793.1	190.697
850.0	6562.581	-41.9741	32.2090	32.3778	94.91	-0.02	7793.4	190.512
900.0	6562.468	-38.1914	31.8550	32.0228	97.03	-0.02	7793.7	190.279
950.0	6562.350	-34.4443	31.3772	31.5435	99.11	-0.02	7794.0	190.001
1000.0	6562.227	-30.7420	30.7790	30.9435	101.13	-0.02	7794.3	189.681
1050.0	6562.102	-27.0925	30.0646	30.2269	103.09	-0.02	7794.7	189.322
1100.0	6561.973	-23.5024	29.2390	29.3986	104.98	-0.02	7795.1	188.928
1150.0	6561.841	-19.9767	28.3075	28.4638	106.78	-0.02	7795.5	188.502
1200.0	6561.707	-16.5191	27.2760	27.4285	108.49	-0.02	7795.9	188.049
1250.0	6561.571	-13.1317	26.1503	26.2985	110.11	-0.02	7796.3	187.575
1300.0	6561.433	-9.8155	24.9369	25.0801	111.64	-0.02	7796.7	187.083
1350.0	6561.293	-6.5701	23.6418	23.7795	113.06	-0.02	7797.2	186.580
1400.0	6561.152	-3.3942	22.2715	22.4030	114.39	-0.02	7797.6	186.070
1450.0	6561.010	-0.2853	20.8322	20.9568	115.61	-0.02	7798.1	185.560
1500.0	6560.867	2.7595	19.3300	19.4471	116.73	-0.02	7798.5	185.055
1550.0	6560.724	5.7441	17.7709	17.8798	117.75	-0.02	7798.9	184.559
1600.0	6560.581	8.6728	16.1606	16.2609	118.67	-0.02	7799.4	184.079
1650.0	6560.438	11.5502	14.5050	14.5959	119.49	-0.02	7799.8	183.619
1700.0	6560.295	14.3815	12.8094	12.8905	120.21	-0.02	7800.2	183.185
1750.0	6560.154	17.1719	11.0791	11.1499	120.83	-0.02	7800.5	182.781
1800.0	6560.014	19.9268	9.3195	9.3794	121.36	-0.02	7800.9	182.411
1850.0	6559.876	22.6520	7.5353	7.5841	121.79	-0.02	7801.2	182.079
1900.0	6559.741	25.3531	5.7317	5.7690	122.13	-0.02	7801.5	181.789
1950.0	6559.608	28.0360	3.9133	3.9388	122.37	-0.02	7801.8	181.542
2000.0	6559.480	30.7064	2.0848	2.0985	122.52	-0.02	7802.1	181.342
2050.0	6559.356	33.3703	0.2510	0.2527	122.58	-0.02	7802.3	181.190
2100.0	6559.237	36.0335	-1.5835	-1.5938	122.55	-0.02	7802.5	181.088
2150.0	6559.125	38.7019	-3.4140	-3.4363	122.42	-0.02	7802.6	181.035
2200.0	6559.019	41.3813	-5.2360	-5.2701	122.20	-0.01	7802.8	181.032
2250.0	6558.922	44.0778	-7.0447	-7.0904	121.89	-0.01	7802.8	181.079
2300.0	6558.833	46.7969	-8.8354	-8.8923	121.48	-0.01	7802.9	181.174
2350.0	6558.754	49.5445	-10.6030	-10.6709	120.98	-0.01	7802.9	181.315
2400.0	6558.685	52.3263	-12.3427	-12.4211	120.39	-0.01	7802.9	181.501
2450.0	6558.628	55.1478	-14.0493	-14.1376	119.69	-0.01	7802.9	181.728
2500.0	6558.583	58.0143	-15.7175	-15.8153	118.90	-0.01	7802.8	181.994
2550.0	6558.552	60.9311	-17.3417	-17.4485	118.01	-0.00	7802.7	182.295
2600.0	6558.535	63.9028	-18.9165	-19.0315	117.02	-0.00	7802.5	182.627
2650.0	6558.534	66.9339	-20.4360	-20.5586	115.92	0.00	7802.4	182.986

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GC LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
2700.0	6558.548	70.0284	-21.8941	-22.0238	114.72	0.00	7802.2	183.369
2750.0	6558.580	73.1895	-23.2848	-23.4209	113.43	0.01	7802.0	183.769
2800.0	6558.629	76.4199	-24.6018	-24.7436	112.03	0.01	7801.8	184.184
2850.0	6558.696	79.7210	-25.8388	-25.9858	110.53	0.01	7801.5	184.609
2900.0	6558.782	83.0936	-26.9894	-27.1409	108.93	0.01	7801.3	185.038
2950.0	6558.887	86.5371	-28.0475	-28.2029	107.24	0.02	7801.0	185.467
3000.0	6559.012	90.0496	-29.0068	-29.1656	105.46	0.02	7800.7	185.893
3050.0	6559.156	93.6278	-29.8615	-30.0232	103.59	0.02	7800.4	186.311
3100.0	6559.321	97.2670	-30.6060	-30.7701	101.65	0.03	7800.1	186.718
3150.0	6559.505	100.9609	-31.2353	-31.4013	99.64	0.03	7799.8	187.110
3200.0	6559.709	104.7019	-31.7450	-31.9125	97.57	0.03	7799.5	187.483
3250.0	6559.932	108.4811	-32.1314	-32.3000	95.45	0.03	7799.2	187.836
3300.0	6560.174	112.2883	-32.3915	-32.5608	93.30	0.04	7798.9	188.166
3350.0	6560.434	116.1126	-32.5234	-32.6930	91.13	0.04	7798.6	188.471
3400.0	6560.712	119.9427	-32.5261	-32.6957	88.96	0.04	7798.3	188.750
3450.0	6561.007	123.7669	-32.3995	-32.5688	86.79	0.04	7798.0	189.002
3500.0	6561.318	127.5738	-32.1448	-32.3134	84.64	0.05	7797.7	189.226
3550.0	6561.643	131.3524	-31.7639	-31.9314	82.52	0.05	7797.4	189.424
3600.0	6561.982	135.0927	-31.2597	-31.4268	80.45	0.05	7797.1	189.595
3650.0	6562.333	138.7857	-30.6360	-30.8001	78.44	0.05	7796.8	189.740
3700.0	6562.695	142.4238	-29.8972	-30.0589	76.50	0.05	7796.6	189.861
3750.0	6563.066	146.0007	-29.0483	-29.2072	74.63	0.06	7796.3	189.961
3800.0	6563.445	149.5116	-28.0950	-28.2505	72.84	0.06	7796.0	190.040
3850.0	6563.830	152.9534	-27.0430	-27.1946	71.15	0.06	7795.8	190.101
3900.0	6564.219	156.3240	-25.8985	-26.0456	69.55	0.06	7795.5	190.148
3950.0	6564.610	159.6229	-24.6678	-24.8098	68.05	0.06	7795.3	190.184
4000.0	6565.002	162.8507	-23.3572	-23.4935	66.65	0.06	7795.1	190.211
4050.0	6565.393	166.0091	-21.9731	-22.1030	65.34	0.06	7794.8	190.233
4100.0	6565.780	169.1005	-20.5215	-20.6445	64.14	0.06	7794.6	190.254
4150.0	6566.163	172.1283	-19.0088	-19.1241	63.05	0.06	7794.4	190.276
4200.0	6566.540	175.0963	-17.4407	-17.5479	62.05	0.05	7794.2	190.304
4250.0	6566.908	178.0090	-15.8232	-15.9215	61.15	0.05	7793.9	190.339
4300.0	6567.266	-179.1289	-14.1618	-14.2507	60.36	0.05	7793.7	190.386
4350.0	6567.613	-176.3122	-12.4620	-12.5410	59.66	0.05	7793.5	190.447
4400.0	6567.947	-173.5356	-10.7290	-10.7975	59.06	0.05	7793.3	190.525
4450.0	6568.266	-170.7935	-8.9679	-9.0256	58.55	0.05	7793.0	190.622
4500.0	6568.569	-168.0804	-7.1837	-7.2302	58.14	0.04	7792.8	190.739
4550.0	6568.855	-165.3905	-5.3813	-5.4163	57.82	0.04	7792.6	190.878
4600.0	6569.124	-162.7180	-3.5654	-3.5886	57.59	0.04	7792.3	191.041
4650.0	6569.373	-160.0572	-1.7406	-1.7519	57.46	0.04	7792.1	191.227
4700.0	6569.603	-157.4021	0.0885	0.0891	57.42	0.03	7791.9	191.437
4750.0	6569.812	-154.7468	1.9172	1.9297	57.47	0.03	7791.6	191.670
4800.0	6570.000	-152.0857	3.7410	3.7654	57.61	0.03	7791.4	191.925

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
4850.0	6570.167	-149.4127	5.5553	5.5914	57.85	0.02	7791.2	192.202
4900.0	6570.312	-146.7221	7.3553	7.4029	58.17	0.02	7790.9	192.498
4950.0	6570.436	-144.0082	9.1365	9.1952	58.59	0.02	7790.7	192.811
5000.0	6570.538	-141.2552	10.8939	10.9634	59.11	0.01	7790.5	193.139
5050.0	6570.618	-138.4874	12.6226	12.7024	59.72	0.01	7790.3	193.478
5100.0	6570.678	-135.6695	14.3174	14.4072	60.43	0.01	7790.1	193.825
5150.0	6570.716	-132.8062	15.9733	16.0723	61.23	0.00	7789.9	194.177
5200.0	6570.735	-129.8923	17.5846	17.6924	62.14	0.00	7789.7	194.529
5250.0	6570.734	-126.9231	19.1459	19.2619	63.14	-0.00	7789.5	194.878
5300.0	6570.714	-123.8943	20.6514	20.7749	64.25	-0.00	7789.4	195.219
5350.0	6570.676	-120.8021	22.0951	22.2256	65.45	-0.01	7789.2	195.549
5400.0	6570.621	-117.6432	23.4711	23.6078	66.76	-0.01	7789.1	195.862
5450.0	6570.550	-114.4152	24.7730	24.9153	68.17	-0.01	7789.0	196.154
5500.0	6570.464	-111.1166	25.9947	26.1420	69.68	-0.01	7788.9	196.422
5550.0	6570.364	-107.7468	27.1298	27.2816	71.28	-0.02	7788.9	196.662
5600.0	6570.250	-104.3066	28.1723	28.3279	72.98	-0.02	7788.9	196.869
5650.0	6570.125	-100.7979	29.1159	29.2749	74.77	-0.02	7788.9	197.041
5700.0	6569.989	-97.2241	29.9550	30.1168	76.64	-0.02	7788.9	197.174
5750.0	6569.843	-93.5899	30.6841	30.8482	78.58	-0.02	7789.0	197.265
5800.0	6569.688	-89.9019	31.2982	31.4641	80.59	-0.02	7789.1	197.313
5850.0	6569.525	-86.1675	31.7930	31.9604	82.66	-0.02	7789.2	197.316
5900.0	6569.356	-82.3958	32.1648	32.3332	84.78	-0.03	7789.4	197.271
5950.0	6569.180	-78.5967	32.4108	32.5799	86.92	-0.03	7789.6	197.179
6000.0	6569.000	-74.7813	32.5292	32.6986	89.09	-0.03	7789.8	197.039
6050.0	6568.816	-70.9608	32.5189	32.6883	91.26	-0.03	7790.0	196.851
6100.0	6568.629	-67.1467	32.3800	32.5491	93.42	-0.03	7790.3	196.617
6150.0	6568.439	-63.3504	32.1137	32.2820	95.57	-0.03	7790.6	196.338
6200.0	6568.248	-59.5826	31.7218	31.8890	97.67	-0.03	7790.9	196.014
6250.0	6568.055	-55.8531	31.2073	31.3730	99.73	-0.03	7791.3	195.651
6300.0	6567.862	-52.1710	30.5740	30.7377	101.74	-0.03	7791.7	195.249
6350.0	6567.669	-48.5435	29.8262	29.9876	103.67	-0.03	7792.1	194.812
6400.0	6567.476	-44.9769	28.9690	29.1275	105.53	-0.03	7792.5	194.345
6450.0	6567.284	-41.4758	28.0079	28.1630	107.30	-0.03	7792.9	193.852
6500.0	6567.094	-38.0434	26.9487	27.0999	108.99	-0.03	7793.3	193.337
6550.0	6566.904	-34.6814	25.7975	25.9442	110.58	-0.03	7793.8	192.805
6600.0	6566.717	-31.3904	24.5606	24.7021	112.07	-0.03	7794.2	192.261
6650.0	6566.532	-28.1697	23.2441	23.3798	113.47	-0.03	7794.7	191.711
6700.0	6566.349	-25.0177	21.8543	21.9837	114.76	-0.03	7795.1	191.159
6750.0	6566.169	-21.9318	20.3975	20.5198	115.95	-0.03	7795.6	190.612
6800.0	6565.992	-18.9086	18.8797	18.9944	117.04	-0.03	7796.0	190.075
6850.0	6565.818	-15.9444	17.3068	17.4132	118.03	-0.03	7796.4	189.553
6900.0	6565.646	-13.0346	15.6845	15.7821	118.92	-0.02	7796.9	189.050
6950.0	6565.479	-10.1745	14.0186	14.1067	119.71	-0.02	7797.3	188.574

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GC LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
7000.0	6565.315	-7.3589	12.3144	12.3925	120.40	-0.02	7797.6	188.126
7050.0	6565.155	-4.5826	10.5771	10.6447	120.99	-0.02	7798.0	187.713
7100.0	6565.000	-1.8400	8.8118	8.8686	121.49	-0.02	7798.3	187.338
7150.0	6564.849	0.8745	7.0236	7.0691	121.89	-0.02	7798.7	187.005
7200.0	6564.704	3.5666	5.2172	5.2512	122.20	-0.02	7798.9	186.716
7250.0	6564.564	6.2421	3.3975	3.4197	122.42	-0.02	7799.2	186.473
7300.0	6564.430	8.9069	1.5691	1.5794	122.55	-0.02	7799.4	186.280
7350.0	6564.303	11.5668	-0.2633	-0.2650	122.58	-0.02	7799.6	186.137
7400.0	6564.183	14.2277	-2.0951	-2.1088	122.52	-0.02	7799.7	186.046
7450.0	6564.071	16.8953	-3.9217	-3.9473	122.37	-0.02	7799.9	186.005
7500.0	6563.967	19.5757	-5.7385	-5.7758	122.12	-0.01	7800.0	186.016
7550.0	6563.873	22.2745	-7.5407	-7.5895	121.79	-0.01	7800.0	186.077
7600.0	6563.788	24.9976	-9.3235	-9.3834	121.36	-0.01	7800.0	186.186
7650.0	6563.714	27.7507	-11.0820	-11.1527	120.83	-0.01	7800.0	186.342
7700.0	6563.652	30.5394	-12.8112	-12.8922	120.21	-0.01	7800.0	186.542
7750.0	6563.601	33.3691	-14.5059	-14.5968	119.49	-0.01	7799.9	186.783
7800.0	6563.564	36.2453	-16.1609	-16.2611	118.67	-0.00	7799.8	187.063
7850.0	6563.541	39.1727	-17.7705	-17.8795	117.75	-0.00	7799.6	187.376
7900.0	6563.533	42.1563	-19.3293	-19.4463	116.73	-0.00	7799.5	187.720
7950.0	6563.539	45.2003	-20.8312	-20.9557	115.61	0.00	7799.3	188.089
8000.0	6563.562	48.3084	-22.2703	-22.4017	114.39	0.00	7799.1	188.480
8050.0	6563.602	51.4837	-23.6405	-23.7781	113.07	0.01	7798.9	188.888
8100.0	6563.659	54.7286	-24.9355	-25.0787	111.64	0.01	7798.6	189.309
8150.0	6563.733	58.0444	-26.1491	-26.2972	110.12	0.01	7798.4	189.737
8200.0	6563.827	61.4315	-27.2748	-27.4273	108.50	0.02	7798.1	190.169
8250.0	6563.938	64.8889	-28.3065	-28.4628	106.78	0.02	7797.8	190.599
8300.0	6564.069	68.4145	-29.2382	-29.3977	104.98	0.02	7797.5	191.024
8350.0	6564.219	72.0045	-30.0640	-30.2262	103.10	0.02	7797.2	191.440
8400.0	6564.388	75.6539	-30.7786	-30.9430	101.14	0.03	7796.9	191.842
8450.0	6564.577	79.3561	-31.3770	-31.5433	99.11	0.03	7796.6	192.229
8500.0	6564.784	83.1031	-31.8551	-32.0228	97.03	0.03	7796.3	192.596
8550.0	6565.010	86.8857	-32.2093	-32.3780	94.91	0.03	7796.0	192.941
8600.0	6565.254	90.6936	-32.4369	-32.6062	92.76	0.04	7795.7	193.262
8650.0	6565.516	94.5158	-32.5364	-32.7059	90.59	0.04	7795.4	193.558
8700.0	6565.795	98.3408	-32.5067	-32.6762	88.41	0.04	7795.1	193.826
8750.0	6566.090	102.1571	-32.3484	-32.5174	86.25	0.04	7794.8	194.068
8800.0	6566.400	105.9533	-32.0626	-32.2308	84.11	0.05	7794.5	194.281
8850.0	6566.724	109.7188	-31.6515	-31.8185	82.01	0.05	7794.2	194.468
8900.0	6567.061	113.4437	-31.1182	-31.2837	79.95	0.05	7794.0	194.627
8950.0	6567.410	117.1195	-30.4667	-30.6301	77.96	0.05	7793.7	194.762
9000.0	6567.769	120.7388	-29.7016	-29.8625	76.04	0.05	7793.4	194.872
9050.0	6568.136	124.2958	-28.8279	-28.9859	74.19	0.05	7793.2	194.961
9100.0	6568.510	127.7861	-27.8514	-28.0059	72.43	0.06	7792.9	195.030

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
9150.0	6568.890	131.2068	-26.7779	-26.9284	70.76	0.06	7792.7	195.082
9200.0	6569.274	134.5563	-25.6136	-25.7595	69.18	0.06	7792.5	195.120
9250.0	6569.659	137.8343	-24.3649	-24.5055	67.71	0.06	7792.2	195.147
9300.0	6570.044	141.0416	-23.0379	-23.1726	66.33	0.06	7792.0	195.166
9350.0	6570.427	144.1802	-21.6389	-21.7672	65.05	0.06	7791.8	195.182
9400.0	6570.807	147.2527	-20.1742	-20.2953	63.88	0.06	7791.6	195.196
9450.0	6571.181	150.2625	-18.6498	-18.7632	62.81	0.05	7791.4	195.212
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6								
9464.500	6571.289	151.1242	-18.1974	-18.3084	62.51	0.05	7791.3	195.217

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE

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
	BEGIN S-IVB RESTART PREPARATICNS -- START OF TIME BASE 6								
9464.500	-10750448	-1576592	-4640972	5470.3	-2368.4	-4368.7	5.51	1.65	6.01
9470.0	-10720278	-1589593	-4664909	5500.5	-2359.3	-4335.6	5.48	1.67	6.04
9480.0	-10665000	-1613102	-4707962	5554.9	-2342.4	-4274.9	5.41	1.70	6.09
9490.0	-10609182	-1636440	-4750405	5608.6	-2325.3	-4213.7	5.34	1.74	6.14
9500.0	-10552830	-1659605	-4792234	5661.7	-2307.7	-4152.0	5.27	1.77	6.20
9510.0	-10495951	-1682593	-4833443	5714.0	-2289.8	-4089.8	5.19	1.81	6.25
9520.0	-10438553	-1705401	-4874028	5765.5	-2271.6	-4027.1	5.12	1.84	6.29
9530.0	-10380643	-1728024	-4913984	5816.4	-2253.0	-3963.9	5.05	1.87	6.34
9540.0	-10322228	-1750460	-4953305	5866.5	-2234.1	-3900.2	4.98	1.91	6.39
9550.0	-10263315	-1772705	-4991987	5915.9	-2214.8	-3836.1	4.90	1.94	6.44
9560.0	-10203912	-1794756	-5030026	5964.5	-2195.2	-3771.5	4.83	1.98	6.48
9570.0	-10144027	-1816609	-5067416	6012.4	-2175.3	-3706.5	4.75	2.01	6.53
9580.0	-10083666	-1838261	-5104153	6059.6	-2155.0	-3641.0	4.68	2.04	6.57
9590.0	-10022838	-1859709	-5140233	6105.9	-2134.4	-3575.0	4.60	2.08	6.62
9600.0	-9961550	-1880949	-5175652	6151.6	-2113.5	-3508.6	4.52	2.11	6.66
9610.0	-9899809	-1901978	-5210405	6196.4	-2092.3	-3441.9	4.44	2.14	6.70
9620.0	-9837624	-1922793	-5244488	6240.4	-2070.7	-3374.7	4.37	2.17	6.74
9630.0	-9775003	-1943391	-5277897	6283.7	-2048.8	-3307.1	4.29	2.21	6.78
9640.0	-9711953	-1963768	-5310628	6326.2	-2026.6	-3239.1	4.21	2.24	6.82
9650.0	-9648482	-1983921	-5342677	6367.8	-2004.0	-3170.7	4.13	2.27	6.86
9660.0	-9584599	-2003847	-5374041	6408.7	-1981.2	-3101.9	4.05	2.30	6.89
9670.0	-9520311	-2023543	-5404715	6448.8	-1958.0	-3032.8	3.97	2.33	6.93
9680.0	-9455626	-2043005	-5434696	6488.1	-1934.5	-2963.3	3.89	2.36	6.97
9690.0	-9390552	-2062232	-5463980	6526.5	-1910.7	-2893.5	3.80	2.39	7.00
9700.0	-9325098	-2081219	-5492565	6564.1	-1886.6	-2823.3	3.72	2.42	7.03
9710.0	-9259273	-2099963	-5520446	6600.9	-1862.2	-2752.8	3.64	2.45	7.07
9720.0	-9193083	-2118462	-5547620	6636.9	-1837.5	-2682.0	3.55	2.48	7.10
9730.0	-9126538	-2136713	-5574085	6672.0	-1812.6	-2610.9	3.47	2.51	7.13
9740.0	-9059646	-2154712	-5599837	6706.3	-1787.3	-2539.4	3.39	2.54	7.16
9750.0	-8992415	-2172458	-5624873	6739.7	-1761.7	-2467.7	3.30	2.57	7.19
9760.0	-8924854	-2189946	-5649190	6772.3	-1735.8	-2395.7	3.22	2.60	7.22
9770.0	-8856971	-2207174	-5672785	6804.1	-1709.7	-2323.4	3.13	2.63	7.24
9780.0	-8788775	-2224139	-5695657	6835.0	-1683.3	-2250.8	3.05	2.66	7.27
9790.0	-8720274	-2240838	-5717801	6865.0	-1656.6	-2178.0	2.96	2.68	7.29
9800.0	-8651478	-2257270	-5739216	6894.2	-1629.6	-2104.9	2.87	2.71	7.32
9810.0	-8582394	-2273430	-5759899	6922.5	-1602.4	-2031.6	2.79	2.74	7.34
9820.0	-8513032	-2289316	-5779847	6949.9	-1574.9	-1958.1	2.70	2.76	7.36
9830.0	-8443399	-2304926	-5799059	6976.4	-1547.1	-1884.3	2.61	2.79	7.39
9840.0	-8373506	-2320257	-5817533	7002.1	-1519.1	-1810.4	2.52	2.82	7.41
9850.0	-8303360	-2335307	-5835266	7026.9	-1490.8	-1736.2	2.44	2.84	7.43

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
9860.0	-8232971	-2350072	-5852256	7050.8	-1462.2	-1661.8	2.35	2.87	7.44
9870.0	-8162347	-2364550	-5868502	7073.8	-1433.4	-1587.3	2.26	2.89	7.46
9880.0	-8091497	-2378740	-5884002	7096.0	-1404.4	-1512.6	2.15	2.92	7.49
9890.0	-8020431	-2392638	-5898754	7117.2	-1375.1	-1437.7	2.08	2.94	7.49
9900.0	-7949157	-2406241	-5912756	7137.5	-1345.6	-1362.7	1.99	2.96	7.51
9910.0	-7877683	-2419549	-5926008	7157.0	-1315.8	-1287.6	1.90	2.99	7.52
9920.0	-7806020	-2432557	-5938507	7175.5	-1285.8	-1212.2	1.81	3.01	7.54
9930.0	-7734176	-2445265	-5950252	7193.2	-1255.6	-1136.8	1.74	3.03	7.55
9940.0	-7662160	-2457669	-5961243	7209.9	-1225.2	-1061.3	1.63	3.06	7.56
9950.0	-7589981	-2469768	-5971477	7225.7	-1194.5	-985.6	1.54	3.08	7.57
9960.0	-7517648	-2481558	-5980955	7240.7	-1163.6	-909.9	1.45	3.10	7.58
9970.0	-7445171	-2493040	-5989675	7254.7	-1132.6	-834.1	1.36	3.12	7.59
9980.0	-7372558	-2504209	-5997636	7267.8	-1101.2	-758.2	1.27	3.14	7.59
9990.0	-7299818	-2515064	-6004838	7280.0	-1069.7	-682.2	1.18	3.16	7.59
10000.0	-7226960	-2525603	-6011280	7291.3	-1038.0	-606.2	1.09	3.18	7.61
10010.0	-7153994	-2535824	-6016962	7301.7	-1006.1	-530.1	0.99	3.20	7.61
10020.0	-7080929	-2545725	-6021882	7311.2	-974.1	-454.0	0.89	3.22	7.61
10030.0	-7007773	-2555304	-6026042	7319.8	-941.8	-377.9	0.80	3.24	7.61
10040.0	-6934537	-2564560	-6029440	7327.4	-909.3	-301.7	0.72	3.25	7.61
S-IVB RE-IGNITION (STDV OPEN)									
10042.800	-6914017	-2567093	-6030255	7329.4	-900.2	-280.4	0.76	3.21	7.60
10044.0	-6905220	-2568171	-6030586	7331.7	-896.5	-271.4	3.77	2.91	7.43
10046.0	-6890546	-2569959	-6031114	7342.8	-891.1	-256.8	6.27	2.62	7.26
10048.0	-6875848	-2571736	-6031613	7355.5	-885.8	-242.2	6.46	2.64	7.35
10050.0	-6861124	-2573502	-6032083	7368.5	-880.6	-227.5	6.50	2.59	7.31
10052.0	-6846373	-2575258	-6032523	7381.7	-875.4	-212.9	6.56	2.60	7.28
10054.0	-6831597	-2577004	-6032935	7394.9	-870.3	-198.1	6.58	2.48	7.49
10056.0	-6816794	-2578740	-6033316	7408.0	-865.6	-183.0	6.54	2.31	7.66
10058.0	-6801965	-2580466	-6033666	7421.1	-861.0	-167.6	6.53	2.23	7.69
10060.0	-6787110	-2582184	-6033986	7434.2	-856.5	-152.3	6.58	2.28	7.64
10062.0	-6772228	-2583892	-6034276	7447.3	-851.9	-137.0	6.60	2.35	7.62
10064.0	-6757320	-2585591	-6034534	7460.5	-847.1	-121.7	6.58	2.37	7.65
10066.0	-6742386	-2587281	-6034762	7473.7	-842.4	-106.4	6.58	2.38	7.65
10068.0	-6727425	-2588961	-6034960	7486.9	-837.6	-91.2	6.59	2.42	7.63
10070.0	-6712438	-2590631	-6035127	7500.1	-832.7	-75.9	6.60	2.47	7.64
10072.0	-6697425	-2592292	-6035264	7513.3	-827.7	-60.6	6.60	2.51	7.67
10074.0	-6682385	-2593942	-6035370	7526.5	-822.7	-45.2	6.60	2.53	7.68
10076.0	-6667319	-2595582	-6035445	7539.7	-817.6	-29.9	6.60	2.54	7.67
10078.0	-6652227	-2597213	-6035489	7552.9	-812.5	-14.6	6.60	2.56	7.66
10080.0	-6637108	-2598832	-6035503	7566.1	-807.4	0.8	6.60	2.59	7.67
10082.0	-6621963	-2600442	-6035486	7579.3	-802.2	16.1	6.60	2.61	7.66

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10084.0	-6606791	-2602041	-6035439	7592.5	-797.0	31.4	6.61	2.63	7.66
10086.0	-6591593	-2603630	-6035360	7605.7	-791.7	46.7	6.61	2.65	7.66
10088.0	-6576368	-2605208	-6035252	7618.9	-786.3	62.1	6.61	2.67	7.66
10090.0	-6561117	-2606775	-6035112	7632.1	-781.0	77.4	6.61	2.70	7.64
10092.0	-6545839	-2608332	-6034942	7645.4	-775.6	92.6	6.61	2.72	7.64
10094.0	-6530535	-2609877	-6034742	7658.6	-770.1	107.9	6.61	2.73	7.64
10096.0	-6515205	-2611412	-6034511	7671.8	-764.6	123.2	6.62	2.75	7.65
10098.0	-6499848	-2612936	-6034249	7685.0	-759.1	138.5	6.63	2.76	7.64
10100.0	-6484465	-2614449	-6033957	7698.3	-753.6	153.8	6.63	2.78	7.63
10102.0	-6469055	-2615950	-6033634	7711.5	-748.0	169.0	6.62	2.81	7.62
10104.0	-6453619	-2617440	-6033281	7724.8	-742.3	184.3	6.63	2.83	7.62
10106.0	-6438156	-2618919	-6032897	7738.1	-736.7	199.5	6.63	2.84	7.62
10108.0	-6422686	-2620387	-6032482	7751.3	-730.9	214.7	6.63	2.87	7.62
10110.0	-6407151	-2621843	-6032038	7764.6	-725.2	230.0	6.64	2.89	7.62
10112.0	-6391608	-2623288	-6031563	7777.9	-719.4	245.2	6.64	2.91	7.61
10114.0	-6376039	-2624721	-6031057	7791.1	-713.6	260.4	6.64	2.92	7.61
10116.0	-6360443	-2626142	-6030521	7804.4	-707.7	275.6	6.63	2.94	7.59
10118.0	-6344821	-2627551	-6029954	7817.7	-701.8	290.8	6.64	2.97	7.59
10120.0	-6329173	-2628949	-6029358	7831.0	-695.8	306.0	6.66	2.99	7.59
10122.0	-6313497	-2630335	-6028730	7844.3	-689.8	321.2	6.66	3.01	7.59
10124.0	-6297796	-2631708	-6028073	7857.6	-683.8	336.4	6.65	3.03	7.59
10126.0	-6282067	-2633070	-6027385	7870.9	-677.7	351.5	6.64	3.04	7.58
10128.0	-6266312	-2634419	-6026667	7884.2	-671.6	366.7	6.64	3.06	7.57
10130.0	-6250530	-2635756	-6025918	7897.5	-665.5	381.8	6.65	3.07	7.56
10132.0	-6234722	-2637081	-6025140	7910.8	-659.3	396.9	6.66	3.09	7.56
10134.0	-6218887	-2638394	-6024331	7924.1	-653.1	412.0	6.67	3.12	7.55
10136.0	-6203026	-2639694	-6023492	7937.4	-646.9	427.1	6.65	3.14	7.55
10138.0	-6187137	-2640981	-6022622	7950.8	-640.6	442.2	6.66	3.15	7.56
10140.0	-6171222	-2642256	-6021723	7964.1	-634.2	457.3	6.65	3.16	7.52
10142.0	-6155281	-2643518	-6020793	7977.4	-627.9	472.4	6.69	3.20	7.53
10144.0	-6139313	-2644767	-6019833	7990.8	-621.5	487.4	6.67	3.20	7.53
10146.0	-6123317	-2646004	-6018843	8004.8	-615.0	502.5	7.42	3.23	7.51
10148.0	-6107293	-2647228	-6017823	8020.0	-608.6	517.5	7.79	3.22	7.51
10150.0	-6091237	-2648438	-6016773	8035.5	-602.1	532.5	7.84	3.28	7.47
10152.0	-6075151	-2649636	-6015694	8051.2	-595.5	547.4	7.87	3.38	7.47
10154.0	-6059032	-2650820	-6014584	8067.0	-588.7	562.3	7.87	3.41	7.46
10156.0	-6042883	-2651991	-6013444	8082.6	-581.9	577.2	7.79	3.38	7.39
10158.0	-6026702	-2653148	-6012275	8098.2	-575.1	592.0	7.77	3.39	7.39
10160.0	-6010490	-2654291	-6011077	8113.7	-568.3	606.7	7.75	3.39	7.39
10162.0	-5994247	-2655421	-6009848	8129.2	-561.6	621.5	7.78	3.36	7.42
10164.0	-5977973	-2656537	-6008590	8144.8	-554.9	636.4	7.82	3.32	7.48
10166.0	-5961668	-2657640	-6007303	8160.5	-548.3	651.4	7.85	3.31	7.53
10168.0	-5945331	-2658730	-6005985	8176.2	-541.6	666.5	7.87	3.33	7.50

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10170.0	-5928963	-2659807	-6004637	8192.0	-534.9	681.4	7.92	3.38	7.50
10172.0	-5912563	-2660870	-6003259	8207.8	-528.2	696.4	7.89	3.39	7.47
10174.0	-5896132	-2661920	-6001851	8223.6	-521.4	711.3	7.88	3.40	7.47
10176.0	-5879669	-2662955	-6000414	8239.4	-514.5	726.3	7.92	3.46	7.44
10178.0	-5863174	-2663977	-5998946	8255.2	-507.5	741.1	7.95	3.53	7.41
10180.0	-5846648	-2664985	-5997449	8271.1	-500.4	755.9	7.94	3.55	7.40
10182.0	-5830090	-2665979	-5995923	8287.0	-493.3	770.7	7.93	3.55	7.40
10184.0	-5813500	-2666959	-5994366	8302.9	-486.2	785.5	7.94	3.58	7.38
10186.0	-5796878	-2667924	-5992781	8318.8	-479.0	800.2	7.98	3.64	7.36
10188.0	-5780225	-2668875	-5991165	8334.8	-471.7	814.9	8.00	3.68	7.34
10190.0	-5763539	-2669811	-5989521	8350.8	-464.3	829.6	8.01	3.70	7.33
10192.0	-5746822	-2670732	-5987847	8366.8	-456.9	844.3	8.02	3.72	7.33
10194.0	-5730072	-2671638	-5986144	8382.9	-449.4	858.9	8.05	3.74	7.31
10196.0	-5713290	-2672529	-5984411	8399.0	-441.9	873.5	8.05	3.76	7.28
10198.0	-5696476	-2673406	-5982650	8415.1	-434.4	888.1	8.05	3.78	7.29
10200.0	-5679630	-2674267	-5980859	8431.2	-426.8	902.7	8.08	3.82	7.30
10202.0	-5662751	-2675113	-5979039	8447.4	-419.1	917.2	8.11	3.85	7.29
10204.0	-5645840	-2675943	-5977190	8463.6	-411.4	931.8	8.12	3.87	7.27
10206.0	-5628897	-2676758	-5975312	8479.9	-403.6	946.3	8.12	3.90	7.25
10208.0	-5611921	-2677558	-5973405	8496.2	-395.8	960.8	8.14	3.92	7.24
10210.0	-5594912	-2678341	-5971469	8512.5	-387.9	975.3	8.17	3.95	7.23
10212.0	-5577871	-2679109	-5969504	8528.8	-380.0	989.7	8.18	3.97	7.22
10214.0	-5560797	-2679861	-5967510	8545.2	-372.0	1004.2	8.17	4.01	7.22
10216.0	-5543690	-2680597	-5965487	8561.5	-364.0	1018.6	8.19	4.04	7.21
10218.0	-5526551	-2681317	-5963435	8577.9	-355.9	1033.0	8.23	4.06	7.18
10220.0	-5509378	-2682021	-5961355	8594.4	-347.7	1047.4	8.25	4.08	7.16
10222.0	-5492173	-2682708	-5959246	8610.9	-339.5	1061.7	8.26	4.11	7.17
10224.0	-5474934	-2683379	-5957108	8627.5	-331.3	1076.0	8.28	4.14	7.16
10226.0	-5457663	-2684033	-5954942	8644.1	-323.0	1090.3	8.31	4.17	7.14
10228.0	-5440358	-2684670	-5952747	8660.7	-314.6	1104.6	8.32	4.19	7.12
10230.0	-5423020	-2685291	-5950524	8677.3	-306.2	1118.8	8.33	4.22	7.12
10232.0	-5405649	-2685895	-5948272	8694.0	-297.7	1133.1	8.36	4.24	7.12
10234.0	-5388244	-2686482	-5945991	8710.8	-289.2	1147.3	8.38	4.27	7.09
10236.0	-5370806	-2687052	-5943682	8727.5	-280.7	1161.5	8.39	4.30	7.09
10238.0	-5353334	-2687605	-5941345	8744.3	-272.0	1175.6	8.41	4.33	7.08
10240.0	-5335828	-2688140	-5938980	8761.2	-263.3	1189.8	8.44	4.36	7.07
10242.0	-5318289	-2688658	-5936586	8778.1	-254.6	1203.9	8.45	4.40	7.06
10244.0	-5300716	-2689158	-5934164	8795.0	-245.8	1218.0	8.47	4.42	7.05
10246.0	-5283109	-2689641	-5931714	8812.0	-236.9	1232.1	8.50	4.44	7.04
10248.0	-5265468	-2690106	-5929236	8829.0	-228.0	1246.2	8.52	4.48	7.03
10250.0	-5247793	-2690553	-5926729	8846.0	-219.0	1260.3	8.53	4.51	7.01
10252.0	-5230084	-2690982	-5924195	8863.1	-210.0	1274.3	8.56	4.52	7.00
10254.0	-5212341	-2691393	-5921632	8880.3	-200.9	1288.3	8.58	4.56	7.00

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10256.0	-5194563	-2691786	-5919042	8897.4	-191.7	1302.3	8.60	4.61	6.98
10258.0	-5176751	-2692160	-5916423	8914.7	-182.5	1316.2	8.63	4.64	6.96
10260.0	-5158904	-2692515	-5913777	8932.0	-173.2	1330.1	8.66	4.66	6.96
10262.0	-5141023	-2692852	-5911103	8949.3	-163.8	1344.0	8.68	4.69	6.96
10264.0	-5123107	-2693171	-5908401	8966.7	-154.4	1357.9	8.70	4.71	6.94
10266.0	-5105156	-2693470	-5905671	8984.1	-145.0	1371.8	8.73	4.74	6.93
10268.0	-5087171	-2693750	-5902913	9001.6	-135.5	1385.7	8.75	4.78	6.92
10270.0	-5069150	-2694012	-5900128	9019.1	-125.9	1399.5	8.77	4.82	6.91
10272.0	-5051094	-2694254	-5897316	9036.7	-116.2	1413.3	8.80	4.85	6.91
10274.0	-5033003	-2694477	-5894475	9054.3	-106.5	1427.1	8.83	4.87	6.91
10276.0	-5014877	-2694680	-5891607	9072.0	-96.7	1440.9	8.85	4.92	6.89
10278.0	-4996715	-2694863	-5888711	9089.7	-86.8	1454.7	8.87	4.96	6.87
10280.0	-4978518	-2695027	-5885788	9107.5	-76.9	1468.4	8.90	4.99	6.86
10282.0	-4960285	-2695171	-5882838	9125.3	-66.9	1482.2	8.94	5.02	6.86
10284.0	-4942017	-2695294	-5879860	9143.2	-56.8	1495.9	8.97	5.06	6.85
10286.0	-4923712	-2695398	-5876854	9161.2	-46.6	1509.5	8.99	5.08	6.84
10288.0	-4905372	-2695481	-5873821	9179.2	-36.4	1523.2	9.02	5.12	6.82
10290.0	-4886995	-2695544	-5870761	9197.3	-26.2	1536.9	9.06	5.16	6.82
10292.0	-4868583	-2695585	-5867674	9215.4	-15.8	1550.5	9.07	5.20	6.82
10294.0	-4850134	-2695607	-5864559	9233.6	-5.4	1564.1	9.10	5.23	6.81
10296.0	-4831648	-2695607	-5861418	9251.8	5.1	1577.7	9.14	5.26	6.81
10298.0	-4813126	-2695586	-5858248	9270.1	15.7	1591.4	9.17	5.30	6.80
10300.0	-4794568	-2695544	-5855052	9288.5	26.3	1605.0	9.20	5.35	6.80
10302.0	-4775972	-2695481	-5851829	9306.9	37.1	1618.5	9.23	5.39	6.79
10304.0	-4757340	-2695396	-5848578	9325.5	47.9	1632.1	9.27	5.43	6.79
10306.0	-4738670	-2695289	-5845300	9344.0	58.8	1645.7	9.30	5.47	6.79
10308.0	-4719964	-2695160	-5841995	9362.7	69.8	1659.3	9.33	5.51	6.77
10310.0	-4701220	-2695010	-5838663	9381.4	80.8	1672.8	9.36	5.55	6.76
10312.0	-4682438	-2694837	-5835304	9400.1	92.0	1686.3	9.40	5.59	6.77
10314.0	-4663619	-2694642	-5831918	9418.9	103.2	1699.9	9.43	5.62	6.77
10316.0	-4644762	-2694424	-5828505	9437.8	114.4	1713.4	9.45	5.66	6.75
10318.0	-4625868	-2694184	-5825064	9456.8	125.8	1726.9	9.49	5.70	6.75
10320.0	-4606935	-2693921	-5821597	9475.8	137.2	1740.4	9.53	5.73	6.76
10322.0	-4587964	-2693635	-5818103	9494.9	148.7	1753.9	9.56	5.78	6.76
10324.0	-4568956	-2693326	-5814581	9514.1	160.3	1767.4	9.61	5.83	6.76
10326.0	-4549908	-2692994	-5811033	9533.3	172.1	1781.0	9.66	5.89	6.76
10328.0	-4530822	-2692638	-5807457	9552.7	183.9	1794.5	9.71	5.95	6.76
10330.0	-4511697	-2692258	-5803855	9572.2	195.9	1808.0	9.74	6.00	6.76
10332.0	-4492533	-2691854	-5800225	9591.7	207.9	1821.5	9.78	6.03	6.77
10334.0	-4473330	-2691426	-5796569	9611.3	220.0	1835.1	9.84	6.07	6.78
10336.0	-4454088	-2690974	-5792885	9631.0	232.2	1848.7	9.88	6.09	6.79
10338.0	-4434806	-2690498	-5789174	9650.8	244.4	1862.3	9.91	6.13	6.80
10340.0	-4415485	-2689997	-5785436	9670.7	256.7	1875.9	9.95	6.19	6.82

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10342.0	-4396124	-2689471	-5781671	9690.6	269.1	1889.5	9.99	6.25	6.82
10344.0	-4376722	-2688920	-5777878	9710.6	281.7	1903.2	10.04	6.31	6.83
10346.0	-4357281	-2688344	-5774058	9730.8	294.4	1916.8	10.09	6.38	6.85
10348.0	-4337799	-2687742	-5770211	9751.0	307.2	1930.6	10.16	6.46	6.88
10350.0	-4318277	-2687115	-5766336	9771.4	320.2	1944.4	10.21	6.51	6.89
10352.0	-4298714	-2686462	-5762433	9791.8	333.2	1958.1	10.21	6.51	6.88
10354.0	-4279110	-2685782	-5758503	9812.3	346.3	1971.9	10.24	6.54	6.88
10356.0	-4259464	-2685076	-5754546	9832.8	359.5	1985.7	10.30	6.66	6.98
10358.0	-4239778	-2684344	-5750560	9853.4	373.0	1999.9	10.31	6.90	7.18
10360.0	-4220051	-2683584	-5746546	9874.1	387.0	2014.4	10.31	7.06	7.32
10362.0	-4200282	-2682796	-5742502	9894.7	401.1	2029.1	10.36	7.08	7.33
10364.0	-4180472	-2681980	-5738430	9915.5	415.3	2043.7	10.43	7.09	7.30
10366.0	-4160620	-2681135	-5734328	9936.4	429.5	2058.3	10.50	7.13	7.30
10368.0	-4140726	-2680261	-5730196	9957.5	443.8	2072.9	10.56	7.14	7.28
10370.0	-4120790	-2679360	-5726036	9978.7	458.0	2087.4	10.63	7.13	7.26
10372.0	-4100811	-2678429	-5721847	10000.0	472.3	2101.9	10.70	7.14	7.24
10374.0	-4080790	-2677470	-5717629	10021.5	486.6	2116.4	10.78	7.16	7.22
10376.0	-4060725	-2676483	-5713381	10043.1	501.0	2130.8	10.85	7.18	7.22
10378.0	-4040617	-2675467	-5709105	10064.9	515.3	2145.2	10.92	7.19	7.21
10380.0	-4020466	-2674422	-5704800	10086.8	529.6	2159.6	11.00	7.17	7.20
10382.0	-4000270	-2673348	-5700467	10108.8	543.9	2174.1	11.07	7.15	7.19
S-IVB 2ND GUIDANCE CUTOFF									
10383.940	-3980638	-2672279	-5696235	10130.3	557.5	2187.9	11.14	7.12	7.18
10384.0	-3980030	-2672246	-5696104	10131.0	557.9	2188.4	11.15	7.12	7.16
10386.0	-3959769	-2671122	-5691715	10128.6	565.3	2200.8	-2.86	3.23	6.14
10388.0	-3939518	-2669985	-5687301	10122.8	571.8	2213.2	-2.88	3.22	6.12
10390.0	-3919279	-2668835	-5682862	10117.0	578.2	2225.4	-2.90	3.21	6.11
10392.0	-3899051	-2667672	-5678399	10110.9	584.7	2237.6	-2.92	3.21	6.09
TRANSLUNAR INJECTION (TLI)									
10393.940	-3879441	-2666531	-5674047	10105.3	590.9	2249.4	-2.94	3.20	6.08
10400.0	-3818257	-2662892	-5660304	10087.3	610.2	2286.1	-2.99	3.19	6.03
10450.0	-3317827	-2628459	-5538642	9926.1	765.8	2576.8	-3.44	3.03	5.59
10500.0	-2825982	-2586448	-5403007	9744.7	913.1	2844.6	-3.80	2.86	5.12
10550.0	-2343626	-2537303	-5254586	9547.3	1051.1	3088.0	-4.08	2.66	4.62
10600.0	-1871451	-2481500	-5094619	9338.1	1179.3	3306.4	-4.27	2.46	4.12
10650.0	-1409947	-2419544	-4924359	9121.1	1297.2	3499.9	-4.40	2.26	3.62
10700.0	-959418	-2351944	-4745034	8899.7	1405.1	3669.1	-4.45	2.06	3.15
10750.0	-520003	-2279202	-4557829	8676.9	1503.0	3815.3	-4.45	1.86	2.70
10800.0	-91703	-2201801	-4363861	8455.5	1591.5	3939.9	-4.40	1.68	2.29

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10850.0	325598	-2120200	-4164170	8237.3	1671.1	4044.5	-4.32	1.51	1.90
10900.0	732106	-2034829	-3959713	8024.0	1742.4	4130.9	-4.21	1.35	1.56
10950.0	1128101	-1946086	-3751358	7816.9	1806.1	4200.7	-4.07	1.20	1.24
11000.0	1513913	-1854335	-3539890	7616.8	1862.8	4255.7	-3.93	1.07	0.96
11050.0	1889909	-1759909	-3326011	7424.4	1913.2	4297.4	-3.77	0.95	0.71
11100.0	2256481	-1663106	-3110344	7239.8	1957.9	4327.4	-3.61	0.84	0.49
11150.0	2614029	-1564200	-2893445	7063.4	1997.5	4346.9	-3.45	0.74	0.30
11200.0	2962962	-1463432	-2675804	6895.2	2032.4	4357.3	-3.28	0.66	0.12
11250.0	3303689	-1361024	-2457847	6735.2	2063.2	4359.7	-3.12	0.58	-0.03
11300.0	3636611	-1257170	-2239949	6583.0	2090.4	4355.1	-2.96	0.51	-0.16
11350.0	3962120	-1152042	-2022439	6438.6	2114.3	4344.4	-2.81	0.45	-0.27
11400.0	4280598	-1045791	-1805603	6301.7	2135.3	4328.3	-2.67	0.39	-0.37
11450.0	4592411	-938554	-1589690	6171.9	2153.8	4307.5	-2.53	0.35	-0.46
11500.0	4897907	-830451	-1374916	6049.0	2170.0	4282.8	-2.39	0.30	-0.53
11550.0	5197420	-721593	-1161469	5932.6	2184.1	4254.6	-2.27	0.26	-0.60
11600.0	5491269	-612074	-949510	5822.4	2196.4	4223.3	-2.15	0.23	-0.65
11650.0	5779753	-501982	-739178	5718.0	2207.1	4189.5	-2.03	0.20	-0.70
11700.0	6063159	-391392	-530593	5619.2	2216.3	4153.5	-1.92	0.17	-0.74
11750.0	6341756	-280374	-323858	5525.6	2224.2	4115.6	-1.82	0.15	-0.78
11800.0	6615801	-168987	-119060	5437.0	2231.1	4076.1	-1.72	0.13	-0.81
11850.0	6885533	-57285	83725	5353.1	2236.8	4035.1	-1.63	0.11	-0.83
CSM SEPARATION									
11884.900	7071371	20842	224042	5297.1	2240.3	4005.9	-1.57	0.09	-0.85

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6									
9464.500	-854.201	-145.207	-6513.915	7724.2	10.0	-1020.6	1.20	0.20	9.16
9470.0	-811.700	-145.149	-6519.390	7730.6	11.1	-970.2	1.14	0.20	9.17
9480.0	-734.338	-145.029	-6528.633	7741.5	13.0	-878.4	1.03	0.20	9.18
9490.0	-656.873	-144.889	-6536.958	7751.4	15.0	-786.6	0.92	0.20	9.19
9500.0	-579.314	-144.729	-6544.364	7760.1	17.0	-694.6	0.82	0.20	9.20
9510.0	-501.674	-144.550	-6550.849	7767.8	18.9	-602.5	0.71	0.19	9.21
9520.0	-423.963	-144.351	-6556.414	7774.3	20.9	-510.4	0.60	0.19	9.22
9530.0	-346.192	-144.132	-6561.056	7779.8	22.8	-418.1	0.49	0.19	9.23
9540.0	-268.371	-143.894	-6564.776	7784.1	24.8	-325.9	0.38	0.19	9.23
9550.0	-190.513	-143.636	-6567.573	7787.4	26.8	-233.5	0.27	0.19	9.24
9560.0	-112.627	-143.359	-6569.447	7789.6	28.7	-141.2	0.16	0.19	9.24
9570.0	-34.725	-143.062	-6570.397	7790.6	30.7	-48.8	0.05	0.19	9.24
9580.0	43.182	-142.745	-6570.423	7790.6	32.6	43.6	-0.06	0.19	9.24
9590.0	121.084	-142.409	-6569.526	7789.5	34.6	135.9	-0.17	0.19	9.24
9600.0	198.969	-142.054	-6567.704	7787.3	36.5	228.3	-0.28	0.19	9.24
9610.0	276.826	-141.679	-6564.960	7784.0	38.4	320.6	-0.39	0.19	9.23
9620.0	354.645	-141.285	-6561.292	7779.6	40.4	412.9	-0.50	0.19	9.23
9630.0	432.414	-140.872	-6556.702	7774.1	42.3	505.1	-0.61	0.19	9.22
9640.0	510.123	-140.439	-6551.190	7767.5	44.2	597.3	-0.72	0.19	9.21
9650.0	587.760	-139.987	-6544.757	7759.8	46.2	689.3	-0.83	0.19	9.20
9660.0	665.316	-139.516	-6537.404	7751.0	48.1	781.3	-0.93	0.19	9.19
9670.0	742.778	-139.026	-6529.132	7741.2	50.0	873.1	-1.04	0.19	9.18
9680.0	820.136	-138.516	-6519.942	7730.2	51.9	964.8	-1.15	0.19	9.17
9690.0	897.379	-137.988	-6509.835	7718.2	53.8	1056.4	-1.26	0.19	9.15
9700.0	974.496	-137.440	-6498.814	7705.1	55.7	1147.9	-1.37	0.19	9.14
9710.0	1051.477	-136.874	-6486.879	7690.9	57.6	1239.1	-1.48	0.19	9.12
9720.0	1128.310	-136.289	-6474.031	7675.6	59.4	1330.2	-1.59	0.19	9.10
9730.0	1204.984	-135.685	-6460.274	7659.2	61.3	1421.2	-1.69	0.19	9.08
9740.0	1281.490	-135.063	-6445.609	7641.8	63.2	1511.9	-1.80	0.18	9.06
9750.0	1357.816	-134.422	-6430.038	7623.2	65.0	1602.4	-1.91	0.18	9.04
9760.0	1433.951	-133.762	-6413.562	7603.6	66.9	1692.6	-2.02	0.18	9.02
9770.0	1509.885	-133.084	-6396.186	7583.0	68.7	1782.7	-2.12	0.18	8.99
9780.0	1585.607	-132.387	-6377.910	7561.3	70.6	1872.4	-2.23	0.18	8.97
9790.0	1661.107	-131.672	-6358.738	7538.5	72.4	1962.0	-2.34	0.18	8.94
9800.0	1736.373	-130.939	-6338.672	7514.6	74.2	2051.2	-2.44	0.18	8.91
9810.0	1811.396	-130.188	-6317.715	7489.7	76.0	2140.1	-2.55	0.18	8.88
9820.0	1886.164	-129.419	-6295.870	7463.7	77.8	2228.8	-2.65	0.18	8.85
9830.0	1960.667	-128.632	-6273.140	7436.7	79.6	2317.1	-2.76	0.18	8.82
9840.0	2034.895	-127.827	-6249.529	7408.7	81.4	2405.1	-2.86	0.18	8.78
9850.0	2108.837	-127.004	-6225.039	7379.6	83.2	2492.8	-2.96	0.18	8.75

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
9860.0	2182.483	-126.163	-6199.674	7349.4	84.9	2580.1	-3.07	0.17	8.71
9870.0	2255.823	-125.305	-6173.439	7318.3	86.7	2667.0	-3.16	0.17	8.68
9880.0	2328.846	-124.430	-6146.336	7286.1	88.4	2753.6	-3.29	0.17	8.64
9890.0	2401.541	-123.537	-6118.369	7252.9	90.1	2839.7	-3.38	0.17	8.60
9900.0	2473.900	-122.627	-6089.542	7218.6	91.9	2925.5	-3.48	0.17	8.56
9910.0	2545.911	-121.700	-6059.860	7183.4	93.6	3010.9	-3.58	0.17	8.52
9920.0	2617.564	-120.756	-6029.326	7147.1	95.2	3095.8	-3.68	0.17	8.47
9930.0	2688.850	-119.795	-5997.945	7109.9	96.9	3180.3	-3.77	0.17	8.44
9940.0	2759.758	-118.818	-5965.721	7071.6	98.6	3264.4	-3.88	0.17	8.38
9950.0	2830.279	-117.824	-5932.658	7032.4	100.3	3348.0	-3.98	0.16	8.34
9960.0	2900.402	-116.813	-5898.762	6992.1	101.9	3431.1	-4.08	0.16	8.29
9970.0	2970.118	-115.786	-5864.038	6950.9	103.5	3513.7	-4.17	0.16	8.24
9980.0	3039.417	-114.742	-5828.489	6908.7	105.1	3595.9	-4.26	0.16	8.19
9990.0	3108.289	-113.683	-5792.121	6865.6	106.8	3677.6	-4.36	0.16	8.14
10000.0	3176.725	-112.607	-5754.940	6821.5	108.3	3758.7	-4.46	0.16	8.10
10010.0	3244.715	-111.516	-5716.949	6776.4	109.9	3839.3	-4.56	0.16	8.03
10020.0	3312.250	-110.409	-5678.156	6730.4	111.5	3919.3	-4.66	0.15	7.98
10030.0	3379.320	-109.286	-5638.564	6683.4	113.0	3998.9	-4.75	0.15	7.92
10040.0	3445.916	-108.148	-5598.180	6635.6	114.6	4077.8	-4.84	0.15	7.86
S-IVB RE-IGNITION (STDV OPEN)									
10042.800	3464.477	-107.827	-5586.731	6622.1	115.0	4099.9	-4.78	0.12	7.87
10044.0	3472.420	-107.689	-5581.806	6617.5	115.1	4110.0	-2.20	0.14	9.44
10046.0	3485.654	-107.458	-5573.565	6616.2	115.4	4130.7	-0.03	0.13	10.72
10048.0	3498.886	-107.227	-5565.282	6616.2	115.7	4152.3	0.07	0.13	10.90
10050.0	3512.119	-106.996	-5556.956	6616.5	115.9	4174.1	0.13	0.09	10.88
10052.0	3525.353	-106.764	-5548.585	6616.9	116.1	4196.0	0.18	0.12	10.90
10054.0	3538.587	-106.531	-5540.172	6617.2	116.1	4217.9	0.12	-0.07	11.04
10056.0	3551.821	-106.299	-5531.714	6617.4	115.8	4240.1	0.04	-0.29	11.10
10058.0	3565.056	-106.068	-5523.211	6617.5	115.1	4262.3	0.04	-0.38	11.10
10060.0	3578.291	-105.839	-5514.665	6617.6	114.4	4284.5	0.09	-0.31	11.10
10062.0	3591.527	-105.611	-5506.073	6617.8	113.8	4306.7	0.09	-0.24	11.12
10064.0	3604.762	-105.384	-5497.438	6617.9	113.3	4328.9	0.05	-0.24	11.13
10066.0	3617.998	-105.157	-5488.758	6618.0	112.9	4351.2	0.05	-0.24	11.13
10068.0	3631.234	-104.932	-5480.033	6618.1	112.4	4373.5	0.05	-0.20	11.14
10070.0	3644.471	-104.708	-5471.264	6618.2	112.1	4395.8	0.03	-0.15	11.16
10072.0	3657.707	-104.484	-5462.450	6618.3	111.8	4418.1	0.01	-0.13	11.20
10074.0	3670.944	-104.260	-5453.591	6618.3	111.6	4440.5	-0.01	-0.12	11.21
10076.0	3684.180	-104.038	-5444.688	6618.2	111.3	4462.9	-0.01	-0.11	11.21
10078.0	3697.417	-103.815	-5435.739	6618.2	111.1	4485.4	-0.02	-0.09	11.21
10080.0	3710.653	-103.593	-5426.746	6618.2	111.0	4507.8	-0.04	-0.06	11.21
10082.0	3723.889	-103.371	-5417.708	6618.1	110.9	4530.2	-0.04	-0.05	11.22

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
10084.0	3737.125	-103.149	-5408.625	6618.0	110.8	4552.7	-0.04	-0.03	11.23
10086.0	3750.361	-102.928	-5399.498	6617.9	110.8	4575.1	-0.05	-0.01	11.23
10088.0	3763.597	-102.706	-5390.325	6617.8	110.8	4597.6	-0.06	0.01	11.23
10090.0	3776.832	-102.485	-5381.107	6617.7	110.8	4620.0	-0.07	0.03	11.23
10092.0	3790.068	-102.263	-5371.845	6617.5	110.9	4642.5	-0.07	0.05	11.23
10094.0	3803.303	-102.041	-5362.537	6617.4	111.0	4665.0	-0.09	0.06	11.24
10096.0	3816.537	-101.819	-5353.185	6617.2	111.2	4687.5	-0.09	0.08	11.26
10098.0	3829.771	-101.596	-5343.788	6617.0	111.3	4710.0	-0.09	0.09	11.26
10100.0	3843.005	-101.374	-5334.345	6616.9	111.5	4732.5	-0.09	0.11	11.26
10102.0	3856.239	-101.150	-5324.858	6616.7	111.8	4755.0	-0.10	0.13	11.26
10104.0	3869.472	-100.927	-5315.325	6616.5	112.0	4777.5	-0.10	0.15	11.26
10106.0	3882.705	-100.702	-5305.747	6616.3	112.4	4800.0	-0.11	0.16	11.27
10108.0	3895.937	-100.477	-5296.125	6616.0	112.7	4822.6	-0.12	0.18	11.27
10110.0	3909.169	-100.251	-5286.457	6615.8	113.1	4845.1	-0.12	0.20	11.28
10112.0	3922.400	-100.025	-5276.744	6615.6	113.5	4867.7	-0.13	0.22	11.28
10114.0	3935.631	-99.797	-5266.986	6615.3	114.0	4890.3	-0.14	0.23	11.28
10116.0	3948.861	-99.569	-5257.183	6615.0	114.4	4912.8	-0.14	0.25	11.28
10118.0	3962.091	-99.339	-5247.335	6614.7	115.0	4935.4	-0.15	0.27	11.28
10120.0	3975.320	-99.109	-5237.442	6614.4	115.5	4957.9	-0.15	0.29	11.30
10122.0	3988.549	-98.877	-5227.503	6614.1	116.1	4980.6	-0.15	0.31	11.31
10124.0	4001.777	-98.644	-5217.520	6613.8	116.8	5003.2	-0.16	0.32	11.30
10126.0	4015.004	-98.410	-5207.491	6613.5	117.4	5025.8	-0.17	0.34	11.30
10128.0	4028.231	-98.175	-5197.416	6613.1	118.1	5048.3	-0.18	0.35	11.29
10130.0	4041.457	-97.938	-5187.297	6612.8	118.9	5070.9	-0.18	0.37	11.30
10132.0	4054.682	-97.699	-5177.133	6612.4	119.6	5093.5	-0.18	0.39	11.31
10134.0	4067.907	-97.459	-5166.923	6612.1	120.4	5116.1	-0.18	0.41	11.31
10136.0	4081.130	-97.217	-5156.668	6611.7	121.3	5138.8	-0.20	0.43	11.31
10138.0	4094.353	-96.974	-5146.368	6611.3	122.1	5161.4	-0.20	0.44	11.32
10140.0	4107.576	-96.729	-5136.023	6610.9	123.0	5184.0	-0.20	0.45	11.29
10142.0	4120.797	-96.482	-5125.632	6610.5	124.0	5206.6	-0.19	0.49	11.33
10144.0	4134.018	-96.233	-5115.196	6610.1	124.9	5229.3	-0.21	0.49	11.32
10146.0	4147.238	-95.982	-5104.715	6610.3	126.0	5252.3	0.38	0.57	11.76
10148.0	4160.459	-95.729	-5094.187	6611.3	127.2	5276.0	0.68	0.59	11.97
10150.0	4173.683	-95.473	-5083.611	6612.6	128.4	5299.9	0.72	0.67	11.99
10152.0	4186.910	-95.215	-5072.987	6614.1	129.8	5324.0	0.71	0.75	12.04
10154.0	4200.140	-94.954	-5062.315	6615.5	131.4	5348.0	0.70	0.79	12.04
10156.0	4213.372	-94.690	-5051.595	6616.9	132.9	5372.0	0.68	0.78	11.93
10158.0	4226.607	-94.422	-5040.827	6618.2	134.5	5395.9	0.66	0.78	11.92
10160.0	4239.845	-94.152	-5030.011	6619.5	136.1	5419.7	0.64	0.78	11.91
10162.0	4253.085	-93.878	-5019.148	6620.8	137.6	5443.5	0.65	0.74	11.94
10164.0	4266.328	-93.601	-5008.237	6622.1	139.0	5467.4	0.66	0.68	12.00
10166.0	4279.573	-93.322	-4997.278	6623.4	140.3	5491.5	0.65	0.65	12.05
10168.0	4292.822	-93.040	-4986.271	6624.7	141.7	5515.6	0.67	0.68	12.06

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
10170.0	4306.072	-92.755	-4975.216	6626.1	143.1	5539.7	0.69	0.73	12.10
10172.0	4319.326	-92.468	-4964.112	6627.5	144.6	5563.9	0.68	0.74	12.05
10174.0	4332.582	-92.177	-4952.960	6628.9	146.1	5588.0	0.67	0.75	12.05
10176.0	4345.841	-91.883	-4941.760	6630.2	147.6	5612.1	0.69	0.82	12.07
10178.0	4359.103	-91.586	-4930.512	6631.6	149.3	5636.3	0.71	0.89	12.09
10180.0	4372.368	-91.286	-4919.215	6633.0	151.1	5660.5	0.70	0.91	12.08
10182.0	4385.635	-90.982	-4907.870	6634.4	153.0	5684.6	0.68	0.91	12.07
10184.0	4398.906	-90.674	-4896.476	6635.8	154.8	5708.8	0.69	0.95	12.08
10186.0	4412.178	-90.362	-4885.035	6637.2	156.8	5733.0	0.71	1.01	12.10
10188.0	4425.454	-90.047	-4873.544	6638.6	158.8	5757.2	0.72	1.05	12.11
10190.0	4438.733	-89.727	-4862.006	6640.0	161.0	5781.4	0.72	1.07	12.11
10192.0	4452.014	-89.403	-4850.419	6641.5	163.1	5805.6	0.72	1.09	12.12
10194.0	4465.299	-89.075	-4838.783	6643.0	165.3	5829.9	0.74	1.12	12.13
10196.0	4478.586	-88.742	-4827.099	6644.4	167.6	5854.1	0.74	1.14	12.12
10198.0	4491.877	-88.404	-4815.367	6645.9	169.9	5878.4	0.74	1.16	12.13
10200.0	4505.170	-88.062	-4803.586	6647.4	172.2	5902.7	0.74	1.19	12.17
10202.0	4518.466	-87.715	-4791.756	6648.9	174.6	5927.0	0.75	1.22	12.19
10204.0	4531.766	-87.363	-4779.878	6650.4	177.1	5951.4	0.76	1.25	12.18
10206.0	4545.068	-87.007	-4767.951	6651.9	179.6	5975.8	0.76	1.28	12.18
10208.0	4558.373	-86.645	-4755.975	6653.5	182.2	6000.1	0.77	1.30	12.19
10210.0	4571.682	-86.278	-4743.950	6655.0	184.8	6024.5	0.78	1.33	12.20
10212.0	4584.994	-85.906	-4731.877	6656.6	187.5	6048.9	0.78	1.35	12.21
10214.0	4598.308	-85.528	-4719.754	6658.1	190.2	6073.4	0.77	1.38	12.22
10216.0	4611.626	-85.144	-4707.583	6659.7	193.1	6097.8	0.77	1.42	12.23
10218.0	4624.947	-84.756	-4695.363	6661.3	195.9	6122.3	0.81	1.45	12.24
10220.0	4638.271	-84.361	-4683.094	6662.9	198.8	6146.7	0.82	1.47	12.24
10222.0	4651.599	-83.960	-4670.776	6664.6	201.8	6171.2	0.82	1.49	12.26
10224.0	4664.929	-83.554	-4658.409	6666.2	204.8	6195.8	0.82	1.52	12.28
10226.0	4678.264	-83.141	-4645.993	6667.9	207.9	6220.3	0.84	1.56	12.29
10228.0	4691.601	-82.722	-4633.528	6669.6	211.0	6244.9	0.85	1.58	12.29
10230.0	4704.942	-82.297	-4621.013	6671.3	214.2	6269.5	0.85	1.60	12.30
10232.0	4718.286	-81.865	-4608.450	6673.0	217.5	6294.1	0.86	1.63	12.32
10234.0	4731.634	-81.427	-4595.837	6674.7	220.7	6318.8	0.87	1.66	12.32
10236.0	4744.985	-80.982	-4583.175	6676.4	224.1	6343.4	0.87	1.69	12.33
10238.0	4758.339	-80.530	-4570.463	6678.2	227.5	6368.1	0.88	1.72	12.35
10240.0	4771.698	-80.072	-4557.702	6680.0	231.0	6392.8	0.90	1.76	12.37
10242.0	4785.059	-79.606	-4544.892	6681.8	234.6	6417.6	0.90	1.79	12.38
10244.0	4798.425	-79.134	-4532.032	6683.6	238.2	6442.3	0.91	1.81	12.39
10246.0	4811.794	-78.654	-4519.123	6685.4	241.8	6467.1	0.92	1.83	12.41
10248.0	4825.166	-78.166	-4506.164	6687.3	245.5	6492.0	0.93	1.87	12.42
10250.0	4838.543	-77.672	-4493.155	6689.1	249.3	6516.8	0.94	1.91	12.42
10252.0	4851.923	-77.169	-4480.096	6691.0	253.1	6541.7	0.95	1.93	12.44
10254.0	4865.307	-76.659	-4466.988	6692.9	257.0	6566.6	0.96	1.96	12.46

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
10256.0	4878.695	-76.141	-4453.830	6694.9	261.0	6591.5	0.96	2.01	12.48
10258.0	4892.087	-75.615	-4440.622	6696.8	265.1	6616.5	0.98	2.05	12.49
10260.0	4905.482	-75.081	-4427.364	6698.8	269.2	6641.5	1.00	2.07	12.51
10262.0	4918.882	-74.538	-4414.056	6700.8	273.3	6666.5	1.00	2.09	12.52
10264.0	4932.285	-73.988	-4400.698	6702.8	277.5	6691.5	1.02	2.11	12.53
10266.0	4945.693	-73.428	-4387.290	6704.9	281.8	6716.6	1.04	2.15	12.55
10268.0	4959.105	-72.860	-4373.832	6707.0	286.1	6741.7	1.04	2.19	12.56
10270.0	4972.521	-72.284	-4360.323	6709.0	290.5	6766.9	1.04	2.23	12.58
10272.0	4985.941	-71.698	-4346.764	6711.1	295.0	6792.1	1.05	2.25	12.61
10274.0	4999.365	-71.104	-4333.155	6713.2	299.6	6817.3	1.06	2.28	12.63
10276.0	5012.794	-70.500	-4319.495	6715.4	304.2	6842.6	1.07	2.32	12.65
10278.0	5026.227	-69.887	-4305.784	6717.5	308.8	6867.9	1.08	2.37	12.66
10280.0	5039.664	-69.264	-4292.023	6719.7	313.6	6893.2	1.10	2.40	12.68
10282.0	5053.106	-68.632	-4278.212	6721.9	318.4	6918.6	1.11	2.43	12.71
10284.0	5066.552	-67.991	-4264.349	6724.2	323.3	6944.0	1.13	2.47	12.73
10286.0	5080.003	-67.339	-4250.435	6726.4	328.3	6969.5	1.14	2.50	12.74
10288.0	5093.458	-66.677	-4236.471	6728.8	333.4	6995.0	1.16	2.53	12.76
10290.0	5106.918	-66.006	-4222.455	6731.1	338.5	7020.6	1.17	2.58	12.79
10292.0	5120.382	-65.323	-4208.389	6733.4	343.7	7046.2	1.17	2.61	12.81
10294.0	5133.851	-64.631	-4194.271	6735.8	348.9	7071.8	1.18	2.64	12.83
10296.0	5147.325	-63.928	-4180.101	6738.1	354.2	7097.5	1.20	2.67	12.86
10298.0	5160.804	-63.214	-4165.881	6740.5	359.6	7123.2	1.21	2.71	12.89
10300.0	5174.287	-62.489	-4151.608	6743.0	365.1	7149.1	1.22	2.75	12.92
10302.0	5187.776	-61.754	-4137.284	6745.4	370.6	7174.9	1.23	2.79	12.94
10304.0	5201.269	-61.007	-4122.909	6747.9	376.2	7200.8	1.24	2.83	12.98
10306.0	5214.767	-60.249	-4108.481	6750.4	381.9	7226.8	1.25	2.87	13.01
10308.0	5228.271	-59.479	-4094.001	6752.9	387.7	7252.8	1.27	2.91	13.02
10310.0	5241.779	-58.698	-4079.470	6755.5	393.6	7278.9	1.28	2.95	13.05
10312.0	5255.293	-57.904	-4064.886	6758.0	399.5	7305.1	1.29	2.98	13.09
10314.0	5268.811	-57.099	-4050.249	6760.6	405.5	7331.2	1.30	3.01	13.11
10316.0	5282.335	-56.282	-4035.561	6763.2	411.6	7357.5	1.31	3.05	13.13
10318.0	5295.864	-55.453	-4020.819	6765.9	417.8	7383.8	1.33	3.09	13.16
10320.0	5309.399	-54.611	-4006.025	6768.6	424.0	7410.1	1.34	3.13	13.20
10322.0	5322.939	-53.757	-3991.179	6771.2	430.3	7436.6	1.34	3.16	13.24
10324.0	5336.484	-52.890	-3976.279	6773.9	436.6	7463.1	1.35	3.21	13.28
10326.0	5350.034	-52.010	-3961.326	6776.7	443.1	7489.7	1.38	3.27	13.33
10328.0	5363.590	-51.117	-3946.320	6779.4	449.7	7516.4	1.39	3.33	13.37
10330.0	5377.152	-50.211	-3931.261	6782.2	456.4	7543.2	1.40	3.37	13.41
10332.0	5390.719	-49.292	-3916.147	6785.0	463.2	7570.1	1.41	3.40	13.45
10334.0	5404.292	-48.358	-3900.980	6787.9	470.0	7597.0	1.43	3.43	13.51
10336.0	5417.871	-47.411	-3885.759	6790.8	476.9	7624.1	1.45	3.45	13.55
10338.0	5431.455	-46.451	-3870.484	6793.7	483.8	7651.2	1.45	3.47	13.58
10340.0	5445.046	-45.476	-3855.154	6796.6	490.8	7678.4	1.45	3.52	13.63

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
10342.0	5458.642	-44.487	-3839.770	6799.5	497.9	7705.7	1.46	3.59	13.68
10344.0	5472.243	-43.484	-3824.331	6802.4	505.2	7733.1	1.47	3.64	13.74
10346.0	5485.851	-42.467	-3808.838	6805.3	512.5	7760.7	1.47	3.69	13.81
10348.0	5499.465	-41.434	-3793.289	6808.3	520.0	7788.4	1.48	3.76	13.89
10350.0	5513.084	-40.387	-3777.684	6811.3	527.5	7816.2	1.49	3.80	13.94
10352.0	5526.710	-39.324	-3762.024	6814.3	535.1	7844.1	1.49	3.80	13.94
10354.0	5540.341	-38.246	-3746.308	6817.3	542.7	7872.0	1.51	3.83	13.97
10356.0	5553.979	-37.153	-3730.536	6820.3	550.5	7900.1	1.46	3.91	14.11
10358.0	5567.622	-36.044	-3714.707	6823.0	558.4	7928.5	1.28	4.04	14.33
10360.0	5581.271	-34.919	-3698.821	6825.4	566.6	7957.3	1.15	4.13	14.48
10362.0	5594.924	-33.778	-3682.878	6827.8	574.9	7986.3	1.17	4.15	14.52
10364.0	5608.582	-32.620	-3666.876	6830.2	583.2	8015.4	1.24	4.17	14.54
10366.0	5622.245	-31.445	-3650.816	6832.7	591.6	8044.5	1.28	4.21	14.60
10368.0	5635.913	-30.253	-3634.698	6835.3	600.0	8073.8	1.33	4.22	14.63
10370.0	5649.586	-29.045	-3618.521	6838.0	608.5	8103.0	1.39	4.23	14.66
10372.0	5663.265	-27.819	-3602.286	6840.8	617.0	8132.4	1.44	4.25	14.69
10374.0	5676.949	-26.577	-3585.992	6843.8	625.5	8161.8	1.50	4.28	14.73
10376.0	5690.640	-25.317	-3569.638	6846.8	634.1	8191.3	1.55	4.30	14.78
10378.0	5704.337	-24.041	-3553.226	6850.0	642.7	8220.9	1.61	4.31	14.82
10380.0	5718.040	-22.747	-3536.755	6853.3	651.2	8250.5	1.67	4.31	14.85
10382.0	5731.750	-21.436	-3520.224	6856.7	659.8	8280.3	1.73	4.29	14.89
S-IVB 2ND GUIDANCE CUTOFF									
10383.940	5745.056	-20.148	-3504.132	6860.2	667.9	8309.0	1.80	4.27	14.92
10384.0	5745.467	-20.108	-3503.634	6860.3	668.1	8309.9	1.81	4.28	14.91
10386.0	5759.176	-18.769	-3487.001	6847.4	669.3	8321.4	-7.53	0.03	4.56
10388.0	5772.855	-17.431	-3470.349	6832.3	669.3	8330.6	-7.54	0.03	4.53
10390.0	5786.504	-16.092	-3453.679	6817.2	669.4	8339.6	-7.55	0.03	4.50
10392.0	5800.123	-14.753	-3436.991	6801.9	669.4	8348.4	-7.56	0.02	4.47
TRANSLUNAR INJECTION (TLI)									
10393.940	5813.305	-13.454	-3420.787	6787.3	669.5	8357.1	-7.56	0.02	4.45
10400.0	5854.297	-9.397	-3370.062	6741.4	669.6	8383.8	-7.58	0.02	4.36
10450.0	6181.843	24.089	-2945.711	6359.5	669.4	8584.4	-7.68	-0.03	3.66
10500.0	6490.208	57.512	-2512.204	5975.1	667.2	8750.1	-7.68	-0.06	2.97
10550.0	6779.389	90.778	-2071.259	5592.9	663.2	8882.2	-7.59	-0.10	2.32
10600.0	7049.610	123.805	-1624.509	5217.3	657.7	8982.7	-7.42	-0.12	1.71
10650.0	7301.285	156.521	-1173.473	4851.6	650.8	9054.1	-7.20	-0.15	1.16
10700.0	7534.981	188.866	-719.534	4498.5	642.8	9099.3	-6.92	-0.17	0.66
10750.0	7751.377	220.791	-263.931	4159.9	634.0	9121.2	-6.62	-0.18	0.23
10800.0	7951.236	252.259	192.248	3837.1	624.6	9122.8	-6.29	-0.19	-0.15

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS KM	YS KM	ZS KM	DXS M/S	DYS M/S	DZS M/S	DDXS M/S SQ	DDYS M/S SQ	DDZS M/S SQ
10850.0	8135.368	283.240	648.059	3530.9	614.6	9107.0	-5.96	-0.20	-0.47
10900.0	8304.611	313.715	1102.696	3241.6	604.3	9076.3	-5.62	-0.21	-0.75
10950.0	8459.804	343.671	1555.480	2969.0	593.8	9033.2	-5.29	-0.21	-0.97
11000.0	8601.780	373.099	2005.844	2712.8	583.3	8979.8	-4.96	-0.21	-1.16
11050.0	8731.346	401.998	2453.325	2472.5	572.7	8918.2	-4.65	-0.21	-1.31
11100.0	8849.279	430.369	2897.548	2247.3	562.2	8849.7	-4.36	-0.21	-1.43
11150.0	8956.318	458.218	3338.209	2036.6	551.8	8775.9	-4.07	-0.21	-1.52
11200.0	9053.166	485.552	3775.074	1839.5	541.6	8698.1	-3.81	-0.20	-1.59
11250.0	9140.484	512.377	4207.969	1655.3	531.5	8617.3	-3.56	-0.20	-1.64
11300.0	9218.892	538.705	4636.765	1483.0	521.6	8534.3	-3.33	-0.19	-1.68
11350.0	9288.968	564.546	5061.372	1321.9	512.1	8449.9	-3.11	-0.19	-1.70
11400.0	9351.253	589.917	5481.738	1171.2	502.8	8364.7	-2.91	-0.18	-1.71
11450.0	9406.250	614.833	5897.836	1030.2	493.9	8279.2	-2.73	-0.18	-1.71
11500.0	9454.425	639.307	6309.659	898.2	485.2	8193.8	-2.55	-0.17	-1.70
11550.0	9496.211	663.353	6717.222	774.6	476.7	8108.8	-2.39	-0.17	-1.69
11600.0	9532.009	686.984	7120.552	658.6	468.6	8024.5	-2.25	-0.16	-1.68
11650.0	9562.194	710.212	7519.691	549.9	460.6	7941.2	-2.11	-0.16	-1.66
11700.0	9587.108	733.053	7914.689	447.8	453.0	7858.9	-1.98	-0.15	-1.63
11750.0	9607.074	755.517	8305.603	351.8	445.6	7777.9	-1.86	-0.15	-1.61
11800.0	9622.388	777.618	8692.498	261.6	438.5	7698.2	-1.75	-0.14	-1.58
11850.0	9633.325	799.367	9075.442	176.7	431.5	7619.8	-1.65	-0.14	-1.55
CSM SEPARATION									
11884.900	9638.502	814.346	9340.432	120.4	426.9	7566.0	-1.58	-0.13	-1.53

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

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	ALTITUDE M
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6										
9464.500	6571.289	151.1242	-18.1974	60.89	0.06	7390.5	62.51	0.05	7791.3	195217
9470.0	6571.329	151.4498	-18.0246	60.77	0.06	7390.5	62.41	0.05	7791.3	195220
9480.0	6571.402	152.0400	-17.7089	60.56	0.06	7390.5	62.21	0.05	7791.2	195224
9490.0	6571.475	152.6280	-17.3912	60.36	0.06	7390.5	62.02	0.05	7791.2	195228
9500.0	6571.548	153.2138	-17.0716	60.16	0.06	7390.5	61.83	0.05	7791.2	195233
9510.0	6571.621	153.7974	-16.7500	59.96	0.06	7390.5	61.65	0.05	7791.1	195239
9520.0	6571.692	154.3788	-16.4265	59.77	0.06	7390.5	61.47	0.05	7791.1	195244
9530.0	6571.764	154.9582	-16.1012	59.58	0.06	7390.5	61.30	0.05	7791.0	195250
9540.0	6571.835	155.5355	-15.7741	59.40	0.06	7390.5	61.13	0.05	7791.0	195257
9550.0	6571.906	156.1109	-15.4453	59.22	0.05	7390.5	60.96	0.05	7790.9	195264
9560.0	6571.976	156.6842	-15.1147	59.05	0.05	7390.5	60.80	0.05	7790.9	195271
9570.0	6572.046	157.2556	-14.7825	58.88	0.05	7390.5	60.64	0.05	7790.9	195279
9580.0	6572.116	157.8251	-14.4487	58.71	0.05	7390.5	60.49	0.05	7790.8	195287
9590.0	6572.184	158.3928	-14.1134	58.55	0.05	7390.5	60.34	0.05	7790.8	195296
9600.0	6572.253	158.9587	-13.7765	58.39	0.05	7390.5	60.19	0.05	7790.7	195305
9610.0	6572.321	159.5228	-13.4381	58.24	0.05	7390.5	60.05	0.05	7790.7	195315
9620.0	6572.388	160.0852	-13.0982	58.09	0.05	7390.5	59.91	0.05	7790.6	195326
9630.0	6572.455	160.6459	-12.7570	57.95	0.05	7390.5	59.77	0.05	7790.6	195337
9640.0	6572.521	161.2049	-12.4144	57.81	0.05	7390.5	59.64	0.05	7790.6	195348
9650.0	6572.587	161.7624	-12.0705	57.67	0.05	7390.5	59.51	0.05	7790.5	195361
9660.0	6572.652	162.3183	-11.7253	57.54	0.05	7390.4	59.39	0.05	7790.5	195374
9670.0	6572.717	162.8727	-11.3789	57.41	0.05	7390.4	59.27	0.05	7790.4	195387
9680.0	6572.781	163.4257	-11.0313	57.28	0.05	7390.4	59.15	0.05	7790.4	195402
9690.0	6572.845	163.9772	-10.6825	57.16	0.05	7390.4	59.04	0.05	7790.3	195417
9700.0	6572.907	164.5274	-10.3326	57.05	0.05	7390.4	58.93	0.05	7790.3	195433
9710.0	6572.970	165.0762	-9.9817	56.93	0.05	7390.4	58.83	0.05	7790.3	195449
9720.0	6573.031	165.6237	-9.6297	56.83	0.05	7390.4	58.73	0.05	7790.2	195467
9730.0	6573.092	166.1700	-9.2767	56.72	0.05	7390.4	58.63	0.04	7790.2	195485
9740.0	6573.152	166.7151	-8.9227	56.62	0.05	7390.4	58.54	0.04	7790.1	195503
9750.0	6573.212	167.2591	-8.5679	56.53	0.05	7390.3	58.45	0.04	7790.1	195523
9760.0	6573.271	167.8019	-8.2121	56.43	0.05	7390.3	58.36	0.04	7790.1	195543
9770.0	6573.329	168.3437	-7.8556	56.35	0.04	7390.3	58.28	0.04	7790.0	195565
9780.0	6573.387	168.8845	-7.4982	56.26	0.04	7390.3	58.20	0.04	7790.0	195587
9790.0	6573.443	169.4243	-7.1400	56.18	0.04	7390.3	58.13	0.04	7789.9	195609
9800.0	6573.500	169.9632	-6.7812	56.11	0.04	7390.3	58.06	0.04	7789.9	195633
9810.0	6573.555	170.5013	-6.4216	56.03	0.04	7390.2	57.99	0.04	7789.8	195658
9820.0	6573.609	171.0385	-6.0614	55.97	0.04	7390.2	57.93	0.04	7789.8	195683
9830.0	6573.663	171.5749	-5.7006	55.90	0.04	7390.2	57.87	0.04	7789.8	195709
9840.0	6573.716	172.1105	-5.3392	55.84	0.04	7390.2	57.81	0.04	7789.7	195736
9850.0	6573.769	172.6455	-4.9773	55.79	0.04	7390.1	57.76	0.04	7789.7	195764

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
9860.0	6573.820	173.1799	-4.6149	55.73	0.04	7390.1	57.71	0.04	7789.6	195793
9870.0	6573.871	173.7136	-4.2520	55.69	0.04	7390.1	57.67	0.04	7789.6	195823
9880.0	6573.922	174.2468	-3.8887	55.64	0.04	7390.1	57.63	0.04	7789.6	195854
9890.0	6573.971	174.7795	-3.5250	55.60	0.04	7390.0	57.59	0.04	7789.5	195886
9900.0	6574.020	175.3118	-3.1610	55.57	0.04	7390.0	57.56	0.04	7789.5	195919
9910.0	6574.068	175.8436	-2.7966	55.53	0.04	7389.9	57.53	0.04	7789.4	195953
9920.0	6574.115	176.3750	-2.4320	55.50	0.04	7389.9	57.50	0.03	7789.4	195988
9930.0	6574.162	176.9062	-2.0671	55.48	0.04	7389.9	57.48	0.03	7789.4	196024
9940.0	6574.208	177.4371	-1.7020	55.46	0.04	7389.9	57.46	0.03	7789.3	196061
9950.0	6574.252	177.9677	-1.3368	55.44	0.03	7389.8	57.44	0.03	7789.3	196098
9960.0	6574.296	178.4982	-0.9714	55.43	0.03	7389.8	57.43	0.03	7789.2	196137
9970.0	6574.340	179.0285	-0.6060	55.42	0.03	7389.8	57.42	0.03	7789.2	196176
9980.0	6574.382	179.5588	-0.2405	55.42	0.03	7389.8	57.42	0.03	7789.3	196217
9990.0	6574.424	-179.9110	0.1251	55.42	0.03	7389.8	57.42	0.03	7789.2	196258
10000.0	6574.465	-179.3808	0.4906	55.42	0.03	7389.8	57.42	0.03	7789.2	196301
10010.0	6574.506	-178.8505	0.8561	55.43	0.03	7389.8	57.43	0.03	7789.2	196344
10020.0	6574.545	-178.3201	1.2215	55.44	0.03	7389.7	57.44	0.03	7789.2	196389
10030.0	6574.584	-177.7895	1.5867	55.45	0.03	7389.8	57.45	0.03	7789.2	196435
10040.0	6574.622	-177.2587	1.9518	55.47	0.03	7389.8	57.47	0.03	7789.3	196481
S-IVB RE-IGNITION (STDV OPEN)										
10042.800	6574.633	-177.1101	2.0540	55.48	0.03	7389.8	57.48	0.03	7789.3	196494
10044.0	6574.637	-177.0464	2.0978	55.48	0.03	7391.3	57.48	0.03	7790.8	196500
10046.0	6574.645	-176.9401	2.1709	55.49	0.03	7401.1	57.48	0.03	7800.6	196510
10048.0	6574.653	-176.8336	2.2440	55.49	0.03	7412.6	57.49	0.03	7812.1	196520
10050.0	6574.662	-176.7270	2.3172	55.50	0.04	7424.5	57.49	0.03	7824.0	196531
10052.0	6574.672	-176.6201	2.3906	55.51	0.04	7436.5	57.49	0.04	7836.0	196543
10054.0	6574.682	-176.5131	2.4640	55.51	0.04	7448.6	57.49	0.04	7848.0	196556
10056.0	6574.693	-176.4059	2.5376	55.51	0.04	7460.6	57.49	0.04	7860.1	196569
10058.0	6574.704	-176.2986	2.6113	55.51	0.04	7472.7	57.49	0.04	7872.2	196583
10060.0	6574.716	-176.1910	2.6851	55.51	0.05	7484.9	57.48	0.04	7884.3	196597
10062.0	6574.729	-176.0833	2.7590	55.51	0.05	7497.2	57.48	0.05	7896.5	196613
10064.0	6574.742	-175.9753	2.8331	55.52	0.05	7509.5	57.48	0.05	7908.8	196629
10066.0	6574.757	-175.8672	2.9072	55.52	0.06	7521.8	57.48	0.05	7921.1	196646
10068.0	6574.773	-175.7589	2.9815	55.52	0.06	7534.1	57.48	0.06	7933.4	196665
10070.0	6574.789	-175.6504	3.0559	55.53	0.07	7546.5	57.48	0.06	7945.8	196685
10072.0	6574.808	-175.5418	3.1304	55.53	0.07	7559.0	57.48	0.07	7958.2	196706
10074.0	6574.827	-175.4329	3.2050	55.53	0.08	7571.4	57.48	0.07	7970.7	196728
10076.0	6574.848	-175.3238	3.2797	55.54	0.08	7583.9	57.48	0.08	7983.2	196753
10078.0	6574.871	-175.2146	3.3546	55.55	0.09	7596.5	57.49	0.08	7995.7	196779
10080.0	6574.896	-175.1051	3.4296	55.55	0.10	7609.0	57.49	0.09	8008.3	196806
10082.0	6574.922	-174.9955	3.5046	55.56	0.10	7621.6	57.49	0.10	8020.9	196836

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
10084.0	6574.951	-174.8856	3.5798	55.56	0.11	7634.3	57.50	0.11	8033.5	196868
10086.0	6574.981	-174.7755	3.6551	55.57	0.12	7646.9	57.50	0.11	8046.2	196903
10088.0	6575.014	-174.6653	3.7305	55.58	0.13	7659.7	57.50	0.12	8058.9	196939
10090.0	6575.050	-174.5548	3.8060	55.59	0.14	7672.4	57.51	0.13	8071.6	196979
10092.0	6575.088	-174.4442	3.8816	55.60	0.15	7685.2	57.51	0.14	8084.4	197021
10094.0	6575.130	-174.3333	3.9574	55.61	0.16	7698.0	57.52	0.15	8097.2	197066
10096.0	6575.174	-174.2222	4.0332	55.62	0.17	7710.8	57.53	0.16	8110.0	197114
10098.0	6575.221	-174.1110	4.1091	55.63	0.18	7723.7	57.53	0.17	8122.9	197166
10100.0	6575.272	-173.9995	4.1852	55.64	0.19	7736.6	57.54	0.18	8135.8	197221
10102.0	6575.326	-173.8878	4.2614	55.65	0.21	7749.6	57.55	0.20	8148.8	197279
10104.0	6575.384	-173.7758	4.3376	55.66	0.22	7762.6	57.55	0.21	8161.8	197341
10106.0	6575.446	-173.6637	4.4140	55.67	0.24	7775.6	57.56	0.22	8174.8	197407
10108.0	6575.512	-173.5514	4.4904	55.68	0.25	7788.7	57.57	0.24	8187.9	197478
10110.0	6575.582	-173.4388	4.5670	55.70	0.27	7801.8	57.58	0.25	8201.0	197552
10112.0	6575.657	-173.3260	4.6437	55.71	0.28	7814.9	57.59	0.27	8214.2	197631
10114.0	6575.735	-173.2130	4.7205	55.72	0.30	7828.1	57.60	0.28	8227.4	197715
10116.0	6575.819	-173.0998	4.7973	55.74	0.31	7841.3	57.61	0.30	8240.6	197803
10118.0	6575.908	-172.9864	4.8743	55.75	0.33	7854.5	57.62	0.32	8253.8	197897
10120.0	6576.001	-172.8727	4.9514	55.77	0.35	7867.8	57.63	0.33	8267.1	197995
10122.0	6576.100	-172.7588	5.0286	55.78	0.37	7881.1	57.64	0.35	8280.5	198099
10124.0	6576.204	-172.6447	5.1058	55.80	0.39	7894.5	57.65	0.37	8293.9	198208
10126.0	6576.314	-172.5304	5.1832	55.82	0.41	7907.8	57.67	0.39	8307.3	198323
10128.0	6576.429	-172.4158	5.2607	55.83	0.43	7921.2	57.68	0.41	8320.7	198444
10130.0	6576.551	-172.3010	5.3382	55.85	0.45	7934.7	57.69	0.43	8334.1	198571
10132.0	6576.678	-172.1860	5.4159	55.87	0.47	7948.1	57.71	0.45	8347.6	198704
10134.0	6576.812	-172.0707	5.4937	55.88	0.49	7961.7	57.72	0.47	8361.2	198843
10136.0	6576.952	-171.9552	5.5715	55.90	0.52	7975.2	57.73	0.49	8374.7	198989
10138.0	6577.100	-171.8395	5.6494	55.92	0.54	7988.8	57.75	0.51	8388.3	199142
10140.0	6577.253	-171.7236	5.7275	55.94	0.56	8002.4	57.76	0.54	8402.0	199301
10142.0	6577.415	-171.6074	5.8056	55.96	0.59	8016.0	57.78	0.56	8415.7	199468
10144.0	6577.583	-171.4909	5.8838	55.98	0.61	8029.7	57.80	0.58	8429.4	199643
10146.0	6577.759	-171.3742	5.9621	56.00	0.64	8044.1	57.81	0.61	8443.8	199824
10148.0	6577.942	-171.2573	6.0405	56.03	0.67	8059.7	57.83	0.64	8459.4	200014
10150.0	6578.134	-171.1401	6.1190	56.05	0.69	8075.6	57.85	0.66	8475.4	200212
10152.0	6578.334	-171.0226	6.1976	56.07	0.72	8091.8	57.87	0.69	8491.6	200418
10154.0	6578.542	-170.9048	6.2764	56.10	0.75	8107.9	57.89	0.72	8507.8	200633
10156.0	6578.760	-170.7868	6.3552	56.12	0.78	8124.1	57.91	0.75	8524.0	200857
10158.0	6578.986	-170.6684	6.4341	56.15	0.81	8140.1	57.93	0.78	8540.2	201090
10160.0	6579.222	-170.5498	6.5131	56.18	0.85	8156.2	57.95	0.81	8556.2	201332
10162.0	6579.468	-170.4309	6.5922	56.20	0.88	8172.3	57.97	0.84	8572.4	201585
10164.0	6579.723	-170.3117	6.6714	56.23	0.91	8188.5	58.00	0.87	8588.6	201847
10166.0	6579.988	-170.1922	6.7508	56.25	0.94	8204.8	58.02	0.90	8605.0	202119
10168.0	6580.264	-170.0724	6.8302	56.28	0.98	8221.2	58.04	0.93	8621.5	202402

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
10170.0	6580.550	-169.9524	6.9097	56.30	1.01	8237.6	58.06	0.97	8638.0	202695
10172.0	6580.846	-169.8320	6.9893	56.33	1.05	8254.2	58.08	1.00	8654.6	202998
10174.0	6581.154	-169.7114	7.0690	56.36	1.08	8270.7	58.10	1.03	8671.2	203313
10176.0	6581.472	-169.5905	7.1489	56.39	1.12	8287.3	58.12	1.07	8687.8	203639
10178.0	6581.802	-169.4692	7.2288	56.41	1.16	8304.0	58.15	1.10	8704.5	203976
10180.0	6582.143	-169.3477	7.3088	56.44	1.20	8320.7	58.17	1.14	8721.3	204325
10182.0	6582.497	-169.2259	7.3889	56.47	1.23	8337.4	58.20	1.18	8738.1	204686
10184.0	6582.862	-169.1037	7.4691	56.50	1.27	8354.1	58.22	1.22	8754.9	205059
10186.0	6583.240	-168.9813	7.5494	56.54	1.31	8370.9	58.25	1.25	8771.7	205445
10188.0	6583.630	-168.8586	7.6297	56.57	1.36	8387.8	58.28	1.29	8788.7	205843
10190.0	6584.034	-168.7355	7.7102	56.60	1.40	8404.7	58.30	1.33	8805.7	206255
10192.0	6584.450	-168.6122	7.7907	56.63	1.44	8421.7	58.33	1.37	8822.8	206679
10194.0	6584.881	-168.4885	7.8714	56.67	1.48	8438.8	58.36	1.42	8839.9	207118
10196.0	6585.324	-168.3645	7.9521	56.70	1.53	8455.8	58.39	1.46	8857.1	207570
10198.0	6585.782	-168.2402	8.0329	56.74	1.57	8473.0	58.42	1.50	8874.3	208036
10200.0	6586.255	-168.1156	8.1137	56.77	1.62	8490.1	58.45	1.54	8891.5	208517
10202.0	6586.741	-167.9907	8.1947	56.81	1.66	8507.4	58.48	1.59	8908.9	209012
10204.0	6587.242	-167.8655	8.2757	56.84	1.71	8524.7	58.51	1.63	8926.3	209522
10206.0	6587.759	-167.7399	8.3568	56.88	1.76	8542.1	58.54	1.68	8943.7	210047
10208.0	6588.290	-167.6140	8.4380	56.92	1.81	8559.5	58.58	1.72	8961.2	210587
10210.0	6588.838	-167.4878	8.5193	56.96	1.85	8576.9	58.61	1.77	8978.8	211143
10212.0	6589.401	-167.3613	8.6006	56.99	1.90	8594.4	58.64	1.82	8996.4	211715
10214.0	6589.980	-167.2344	8.6820	57.03	1.95	8612.0	58.68	1.87	9014.0	212304
10216.0	6590.575	-167.1073	8.7635	57.07	2.00	8629.6	58.71	1.92	9031.7	212908
10218.0	6591.188	-166.9797	8.8450	57.11	2.06	8647.2	58.75	1.96	9049.5	213530
10220.0	6591.817	-166.8519	8.9267	57.15	2.11	8665.0	58.78	2.02	9067.3	214168
10222.0	6592.463	-166.7237	9.0083	57.19	2.16	8682.8	58.82	2.07	9085.2	214824
10224.0	6593.127	-166.5952	9.0901	57.24	2.22	8700.6	58.85	2.12	9103.2	215497
10226.0	6593.809	-166.4663	9.1719	57.28	2.27	8718.5	58.89	2.17	9121.2	216189
10228.0	6594.508	-166.3372	9.2538	57.32	2.33	8736.5	58.93	2.22	9139.3	216898
10230.0	6595.227	-166.2076	9.3357	57.36	2.38	8754.5	58.97	2.28	9157.4	217626
10232.0	6595.963	-166.0778	9.4177	57.41	2.44	8772.6	59.01	2.33	9175.6	218373
10234.0	6596.719	-165.9475	9.4997	57.45	2.49	8790.7	59.05	2.39	9193.9	219138
10236.0	6597.494	-165.8170	9.5818	57.50	2.55	8808.9	59.09	2.44	9212.2	219924
10238.0	6598.289	-165.6861	9.6640	57.54	2.61	8827.2	59.13	2.50	9230.5	220728
10240.0	6599.103	-165.5548	9.7462	57.59	2.67	8845.5	59.17	2.55	9249.0	221553
10242.0	6599.937	-165.4232	9.8285	57.64	2.73	8863.9	59.21	2.61	9267.5	222397
10244.0	6600.792	-165.2912	9.9108	57.68	2.79	8882.3	59.25	2.67	9286.0	223263
10246.0	6601.668	-165.1589	9.9931	57.73	2.85	8900.8	59.29	2.73	9304.7	224149
10248.0	6602.564	-165.0263	10.0755	57.78	2.91	8919.4	59.34	2.79	9323.4	225056
10250.0	6603.482	-164.8933	10.1580	57.83	2.98	8938.0	59.38	2.85	9342.1	225984
10252.0	6604.421	-164.7599	10.2405	57.88	3.04	8956.7	59.42	2.91	9360.9	226934
10254.0	6605.382	-164.6261	10.3230	57.93	3.10	8975.5	59.47	2.97	9379.8	227906

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
10256.0	6606.365	-164.4920	10.4056	57.98	3.17	8994.3	59.51	3.03	9398.8	228900
10258.0	6607.371	-164.3576	10.4882	58.03	3.23	9013.2	59.56	3.10	9417.8	229917
10260.0	6608.400	-164.2227	10.5708	58.08	3.30	9032.1	59.61	3.16	9436.9	230957
10262.0	6609.451	-164.0875	10.6535	58.14	3.37	9051.2	59.65	3.22	9456.1	232020
10264.0	6610.526	-163.9520	10.7362	58.19	3.43	9070.2	59.70	3.29	9475.3	233106
10266.0	6611.625	-163.8160	10.8190	58.24	3.50	9089.4	59.75	3.35	9494.6	234216
10268.0	6612.748	-163.6797	10.9018	58.30	3.57	9108.6	59.80	3.42	9514.0	235350
10270.0	6613.895	-163.5431	10.9846	58.35	3.64	9127.9	59.85	3.49	9533.4	236509
10272.0	6615.067	-163.4060	11.0674	58.41	3.71	9147.3	59.90	3.55	9552.9	237692
10274.0	6616.263	-163.2686	11.1502	58.46	3.78	9166.7	59.95	3.62	9572.5	238901
10276.0	6617.485	-163.1308	11.2331	58.52	3.85	9186.2	60.00	3.69	9592.2	240135
10278.0	6618.733	-162.9926	11.3160	58.58	3.92	9205.8	60.05	3.76	9611.9	241394
10280.0	6620.006	-162.8540	11.3989	58.63	4.00	9225.4	60.10	3.83	9631.7	242679
10282.0	6621.305	-162.7151	11.4818	58.69	4.07	9245.2	60.16	3.90	9651.6	243991
10284.0	6622.631	-162.5757	11.5648	58.75	4.14	9265.0	60.21	3.97	9671.5	245329
10286.0	6623.984	-162.4360	11.6477	58.81	4.22	9284.8	60.26	4.04	9691.6	246694
10288.0	6625.364	-162.2959	11.7307	58.87	4.29	9304.8	60.32	4.11	9711.7	248086
10290.0	6626.771	-162.1554	11.8137	58.93	4.37	9324.8	60.37	4.19	9731.9	249505
10292.0	6628.206	-162.0145	11.8966	58.99	4.45	9345.0	60.43	4.26	9752.2	250953
10294.0	6629.669	-161.8732	11.9796	59.06	4.52	9365.1	60.49	4.33	9772.5	252429
10296.0	6631.161	-161.7315	12.0626	59.12	4.60	9385.4	60.54	4.41	9793.0	253933
10298.0	6632.681	-161.5895	12.1456	59.18	4.68	9405.7	60.60	4.48	9813.5	255466
10300.0	6634.230	-161.4470	12.2285	59.24	4.76	9426.2	60.66	4.56	9834.1	257028
10302.0	6635.808	-161.3041	12.3115	59.31	4.84	9446.7	60.72	4.64	9854.8	258619
10304.0	6637.416	-161.1608	12.3945	59.37	4.92	9467.3	60.78	4.71	9875.6	260240
10306.0	6639.055	-161.0172	12.4774	59.44	5.00	9488.0	60.84	4.79	9896.5	261891
10308.0	6640.723	-160.8731	12.5604	59.51	5.08	9508.8	60.90	4.87	9917.5	263573
10310.0	6642.422	-160.7286	12.6433	59.57	5.16	9529.7	60.96	4.95	9938.5	265285
10312.0	6644.151	-160.5837	12.7262	59.64	5.24	9550.6	61.02	5.03	9959.6	267028
10314.0	6645.912	-160.4384	12.8091	59.71	5.33	9571.7	61.08	5.11	9980.9	268802
10316.0	6647.705	-160.2927	12.8920	59.78	5.41	9592.8	61.15	5.19	10002.2	270608
10318.0	6649.529	-160.1465	12.9748	59.85	5.49	9614.0	61.21	5.27	10023.6	272446
10320.0	6651.386	-160.0000	13.0576	59.92	5.58	9635.3	61.27	5.35	10045.1	274317
10322.0	6653.275	-159.8530	13.1404	59.99	5.66	9656.7	61.34	5.43	10066.7	276220
10324.0	6655.197	-159.7056	13.2232	60.06	5.75	9678.2	61.41	5.51	10088.3	278155
10326.0	6657.152	-159.5578	13.3059	60.13	5.83	9699.8	61.47	5.60	10110.2	280124
10328.0	6659.141	-159.4096	13.3886	60.20	5.92	9721.5	61.54	5.68	10132.1	282127
10330.0	6661.163	-159.2610	13.4713	60.28	6.01	9743.4	61.61	5.76	10154.1	284163
10332.0	6663.219	-159.1119	13.5539	60.35	6.09	9765.3	61.67	5.85	10176.3	286234
10334.0	6665.310	-158.9624	13.6365	60.43	6.18	9787.4	61.74	5.93	10198.6	288338
10336.0	6667.436	-158.8125	13.7191	60.50	6.27	9809.6	61.81	6.02	10221.0	290478
10338.0	6669.596	-158.6621	13.8016	60.58	6.36	9831.9	61.88	6.10	10243.5	292653
10340.0	6671.792	-158.5113	13.8840	60.65	6.45	9854.3	61.95	6.19	10266.1	294863

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
10342.0	6674.023	-158.3601	13.9664	60.73	6.54	9876.8	62.02	6.28	10288.8	297108
10344.0	6676.290	-158.2084	14.0487	60.81	6.63	9899.4	62.10	6.36	10311.6	299390
10346.0	6678.593	-158.0563	14.1310	60.89	6.72	9922.1	62.17	6.45	10334.6	301708
10348.0	6680.933	-157.9038	14.2133	60.97	6.81	9945.1	62.24	6.54	10357.7	304062
10350.0	6683.310	-157.7508	14.2954	61.05	6.90	9968.1	62.32	6.62	10381.0	306453
10352.0	6685.723	-157.5973	14.3775	61.13	6.99	9991.2	62.39	6.71	10404.3	308882
10354.0	6688.174	-157.4435	14.4596	61.21	7.08	10014.4	62.47	6.80	10427.8	311347
10356.0	6690.662	-157.2891	14.5416	61.29	7.17	10037.8	62.54	6.89	10451.3	313850
10358.0	6693.188	-157.1344	14.6235	61.37	7.26	10061.3	62.62	6.98	10475.0	316391
10360.0	6695.751	-156.9791	14.7053	61.46	7.35	10084.9	62.70	7.06	10498.9	318969
10362.0	6698.351	-156.8234	14.7871	61.54	7.44	10108.6	62.78	7.15	10522.8	321584
10364.0	6700.988	-156.6673	14.8687	61.63	7.53	10132.4	62.86	7.23	10546.9	324236
10366.0	6703.662	-156.5107	14.9503	61.71	7.62	10156.5	62.94	7.32	10571.2	326926
10368.0	6706.374	-156.3536	15.0318	61.80	7.71	10180.6	63.02	7.41	10595.6	329653
10370.0	6709.125	-156.1961	15.1133	61.88	7.80	10204.9	63.10	7.49	10620.2	332419
10372.0	6711.915	-156.0381	15.1946	61.97	7.89	10229.4	63.18	7.58	10644.9	335225
10374.0	6714.745	-155.8796	15.2758	62.06	7.99	10254.1	63.26	7.67	10669.7	338070
10376.0	6717.614	-155.7207	15.3570	62.15	8.08	10278.9	63.34	7.77	10694.8	340955
10378.0	6720.525	-155.5613	15.4381	62.23	8.18	10303.8	63.42	7.86	10720.0	343881
10380.0	6723.476	-155.4014	15.5190	62.32	8.27	10329.0	63.50	7.95	10745.4	346848
10382.0	6726.470	-155.2410	15.5999	62.41	8.37	10354.3	63.59	8.04	10770.9	349857
S-IVB 2ND GUIDANCE CUTOFF										
10383.940	6729.414	-155.0851	15.6782	62.49	8.47	10378.9	63.66	8.14	10795.8	352817
10384.0	6729.506	-155.0802	15.6807	62.50	8.47	10379.7	63.67	8.14	10796.6	352909
10386.0	6732.580	-154.9191	15.7613	62.55	8.56	10380.3	63.72	8.23	10797.3	355999
10388.0	6735.688	-154.7581	15.8417	62.60	8.66	10377.7	63.76	8.32	10794.8	359122
10390.0	6738.827	-154.5970	15.9220	62.64	8.75	10375.0	63.81	8.41	10792.2	362278
10392.0	6742.000	-154.4360	16.0020	62.69	8.84	10372.1	63.86	8.50	10789.4	365466
TRANSLUNAR INJECTION (TLI)										
10393.940	6745.108	-154.2798	16.0794	62.74	8.93	10369.4	63.90	8.58	10786.8	368590
10400.0	6755.013	-153.7921	16.3200	62.89	9.21	10361.1	64.05	8.85	10778.8	378543
10450.0	6847.845	-149.7815	18.2279	64.17	11.50	10283.7	65.30	11.04	10704.4	471781
10500.0	6959.690	-145.8080	19.9894	65.58	13.73	10192.4	66.67	13.17	10616.6	584034
10550.0	7089.321	-141.8899	21.5958	67.08	15.89	10089.2	68.14	15.22	10517.3	714064
10600.0	7235.424	-138.0448	23.0429	68.66	17.97	9976.1	69.68	17.20	10408.7	860548
10650.0	7396.641	-134.2887	24.3308	70.30	19.97	9855.2	71.28	19.09	10292.7	1022120
10700.0	7571.614	-130.6358	25.4633	71.97	21.90	9728.3	72.90	20.90	10170.9	1197416
10750.0	7759.012	-127.0982	26.4472	73.66	23.74	9597.1	74.55	22.62	10045.1	1385104
10800.0	7957.559	-123.6856	27.2911	75.36	25.50	9463.1	76.18	24.26	9916.6	1583906

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE M
10850.0	8166.053	-120.4049	28.0053	77.04	27.19	9327.6	77.81	25.81	9786.8	1792620
10900.0	8383.371	-117.2612	28.6006	78.69	28.80	9191.6	79.40	27.29	9656.7	2010124
10950.0	8608.479	-114.2569	29.0883	80.32	30.33	9056.0	80.95	28.69	9527.1	2235386
11000.0	8840.431	-111.3928	29.4793	81.90	31.80	8921.7	82.45	30.02	9398.8	2467463
11050.0	9078.370	-108.6677	29.7845	83.43	33.21	8789.2	83.91	31.27	9272.2	2705500
11100.0	9321.520	-106.0792	30.0136	84.91	34.55	8658.8	85.30	32.46	9147.9	2948724
11150.0	9569.182	-103.6237	30.1761	86.34	35.83	8531.0	86.64	33.59	9026.0	3196438
11200.0	9820.732	-101.2969	30.2803	87.72	37.06	8406.0	87.92	34.66	8907.0	3448022
11250.0	10075.613	-99.0938	30.3340	89.05	38.24	8284.1	89.13	35.68	8790.9	3702922
11300.0	10333.332	-97.0088	30.3439	90.32	39.37	8165.3	90.29	36.65	8677.8	3960643
11350.0	10593.447	-95.0364	30.3162	91.55	40.46	8049.8	91.39	37.57	8568.0	4220750
11400.0	10855.570	-93.1708	30.2562	92.72	41.51	7937.6	92.44	38.44	8461.2	4482853
11450.0	11119.353	-91.4064	30.1687	93.85	42.51	7828.6	93.43	39.27	8357.6	4746608
11500.0	11384.492	-89.7374	30.0578	94.94	43.48	7722.8	94.38	40.06	8257.1	5011710
11550.0	11650.713	-88.1584	29.9271	95.98	44.42	7620.2	95.27	40.82	8159.7	5277889
11600.0	11917.777	-86.6643	29.7797	96.99	45.33	7520.7	96.12	41.54	8065.1	5544906
11650.0	12185.471	-85.2499	29.6185	97.96	46.20	7424.2	96.93	42.23	7973.5	5812548
11700.0	12453.606	-83.9104	29.4457	98.90	47.05	7330.7	97.69	42.89	7884.7	6080628
11750.0	12722.017	-82.6415	29.2635	99.81	47.88	7240.0	98.41	43.52	7798.6	6348980
11800.0	12990.556	-81.4388	29.0736	100.69	48.68	7152.1	99.10	44.12	7715.1	6617459
11850.0	13259.094	-80.2983	28.8776	101.55	49.45	7066.9	99.76	44.70	7634.1	6885934
	CSM SEPARATION									
11884.900	13446.470	-79.5372	28.7378	102.13	49.98	7009.0	100.19	45.09	7579.0	7073266

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APPENDIX C

TIME HISTORY OF TRAJECTORY PARAMETERS - ENGLISH UNITS

The postflight trajectory, from guidance reference release to CSM separation, is tabulated in English units in Tables C-I through C-VII.

Table C-I gives the earth-fixed launch site position, velocity, and acceleration components for the ascent phase of flight.

Table C-II gives the launch vehicle navigation position, velocity, and acceleration components for the ascent phase of flight.

Table C-III gives the geographic polar coordinates for the ascent phase of flight.

Table C-IV gives the geographic polar coordinates for the parking orbit phase of flight.

Table C-V gives the earth-fixed launch site position, velocity, and acceleration components for the second burn phase of flight.

Table C-VI gives the launch vehicle navigation position, velocity, and acceleration components for the second burn phase of flight.

Table C-VII gives the geographic polar coordinates for the second burn phase of flight.

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TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE

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									
-16.968	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	196	0	0	0.0	0.0	0.0	0.0	0.0	0.0
ALL HOLDDOWN ARMS RELEASED									
0.300	196	0	0	0.2	0.0	-0.0	3.09	0.08	-0.01
START OF TIME BASE 1									
0.700	197	0	0	1.7	0.0	-0.0	5.14	0.11	0.01
1.0	197	0	0	3.5	0.1	0.0	7.19	0.13	0.02
2.0	204	0	0	10.9	0.2	0.0	7.52	0.19	0.06
3.0	219	1	0	18.5	0.5	0.1	7.78	0.35	0.09
4.0	242	1	0	26.4	1.0	0.2	8.03	0.73	0.09
5.0	272	3	1	34.6	1.9	0.3	8.26	1.01	0.09
6.0	311	5	1	42.9	3.0	0.4	8.44	1.16	0.07
7.0	358	9	1	51.5	4.2	0.4	8.58	1.21	0.04
8.0	414	14	2	60.1	5.4	0.5	8.74	1.17	0.00
9.0	478	20	2	68.9	6.5	0.4	8.85	1.06	-0.05
10.0	552	27	3	77.9	7.5	0.4	9.02	0.99	-0.11
11.0	634	35	3	87.0	8.4	0.2	9.15	0.86	-0.16
12.0	726	43	3	96.2	9.0	0.0	9.27	0.31	-0.22
13.0	827	52	3	105.5	9.1	-0.2	9.37	-0.09	-0.15
14.0	937	61	3	114.9	8.9	-0.3	9.49	-0.26	0.00

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	1057	70	2	124.5	8.6	-0.2	9.70	-0.35	0.13
16.0	1186	79	2	134.4	8.2	-0.0	9.94	-0.44	0.26
17.0	1325	87	2	144.4	7.8	0.3	10.21	-0.50	0.37
18.0	1475	94	3	154.8	7.2	0.8	10.49	-0.53	0.57
19.0	1635	101	4	165.4	6.7	1.4	10.72	-0.54	0.74
20.0	1806	107	6	176.2	6.2	2.3	11.02	-0.44	0.94
21.0	1988	113	9	187.4	5.7	3.3	11.26	-0.44	1.14
22.0	2181	119	13	198.8	5.3	4.6	11.49	-0.45	1.40
23.0	2385	124	18	210.4	4.9	6.1	11.75	-0.45	1.65
24.0	2601	129	25	222.3	4.4	7.8	12.01	-0.44	1.89
25.0	2830	133	34	234.4	4.0	9.8	12.26	-0.41	2.14
26.0	3070	137	45	246.8	3.6	12.1	12.50	-0.39	2.41
27.0	3323	140	58	259.4	3.2	14.7	12.74	-0.36	2.72
28.0	3589	143	74	272.2	2.9	17.6	12.98	-0.34	3.07
29.0	3868	146	93	285.4	2.5	20.9	13.22	-0.31	3.43
30.0	4160	148	116	298.7	2.3	24.5	13.46	-0.28	3.81
31.0	4465	150	142	312.3	2.0	28.5	13.72	-0.25	4.22
32.0	4785	152	173	326.1	1.7	32.9	13.98	-0.24	4.63
33.0	5118	154	208	340.2	1.5	37.8	14.23	-0.23	5.07
34.0	5465	155	249	354.6	1.3	43.1	14.49	-0.23	5.52
35.0	5827	156	295	369.2	1.0	48.8	14.73	-0.22	5.97
36.0	6204	157	347	384.0	0.8	55.0	14.94	-0.21	6.44
37.0	6595	158	405	399.1	0.6	61.7	15.18	-0.19	6.92
38.0	7002	159	470	414.4	0.5	68.8	15.40	-0.14	7.41
39.0	7424	159	543	429.9	0.4	76.5	15.63	-0.09	7.93
40.0	7862	159	623	445.7	0.3	84.7	15.88	-0.05	8.46
41.0	8315	160	712	461.7	0.2	93.5	16.13	-0.03	9.03
42.0	8785	160	810	477.9	0.2	102.8	16.38	-0.03	9.61
43.0	9271	160	918	494.4	0.2	112.7	16.63	-0.04	10.20
44.0	9774	160	1036	511.1	0.1	123.2	16.86	-0.06	10.78
45.0	10294	160	1165	528.1	0.1	134.2	17.10	-0.07	11.35
46.0	10830	160	1304	545.3	-0.0	145.8	17.33	-0.08	11.90
47.0	11384	160	1456	562.8	-0.1	158.0	17.57	-0.12	12.45
48.0	11956	160	1621	580.5	-0.3	170.7	17.82	-0.16	12.99
49.0	12546	160	1798	598.5	-0.4	184.0	18.07	-0.17	13.55
50.0	13153	159	1989	616.6	-0.6	197.8	18.30	-0.20	14.11
51.0	13779	158	2194	635.0	-0.8	212.2	18.52	-0.23	14.69
52.0	14423	158	2414	653.7	-1.1	227.2	18.78	-0.28	15.30
53.0	15086	156	2649	672.6	-1.4	242.9	19.02	-0.34	15.94
54.0	15769	155	2900	691.8	-1.8	259.2	19.25	-0.39	16.61
55.0	16470	153	3167	711.1	-2.2	276.1	19.50	-0.45	17.31
56.0	17191	150	3452	730.7	-2.7	293.8	19.71	-0.51	18.00
57.0	17931	147	3755	750.5	-3.2	312.1	19.89	-0.54	18.65

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	18692	144	4076	770.5	-3.7	331.0	20.07	-0.53	19.29
59.0	19473	140	4417	790.7	-4.2	350.6	20.26	-0.49	19.91
60.0	20273	136	4778	811.1	-4.6	370.8	20.48	-0.40	20.50
61.0	21095	131	5159	831.7	-5.0	391.6	20.68	-0.31	21.10
62.0	21937	126	5561	852.5	-5.3	413.0	20.88	-0.25	21.73
63.0	22800	120	5985	873.4	-5.5	435.1	21.04	-0.18	22.42
64.0	23684	115	6432	894.4	-5.6	457.9	21.12	-0.09	23.18
65.0	24589	109	6901	915.5	-5.7	481.5	21.14	-0.02	23.98
66.0	25515	103	7395	936.7	-5.7	505.9	21.14	0.02	24.82
MACH 1									
66.100	25609	103	7446	938.8	-5.7	508.4	21.14	0.03	24.91
67.0	26462	98	7913	957.8	-5.6	531.2	21.14	0.08	25.69
68.0	27430	92	8458	979.0	-5.5	557.3	21.15	0.12	26.54
69.0	28420	87	9028	1000.2	-5.4	584.2	21.20	0.14	27.40
70.0	29431	81	9626	1021.4	-5.2	612.0	21.33	0.14	28.23
71.0	30463	76	10253	1042.8	-5.1	640.6	21.49	0.08	29.03
72.0	31516	71	10908	1064.4	-5.1	670.1	21.66	-0.04	29.82
73.0	32592	66	11593	1086.2	-5.3	700.3	21.84	-0.19	30.63
74.0	33689	61	12309	1108.1	-5.5	731.4	22.02	-0.36	31.49
75.0	34808	55	13056	1130.2	-6.0	763.3	22.23	-0.55	32.32
76.0	35949	48	13836	1152.5	-6.6	796.0	22.43	-0.70	33.17
77.0	37113	42	14649	1175.1	-7.3	829.6	22.64	-0.82	33.98
78.0	38300	34	15495	1197.9	-8.2	863.9	22.87	-0.92	34.76
79.0	39509	25	16377	1220.8	-9.1	899.1	23.09	-0.94	35.59
80.0	40741	15	17294	1244.1	-10.1	935.1	23.29	-0.94	36.42
81.0	41997	5	18247	1267.4	-11.0	972.0	23.46	-0.92	37.36
MAXIMUM DYNAMIC PRESSURE									
81.100	42124	4	18345	1269.8	-11.1	975.8	23.48	-0.91	37.46
82.0	43276	-7	19238	1290.9	-11.9	1009.9	23.58	-0.84	38.42
83.0	44579	-19	20267	1314.5	-12.7	1049.0	23.62	-0.75	39.58
84.0	45905	-32	21336	1338.1	-13.4	1089.2	23.60	-0.67	40.82
85.0	47255	-46	22446	1361.7	-14.0	1130.6	23.53	-0.58	42.12
86.0	48628	-60	23598	1385.1	-14.6	1173.4	23.44	-0.47	43.41
87.0	50025	-75	24793	1408.5	-15.0	1217.4	23.35	-0.39	44.65
88.0	51446	-90	26033	1431.9	-15.4	1262.6	23.31	-0.34	45.82
89.0	52889	-105	27319	1455.2	-15.7	1308.9	23.32	-0.30	46.91
90.0	54356	-121	28651	1478.6	-16.0	1356.4	23.37	-0.26	47.94
91.0	55846	-137	30032	1502.0	-16.2	1404.8	23.46	-0.18	48.95
92.0	57360	-154	31461	1525.5	-16.3	1454.2	23.57	-0.07	49.93

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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	58697	-170	32941	1549.1	-16.3	1504.7	23.70	-0.01	50.87
94.0	60458	-186	34471	1572.9	-16.3	1556.1	23.80	0.10	51.88
95.0	62043	-202	36053	1596.7	-16.1	1608.4	23.89	0.18	52.86
96.0	63652	-219	37688	1620.6	-16.0	1661.8	23.95	0.23	53.87
97.0	65284	-234	39377	1644.6	-15.7	1716.2	24.00	0.25	54.93
98.0	66941	-250	41121	1668.6	-15.5	1771.6	24.05	0.26	56.00
99.0	68622	-265	42921	1692.7	-15.2	1828.2	24.11	0.26	57.08
100.0	70326	-280	44778	1716.9	-15.0	1885.8	24.14	0.24	58.19
101.0	72055	-295	46693	1741.0	-14.7	1944.6	24.16	0.27	59.29
102.0	73808	-310	48667	1765.2	-14.4	2004.4	24.18	0.32	60.38
103.0	75586	-324	50702	1789.4	-14.0	2065.3	24.20	0.37	61.45
104.0	77387	-338	52798	1813.6	-13.6	2127.3	24.23	0.42	62.52
105.0	79213	-351	54957	1837.8	-13.2	2190.4	24.28	0.47	63.59
106.0	81063	-364	57179	1862.2	-12.7	2254.5	24.35	0.49	64.65
107.0	82937	-377	59466	1886.6	-12.3	2319.6	24.44	0.46	65.67
108.0	84836	-389	61819	1911.0	-11.8	2385.8	24.54	0.40	66.72
109.0	86759	-400	64238	1935.6	-11.5	2453.1	24.62	0.32	67.79
110.0	88707	-412	66725	1960.3	-11.2	2521.4	24.71	0.25	68.86
111.0	90680	-423	69281	1985.0	-11.0	2590.8	24.79	0.20	69.97
112.0	92677	-434	71907	2009.8	-10.7	2661.4	24.86	0.19	71.10
113.0	94700	-444	74604	2034.7	-10.5	2733.0	24.92	0.23	72.24
114.0	96747	-455	77374	2059.7	-10.2	2805.8	25.01	0.31	73.38
115.0	98819	-465	80216	2084.8	-9.9	2879.7	25.10	0.39	74.54
116.0	100916	-474	83133	2109.9	-9.5	2954.9	25.19	0.47	75.70
117.0	103039	-484	86126	2135.2	-9.0	3031.1	25.26	0.52	76.84
118.0	105187	-492	89196	2160.4	-8.5	3108.6	25.29	0.53	78.03
119.0	107360	-501	92344	2185.7	-8.0	3187.3	25.28	0.50	79.30
120.0	109558	-508	95571	2210.9	-7.5	3267.3	25.23	0.44	80.66
121.0	111782	-516	98879	2236.1	-7.1	3348.6	25.15	0.38	82.05
122.0	114030	-523	102269	2261.2	-6.7	3431.4	25.08	0.33	83.47
123.0	116304	-529	105742	2286.3	-6.4	3515.5	25.04	0.30	84.88
124.0	118603	-535	109300	2311.3	-6.1	3601.1	25.07	0.30	86.25
125.0	120927	-541	112945	2336.5	-5.8	3688.0	25.17	0.32	87.57
126.0	123276	-547	116677	2361.8	-5.5	3776.2	25.35	0.33	88.86
127.0	125650	-552	120497	2387.2	-5.1	3865.6	25.58	0.32	90.11
128.0	128050	-557	124408	2412.9	-4.8	3956.4	25.83	0.30	91.37
129.0	130476	-562	128411	2437.7	-4.5	4048.3	26.10	0.17	92.79
130.0	132928	-566	132506	2463.9	-4.3	4141.8	26.35	0.29	94.21
131.0	135406	-571	136695	2490.4	-4.1	4236.7	26.60	0.04	95.62
132.0	137911	-575	140979	2517.1	-4.0	4333.1	26.85	0.13	97.04
133.0	140443	-579	145361	2544.1	-4.0	4430.8	27.10	0.02	98.46
134.0	143002	-583	149841	2571.3	-3.9	4530.0	27.35	0.00	99.87
135.0	145588	-587	154420	2598.8	-4.0	4630.6	27.60	-0.03	101.29

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
135.240	146213	-587	155536	2605.4	-4.0	4654.9	27.67	-0.04	101.63
136.0	148197	-591	159093	2621.0	-4.0	4722.9	15.52	-0.04	80.73
137.0	150825	-595	163852	2636.6	-4.0	4804.2	15.62	0.05	81.69
138.0	153474	-598	168705	2652.3	-3.9	4886.3	15.73	0.19	82.66
139.0	156134	-602	173632	2668.0	-3.7	4969.5	15.83	0.21	83.62
140.0	158809	-606	178641	2683.9	-3.4	5053.6	15.93	0.34	84.70
141.0	161501	-609	183738	2699.9	-3.0	5138.9	16.04	0.55	85.82
142.0	164210	-612	188921	2716.0	-2.4	5225.2	16.16	0.62	86.94
143.0	166934	-614	194190	2732.2	-1.8	5312.7	16.29	0.61	88.06
144.0	169675	-615	199548	2748.6	-1.2	5402.2	16.42	0.62	89.25
145.0	172432	-616	204995	2765.0	-0.6	5492.1	16.55	0.60	90.49
146.0	175205	-616	210532	2781.6	-0.0	5583.1	16.68	0.56	91.83
147.0	177996	-616	216162	2798.4	0.5	5675.5	16.82	0.52	92.98
148.0	180803	-615	221884	2815.6	1.1	5769.2	16.94	0.49	94.20
149.0	183627	-614	227700	2832.6	1.5	5864.0	17.09	0.48	95.46
150.0	186468	-612	233612	2849.8	2.0	5960.0	17.24	0.48	96.74
151.0	189327	-610	239621	2867.1	2.5	6057.4	17.40	0.49	98.20
152.0	192203	-607	245727	2884.6	3.0	6156.2	17.55	0.52	99.55
153.0	195096	-604	251934	2902.2	3.5	6256.5	17.69	0.55	100.90
154.0	198007	-600	258241	2920.0	4.1	6358.0	17.84	0.57	102.24
155.0	200936	-596	264650	2937.1	4.6	6461.0	18.03	0.64	103.79
156.0	203883	-591	271164	2955.2	5.3	6565.6	18.23	0.65	105.38
157.0	206848	-585	277782	2973.5	5.9	6671.8	18.43	0.67	106.97
158.0	209832	-579	284505	2992.1	6.5	6779.5	18.63	0.52	108.56
159.0	212834	-572	291339	3010.8	7.1	6888.9	18.83	0.55	110.15
160.0	215855	-565	298283	3029.7	7.7	6999.8	19.02	0.84	111.74
161.0	218896	-557	305338	3048.8	8.3	7112.4	19.22	0.32	113.33
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.740	221157	-550	310631	3063.1	8.6	7196.6	19.37	0.42	114.50
162.0	221954	-548	312501	3065.9	8.7	7223.0	-0.47	0.47	66.74
S-IC/S-II SEPARATION COMMAND									
162.400	223182	-545	315399	3059.1	8.9	7229.7	-27.15	0.49	1.17
164.0	228042	-530	326971	3012.3	9.6	7231.6	-29.48	0.40	1.18
166.0	234033	-510	341495	2957.3	10.4	7241.2	-23.60	0.34	12.78
168.0	239894	-488	355996	2912.2	11.1	7274.0	-22.14	0.36	17.59
170.0	245677	-465	370591	2868.6	12.0	7314.6	-20.26	0.51	21.80

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
172.0	251375	-440	385267	2828.6	13.1	7358.7	-20.09	0.53	22.31
174.0	256991	-413	400029	2788.4	14.0	7404.4	-19.93	0.48	22.48
176.0	262528	-384	414884	2748.6	15.0	7449.4	-19.79	0.50	22.75
178.0	267986	-353	429829	2709.1	16.0	7495.0	-19.74	0.52	22.78
180.0	273365	-320	444864	2669.7	17.1	7540.7	-19.68	0.52	22.91
182.0	278665	-284	459992	2630.4	18.1	7586.6	-19.62	0.53	23.02
184.0	283886	-247	475211	2591.2	19.2	7632.8	-19.53	0.54	23.13
186.0	289030	-208	490523	2552.3	20.3	7679.1	-19.45	0.56	23.20
188.0	294095	-166	505928	2513.4	21.4	7725.6	-19.36	0.56	23.29
190.0	299084	-122	521425	2474.8	22.5	7772.3	-19.27	0.55	23.42
192.0	303995	-76	537017	2436.4	23.7	7819.3	-19.18	0.56	23.55
194.0	308829	-27	552703	2398.1	24.8	7866.5	-19.11	0.60	23.67
196.0	313587	24	568483	2359.9	26.0	7913.9	-19.05	0.61	23.77
198.0	318269	77	584359	2322.0	27.2	7961.5	-18.93	0.59	23.85
200.0	322875	132	600329	2284.1	28.4	8009.4	-18.88	0.59	23.99
202.0	327406	190	616396	2246.4	29.6	8057.6	-18.84	0.63	24.15
204.0	331861	251	632560	2208.9	30.9	8105.9	-18.67	0.65	24.25
206.0	336242	314	648820	2171.9	32.1	8154.4	-18.33	0.64	24.26
208.0	340549	379	665178	2135.6	33.4	8202.9	-17.94	0.65	24.21
210.0	344785	447	681632	2100.0	34.8	8251.4	-17.71	0.68	24.25
212.0	348949	518	698183	2064.6	36.2	8300.0	-17.68	0.71	24.36
214.0	353043	592	714832	2029.2	37.6	8348.9	-17.73	0.73	24.51
216.0	357066	669	731579	1993.7	39.1	8398.0	-17.79	0.75	24.65
218.0	361018	749	748424	1958.1	40.6	8447.4	-17.77	0.76	24.78
220.0	364899	831	765369	1922.6	42.1	8497.1	-17.74	0.75	24.91
222.0	368708	917	782413	1887.1	43.6	8547.1	-17.76	0.75	25.05
224.0	372447	1006	799557	1851.5	45.1	8597.3	-17.81	0.77	25.18
226.0	376114	1098	816802	1815.9	46.7	8647.8	-17.86	0.80	25.29
228.0	379710	1193	834148	1780.1	48.3	8698.5	-17.87	0.81	25.41
230.0	383235	1291	851596	1744.4	50.0	8749.4	-17.84	0.82	25.55
232.0	386688	1392	869146	1708.7	51.6	8800.7	-17.83	0.82	25.69
234.0	390070	1497	886799	1673.1	53.2	8852.2	-17.83	0.83	25.82
236.0	393380	1605	904555	1637.4	54.9	8903.9	-17.84	0.85	25.94
238.0	396619	1717	922415	1601.7	56.6	8956.0	-17.85	0.88	26.08
240.0	399787	1832	940379	1566.0	58.4	9008.3	-17.84	0.89	26.21
242.0	402883	1951	958448	1530.3	60.2	9060.8	-17.83	0.88	26.34
244.0	405908	2073	976623	1494.7	61.9	9113.6	-17.83	0.87	26.48
246.0	408862	2198	994903	1459.0	63.7	9166.7	-17.85	0.88	26.63
248.0	411744	2327	1013290	1423.3	65.5	9220.2	-17.88	0.88	26.78
250.0	414555	2460	1031784	1387.5	67.2	9273.8	-17.89	0.88	26.90
252.0	417294	2596	1050385	1351.7	69.0	9327.8	-17.88	0.89	27.03
254.0	419962	2736	1069095	1316.0	70.8	9382.0	-17.88	0.92	27.18
256.0	422558	2880	1087914	1280.2	72.7	9436.5	-17.89	0.94	27.33

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
258.0	425083	3027	1106841	1244.4	74.5	9491.3	-17.91	0.94	27.48
260.0	427536	3178	1125879	1208.6	76.4	9546.4	-17.92	0.93	27.62
262.0	429917	3332	1145027	1172.7	78.3	9601.8	-17.93	0.92	27.77
264.0	432227	3491	1164287	1136.8	80.1	9657.5	-17.94	0.92	27.91
266.0	434464	3653	1183657	1100.9	82.0	9713.5	-17.96	0.95	28.08
268.0	436630	3819	1203141	1065.0	83.9	9769.8	-17.98	0.98	28.27
270.0	438724	3989	1222737	1029.0	85.9	9826.5	-17.99	0.99	28.43
272.0	440746	4162	1242447	993.0	87.8	9883.6	-18.00	0.97	28.58
274.0	442697	4340	1262272	957.0	89.8	9940.9	-18.00	0.97	28.72
276.0	444575	4521	1282211	921.1	91.7	9998.5	-17.94	0.98	28.87
278.0	446381	4707	1302266	885.2	93.7	10056.4	-17.97	1.01	29.03
280.0	448115	4896	1322436	849.1	95.8	10114.6	-18.11	1.04	29.19
282.0	449777	5090	1342724	812.8	97.9	10173.1	-18.23	1.06	29.35
284.0	451366	5287	1363129	776.3	100.0	10232.0	-18.23	1.05	29.50
286.0	452883	5489	1383652	739.9	102.1	10291.2	-18.16	1.04	29.68
288.0	454326	5696	1404294	703.6	104.2	10350.7	-18.14	1.06	29.84
290.0	455697	5906	1425055	667.3	106.3	10410.5	-18.18	1.09	29.99
292.0	456995	6121	1445936	630.9	108.5	10470.6	-18.21	1.08	30.13
294.0	458220	6340	1466938	594.4	110.6	10531.1	-18.24	1.06	30.30
296.0	459373	6564	1488061	557.9	112.8	10591.8	-18.28	1.06	30.49
298.0	460452	6791	1509306	521.3	114.9	10653.0	-18.31	1.09	30.65
300.0	461458	7023	1530673	484.7	117.1	10714.4	-18.34	1.12	30.81
302.0	462391	7260	1552164	448.0	119.4	10776.2	-18.36	1.14	30.98
304.0	463250	7501	1573778	411.2	121.6	10838.4	-18.37	1.15	31.17
306.0	464036	7746	1595517	374.5	124.0	10900.9	-18.37	1.16	31.35
308.0	464748	7996	1617382	337.7	126.3	10963.8	-18.39	1.15	31.52
310.0	465386	8251	1639373	300.9	128.5	11027.0	-18.42	1.14	31.70
312.0	465951	8511	1661490	264.1	130.8	11090.6	-18.46	1.16	31.89
314.0	466443	8775	1683735	227.1	133.2	11154.5	-18.50	1.19	32.07
316.0	466860	9043	1706108	190.1	135.6	11218.9	-18.53	1.23	32.25
318.0	467203	9317	1728611	153.0	138.1	11283.6	-18.53	1.23	32.45
320.0	467472	9596	1751243	115.9	140.5	11348.7	-18.57	1.22	32.66
322.0	467666	9879	1774006	78.7	143.0	11414.2	-18.65	1.22	32.87
324.0	467786	10168	1796900	41.3	145.4	11480.1	-18.72	1.23	33.05
326.0	467832	10461	1819927	3.9	147.9	11546.4	-18.74	1.25	33.25
328.0	467802	10759	1843086	-33.6	150.4	11613.1	-18.72	1.27	33.44
330.0	467697	11063	1866379	-71.0	153.0	11680.2	-18.68	1.28	33.64
332.0	467518	11371	1889807	-108.4	155.6	11747.7	-18.78	1.31	33.86
334.0	467263	11685	1913370	-146.2	158.2	11815.6	-18.99	1.34	34.06
336.0	466933	12004	1937070	-184.3	160.9	11884.0	-19.11	1.35	34.28
338.0	466526	12329	1960907	-222.4	163.6	11952.8	-19.05	1.34	34.50
340.0	466043	12659	1984881	-260.5	166.3	12022.0	-18.96	1.34	34.72
342.0	465484	12994	2008995	-298.5	169.0	12091.6	-19.02	1.35	34.94

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
344.0	464849	13334	2033248	-336.6	171.7	12161.7	-19.13	1.36	35.14
346.0	464138	13681	2057642	-374.9	174.4	12232.2	-19.19	1.38	35.37
348.0	463349	14032	2082177	-413.4	177.2	12303.2	-19.26	1.39	35.62
350.0	462484	14389	2106855	-452.0	180.0	12374.7	-19.33	1.40	35.84
352.0	461541	14752	2131676	-490.7	182.8	12446.6	-19.37	1.41	36.04
354.0	460521	15121	2156642	-529.5	185.6	12518.9	-19.40	1.42	36.27
356.0	459423	15495	2181752	-568.3	188.5	12591.6	-19.41	1.44	36.50
358.0	458248	15875	2207008	-607.2	191.4	12664.9	-19.48	1.47	36.72
360.0	456995	16260	2232412	-646.2	194.4	12738.5	-19.59	1.50	36.96
362.0	455663	16652	2257963	-685.5	197.4	12812.8	-19.70	1.51	37.23
364.0	454253	17050	2283663	-724.9	200.4	12887.5	-19.74	1.50	37.48
366.0	452763	17453	2309513	-764.4	203.4	12962.6	-19.76	1.50	37.68
368.0	451195	17863	2335514	-804.0	206.4	13038.2	-19.82	1.51	37.89
370.0	449547	18279	2361666	-843.8	209.4	13114.2	-19.91	1.53	38.18
372.0	447820	18701	2387971	-883.6	212.5	13190.9	-19.97	1.54	38.48
374.0	446012	19129	2414430	-923.6	215.6	13268.1	-20.01	1.56	38.72
376.0	444125	19563	2441044	-963.7	218.7	13345.8	-20.08	1.56	38.94
378.0	442157	20004	2467813	-1003.9	221.8	13423.9	-20.17	1.56	39.19
380.0	440109	20451	2494740	-1044.4	225.0	13502.6	-20.26	1.57	39.49
382.0	437980	20904	2521824	-1085.0	228.1	13581.8	-20.35	1.60	39.79
384.0	435769	21363	2549068	-1125.8	231.4	13661.7	-20.44	1.62	40.09
386.0	433477	21829	2576471	-1166.7	234.6	13742.1	-20.52	1.62	40.35
388.0	431102	22302	2604037	-1207.8	237.8	13823.1	-20.53	1.63	40.58
390.0	428645	22781	2631764	-1248.8	241.2	13904.5	-20.53	1.69	40.86
392.0	426107	23267	2659655	-1290.1	244.6	13986.6	-20.65	1.74	41.18
394.0	423485	23759	2687711	-1331.6	248.1	14069.2	-20.88	1.73	41.49
396.0	420780	24259	2715932	-1373.5	251.5	14152.5	-21.07	1.69	41.75
398.0	417991	24765	2744321	-1415.7	254.9	14236.2	-21.13	1.68	42.02
400.0	415117	25278	2772878	-1458.0	258.2	14320.6	-21.14	1.72	42.33
402.0	412159	25798	2801604	-1500.4	261.7	14405.6	-21.22	1.74	42.66
404.0	409115	26325	2830500	-1542.9	265.2	14491.2	-21.33	1.76	42.96
406.0	405987	26859	2859569	-1585.7	268.7	14577.4	-21.42	1.77	43.28
408.0	402773	27400	2888811	-1628.6	272.3	14664.3	-21.52	1.79	43.59
410.0	399472	27948	2918227	-1671.8	275.9	14751.8	-21.63	1.81	43.91
412.0	396085	28503	2947818	-1715.1	279.5	14839.9	-21.69	1.82	44.23
414.0	392612	29066	2977587	-1758.5	283.1	14928.7	-21.74	1.83	44.56
416.0	389051	29636	3007534	-1802.1	286.8	15018.2	-21.83	1.86	44.91
418.0	385403	30213	3037660	-1846.1	290.6	15108.4	-22.07	1.89	45.26
420.0	381667	30798	3067968	-1890.4	294.4	15199.2	-22.23	1.93	45.61
422.0	377841	31391	3098457	-1934.9	298.3	15290.8	-22.31	1.93	45.94
424.0	373927	31991	3129131	-1979.6	302.1	15383.0	-22.39	1.93	46.28
426.0	369923	32600	3159990	-2024.5	306.0	15475.9	-22.53	1.94	46.64
428.0	365829	33215	3191035	-2069.7	309.9	15569.6	-22.64	1.97	47.01

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
430.0	361644	33839	3222269	-2115.1	313.9	15663.9	-22.75	2.01	47.37
432.0	357368	34471	3253692	-2160.7	317.9	15759.1	-22.89	2.04	47.78
434.0	353001	35111	3285306	-2206.6	322.0	15855.1	-23.03	2.05	48.18
436.0	348541	35759	3317112	-2252.8	326.1	15951.8	-23.17	2.06	48.52
438.0	343989	36415	3349113	-2299.3	330.2	16049.1	-23.31	2.06	48.83
440.0	339347	37080	3381309	-2346.1	334.4	16147.1	-23.45	2.07	49.19
442.0	334618	37753	3413702	-2393.1	338.6	16246.0	-23.59	2.11	49.68
444.0	329794	38434	3446294	-2440.5	342.8	16345.9	-23.73	2.16	50.22
446.0	324869	39124	3479087	-2488.1	347.2	16446.8	-23.87	2.19	50.68
448.0	319840	39823	3512082	-2535.9	351.5	16548.5	-24.02	2.20	51.00
450.0	314712	40530	3545281	-2584.1	355.9	16650.8	-24.16	2.20	51.31
452.0	309491	41247	3578686	-2632.6	360.4	16753.9	-24.30	2.22	51.74
454.0	304179	41972	3612297	-2681.3	364.8	16857.6	-24.44	2.26	52.24
456.0	298768	42706	3646118	-2730.3	369.4	16962.5	-24.58	2.28	52.71
458.0	293260	43449	3680149	-2779.6	373.9	17068.3	-24.72	2.29	53.17
460.0	287652	44202	3714394	-2829.2	378.6	17175.1	-24.86	2.32	53.64
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
460.750	285523	44486	3727292	-2847.6	380.2	17215.4	-25.32	2.11	53.81
462.0	281944	44963	3748845	-2879.5	382.8	17271.3	-25.65	2.02	42.40
464.0	276134	45733	3783468	-2930.9	386.5	17356.3	-25.76	1.82	42.61
466.0	270219	46509	3818266	-2982.5	390.2	17441.7	-25.75	1.83	42.83
468.0	264203	47294	3853235	-3033.8	394.0	17527.6	-25.41	1.91	43.08
470.0	258084	48085	3888375	-3082.7	397.9	17614.0	-23.84	1.93	43.34
472.0	251864	48885	3923689	-3130.1	401.7	17700.9	-23.55	1.93	43.59
474.0	245542	49692	3959177	-3177.0	405.6	17788.3	-23.44	1.95	43.83
476.0	239119	50507	3994840	-3223.9	409.5	17876.2	-23.41	1.97	44.08
478.0	232604	51330	4030680	-3270.7	413.5	17964.1	-23.43	1.97	44.34
480.0	226001	52161	4066697	-3317.6	417.4	18053.0	-23.51	1.96	44.61
482.0	219315	53000	4102892	-3364.8	421.3	18142.6	-23.62	1.97	44.97
484.0	212541	53847	4139268	-3412.1	425.3	18232.9	-23.76	2.02	45.35
486.0	205675	54701	4175826	-3459.8	429.4	18323.9	-23.94	2.09	45.71
488.0	198720	55564	4212569	-3507.9	433.7	18415.7	-24.19	2.15	46.07
490.0	191675	56436	4249492	-3556.7	438.0	18507.3	-24.52	2.17	44.42
492.0	184533	57316	4286583	-3606.1	442.3	18587.3	-24.97	2.17	36.48
494.0	177287	58205	4323827	-3656.5	446.7	18658.1	-25.48	2.17	34.85
496.0	169930	59103	4361214	-3707.8	451.0	18727.7	-25.84	2.17	34.81
498.0	162464	60009	4398739	-3759.8	455.3	18797.4	-26.12	2.18	34.96
500.0	154891	60924	4436404	-3812.2	459.8	18867.4	-26.31	2.22	35.12
502.0	147213	61848	4474209	-3865.0	464.2	18937.8	-26.42	2.25	35.30
504.0	139430	62781	4512156	-3917.9	468.7	19008.5	-26.46	2.25	35.47
506.0	131542	63723	4550244	-3970.8	473.2	19079.6	-26.43	2.23	35.63

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
508.0	123547	64674	4588474	-4023.6	477.6	19151.0	-26.36	2.21	35.78
510.0	115447	65634	4626848	-4076.3	482.1	19222.8	-26.35	2.21	35.95
512.0	107242	66602	4665366	-4129.2	486.5	19294.9	-26.53	2.22	36.18
514.0	98930	67580	4704028	-4182.6	491.0	19367.5	-26.84	2.27	36.41
516.0	90511	68566	4742836	-4236.5	495.6	19440.5	-27.16	2.34	36.59
518.0	81984	69562	4781790	-4291.0	500.3	19513.8	-27.35	2.38	36.75
520.0	73347	70567	4820892	-4345.9	505.1	19587.5	-27.47	2.39	36.94
522.0	64600	71582	4860141	-4401.0	509.9	19661.7	-27.65	2.40	37.19
524.0	55743	72607	4899539	-4456.5	514.7	19736.3	-27.88	2.43	37.44
526.0	46774	73641	4939086	-4512.5	519.6	19811.4	-28.07	2.46	37.64
528.0	37693	74685	4978784	-4568.8	524.5	19886.8	-28.22	2.48	37.83
530.0	28498	75740	5018634	-4625.4	529.5	19962.7	-28.43	2.49	38.04
532.0	19191	76804	5058636	-4682.5	534.5	20039.0	-28.65	2.49	38.28
534.0	9768	77877	5098790	-4740.0	539.5	20115.8	-28.83	2.48	38.53
536.0	231	78961	5139099	-4797.8	544.4	20193.1	-28.98	2.48	38.75
538.0	-9423	80055	5179563	-4855.9	549.4	20270.8	-29.13	2.51	38.94
540.0	-19193	81159	5220183	-4914.3	554.5	20348.9	-29.29	2.55	39.15
542.0	-29081	82273	5260959	-4973.1	559.6	20427.4	-29.45	2.57	39.39
544.0	-39086	83398	5301893	-5032.1	564.7	20506.4	-29.61	2.57	39.59
546.0	-49209	84532	5342985	-5091.5	569.9	20585.9	-29.77	2.60	39.90
548.0	-59452	85677	5384237	-5151.2	575.1	20666.0	-29.93	2.61	40.22
550.0	-69814	86833	5425648	-5211.2	580.4	20746.7	-30.09	2.63	40.54
552.0	-80299	87999	5467242	-5271.6	585.7	20828.1	-30.25	2.56	40.83
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
552.340	-82093	88199	5474326	-5281.9	586.5	20842.0	-30.28	2.25	40.89
S-II/S-IVB SEPARATION COMMAND									
553.200	-86645	88704	5492249	-5305.8	588.1	20845.1	-26.77	1.69	-6.53
554.0	-90895	89175	5508935	-5327.2	589.4	20839.9	-26.76	1.58	-6.50
556.0	-101605	90357	5550583	-5380.7	592.6	20826.9	-26.77	1.56	-6.43
558.0	-112419	91545	5592234	-5434.5	595.8	20818.3	-27.33	1.78	3.95
560.0	-123344	92740	5633887	-5490.1	599.6	20835.3	-27.88	1.92	9.98
562.0	-134380	93943	5675578	-5545.8	603.4	20855.6	-27.79	1.94	10.34
564.0	-145528	95154	5717311	-5601.6	607.2	20876.5	-28.22	1.85	10.51
566.0	-156789	96372	5759086	-5659.3	610.8	20897.4	-28.95	1.78	10.51
568.0	-168165	97597	5800904	-5717.6	614.4	20919.2	-29.35	1.78	10.63
570.0	-179659	98830	5842763	-5776.3	618.0	20940.6	-29.39	1.83	10.81
572.0	-191271	100069	5884666	-5835.1	621.7	20962.3	-29.33	1.89	10.87
574.0	-203000	101317	5926612	-5893.8	625.5	20984.0	-29.37	1.94	10.86
576.0	-214846	102571	5968602	-5952.7	629.5	21005.7	-29.52	2.00	10.84

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
578.0	-226811	103834	6010635	-6011.9	633.5	21027.4	-29.67	2.03	10.79
580.0	-238894	105105	6052711	-6071.4	637.6	21048.9	-29.79	2.05	10.73
582.0	-251096	106385	6094831	-6131.0	641.7	21070.3	-29.89	2.08	10.68
584.0	-263418	107672	6136993	-6190.9	645.9	21091.6	-29.96	2.12	10.65
586.0	-275860	108968	6179197	-6250.9	650.2	21112.9	-30.00	2.16	10.65
588.0	-288422	110273	6221444	-6310.9	654.5	21134.2	-30.01	2.17	10.65
590.0	-301103	111586	6263734	-6370.9	658.8	21155.5	-30.02	2.17	10.65
592.0	-313905	112908	6306066	-6431.0	663.2	21176.8	-30.03	2.18	10.64
594.0	-326827	114239	6348441	-6491.1	667.6	21198.1	-30.08	2.21	10.64
596.0	-339870	115579	6390859	-6551.3	672.0	21219.4	-30.14	2.23	10.67
598.0	-353032	116927	6433319	-6611.6	676.5	21240.7	-30.20	2.23	10.68
600.0	-366316	118285	6475822	-6672.1	680.9	21262.1	-30.24	2.21	10.67
602.0	-379721	119651	6518367	-6732.5	685.4	21283.4	-30.26	2.22	10.63
604.0	-393246	121026	6560955	-6793.1	689.8	21304.6	-30.29	2.24	10.59
606.0	-406893	122410	6603586	-6853.7	694.3	21325.8	-30.33	2.26	10.58
608.0	-420661	123804	6646258	-6914.4	698.9	21347.0	-30.39	2.27	10.58
610.0	-434551	125206	6688973	-6975.2	703.4	21368.1	-30.43	2.27	10.57
612.0	-448562	126617	6731731	-7036.1	707.9	21389.2	-30.46	2.27	10.54
614.0	-462696	128038	6774530	-7097.1	712.5	21410.3	-30.49	2.25	10.52
616.0	-476951	129467	6817372	-7158.1	716.9	21431.3	-30.50	2.24	10.51
618.0	-491328	130905	6860255	-7219.1	721.4	21452.3	-30.53	2.24	10.50
620.0	-505827	132353	6903181	-7280.2	725.9	21473.3	-30.57	2.26	10.49
622.0	-520449	133809	6946149	-7341.4	730.4	21494.3	-30.61	2.27	10.49
624.0	-535193	135275	6989158	-7402.6	735.0	21515.3	-30.64	2.27	10.51
626.0	-550059	136749	7032210	-7463.9	739.6	21536.3	-30.67	2.29	10.54
628.0	-565049	138233	7075304	-7525.3	744.1	21557.4	-30.71	2.30	10.56
630.0	-580161	139726	7118440	-7586.8	748.7	21578.5	-30.75	2.30	10.55
632.0	-595396	141228	7161618	-7648.3	753.3	21599.6	-30.80	2.29	10.52
634.0	-610754	142739	7204838	-7710.0	757.9	21620.6	-30.86	2.27	10.49
636.0	-626236	144259	7248100	-7771.7	762.4	21641.6	-30.90	2.26	10.47
638.0	-641841	145789	7291404	-7833.6	767.0	21662.5	-30.92	2.25	10.45
640.0	-657570	147327	7334750	-7895.4	771.5	21683.4	-30.93	2.25	10.45
642.0	-673423	148875	7378138	-7957.3	776.0	21704.3	-30.93	2.26	10.45
644.0	-689399	150431	7421568	-8019.2	780.5	21725.2	-30.94	2.27	10.45
646.0	-705499	151997	7465039	-8081.0	785.0	21746.1	-30.96	2.27	10.45
648.0	-721723	153571	7508552	-8143.0	789.6	21767.0	-30.98	2.26	10.45
650.0	-738071	155155	7552107	-8205.0	794.1	21787.9	-31.01	2.24	10.45
652.0	-754543	156747	7595704	-8267.0	798.5	21808.8	-31.04	2.24	10.43
654.0	-771139	158349	7639342	-8329.1	803.0	21829.6	-31.07	2.25	10.43
656.0	-787860	159960	7683022	-8391.3	807.5	21850.5	-31.10	2.24	10.43
658.0	-804705	161579	7726744	-8453.5	812.0	21871.4	-31.10	2.24	10.44
660.0	-821674	163208	7770508	-8515.7	816.5	21892.3	-31.12	2.25	10.45
662.0	-838767	164845	7814313	-8578.0	821.0	21913.2	-31.17	2.25	10.44

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

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
664.0	-855986	166492	7858160	-8640.5	825.5	21934.0	-31.30	2.22	10.41
666.0	-873330	168147	7902049	-8703.2	829.9	21954.8	-31.44	2.20	10.37
668.0	-890799	169811	7945979	-8766.1	834.3	21975.5	-31.47	2.20	10.35
670.0	-908394	171484	7989951	-8829.0	838.7	21996.2	-31.42	2.20	10.36
672.0	-926115	173166	8033964	-8891.8	843.1	22016.9	-31.37	2.23	10.38
674.0	-943961	174857	8078019	-8954.6	847.6	22037.7	-31.39	2.27	10.39
676.0	-961933	176557	8122115	-9017.4	852.2	22058.5	-31.42	2.28	10.40
678.0	-980031	178265	8166253	-9080.2	856.7	22079.3	-31.39	2.26	10.41
680.0	-998254	179983	8210432	-9142.9	861.2	22100.1	-31.34	2.23	10.42
682.0	-1016602	181710	8254653	-9205.6	865.7	22121.0	-31.32	2.23	10.45
684.0	-1035076	183446	8298916	-9268.2	870.2	22141.9	-31.31	2.25	10.46
686.0	-1053675	185191	8343221	-9330.8	874.7	22162.8	-31.31	2.27	10.49
688.0	-1072399	186945	8387567	-9393.4	879.3	22183.8	-31.30	2.29	10.49
690.0	-1091249	188708	8431956	-9456.0	883.8	22204.8	-31.29	2.30	10.50
692.0	-1110223	190480	8476386	-9518.6	888.3	22225.7	-31.28	2.26	10.50
S-IVB 1ST GUIDANCE CUTOFF									
693.910	-1128461	192181	8518857	-9578.3	892.6	22245.8	-31.28	2.08	10.50
694.0	-1129322	192261	8520859	-9581.1	892.8	22246.7	-31.28	2.04	10.50
696.0	-1148535	194050	8565331	-9632.8	896.3	22227.6	-25.06	1.70	-10.86
698.0	-1167850	195847	8609770	-9682.3	899.7	22206.4	-25.03	1.67	-10.96
700.0	-1187264	197649	8654160	-9732.3	903.0	22184.3	-25.01	1.67	-11.02
702.0	-1206779	199459	8698507	-9782.3	906.4	22162.4	-24.99	1.67	-11.07
PARKING ORBIT INSERTION									
703.910	-1225515	201191	8740812	-9830.0	909.5	22141.2	-24.95	1.67	-11.14

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
GUIDANCE REFERENCE RELEASE									
-16.968	3441.323	9.225	-2.992	0.0	413.6	1275.3	-0.07	-0.04	0.01
-16.0	3441.323	9.290	-2.789	-0.1	413.6	1275.3	-0.07	-0.04	0.01
-15.0	3441.323	9.358	-2.579	-0.2	413.6	1275.3	-0.07	-0.04	0.01
-14.0	3441.323	9.427	-2.369	-0.3	413.5	1275.3	-0.07	-0.04	0.01
-13.0	3441.323	9.495	-2.159	-0.3	413.5	1275.3	-0.07	-0.04	0.01
-12.0	3441.323	9.563	-1.949	-0.4	413.4	1275.3	-0.07	-0.04	0.01
-11.0	3441.323	9.631	-1.739	-0.5	413.4	1275.4	-0.07	-0.04	0.01
-10.0	3441.322	9.699	-1.530	-0.6	413.3	1275.4	-0.07	-0.04	0.01
-9.0	3441.322	9.767	-1.320	-0.7	413.3	1275.4	-0.07	-0.04	0.01
-8.0	3441.322	9.835	-1.110	-0.8	413.2	1275.4	-0.07	-0.04	0.01
-7.0	3441.322	9.903	-0.900	-0.9	413.2	1275.4	-0.07	-0.04	0.01
-6.0	3441.322	9.971	-0.690	-0.9	413.2	1275.4	-0.07	-0.04	0.01
-5.0	3441.322	10.039	-0.480	-1.0	413.1	1275.4	-0.07	-0.04	0.01
-4.0	3441.322	10.107	-0.270	-1.1	413.1	1275.5	-0.07	-0.04	0.01
-3.0	3441.321	10.175	-0.060	-1.2	413.0	1275.5	-0.07	-0.04	0.01
-2.0	3441.321	10.243	0.150	-1.3	413.0	1275.5	-0.07	-0.04	0.01
-1.0	3441.321	10.311	0.360	-1.4	412.9	1275.5	-0.07	-0.04	0.01
0.0	3441.321	10.379	0.570	-1.5	412.9	1275.5	-0.07	-0.04	0.01
ALL HOLDDOWN ARMS RELEASED									
0.300	3441.321	10.399	0.633	-1.3	412.9	1275.5	3.02	0.04	-0.00
START OF TIME BASE 1									
0.700	3441.321	10.426	0.716	0.2	412.9	1275.5	5.07	0.07	0.02
1.0	3441.321	10.447	0.779	2.0	412.9	1275.5	7.12	0.10	0.04
2.0	3441.322	10.515	0.989	9.3	413.0	1275.6	7.45	0.16	0.08
3.0	3441.324	10.583	1.199	16.8	413.3	1275.7	7.71	0.31	0.11
4.0	3441.327	10.651	1.409	24.6	413.8	1275.8	7.96	0.70	0.12
5.0	3441.332	10.719	1.619	32.7	414.6	1275.9	8.19	0.98	0.11
6.0	3441.338	10.787	1.829	41.0	415.7	1276.0	8.36	1.13	0.10
7.0	3441.345	10.856	2.039	49.4	416.8	1276.1	8.51	1.18	0.07
8.0	3441.354	10.924	2.249	58.0	418.0	1276.2	8.67	1.14	0.03
9.0	3441.364	10.993	2.459	66.7	419.0	1276.2	8.78	1.03	-0.02
10.0	3441.376	11.062	2.669	75.6	420.0	1276.2	8.95	0.96	-0.07
11.0	3441.389	11.131	2.879	84.6	420.9	1276.1	9.08	0.83	-0.13
12.0	3441.404	11.201	3.089	93.7	421.4	1275.9	9.20	0.28	-0.18
13.0	3441.420	11.270	3.299	102.9	421.5	1275.7	9.29	-0.11	-0.11
14.0	3441.438	11.339	3.509	112.3	421.3	1275.7	9.42	-0.29	0.04

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
15.0	3441.457	11.409	3.719	121.8	420.9	1275.8	9.63	-0.38	0.18
16.0	3441.478	11.478	3.929	131.5	420.5	1276.1	9.87	-0.46	0.31
17.0	3441.500	11.547	4.139	141.5	420.0	1276.4	10.13	-0.53	0.42
18.0	3441.525	11.616	4.349	151.8	419.5	1277.0	10.41	-0.56	0.62
19.0	3441.550	11.685	4.560	162.3	418.9	1277.7	10.65	-0.57	0.79
20.0	3441.578	11.754	4.770	173.1	418.4	1278.6	10.95	-0.46	0.99
21.0	3441.607	11.823	4.981	184.1	417.9	1279.7	11.18	-0.47	1.20
22.0	3441.639	11.892	5.191	195.4	417.4	1281.0	11.41	-0.48	1.46
23.0	3441.672	11.960	5.402	206.9	416.9	1282.6	11.67	-0.47	1.71
24.0	3441.707	12.029	5.613	218.7	416.5	1284.4	11.93	-0.46	1.96
25.0	3441.744	12.097	5.825	230.7	416.0	1286.5	12.18	-0.44	2.21
26.0	3441.783	12.166	6.037	243.0	415.6	1288.8	12.42	-0.41	2.48
27.0	3441.824	12.234	6.249	255.6	415.2	1291.5	12.66	-0.38	2.80
28.0	3441.867	12.302	6.462	268.3	414.8	1294.5	12.90	-0.36	3.15
29.0	3441.912	12.371	6.675	281.3	414.4	1297.8	13.13	-0.33	3.51
30.0	3441.959	12.439	6.889	294.6	414.1	1301.5	13.37	-0.31	3.90
31.0	3442.009	12.507	7.104	308.1	413.8	1305.6	13.63	-0.28	4.30
32.0	3442.061	12.575	7.319	321.8	413.5	1310.1	13.89	-0.26	4.72
33.0	3442.115	12.643	7.535	335.8	413.3	1315.1	14.14	-0.25	5.16
34.0	3442.171	12.711	7.752	350.1	413.0	1320.5	14.40	-0.25	5.61
35.0	3442.230	12.779	7.970	364.6	412.7	1326.3	14.63	-0.25	6.07
36.0	3442.291	12.847	8.189	379.3	412.5	1332.6	14.84	-0.24	6.55
37.0	3442.355	12.915	8.408	394.2	412.3	1339.4	15.07	-0.21	7.02
38.0	3442.421	12.983	8.629	409.4	412.1	1346.7	15.30	-0.17	7.52
39.0	3442.490	13.050	8.852	424.8	412.0	1354.5	15.52	-0.12	8.04
40.0	3442.561	13.118	9.075	440.4	411.8	1362.8	15.76	-0.07	8.58
41.0	3442.635	13.186	9.300	456.3	411.8	1371.7	16.01	-0.05	9.15
42.0	3442.711	13.254	9.527	472.4	411.7	1381.1	16.26	-0.05	9.74
43.0	3442.790	13.322	9.755	488.8	411.6	1391.2	16.50	-0.07	10.33
44.0	3442.872	13.389	9.985	505.4	411.6	1401.8	16.74	-0.09	10.92
45.0	3442.957	13.457	10.216	522.2	411.5	1413.0	16.97	-0.11	11.49
46.0	3443.044	13.525	10.450	539.3	411.4	1424.7	17.20	-0.12	12.04
47.0	3443.134	13.592	10.685	556.6	411.2	1437.1	17.43	-0.15	12.59
48.0	3443.227	13.660	10.923	574.2	411.0	1450.0	17.68	-0.19	13.14
49.0	3443.323	13.728	11.163	591.9	410.8	1463.4	17.93	-0.21	13.70
50.0	3443.422	13.795	11.405	609.9	410.6	1477.4	18.15	-0.23	14.26
51.0	3443.524	13.863	11.649	628.2	410.3	1491.9	18.37	-0.27	14.86
52.0	3443.629	13.930	11.896	646.7	410.0	1507.1	18.61	-0.32	15.47
53.0	3443.737	13.998	12.145	665.4	409.7	1522.9	18.85	-0.38	16.11
54.0	3443.848	14.065	12.397	684.4	409.2	1539.4	19.08	-0.44	16.79
55.0	3443.962	14.133	12.652	703.6	408.8	1556.5	19.32	-0.49	17.49
56.0	3444.080	14.200	12.909	722.9	408.2	1574.3	19.52	-0.56	18.19
57.0	3444.200	14.267	13.170	742.5	407.7	1592.8	19.70	-0.59	18.83

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
58.0	3444.324	14.334	13.434	762.3	407.1	1612.0	19.87	-0.58	19.48
59.0	3444.451	14.401	13.701	782.2	406.5	1631.8	20.06	-0.54	20.11
60.0	3444.581	14.468	13.971	802.4	406.0	1652.2	20.27	-0.46	20.70
61.0	3444.715	14.535	14.245	822.8	405.6	1673.2	20.46	-0.36	21.31
62.0	3444.852	14.601	14.522	843.3	405.3	1694.8	20.65	-0.31	21.94
63.0	3444.993	14.668	14.802	864.0	405.0	1717.1	20.80	-0.24	22.64
64.0	3445.137	14.735	15.087	884.8	404.8	1740.2	20.88	-0.15	23.40
65.0	3445.284	14.801	15.375	905.6	404.6	1764.0	20.89	-0.09	24.20
66.0	3445.435	14.868	15.668	926.5	404.6	1788.6	20.88	-0.05	25.05
MACH 1									
66.100	3445.450	14.874	15.697	928.6	404.6	1791.2	20.87	-0.04	25.14
67.0	3445.589	14.934	15.964	947.4	404.6	1814.1	20.87	0.00	25.93
68.0	3445.747	15.001	16.265	968.3	404.6	1840.5	20.87	0.04	26.78
69.0	3445.908	15.068	16.570	989.2	404.6	1867.7	20.91	0.05	27.64
70.0	3446.072	15.134	16.880	1010.1	404.6	1895.7	21.03	0.05	28.47
71.0	3446.240	15.201	17.194	1031.2	404.6	1924.6	21.18	-0.01	29.28
72.0	3446.412	15.267	17.513	1052.5	404.6	1954.3	21.35	-0.13	30.07
73.0	3446.587	15.334	17.837	1073.9	404.3	1984.8	21.52	-0.29	30.89
74.0	3446.765	15.400	18.166	1095.5	403.9	2016.1	21.69	-0.47	31.75
75.0	3446.947	15.467	18.501	1117.2	403.3	2048.3	21.88	-0.66	32.59
76.0	3447.133	15.533	18.841	1139.2	402.6	2081.3	22.07	-0.82	33.44
77.0	3447.322	15.599	19.186	1161.4	401.8	2115.1	22.27	-0.94	34.25
78.0	3447.515	15.665	19.537	1183.7	400.8	2149.7	22.49	-1.04	35.04
79.0	3447.712	15.731	19.894	1206.3	399.7	2185.2	22.70	-1.07	35.87
80.0	3447.912	15.797	20.256	1229.1	398.6	2221.5	22.89	-1.07	36.72
81.0	3448.117	15.862	20.625	1252.1	397.5	2258.7	23.05	-1.06	37.65
MAXIMUM DYNAMIC PRESSURE									
81.100	3448.137	15.869	20.662	1254.4	397.4	2262.5	23.06	-1.05	37.76
82.0	3448.324	15.928	21.000	1275.1	396.5	2296.9	23.15	-0.99	38.72
83.0	3448.536	15.993	21.381	1298.3	395.6	2336.3	23.18	-0.91	39.88
84.0	3448.752	16.058	21.769	1321.4	394.7	2376.8	23.15	-0.83	41.13
85.0	3448.971	16.123	22.163	1344.5	393.9	2418.6	23.06	-0.75	42.43
86.0	3449.194	16.188	22.565	1367.5	393.2	2461.6	22.95	-0.65	43.73
87.0	3449.421	16.252	22.974	1390.4	392.5	2506.0	22.85	-0.57	44.98
88.0	3449.652	16.317	23.390	1413.2	392.0	2551.5	22.79	-0.53	46.15
89.0	3449.886	16.381	23.814	1436.0	391.5	2598.2	22.78	-0.50	47.24
90.0	3450.125	16.446	24.245	1458.8	391.0	2646.0	22.82	-0.47	48.28
91.0	3450.367	16.510	24.685	1481.7	390.6	2694.7	22.89	-0.39	49.29
92.0	3450.612	16.574	25.132	1504.6	390.2	2744.5	22.99	-0.29	50.28

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
93.0	3450.862	16.639	25.588	1527.6	390.0	2795.3	23.10	-0.24	51.22
94.0	3451.115	16.703	26.052	1550.7	389.8	2847.1	23.18	-0.13	52.24
95.0	3451.372	16.767	26.525	1573.9	389.6	2899.8	23.26	-0.07	53.22
96.0	3451.633	16.831	27.007	1597.2	389.6	2953.5	23.31	-0.03	54.24
97.0	3451.898	16.895	27.498	1620.5	389.6	3008.3	23.34	-0.01	55.30
98.0	3452.167	16.959	27.997	1643.8	389.5	3064.1	23.37	-0.00	56.38
99.0	3452.439	17.023	28.506	1667.2	389.5	3121.1	23.41	-0.02	57.46
100.0	3452.715	17.087	29.025	1690.6	389.5	3179.1	23.43	-0.05	58.57
101.0	3452.996	17.151	29.553	1714.0	389.5	3238.2	23.43	-0.02	59.68
102.0	3453.280	17.216	30.091	1737.4	389.4	3298.4	23.43	0.01	60.77
103.0	3453.568	17.280	30.638	1760.8	389.5	3359.7	23.43	0.06	61.85
104.0	3453.859	17.344	31.197	1784.3	389.6	3422.1	23.44	0.10	62.93
105.0	3454.155	17.408	31.765	1807.7	389.7	3485.6	23.46	0.14	64.00
106.0	3454.454	17.472	32.344	1831.2	389.8	3550.2	23.52	0.14	65.06
107.0	3454.758	17.536	32.934	1854.8	389.9	3615.7	23.58	0.11	66.09
108.0	3455.065	17.600	33.534	1878.3	390.0	3682.4	23.66	0.03	67.14
109.0	3455.376	17.665	34.146	1902.0	389.9	3750.0	23.73	-0.05	68.22
110.0	3455.691	17.729	34.769	1925.8	389.8	3818.8	23.80	-0.13	69.30
111.0	3456.010	17.793	35.403	1949.6	389.7	3888.7	23.85	-0.19	70.40
112.0	3456.333	17.857	36.049	1973.4	389.5	3959.7	23.90	-0.21	71.54
113.0	3456.659	17.921	36.706	1997.4	389.3	4031.8	23.94	-0.18	72.68
114.0	3456.990	17.985	37.376	2021.3	389.2	4105.0	24.01	-0.12	73.84
115.0	3457.325	18.049	38.057	2045.4	389.1	4179.4	24.08	-0.05	75.00
116.0	3457.663	18.113	38.751	2069.5	389.0	4255.0	24.14	0.02	76.16
117.0	3458.006	18.177	39.458	2093.6	389.1	4331.7	24.18	0.06	77.31
118.0	3458.352	18.241	40.177	2117.8	389.1	4409.6	24.20	0.05	78.50
119.0	3458.703	18.305	40.910	2141.9	389.1	4488.8	24.16	0.02	79.78
120.0	3459.057	18.369	41.655	2166.0	389.1	4569.3	24.08	-0.06	81.14
121.0	3459.416	18.433	42.414	2190.0	389.0	4651.2	23.97	-0.14	82.53
122.0	3459.778	18.497	43.186	2213.9	388.8	4734.4	23.88	-0.20	83.96
123.0	3460.145	18.561	43.972	2237.8	388.6	4819.1	23.82	-0.24	85.37
124.0	3460.515	18.625	44.772	2261.6	388.3	4905.1	23.82	-0.26	86.75
125.0	3460.889	18.689	45.587	2285.4	388.1	4992.5	23.89	-0.25	88.07
126.0	3461.267	18.753	46.416	2309.4	387.8	5081.2	24.04	-0.26	89.37
127.0	3461.649	18.817	47.259	2333.5	387.5	5171.2	24.24	-0.27	90.62
128.0	3462.035	18.881	48.118	2357.9	387.2	5262.5	24.47	-0.31	91.90
129.0	3462.425	18.944	48.992	2381.3	386.9	5354.9	24.70	-0.46	93.32
130.0	3462.819	19.008	49.881	2406.1	386.5	5449.0	24.93	-0.35	94.74
131.0	3463.218	19.071	50.785	2431.1	386.0	5544.4	25.15	-0.61	96.16
132.0	3463.620	19.135	51.706	2456.3	385.5	5641.3	25.37	-0.55	97.59
133.0	3464.027	19.198	52.642	2481.8	384.8	5739.6	25.59	-0.67	99.01
134.0	3464.437	19.262	53.595	2507.5	384.1	5839.3	25.81	-0.70	100.44
135.0	3464.852	19.325	54.564	2533.4	383.4	5940.5	26.03	-0.75	101.86

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
135.240	3464.953	19.340	54.799	2539.6	383.2	5964.9	26.08	-0.76	102.20
136.0	3465.271	19.388	55.549	2554.1	382.7	6033.4	14.12	-0.69	81.19
137.0	3465.692	19.451	56.548	2568.2	382.0	6115.0	14.20	-0.62	82.16
138.0	3466.117	19.514	57.562	2582.4	381.4	6197.7	14.28	-0.49	83.12
139.0	3466.543	19.576	58.589	2596.7	380.9	6281.3	14.36	-0.49	84.09
140.0	3466.971	19.639	59.629	2611.1	380.5	6365.9	14.43	-0.37	85.18
141.0	3467.402	19.702	60.684	2625.6	380.2	6451.7	14.51	-0.17	86.30
142.0	3467.836	19.764	61.753	2640.1	380.1	6538.5	14.60	-0.12	87.43
143.0	3468.271	19.827	62.837	2654.7	379.9	6626.5	14.71	-0.14	88.55
144.0	3468.710	19.889	63.935	2669.5	379.8	6716.5	14.81	-0.15	89.74
145.0	3469.150	19.952	65.047	2684.3	379.6	6806.9	14.91	-0.18	90.99
146.0	3469.593	20.014	66.175	2699.3	379.4	6898.4	15.01	-0.24	92.33
147.0	3470.039	20.077	67.318	2714.3	379.1	6991.3	15.12	-0.29	93.49
148.0	3470.487	20.139	68.476	2729.8	378.8	7085.5	15.22	-0.33	94.70
149.0	3470.937	20.201	69.650	2745.1	378.5	7180.8	15.33	-0.36	95.98
150.0	3471.390	20.264	70.840	2760.4	378.1	7277.4	15.46	-0.38	97.26
151.0	3471.846	20.326	72.046	2775.9	377.7	7375.3	15.58	-0.38	98.72
152.0	3472.304	20.388	73.268	2791.6	377.3	7474.6	15.70	-0.37	100.07
153.0	3472.765	20.450	74.506	2807.3	376.9	7575.4	15.81	-0.36	101.43
154.0	3473.228	20.512	75.761	2823.2	376.6	7677.5	15.92	-0.35	102.78
155.0	3473.694	20.574	77.033	2838.3	376.2	7781.0	16.08	-0.31	104.33
156.0	3474.163	20.636	78.323	2854.5	375.8	7886.1	16.25	-0.31	105.93
157.0	3474.634	20.698	79.629	2870.8	375.5	7992.9	16.41	-0.31	107.52
158.0	3475.108	20.759	80.953	2887.2	375.1	8101.2	16.57	-0.48	109.11
159.0	3475.585	20.821	82.296	2903.9	374.6	8211.1	16.73	-0.47	110.71
160.0	3476.064	20.883	83.656	2920.7	374.3	8322.6	16.89	-0.20	112.30
161.0	3476.546	20.944	85.035	2937.6	373.8	8435.7	17.05	-0.74	113.90
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.740	3476.905	20.990	86.067	2950.3	373.3	8520.4	17.17	-0.65	115.08
162.0	3477.031	21.006	86.432	2952.6	373.1	8547.0	-2.15	-0.38	67.10
S-IC/S-II SEPARATION COMMAND									
162.400	3477.226	21.030	86.996	2945.3	373.1	8553.7	-28.12	-0.04	1.24
164.0	3477.995	21.128	89.249	2896.9	372.9	8555.6	-30.45	-0.14	1.22
166.0	3478.943	21.251	92.075	2839.8	372.5	8565.4	-24.70	-0.26	12.87
168.0	3479.869	21.374	94.898	2792.4	372.1	8598.4	-23.30	-0.27	17.69
170.0	3480.781	21.496	97.736	2746.4	371.6	8639.2	-21.47	-0.15	21.92

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
172.0	3481.678	21.618	100.587	2704.0	371.3	8683.6	-21.32	-0.14	22.42
174.0	3482.561	21.740	103.453	2661.3	370.9	8729.5	-21.17	-0.19	22.59
176.0	3483.430	21.863	106.334	2618.9	370.5	8774.7	-21.04	-0.19	22.85
178.0	3484.285	21.984	109.229	2576.9	370.2	8820.5	-21.00	-0.18	22.87
180.0	3485.126	22.106	112.140	2534.9	369.8	8866.4	-20.95	-0.18	22.99
182.0	3485.954	22.228	115.066	2493.0	369.4	8912.5	-20.90	-0.18	23.09
184.0	3486.767	22.349	118.008	2451.3	369.1	8958.8	-20.82	-0.18	23.20
186.0	3487.567	22.471	120.964	2409.7	368.7	9005.2	-20.74	-0.16	23.27
188.0	3488.354	22.592	123.936	2368.3	368.4	9051.9	-20.66	-0.17	23.35
190.0	3489.126	22.713	126.923	2327.0	368.0	9098.7	-20.58	-0.19	23.47
192.0	3489.886	22.834	129.926	2285.9	367.6	9145.8	-20.50	-0.19	23.59
194.0	3490.631	22.955	132.944	2244.9	367.3	9193.1	-20.44	-0.16	23.71
196.0	3491.363	23.076	135.978	2204.0	366.9	9240.6	-20.39	-0.15	23.80
198.0	3492.082	23.197	139.027	2163.3	366.6	9288.3	-20.29	-0.18	23.88
200.0	3492.788	23.317	142.092	2122.7	366.2	9336.2	-20.25	-0.19	24.01
202.0	3493.480	23.438	145.173	2082.2	365.8	9384.4	-20.21	-0.16	24.16
204.0	3494.158	23.558	148.270	2041.9	365.5	9432.8	-20.06	-0.14	24.26
206.0	3494.824	23.679	151.383	2002.1	365.2	9481.3	-19.73	-0.16	24.26
208.0	3495.476	23.799	154.512	1963.0	364.9	9529.8	-19.35	-0.15	24.22
210.0	3496.116	23.919	157.657	1924.5	364.6	9578.3	-19.12	-0.13	24.25
212.0	3496.743	24.039	160.818	1886.2	364.3	9626.9	-19.11	-0.10	24.36
214.0	3497.358	24.159	163.994	1847.9	364.1	9675.8	-19.17	-0.10	24.49
216.0	3497.960	24.278	167.187	1809.5	363.9	9724.9	-19.23	-0.09	24.63
218.0	3498.549	24.398	170.396	1771.0	363.7	9774.3	-19.23	-0.09	24.75
220.0	3499.126	24.518	173.622	1732.6	363.5	9824.0	-19.21	-0.10	24.88
222.0	3499.690	24.637	176.864	1694.1	363.3	9873.9	-19.24	-0.11	25.01
224.0	3500.241	24.757	180.122	1655.5	363.1	9924.0	-19.30	-0.09	25.13
226.0	3500.780	24.876	183.397	1616.8	362.9	9974.4	-19.36	-0.08	25.23
228.0	3501.305	24.996	186.688	1578.0	362.7	10025.0	-19.38	-0.07	25.35
230.0	3501.818	25.115	189.997	1539.2	362.5	10075.8	-19.37	-0.08	25.48
232.0	3502.319	25.235	193.321	1500.5	362.4	10126.9	-19.37	-0.08	25.62
234.0	3502.806	25.354	196.663	1461.7	362.2	10178.3	-19.38	-0.08	25.74
236.0	3503.281	25.473	200.022	1422.9	362.0	10229.9	-19.40	-0.07	25.85
238.0	3503.743	25.592	203.398	1384.0	361.9	10281.8	-19.42	-0.05	25.99
240.0	3504.192	25.711	206.791	1345.1	361.7	10333.9	-19.42	-0.05	26.11
242.0	3504.628	25.830	210.201	1306.3	361.6	10386.2	-19.42	-0.06	26.23
244.0	3505.052	25.949	213.628	1267.4	361.5	10438.8	-19.43	-0.08	26.36
246.0	3505.463	26.068	217.073	1228.4	361.3	10491.7	-19.46	-0.09	26.51
248.0	3505.861	26.187	220.535	1189.4	361.1	10544.9	-19.50	-0.09	26.65
250.0	3506.246	26.306	224.015	1150.4	360.9	10598.3	-19.52	-0.10	26.77
252.0	3506.618	26.425	227.512	1111.3	360.6	10652.0	-19.54	-0.10	26.89
254.0	3506.977	26.543	231.027	1072.2	360.4	10706.0	-19.55	-0.08	27.03
256.0	3507.324	26.662	234.560	1033.0	360.3	10760.2	-19.57	-0.07	27.17

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
258.0	3507.657	26.781	238.111	993.8	360.1	10814.7	-19.60	-0.08	27.32
260.0	3507.978	26.899	241.680	954.5	359.9	10869.5	-19.62	-0.10	27.45
262.0	3508.286	27.017	245.266	915.2	359.7	10924.5	-19.64	-0.12	27.59
264.0	3508.581	27.136	248.871	875.9	359.4	10979.8	-19.67	-0.13	27.73
266.0	3508.862	27.254	252.495	836.5	359.1	11035.5	-19.70	-0.11	27.89
268.0	3509.131	27.372	256.136	797.0	358.9	11091.4	-19.73	-0.09	28.07
270.0	3509.387	27.490	259.796	757.5	358.7	11147.7	-19.75	-0.09	28.23
272.0	3509.630	27.608	263.475	717.9	358.5	11204.3	-19.78	-0.12	28.37
274.0	3509.860	27.726	267.172	678.3	358.2	11261.2	-19.79	-0.13	28.50
276.0	3510.076	27.844	270.888	638.8	358.0	11318.4	-19.75	-0.13	28.65
278.0	3510.280	27.962	274.623	599.2	357.7	11375.9	-19.79	-0.11	28.80
280.0	3510.471	28.080	278.377	559.4	357.5	11433.6	-19.94	-0.09	28.95
282.0	3510.648	28.197	282.150	519.4	357.3	11491.7	-20.07	-0.08	29.09
284.0	3510.813	28.315	285.943	479.2	357.1	11550.0	-20.09	-0.10	29.24
286.0	3510.964	28.432	289.754	439.0	356.9	11608.7	-20.04	-0.12	29.41
288.0	3511.102	28.550	293.585	398.9	356.6	11667.7	-20.03	-0.11	29.57
290.0	3511.227	28.667	297.435	358.8	356.4	11727.0	-20.08	-0.09	29.71
292.0	3511.338	28.784	301.305	318.5	356.2	11786.5	-20.12	-0.10	29.84
294.0	3511.436	28.902	305.194	278.2	355.9	11846.4	-20.17	-0.14	30.01
296.0	3511.521	29.019	309.104	237.7	355.6	11906.6	-20.22	-0.15	30.18
298.0	3511.593	29.136	313.033	197.2	355.3	11967.1	-20.27	-0.13	30.34
300.0	3511.651	29.253	316.982	156.6	355.1	12028.0	-20.31	-0.12	30.49
302.0	3511.696	29.370	320.951	115.9	354.8	12089.1	-20.34	-0.11	30.65
304.0	3511.727	29.486	324.940	75.2	354.6	12150.6	-20.37	-0.11	30.84
306.0	3511.745	29.603	328.950	34.4	354.4	12212.5	-20.39	-0.11	31.01
308.0	3511.750	29.720	332.980	-6.5	354.1	12274.7	-20.42	-0.12	31.18
310.0	3511.741	29.836	337.031	-47.4	353.8	12337.2	-20.46	-0.15	31.35
312.0	3511.719	29.952	341.102	-88.4	353.5	12400.1	-20.52	-0.14	31.52
314.0	3511.683	30.069	345.194	-129.6	353.2	12463.4	-20.58	-0.12	31.70
316.0	3511.633	30.185	349.307	-170.8	353.0	12527.0	-20.61	-0.09	31.87
318.0	3511.570	30.301	353.441	-212.1	352.8	12590.9	-20.64	-0.10	32.07
320.0	3511.494	30.417	357.595	-253.5	352.6	12655.3	-20.69	-0.12	32.27
322.0	3511.403	30.533	361.772	-295.0	352.3	12720.0	-20.78	-0.14	32.47
324.0	3511.300	30.649	365.969	-336.7	352.0	12785.1	-20.87	-0.13	32.64
326.0	3511.182	30.765	370.188	-378.5	351.7	12850.6	-20.91	-0.13	32.83
328.0	3511.050	30.881	374.429	-420.3	351.4	12916.5	-20.90	-0.12	33.02
330.0	3510.905	30.996	378.692	-462.1	351.2	12982.7	-20.88	-0.12	33.21
332.0	3510.746	31.112	382.976	-504.1	350.9	13049.3	-20.99	-0.11	33.42
334.0	3510.573	31.227	387.282	-546.4	350.7	13116.4	-21.23	-0.09	33.61
336.0	3510.386	31.343	391.611	-588.9	350.5	13183.8	-21.36	-0.09	33.82
338.0	3510.186	31.458	395.961	-631.6	350.3	13251.7	-21.32	-0.11	34.03
340.0	3509.971	31.573	400.334	-674.3	350.0	13320.0	-21.25	-0.13	34.24
342.0	3509.742	31.689	404.730	-716.9	349.8	13388.7	-21.32	-0.13	34.46

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
344.0	3509.499	31.804	409.149	-759.7	349.5	13457.8	-21.45	-0.13	34.65
346.0	3509.241	31.919	413.590	-802.7	349.2	13527.4	-21.53	-0.12	34.87
348.0	3508.970	32.034	418.054	-846.0	348.9	13597.4	-21.62	-0.13	35.11
350.0	3508.685	32.148	422.541	-889.3	348.7	13667.8	-21.71	-0.13	35.31
352.0	3508.385	32.263	427.052	-932.8	348.4	13738.6	-21.77	-0.13	35.52
354.0	3508.070	32.378	431.586	-976.5	348.1	13809.9	-21.81	-0.14	35.73
356.0	3507.742	32.492	436.143	-1020.1	347.8	13881.6	-21.84	-0.13	35.95
358.0	3507.399	32.607	440.724	-1063.9	347.5	13953.7	-21.92	-0.12	36.16
360.0	3507.041	32.721	445.329	-1108.0	347.3	14026.3	-22.05	-0.10	36.40
362.0	3506.669	32.835	449.958	-1152.2	347.1	14099.4	-22.18	-0.10	36.66
364.0	3506.283	32.950	454.611	-1196.7	346.8	14173.0	-22.25	-0.12	36.89
366.0	3505.882	33.064	459.288	-1241.3	346.6	14247.0	-22.28	-0.14	37.09
368.0	3505.466	33.178	463.990	-1286.0	346.3	14321.4	-22.36	-0.14	37.29
370.0	3505.035	33.292	468.716	-1330.9	346.0	14396.2	-22.47	-0.14	37.57
372.0	3504.590	33.405	473.467	-1375.9	345.7	14471.7	-22.55	-0.14	37.86
374.0	3504.129	33.519	478.243	-1421.1	345.4	14547.7	-22.61	-0.13	38.10
376.0	3503.654	33.633	483.044	-1466.5	345.1	14624.1	-22.70	-0.15	38.30
378.0	3503.164	33.746	487.870	-1512.1	344.7	14700.9	-22.81	-0.17	38.54
380.0	3502.659	33.860	492.722	-1557.8	344.4	14778.3	-22.93	-0.17	38.83
382.0	3502.138	33.973	497.599	-1603.8	344.0	14856.3	-23.03	-0.16	39.12
384.0	3501.603	34.086	502.502	-1650.1	343.7	14934.8	-23.15	-0.15	39.41
386.0	3501.052	34.199	507.431	-1696.5	343.3	15013.9	-23.25	-0.17	39.66
388.0	3500.486	34.312	512.386	-1743.1	343.0	15093.5	-23.28	-0.17	39.89
390.0	3499.904	34.425	517.368	-1789.7	342.7	15173.5	-23.30	-0.13	40.15
392.0	3499.308	34.538	522.375	-1836.5	342.4	15254.2	-23.44	-0.09	40.46
394.0	3498.695	34.650	527.410	-1883.7	342.2	15335.4	-23.70	-0.12	40.76
396.0	3498.067	34.763	532.471	-1931.3	341.9	15417.2	-23.91	-0.18	41.00
398.0	3497.424	34.876	537.559	-1979.3	341.5	15499.5	-23.99	-0.20	41.26
400.0	3496.764	34.988	542.674	-2027.4	341.1	15582.3	-24.02	-0.18	41.57
402.0	3496.089	35.100	547.817	-2075.6	340.7	15665.8	-24.13	-0.18	41.89
404.0	3495.398	35.212	552.988	-2124.0	340.3	15749.9	-24.26	-0.18	42.18
406.0	3494.691	35.324	558.186	-2172.7	339.9	15834.6	-24.37	-0.18	42.48
408.0	3493.968	35.436	563.412	-2221.6	339.5	15919.8	-24.49	-0.18	42.78
410.0	3493.228	35.548	568.666	-2270.8	339.2	16005.7	-24.62	-0.18	43.10
412.0	3492.473	35.659	573.949	-2320.1	338.8	16092.3	-24.71	-0.18	43.41
414.0	3491.701	35.771	579.260	-2369.7	338.4	16179.4	-24.79	-0.18	43.72
416.0	3490.913	35.882	584.600	-2419.5	338.0	16267.2	-24.95	-0.18	44.06
418.0	3490.108	35.993	589.969	-2469.7	337.6	16355.7	-25.17	-0.17	44.40
420.0	3489.287	36.104	595.367	-2520.2	337.3	16444.9	-25.35	-0.15	44.74
422.0	3488.449	36.215	600.795	-2571.1	336.9	16534.7	-25.46	-0.16	45.05
424.0	3487.594	36.326	606.252	-2622.2	336.6	16625.1	-25.56	-0.18	45.38
426.0	3486.723	36.437	611.740	-2673.5	336.2	16716.2	-25.73	-0.19	45.73
428.0	3485.834	36.547	617.257	-2725.2	335.8	16808.1	-25.87	-0.18	46.09

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
430.0	3484.929	36.658	622.805	-2777.1	335.4	16900.6	-26.01	-0.16	46.44
432.0	3484.006	36.768	628.383	-2829.3	335.1	16993.9	-26.17	-0.15	46.84
434.0	3483.066	36.878	633.992	-2881.9	334.8	17088.0	-26.34	-0.16	47.22
436.0	3482.109	36.988	639.632	-2934.8	334.4	17182.8	-26.51	-0.17	47.55
438.0	3481.134	37.098	645.304	-2988.0	334.0	17278.2	-26.68	-0.18	47.84
440.0	3480.142	37.208	651.007	-3041.6	333.6	17374.3	-26.84	-0.19	48.19
442.0	3479.134	37.318	656.742	-3095.5	333.2	17471.1	-27.02	-0.18	48.67
444.0	3478.108	37.428	662.509	-3149.8	332.8	17569.0	-27.19	-0.16	49.20
446.0	3477.062	37.537	668.308	-3204.4	332.5	17667.9	-27.36	-0.15	49.64
448.0	3475.998	37.647	674.140	-3259.3	332.2	17767.5	-27.53	-0.16	49.95
450.0	3474.915	37.756	680.004	-3314.6	331.8	17867.7	-27.70	-0.18	50.24
452.0	3473.814	37.865	685.902	-3370.2	331.4	17968.7	-27.87	-0.18	50.66
454.0	3472.695	37.974	691.834	-3426.2	331.1	18070.2	-28.04	-0.17	51.15
456.0	3471.559	38.083	697.798	-3482.5	330.7	18172.9	-28.22	-0.17	51.60
458.0	3470.403	38.192	703.797	-3539.2	330.3	18276.6	-28.39	-0.17	52.05
460.0	3469.229	38.300	709.831	-3596.2	330.0	18381.1	-28.56	-0.17	52.51
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
460.750	3468.784	38.341	712.102	-3617.4	329.7	18420.6	-29.03	-0.39	52.66
462.0	3468.036	38.409	715.897	-3653.6	329.3	18475.0	-29.05	-0.30	41.23
464.0	3466.824	38.517	721.991	-3711.9	328.4	18557.7	-29.17	-0.52	41.42
466.0	3465.592	38.625	728.113	-3770.3	327.3	18640.7	-29.18	-0.53	41.63
468.0	3464.342	38.733	734.263	-3828.6	326.4	18724.2	-28.86	-0.46	41.89
470.0	3463.072	38.840	740.440	-3884.6	325.5	18808.3	-27.32	-0.44	42.18
472.0	3461.783	38.947	746.644	-3938.9	324.6	18893.0	-27.05	-0.45	42.44
474.0	3460.475	39.054	752.877	-3993.0	323.7	18978.1	-26.97	-0.45	42.67
476.0	3459.148	39.160	759.137	-4047.0	322.7	19063.7	-26.96	-0.45	42.91
478.0	3457.804	39.266	765.426	-4101.0	321.8	19149.2	-27.01	-0.46	43.16
480.0	3456.443	39.372	771.743	-4155.1	320.8	19235.8	-27.11	-0.48	43.42
482.0	3455.065	39.477	778.089	-4209.5	319.8	19323.0	-27.25	-0.50	43.77
484.0	3453.671	39.582	784.464	-4264.2	318.8	19410.9	-27.41	-0.47	44.13
486.0	3452.260	39.687	790.868	-4319.3	317.9	19499.5	-27.62	-0.42	44.48
488.0	3450.831	39.792	797.302	-4374.9	317.1	19588.8	-27.90	-0.38	44.82
490.0	3449.385	39.896	803.765	-4431.1	316.3	19677.9	-28.19	-0.35	43.15
492.0	3447.921	40.000	810.254	-4487.7	315.7	19755.4	-28.41	-0.22	35.20
494.0	3446.437	40.104	816.768	-4544.9	315.3	19823.6	-28.88	-0.21	33.54
496.0	3444.932	40.208	823.304	-4603.1	314.8	19890.6	-29.26	-0.22	33.47
498.0	3443.408	40.311	829.862	-4662.0	314.4	19957.6	-29.55	-0.22	33.61
500.0	3441.863	40.415	836.443	-4721.4	313.9	20025.0	-29.76	-0.20	33.75
502.0	3440.299	40.518	843.045	-4781.1	313.5	20092.6	-29.89	-0.19	33.92
504.0	3438.716	40.621	849.670	-4841.0	313.1	20160.6	-29.94	-0.20	34.08
506.0	3437.112	40.724	856.317	-4901.0	312.6	20228.9	-29.93	-0.23	34.23

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
508.0	3435.489	40.827	862.987	-4960.8	312.1	20297.6	-29.87	-0.26	34.37
510.0	3433.846	40.929	869.679	-5020.7	311.5	20366.5	-29.89	-0.28	34.53
512.0	3432.184	41.032	876.395	-5080.8	310.9	20435.8	-30.08	-0.29	34.74
514.0	3430.502	41.134	883.133	-5141.3	310.4	20505.5	-30.41	-0.25	34.95
516.0	3428.799	41.236	889.894	-5202.5	309.9	20575.6	-30.76	-0.20	35.12
518.0	3427.077	41.338	896.678	-5264.3	309.5	20646.0	-30.97	-0.17	35.25
520.0	3425.334	41.440	903.485	-5326.5	309.1	20716.7	-31.10	-0.18	35.43
522.0	3423.570	41.542	910.316	-5388.9	308.7	20787.8	-31.31	-0.19	35.66
524.0	3421.786	41.643	917.170	-5451.9	308.3	20859.4	-31.56	-0.18	35.90
526.0	3419.981	41.745	924.048	-5515.2	307.9	20931.4	-31.76	-0.17	36.08
528.0	3418.155	41.846	930.950	-5579.0	307.6	21003.7	-31.94	-0.17	36.25
530.0	3416.308	41.947	937.875	-5643.2	307.2	21076.5	-32.16	-0.17	36.44
532.0	3414.440	42.048	944.825	-5707.8	306.8	21149.6	-32.41	-0.18	36.67
534.0	3412.551	42.149	951.798	-5772.9	306.4	21223.2	-32.61	-0.21	36.90
536.0	3410.640	42.250	958.796	-5838.4	305.9	21297.2	-32.78	-0.23	37.10
538.0	3408.707	42.350	965.819	-5904.2	305.4	21371.6	-32.95	-0.22	37.27
540.0	3406.753	42.451	972.866	-5970.3	305.0	21446.4	-33.13	-0.20	37.47
542.0	3404.777	42.551	979.937	-6036.8	304.5	21521.6	-33.31	-0.20	37.69
544.0	3402.779	42.651	987.034	-6103.7	304.1	21597.2	-33.50	-0.21	37.87
546.0	3400.759	42.751	994.155	-6171.0	303.7	21673.2	-33.68	-0.20	38.17
548.0	3398.716	42.851	1001.302	-6238.6	303.2	21749.9	-33.87	-0.21	38.47
550.0	3396.652	42.951	1008.473	-6306.6	302.8	21827.1	-34.05	-0.21	38.77
552.0	3394.564	43.051	1015.674	-6374.9	302.3	21904.9	-34.24	-0.30	39.05
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
552.340	3394.207	43.067	1016.900	-6386.6	302.1	21918.2	-34.27	-0.62	39.10
S-II/S-IVB SEPARATION COMMAND									
553.200	3393.301	43.110	1020.002	-6412.9	302.0	21919.9	-29.11	-0.19	-8.18
554.0	3392.456	43.150	1022.889	-6436.2	301.8	21913.4	-29.10	-0.30	-8.16
556.0	3390.328	43.249	1030.097	-6494.4	301.1	21897.1	-29.11	-0.32	-8.10
558.0	3388.180	43.348	1037.303	-6553.1	300.5	21885.2	-30.03	-0.32	2.25
560.0	3386.013	43.447	1044.509	-6614.5	299.8	21898.8	-30.80	-0.31	8.25
562.0	3383.826	43.546	1051.720	-6676.1	299.2	21915.7	-30.72	-0.30	8.60
564.0	3381.618	43.644	1058.937	-6737.9	298.4	21933.1	-31.16	-0.41	8.74
566.0	3379.390	43.742	1066.159	-6801.5	297.4	21950.4	-31.89	-0.49	8.71
568.0	3377.140	43.840	1073.387	-6865.8	296.4	21968.6	-32.30	-0.51	8.80
570.0	3374.870	43.937	1080.621	-6930.5	295.4	21986.3	-32.35	-0.47	8.96
572.0	3372.578	44.034	1087.861	-6995.3	294.4	22004.3	-32.29	-0.41	9.02
574.0	3370.265	44.131	1095.107	-7060.0	293.6	22022.4	-32.34	-0.37	9.00
576.0	3367.930	44.227	1102.359	-7124.9	292.9	22040.4	-32.50	-0.31	8.96

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
578.0	3365.574	44.324	1109.617	-7190.1	292.3	22058.2	-32.64	-0.29	8.89
580.0	3363.197	44.420	1116.880	-7255.6	291.7	22076.0	-32.77	-0.27	8.82
582.0	3360.798	44.516	1124.150	-7321.3	291.1	22093.6	-32.86	-0.25	8.75
584.0	3358.377	44.612	1131.425	-7387.2	290.6	22111.1	-32.94	-0.22	8.71
586.0	3355.935	44.707	1138.706	-7453.2	290.2	22128.5	-32.99	-0.19	8.70
588.0	3353.470	44.803	1145.992	-7519.3	289.8	22145.9	-33.00	-0.18	8.69
590.0	3350.985	44.898	1153.285	-7585.4	289.4	22163.3	-33.00	-0.18	8.68
592.0	3348.477	44.993	1160.583	-7651.5	289.0	22180.7	-33.02	-0.18	8.65
594.0	3345.947	45.088	1167.887	-7717.6	288.6	22198.0	-33.08	-0.15	8.64
596.0	3343.396	45.183	1175.196	-7783.9	288.3	22215.3	-33.14	-0.14	8.65
598.0	3340.823	45.278	1182.511	-7850.4	288.0	22232.7	-33.20	-0.15	8.66
600.0	3338.228	45.373	1189.832	-7916.9	287.6	22250.0	-33.24	-0.17	8.63
602.0	3335.611	45.467	1197.159	-7983.5	287.2	22267.2	-33.27	-0.17	8.58
604.0	3332.973	45.562	1204.491	-8050.1	286.9	22284.4	-33.30	-0.16	8.53
606.0	3330.312	45.656	1211.829	-8116.8	286.5	22301.4	-33.35	-0.14	8.50
608.0	3327.629	45.750	1219.172	-8183.7	286.2	22318.5	-33.40	-0.14	8.49
610.0	3324.924	45.845	1226.522	-8250.6	285.9	22335.4	-33.45	-0.14	8.47
612.0	3322.198	45.939	1233.876	-8317.6	285.6	22352.4	-33.49	-0.15	8.43
614.0	3319.449	46.033	1241.236	-8384.7	285.2	22369.2	-33.51	-0.17	8.39
616.0	3316.678	46.126	1248.602	-8451.8	284.8	22386.0	-33.53	-0.19	8.37
618.0	3313.885	46.220	1255.973	-8519.0	284.4	22402.8	-33.56	-0.19	8.34
620.0	3311.070	46.314	1263.350	-8586.2	284.0	22419.4	-33.60	-0.18	8.32
622.0	3308.232	46.407	1270.733	-8653.5	283.6	22436.1	-33.64	-0.18	8.31
624.0	3305.373	46.500	1278.120	-8720.9	283.2	22452.8	-33.68	-0.18	8.32
626.0	3302.491	46.593	1285.514	-8788.4	282.8	22469.4	-33.72	-0.17	8.34
628.0	3299.587	46.686	1292.912	-8856.0	282.4	22486.2	-33.76	-0.16	8.34
630.0	3296.661	46.779	1300.316	-8923.6	282.0	22502.8	-33.81	-0.17	8.32
632.0	3293.713	46.872	1307.726	-8991.4	281.6	22519.5	-33.86	-0.19	8.28
634.0	3290.742	46.965	1315.141	-9059.2	281.2	22536.0	-33.91	-0.21	8.23
636.0	3287.749	47.057	1322.562	-9127.2	280.7	22552.5	-33.96	-0.23	8.20
638.0	3284.734	47.150	1329.988	-9195.2	280.2	22568.9	-33.98	-0.24	8.16
640.0	3281.696	47.242	1337.419	-9263.2	279.7	22585.2	-33.99	-0.25	8.15
642.0	3278.635	47.334	1344.856	-9331.3	279.1	22601.5	-33.99	-0.25	8.14
644.0	3275.553	47.425	1352.298	-9399.4	278.6	22617.8	-34.01	-0.24	8.12
646.0	3272.448	47.517	1359.746	-9467.5	278.1	22634.1	-34.03	-0.25	8.11
648.0	3269.320	47.609	1367.199	-9535.7	277.5	22650.3	-34.05	-0.27	8.10
650.0	3266.170	47.700	1374.657	-9603.9	276.9	22666.5	-34.08	-0.29	8.08
652.0	3262.998	47.791	1382.120	-9672.2	276.3	22682.7	-34.12	-0.30	8.06
654.0	3259.803	47.882	1389.589	-9740.6	275.7	22698.8	-34.16	-0.30	8.04
656.0	3256.585	47.972	1397.063	-9809.0	275.0	22714.9	-34.18	-0.31	8.03
658.0	3253.345	48.063	1404.543	-9877.4	274.4	22731.0	-34.19	-0.31	8.03
660.0	3250.083	48.153	1412.028	-9945.9	273.7	22747.1	-34.21	-0.31	8.02
662.0	3246.798	48.243	1419.518	-10014.5	273.1	22763.2	-34.27	-0.32	8.00

TABLE C-II. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - ASCENT PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
664.0	3243.490	48.333	1427.013	-10083.2	272.3	22779.2	-34.39	-0.35	7.95
666.0	3240.160	48.422	1434.514	-10152.3	271.6	22795.0	-34.53	-0.38	7.89
668.0	3236.807	48.511	1442.019	-10221.4	270.8	22810.8	-34.57	-0.39	7.86
670.0	3233.431	48.600	1449.530	-10290.6	270.0	22826.6	-34.52	-0.39	7.86
672.0	3230.032	48.689	1457.046	-10359.7	269.2	22842.3	-34.47	-0.36	7.87
674.0	3226.611	48.778	1464.568	-10428.8	268.5	22858.1	-34.51	-0.33	7.87
676.0	3223.167	48.866	1472.094	-10497.9	267.7	22873.9	-34.53	-0.33	7.86
678.0	3219.700	48.954	1479.626	-10567.0	267.0	22889.6	-34.51	-0.36	7.86
680.0	3216.210	49.042	1487.163	-10636.1	266.2	22905.4	-34.46	-0.39	7.86
682.0	3212.698	49.129	1494.705	-10705.1	265.4	22921.2	-34.45	-0.39	7.88
684.0	3209.163	49.216	1502.252	-10774.1	264.6	22937.0	-34.44	-0.38	7.88
686.0	3205.605	49.303	1509.805	-10843.1	263.8	22952.8	-34.44	-0.36	7.90
688.0	3202.025	49.390	1517.362	-10912.0	263.1	22968.6	-34.44	-0.35	7.89
690.0	3198.422	49.477	1524.925	-10981.0	262.3	22984.4	-34.43	-0.35	7.89
692.0	3194.796	49.563	1532.493	-11049.9	261.4	23000.1	-34.43	-0.39	7.88
S-IVB 1ST GUIDANCE CUTOFF									
693.910	3191.312	49.645	1539.726	-11115.8	260.6	23015.2	-34.42	-0.57	7.86
694.0	3191.147	49.649	1540.067	-11118.9	260.6	23015.9	-34.42	-0.62	7.86
696.0	3187.479	49.734	1547.638	-11175.2	259.9	22992.0	-27.28	-0.34	-13.22
698.0	3183.791	49.820	1555.203	-11229.2	259.1	22966.2	-27.24	-0.36	-13.33
700.0	3180.086	49.905	1562.758	-11283.7	258.4	22939.3	-27.21	-0.36	-13.40
702.0	3176.363	49.990	1570.304	-11338.2	257.6	22912.7	-27.18	-0.36	-13.46
PARKING ORBIT INSERTION									
703.910	3172.790	50.070	1577.502	-11390.2	256.8	22887.0	-27.14	-0.37	-13.54

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

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
GUIDANCE REFERENCE RELEASE											
-16.968	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-16.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-15.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-14.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-13.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-12.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-11.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-10.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-9.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-8.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-7.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-6.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-5.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-4.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-3.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-2.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
-1.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
0.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	196
ALL HOLDDOWN ARMS RELEASED											
0.300	3441.336	-80.6041	28.4470	0.0	90.00	0.2	90.00	0.01	1340.7	0.0	196
START OF TIME BASE 1											
0.700	3441.337	-80.6041	28.4470	164.79	88.75	1.7	90.00	0.07	1340.7	0.000	197
1.0	3441.337	-80.6041	28.4470	156.65	88.90	3.5	90.00	0.15	1340.7	-0.000	197
2.0	3441.338	-80.6041	28.4470	147.43	88.87	10.9	90.01	0.47	1340.8	-0.000	204
3.0	3441.340	-80.6041	28.4470	145.44	88.52	18.5	90.02	0.79	1341.1	-0.000	219
4.0	3441.344	-80.6041	28.4470	148.56	87.82	26.5	90.04	1.13	1341.5	0.000	242
5.0	3441.349	-80.6041	28.4470	151.76	86.92	34.7	90.07	1.48	1342.0	0.000	272
6.0	3441.355	-80.6041	28.4470	153.82	86.10	43.1	90.11	1.83	1342.7	0.001	311
7.0	3441.362	-80.6041	28.4469	155.25	85.46	51.6	90.16	2.20	1343.4	0.001	358
8.0	3441.372	-80.6041	28.4469	156.43	85.01	60.4	90.21	2.56	1344.1	0.002	414
9.0	3441.383	-80.6041	28.4469	157.56	84.75	69.2	90.25	2.94	1344.9	0.003	478
10.0	3441.395	-80.6041	28.4469	158.72	84.65	78.2	90.29	3.32	1345.6	0.004	552
11.0	3441.409	-80.6041	28.4469	159.98	84.62	87.4	90.33	3.70	1346.3	0.005	634
12.0	3441.424	-80.6041	28.4469	161.31	84.81	96.6	90.35	4.10	1347.0	0.007	726
13.0	3441.440	-80.6041	28.4468	162.74	85.23	105.9	90.36	4.49	1347.5	0.008	827
14.0	3441.458	-80.6041	28.4468	163.20	85.71	115.3	90.35	4.89	1348.1	0.010	937

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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	3441.478	-80.6041	28.4468	162.72	86.20	124.8	90.34	5.30	1349.0	0.011	1057
16.0	3441.499	-80.6041	28.4468	161.28	86.65	134.6	90.32	5.71	1350.0	0.012	1186
17.0	3441.522	-80.6040	28.4467	158.72	87.08	144.6	90.29	6.14	1351.2	0.014	1325
18.0	3441.547	-80.6040	28.4467	154.48	87.46	154.9	90.26	6.57	1352.6	0.015	1475
19.0	3441.573	-80.6040	28.4467	147.96	87.77	165.5	90.23	7.01	1354.3	0.016	1635
20.0	3441.601	-80.6040	28.4467	139.18	87.98	176.4	90.20	7.47	1356.4	0.017	1806
21.0	3441.631	-80.6040	28.4467	128.46	88.08	187.5	90.17	7.93	1358.7	0.018	1988
22.0	3441.663	-80.6040	28.4467	117.19	88.06	198.9	90.13	8.40	1361.4	0.019	2181
23.0	3441.697	-80.6040	28.4467	106.47	87.93	210.5	90.09	8.87	1364.4	0.020	2385
24.0	3441.732	-80.6039	28.4467	97.54	87.71	222.4	90.05	9.35	1367.8	0.020	2601
25.0	3441.770	-80.6039	28.4467	90.60	87.41	234.6	90.00	9.84	1371.6	0.021	2830
26.0	3441.810	-80.6039	28.4467	85.39	87.06	247.1	89.96	10.33	1375.8	0.022	3070
27.0	3441.851	-80.6038	28.4467	81.59	86.66	259.8	89.91	10.83	1380.4	0.024	3323
28.0	3441.895	-80.6038	28.4467	78.85	86.22	272.8	89.85	11.33	1385.5	0.025	3589
29.0	3441.941	-80.6037	28.4467	76.84	85.75	286.1	89.80	11.84	1391.1	0.027	3868
30.0	3441.989	-80.6036	28.4467	75.39	85.26	299.7	89.74	12.34	1397.2	0.030	4160
31.0	3442.039	-80.6036	28.4467	74.33	84.73	313.6	89.67	12.85	1403.9	0.033	4465
32.0	3442.092	-80.6035	28.4467	73.52	84.19	327.8	89.61	13.36	1411.0	0.037	4785
33.0	3442.146	-80.6034	28.4468	72.89	83.62	342.3	89.53	13.87	1418.8	0.042	5118
34.0	3442.204	-80.6032	28.4468	72.42	83.03	357.2	89.46	14.39	1427.2	0.048	5465
35.0	3442.263	-80.6031	28.4468	72.08	82.42	372.4	89.38	14.90	1436.1	0.054	5827
36.0	3442.325	-80.6030	28.4469	71.81	81.80	387.9	89.29	15.40	1445.7	0.062	6204
37.0	3442.390	-80.6028	28.4469	71.63	81.17	403.8	89.20	15.91	1455.8	0.071	6595
38.0	3442.457	-80.6026	28.4470	71.51	80.52	420.0	89.11	16.41	1466.6	0.082	7002
39.0	3442.526	-80.6024	28.4471	71.44	79.86	436.7	89.01	16.91	1478.1	0.093	7424
40.0	3442.598	-80.6021	28.4471	71.41	79.19	453.6	88.91	17.40	1490.3	0.106	7862
41.0	3442.673	-80.6019	28.4472	71.42	78.51	471.0	88.80	17.88	1503.1	0.120	8315
42.0	3442.750	-80.6016	28.4473	71.43	77.81	488.8	88.69	18.36	1516.7	0.136	8785
43.0	3442.830	-80.6013	28.4474	71.44	77.11	507.1	88.58	18.84	1530.9	0.154	9271
44.0	3442.913	-80.6009	28.4475	71.45	76.41	525.8	88.46	19.30	1545.9	0.173	9774
45.0	3442.998	-80.6005	28.4476	71.46	75.69	544.9	88.33	19.76	1561.6	0.194	10294
46.0	3443.087	-80.6001	28.4477	71.46	74.98	564.5	88.20	20.21	1578.0	0.217	10830
47.0	3443.178	-80.5997	28.4479	71.44	74.27	584.6	88.06	20.66	1595.0	0.242	11385
48.0	3443.272	-80.5992	28.4480	71.42	73.56	605.1	87.92	21.09	1612.7	0.269	11956
49.0	3443.369	-80.5987	28.4482	71.40	72.86	626.1	87.78	21.52	1631.1	0.298	12546
50.0	3443.469	-80.5981	28.4483	71.38	72.17	647.6	87.63	21.94	1650.2	0.330	13153
51.0	3443.572	-80.5975	28.4485	71.36	71.48	669.6	87.48	22.34	1670.0	0.363	13779
52.0	3443.678	-80.5968	28.4487	71.32	70.79	692.1	87.32	22.74	1690.4	0.399	14423
53.0	3443.787	-80.5961	28.4489	71.28	70.10	715.1	87.16	23.13	1711.7	0.438	15087
54.0	3443.899	-80.5954	28.4491	71.23	69.42	738.7	86.99	23.51	1733.6	0.479	15769
55.0	3444.014	-80.5946	28.4494	71.19	68.74	762.9	86.82	23.88	1756.4	0.523	16470
56.0	3444.133	-80.5938	28.4496	71.13	68.06	787.6	86.64	24.23	1779.8	0.570	17191
57.0	3444.255	-80.5929	28.4499	71.08	67.38	812.8	86.46	24.57	1804.0	0.620	17932

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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	3444.380	-80.5919	28.4502	71.04	66.71	838.6	86.28	24.91	1829.0	0.673	18692
59.0	3444.508	-80.5909	28.4505	71.01	66.04	864.9	86.09	25.22	1854.7	0.729	19473
60.0	3444.640	-80.5899	28.4508	70.99	65.39	891.8	85.91	25.53	1881.1	0.788	20274
61.0	3444.775	-80.5887	28.4511	70.98	64.75	919.3	85.73	25.83	1908.2	0.851	21095
62.0	3444.914	-80.5875	28.4515	70.99	64.11	947.3	85.55	26.12	1935.9	0.917	21938
63.0	3445.056	-80.5863	28.4519	71.01	63.48	975.8	85.38	26.39	1964.5	0.987	22801
64.0	3445.201	-80.5850	28.4523	71.04	62.85	1004.8	85.20	26.65	1993.7	1.061	23685
65.0	3445.350	-80.5836	28.4527	71.07	62.22	1034.4	85.03	26.89	2023.8	1.138	24590
66.0	3445.503	-80.5821	28.4531	71.11	61.59	1064.6	84.86	27.11	2054.6	1.219	25516
MACH 1											
66.100	3445.518	-80.5820	28.4532	71.12	61.53	1067.6	84.84	27.13	2057.7	1.228	25610
67.0	3445.658	-80.5806	28.4536	71.16	60.96	1095.3	84.68	27.32	2086.2	1.304	26463
68.0	3445.818	-80.5790	28.4541	71.21	60.32	1126.5	84.51	27.51	2118.6	1.394	27432
69.0	3445.981	-80.5773	28.4546	71.25	59.68	1158.3	84.34	27.69	2151.8	1.488	28422
70.0	3446.147	-80.5756	28.4551	71.30	59.04	1190.8	84.17	27.85	2185.8	1.586	29433
71.0	3446.317	-80.5737	28.4557	71.33	58.41	1223.9	83.99	28.00	2220.6	1.689	30465
72.0	3446.490	-80.5718	28.4562	71.36	57.79	1257.8	83.82	28.14	2256.2	1.797	31519
73.0	3446.667	-80.5698	28.4568	71.38	57.17	1292.4	83.64	28.27	2292.6	1.910	32595
74.0	3446.847	-80.5676	28.4574	71.38	56.56	1327.7	83.45	28.39	2329.8	2.027	33693
75.0	3447.032	-80.5654	28.4581	71.37	55.95	1363.8	83.27	28.51	2367.8	2.150	34812
76.0	3447.219	-80.5631	28.4588	71.35	55.35	1400.7	83.08	28.61	2406.6	2.278	35954
77.0	3447.411	-80.5607	28.4595	71.33	54.77	1438.4	82.89	28.71	2446.2	2.412	37118
78.0	3447.606	-80.5582	28.4602	71.29	54.19	1476.9	82.69	28.79	2486.6	2.551	38305
79.0	3447.805	-80.5556	28.4610	71.26	53.62	1516.2	82.50	28.88	2527.9	2.696	39515
80.0	3448.008	-80.5529	28.4618	71.23	53.06	1556.3	82.31	28.95	2569.9	2.846	40749
81.0	3448.215	-80.5501	28.4627	71.21	52.51	1597.3	82.12	29.02	2612.9	3.003	42005
MAXIMUM DYNAMIC PRESSURE											
81.100	3448.236	-80.5498	28.4627	71.20	52.46	1601.4	82.10	29.02	2617.3	3.019	42133
82.0	3448.425	-80.5472	28.4635	71.19	51.96	1639.1	81.94	29.07	2656.9	3.166	43285
83.0	3448.640	-80.5442	28.4644	71.17	51.41	1681.8	81.76	29.11	2701.9	3.335	44589
84.0	3448.858	-80.5410	28.4654	71.17	50.86	1725.4	81.58	29.14	2747.9	3.510	45916
85.0	3449.080	-80.5378	28.4664	71.17	50.30	1769.9	81.40	29.16	2795.1	3.693	47267
86.0	3449.306	-80.5344	28.4674	71.17	49.74	1815.4	81.23	29.16	2843.3	3.882	48642
87.0	3449.536	-80.5309	28.4684	71.18	49.18	1861.8	81.06	29.15	2892.6	4.078	50040
88.0	3449.770	-80.5272	28.4695	71.19	48.61	1909.1	80.89	29.12	2943.0	4.281	51462
89.0	3450.008	-80.5234	28.4707	71.21	48.05	1957.3	80.73	29.09	2994.3	4.492	52907
90.0	3450.249	-80.5195	28.4718	71.23	47.49	2006.5	80.57	29.05	3046.6	4.711	54376
91.0	3450.494	-80.5155	28.4730	71.25	46.94	2056.6	80.42	29.00	3099.9	4.938	55868
92.0	3450.744	-80.5112	28.4743	71.27	46.40	2107.7	80.27	28.94	3154.1	5.172	57384

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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	3450.997	-80.5069	28.4756	71.30	45.87	2159.7	80.12	28.88	3209.3	5.415	58923
94.0	3451.254	-80.5024	28.4769	71.32	45.35	2212.6	79.98	28.82	3265.3	5.666	60487
95.0	3451.515	-80.4977	28.4783	71.35	44.84	2266.4	79.84	28.75	3322.3	5.925	62074
96.0	3451.780	-80.4929	28.4797	71.38	44.33	2321.2	79.70	28.68	3380.2	6.193	63686
97.0	3452.049	-80.4880	28.4812	71.41	43.84	2377.0	79.57	28.60	3439.1	6.470	65322
98.0	3452.322	-80.4828	28.4827	71.44	43.35	2433.8	79.44	28.52	3499.0	6.756	66982
99.0	3452.599	-80.4775	28.4843	71.47	42.86	2491.6	79.32	28.43	3559.8	7.051	68666
100.0	3452.880	-80.4721	28.4859	71.50	42.38	2550.3	79.19	28.34	3621.7	7.355	70374
101.0	3453.165	-80.4664	28.4876	71.52	41.91	2610.1	79.07	28.24	3684.5	7.669	72108
102.0	3453.454	-80.4606	28.4893	71.55	41.45	2670.9	78.95	28.14	3748.3	7.992	73865
103.0	3453.747	-80.4546	28.4910	71.58	40.99	2732.7	78.83	28.04	3813.2	8.326	75647
104.0	3454.044	-80.4485	28.4928	71.61	40.54	2795.5	78.72	27.93	3879.0	8.669	77454
105.0	3454.345	-80.4421	28.4947	71.63	40.10	2859.3	78.61	27.82	3945.8	9.022	79285
106.0	3454.650	-80.4356	28.4966	71.66	39.66	2924.1	78.50	27.71	4013.6	9.386	81141
107.0	3454.959	-80.4288	28.4985	71.69	39.23	2990.0	78.40	27.60	4082.4	9.760	83022
108.0	3455.272	-80.4219	28.5006	71.71	38.81	3056.8	78.29	27.48	4152.1	10.145	84927
109.0	3455.590	-80.4148	28.5026	71.73	38.40	3124.8	78.19	27.36	4222.8	10.541	86858
110.0	3455.911	-80.4075	28.5047	71.75	37.99	3193.8	78.09	27.25	4294.6	10.948	88814
111.0	3456.237	-80.3999	28.5069	71.77	37.60	3263.9	77.99	27.13	4367.4	11.366	90794
112.0	3456.567	-80.3922	28.5092	71.78	37.21	3335.0	77.89	27.00	4441.3	11.796	92801
113.0	3456.901	-80.3843	28.5115	71.80	36.82	3407.3	77.79	26.88	4516.2	12.237	94832
114.0	3457.239	-80.3761	28.5138	71.82	36.44	3480.7	77.70	26.76	4592.2	12.690	96890
115.0	3457.581	-80.3677	28.5162	71.83	36.07	3555.2	77.61	26.63	4669.3	13.154	98972
116.0	3457.928	-80.3592	28.5187	71.85	35.71	3630.9	77.52	26.51	4747.5	13.631	101081
117.0	3458.279	-80.3504	28.5212	71.87	35.35	3707.6	77.43	26.38	4826.8	14.120	103216
118.0	3458.634	-80.3413	28.5238	71.89	34.99	3785.6	77.35	26.26	4907.3	14.622	105376
119.0	3458.993	-80.3321	28.5265	71.91	34.64	3864.7	77.27	26.13	4988.8	15.136	107563
120.0	3459.357	-80.3226	28.5292	71.93	34.30	3945.0	77.19	26.00	5071.6	15.663	109776
121.0	3459.725	-80.3128	28.5320	71.94	33.95	4026.6	77.11	25.86	5155.6	16.203	112014
122.0	3460.097	-80.3029	28.5349	71.96	33.61	4109.4	77.03	25.73	5240.9	16.757	114279
123.0	3460.474	-80.2926	28.5378	71.97	33.28	4193.6	76.95	25.59	5327.5	17.324	116570
124.0	3460.855	-80.2822	28.5408	71.99	32.94	4279.0	76.87	25.45	5415.3	17.904	118887
125.0	3461.240	-80.2715	28.5438	72.00	32.61	4365.8	76.80	25.31	5504.4	18.499	121230
126.0	3461.629	-80.2605	28.5470	72.02	32.29	4453.9	76.73	25.17	5594.8	19.108	123600
127.0	3462.023	-80.2492	28.5502	72.03	31.98	4543.3	76.66	25.03	5686.5	19.731	125996
128.0	3462.421	-80.2377	28.5534	72.04	31.67	4634.2	76.59	24.89	5779.6	20.369	128418
129.0	3462.824	-80.2260	28.5568	72.05	31.35	4725.6	76.52	24.75	5873.3	21.021	130868
130.0	3463.231	-80.2139	28.5602	72.07	31.06	4819.3	76.45	24.62	5969.1	21.689	133345
131.0	3463.642	-80.2016	28.5637	72.08	30.77	4914.5	76.39	24.49	6066.3	22.372	135850
132.0	3464.059	-80.1890	28.5673	72.09	30.49	5011.1	76.32	24.35	6164.9	23.070	138383
133.0	3464.480	-80.1762	28.5709	72.09	30.21	5109.3	76.26	24.23	6265.0	23.784	140945
134.0	3464.905	-80.1630	28.5747	72.10	29.94	5208.9	76.19	24.10	6366.5	24.514	143535
135.0	3465.336	-80.1495	28.5785	72.11	29.67	5310.0	76.13	23.97	6469.5	25.259	146154

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
135.240	3465.440	-80.1463	28.5794	72.11	29.61	5334.5	76.11	23.94	6494.4	25.441	146788
136.0	3465.770	-80.1358	28.5824	72.12	29.41	5401.5	76.07	23.84	6562.9	26.020	148798
137.0	3466.208	-80.1218	28.5863	72.13	29.15	5480.1	76.03	23.69	6643.5	26.795	151462
138.0	3466.650	-80.1076	28.5904	72.14	28.90	5559.7	75.99	23.55	6725.0	27.585	154150
139.0	3467.093	-80.0931	28.5945	72.15	28.65	5640.4	75.94	23.41	6807.6	28.386	156850
140.0	3467.540	-80.0784	28.5986	72.16	28.41	5722.1	75.90	23.27	6891.1	29.201	159566
141.0	3467.989	-80.0634	28.6028	72.17	28.17	5804.9	75.87	23.13	6975.8	30.030	162302
142.0	3468.442	-80.0482	28.6071	72.19	27.93	5888.9	75.83	22.99	7061.7	30.873	165056
143.0	3468.897	-80.0327	28.6115	72.20	27.69	5974.1	75.79	22.85	7148.6	31.730	167828
144.0	3469.356	-80.0170	28.6159	72.22	27.46	6061.2	75.76	22.72	7237.5	32.601	170619
145.0	3469.817	-80.0010	28.6204	72.23	27.23	6148.9	75.72	22.58	7326.9	33.486	173428
146.0	3470.282	-79.9848	28.6250	72.25	27.01	6237.7	75.69	22.45	7417.4	34.385	176256
147.0	3470.750	-79.9683	28.6296	72.26	26.78	6327.9	75.66	22.32	7509.3	35.300	179103
148.0	3471.221	-79.9515	28.6344	72.28	26.57	6419.6	75.62	22.19	7602.6	36.229	181970
149.0	3471.695	-79.9344	28.6391	72.29	26.35	6512.3	75.59	22.06	7696.9	37.174	184856
150.0	3472.172	-79.9171	28.6440	72.30	26.14	6606.3	75.56	21.93	7792.5	38.133	187761
151.0	3472.653	-79.8994	28.6489	72.32	25.93	6701.7	75.53	21.80	7889.5	39.108	190687
152.0	3473.137	-79.8815	28.6539	72.33	25.72	6798.5	75.50	21.68	7987.8	40.099	193633
153.0	3473.624	-79.8633	28.6590	72.35	25.52	6896.8	75.47	21.55	8087.6	41.106	196599
154.0	3474.115	-79.8448	28.6642	72.36	25.32	6996.5	75.44	21.43	8188.8	42.129	199586
155.0	3474.609	-79.8260	28.6694	72.37	25.11	7097.3	75.41	21.30	8291.1	43.168	202594
156.0	3475.107	-79.8069	28.6747	72.39	24.92	7200.0	75.38	21.18	8395.3	44.224	205623
157.0	3475.608	-79.7875	28.6801	72.40	24.73	7304.4	75.35	21.06	8501.1	45.296	208674
158.0	3476.113	-79.7678	28.6856	72.42	24.54	7410.4	75.33	20.95	8608.5	46.386	211747
159.0	3476.621	-79.7478	28.6912	72.43	24.35	7518.1	75.30	20.83	8717.5	47.493	214842
160.0	3477.133	-79.7274	28.6968	72.45	24.16	7627.4	75.28	20.71	8828.1	48.617	217959
161.0	3477.649	-79.7068	28.7026	72.46	23.98	7738.3	75.25	20.60	8940.4	49.760	221101
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
161.740	3478.033	-79.6913	28.7069	72.47	23.85	7821.4	75.23	20.51	9024.5	50.616	223439
162.0	3478.169	-79.6858	28.7084	72.47	23.80	7846.8	75.23	20.48	9050.3	50.919	224263
S-IC/S-II SEPARATION COMMAND											
162.400	3478.377	-79.6773	28.7107	72.48	23.74	7850.3	75.23	20.43	9054.2	51.388	225534
164.0	3479.205	-79.6434	28.7201	72.50	23.45	7833.9	75.25	20.17	9040.5	53.261	230569
166.0	3480.226	-79.6008	28.7319	72.53	23.09	7821.8	75.27	19.86	9031.6	55.610	236789
168.0	3481.228	-79.5584	28.7436	72.56	22.73	7835.3	75.28	19.55	9048.1	57.954	242888
170.0	3482.219	-79.5157	28.7553	72.59	22.37	7857.0	75.29	19.24	9072.9	60.312	248920

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
172.0	3483.197	-79.4727	28.7671	72.62	22.02	7883.7	75.31	18.95	9102.4	62.683	254879
174.0	3484.165	-79.4295	28.7790	72.64	21.67	7912.0	75.32	18.66	9133.6	65.066	260767
176.0	3485.121	-79.3860	28.7909	72.67	21.33	7940.4	75.33	18.37	9164.7	67.464	266590
178.0	3486.066	-79.3423	28.8028	72.70	20.99	7969.6	75.34	18.08	9196.7	69.875	272344
180.0	3487.000	-79.2983	28.8148	72.73	20.65	7999.4	75.35	17.80	9229.0	72.299	278032
182.0	3487.923	-79.2540	28.8269	72.76	20.32	8029.7	75.37	17.52	9262.0	74.738	283653
184.0	3488.835	-79.2095	28.8390	72.79	19.99	8060.7	75.38	17.24	9295.4	77.190	289209
186.0	3489.737	-79.1647	28.8511	72.82	19.66	8092.2	75.39	16.97	9329.4	79.656	294699
188.0	3490.628	-79.1197	28.8633	72.85	19.34	8124.2	75.40	16.70	9363.8	82.137	300125
190.0	3491.508	-79.0743	28.8755	72.88	19.02	8156.9	75.42	16.43	9398.8	84.631	305487
192.0	3492.378	-79.0287	28.8878	72.91	18.71	8190.1	75.43	16.17	9434.3	87.140	310785
194.0	3493.237	-78.9829	28.9001	72.94	18.40	8223.9	75.44	15.91	9470.3	89.664	316020
196.0	3494.087	-78.9367	28.9125	72.97	18.09	8258.4	75.46	15.65	9506.9	92.201	321193
198.0	3494.926	-78.8903	28.9250	73.00	17.79	8293.3	75.47	15.39	9543.9	94.753	326304
200.0	3495.754	-78.8436	28.9374	73.04	17.49	8328.8	75.49	15.14	9581.5	97.320	331353
202.0	3496.573	-78.7966	28.9500	73.07	17.19	8364.9	75.50	14.89	9619.6	99.901	336341
204.0	3497.382	-78.7494	28.9625	73.10	16.90	8401.6	75.52	14.65	9658.2	102.497	341269
206.0	3498.181	-78.7018	28.9752	73.13	16.61	8438.8	75.53	14.41	9697.3	105.108	346138
208.0	3498.971	-78.6540	28.9878	73.16	16.34	8476.4	75.55	14.17	9736.8	107.734	350948
210.0	3499.751	-78.6059	29.0006	73.19	16.07	8514.5	75.56	13.95	9776.6	110.375	355702
212.0	3500.522	-78.5575	29.0133	73.23	15.80	8553.0	75.58	13.72	9816.8	113.030	360401
214.0	3501.284	-78.5088	29.0262	73.26	15.54	8592.0	75.60	13.50	9857.4	115.701	365045
216.0	3502.037	-78.4598	29.0390	73.29	15.28	8631.5	75.61	13.28	9898.5	118.386	369634
218.0	3502.781	-78.4105	29.0519	73.33	15.02	8671.5	75.63	13.06	9940.1	121.087	374168
220.0	3503.516	-78.3610	29.0649	73.36	14.76	8712.0	75.65	12.85	9982.2	123.803	378648
222.0	3504.243	-78.3111	29.0779	73.39	14.51	8753.0	75.67	12.63	10024.7	126.534	383075
224.0	3504.960	-78.2610	29.0910	73.43	14.26	8794.5	75.68	12.42	10067.7	129.281	387447
226.0	3505.668	-78.2105	29.1041	73.46	14.01	8836.5	75.70	12.21	10111.1	132.043	391765
228.0	3506.368	-78.1598	29.1172	73.50	13.76	8878.9	75.72	12.00	10154.9	134.821	396030
230.0	3507.059	-78.1087	29.1304	73.53	13.52	8921.8	75.74	11.80	10199.2	137.615	400241
232.0	3507.741	-78.0573	29.1437	73.56	13.28	8965.2	75.76	11.59	10243.9	140.425	404399
234.0	3508.414	-78.0057	29.1570	73.60	13.04	9009.1	75.78	11.39	10289.1	143.250	408505
236.0	3509.079	-77.9537	29.1703	73.63	12.80	9053.4	75.80	11.19	10334.7	146.092	412557
238.0	3509.735	-77.9014	29.1837	73.67	12.57	9098.2	75.82	11.00	10380.8	148.949	416558
240.0	3510.383	-77.8488	29.1972	73.70	12.34	9143.5	75.84	10.80	10427.3	151.823	420506
242.0	3511.022	-77.7959	29.2107	73.74	12.11	9189.3	75.86	10.61	10474.3	154.714	424403
244.0	3511.652	-77.7426	29.2242	73.78	11.89	9235.6	75.88	10.42	10521.7	157.620	428248
246.0	3512.274	-77.6891	29.2378	73.81	11.67	9282.3	75.90	10.23	10569.6	160.544	432042
248.0	3512.888	-77.6352	29.2514	73.85	11.45	9329.6	75.92	10.04	10617.9	163.484	435785
250.0	3513.493	-77.5810	29.2651	73.88	11.23	9377.3	75.94	9.86	10666.7	166.440	439478
252.0	3514.090	-77.5264	29.2788	73.92	11.02	9425.5	75.96	9.68	10715.9	169.414	443120
254.0	3514.679	-77.4716	29.2926	73.96	10.81	9474.1	75.98	9.50	10765.5	172.405	446712
256.0	3515.260	-77.4164	29.3064	73.99	10.60	9523.2	76.00	9.32	10815.6	175.412	450254

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
258.0	3515.832	-77.3609	29.3203	74.03	10.39	9572.8	76.02	9.14	10866.2	178.437	453746
260.0	3516.396	-77.3050	29.3342	74.07	10.19	9622.9	76.05	8.97	10917.2	181.479	457190
262.0	3516.952	-77.2488	29.3482	74.10	9.99	9673.5	76.07	8.80	10968.7	184.539	460584
264.0	3517.501	-77.1923	29.3622	74.14	9.79	9724.5	76.09	8.63	11020.6	187.615	463929
266.0	3518.041	-77.1354	29.3763	74.18	9.59	9776.0	76.11	8.46	11072.9	190.710	467227
268.0	3518.573	-77.0782	29.3904	74.21	9.40	9828.1	76.14	8.29	11125.8	193.822	470476
270.0	3519.098	-77.0206	29.4045	74.25	9.21	9880.6	76.16	8.13	11179.2	196.953	473677
272.0	3519.614	-76.9627	29.4188	74.29	9.02	9933.7	76.18	7.97	11233.0	200.101	476830
274.0	3520.123	-76.9044	29.4330	74.33	8.83	9987.2	76.21	7.81	11287.3	203.267	479937
276.0	3520.624	-76.8458	29.4473	74.36	8.65	10041.2	76.23	7.65	11342.1	206.452	482996
278.0	3521.117	-76.7868	29.4617	74.40	8.47	10095.7	76.25	7.50	11397.2	209.655	486009
280.0	3521.603	-76.7274	29.4761	74.44	8.29	10150.6	76.28	7.35	11452.9	212.876	488976
282.0	3522.081	-76.6677	29.4905	74.48	8.12	10206.0	76.30	7.19	11509.0	216.116	491897
284.0	3522.552	-76.6077	29.5051	74.52	7.94	10261.9	76.33	7.04	11565.5	219.374	494771
286.0	3523.015	-76.5472	29.5196	74.56	7.77	10318.2	76.35	6.89	11622.5	222.652	497599
288.0	3523.470	-76.4864	29.5342	74.59	7.60	10375.1	76.38	6.75	11679.9	225.948	500382
290.0	3523.918	-76.4252	29.5488	74.63	7.44	10432.4	76.40	6.61	11737.9	229.264	503121
292.0	3524.359	-76.3637	29.5635	74.67	7.27	10490.2	76.43	6.46	11796.2	232.598	505814
294.0	3524.793	-76.3018	29.5783	74.71	7.11	10548.4	76.45	6.32	11855.0	235.952	508463
296.0	3525.219	-76.2394	29.5931	74.75	6.95	10607.1	76.48	6.19	11914.3	239.325	511068
298.0	3525.638	-76.1768	29.6079	74.79	6.79	10666.4	76.51	6.05	11974.0	242.718	513630
300.0	3526.050	-76.1137	29.6228	74.83	6.64	10726.0	76.53	5.92	12034.2	246.130	516148
302.0	3526.454	-76.0502	29.6377	74.87	6.49	10786.2	76.56	5.78	12094.9	249.563	518622
304.0	3526.852	-75.9864	29.6527	74.91	6.34	10846.9	76.59	5.65	12156.1	253.015	521054
306.0	3527.242	-75.9221	29.6677	74.95	6.19	10908.0	76.61	5.52	12217.7	256.487	523443
308.0	3527.626	-75.8575	29.6828	74.99	6.04	10969.7	76.64	5.40	12279.8	259.979	525790
310.0	3528.003	-75.7924	29.6980	75.03	5.90	11031.8	76.67	5.27	12342.4	263.492	528096
312.0	3528.373	-75.7270	29.7131	75.08	5.76	11094.5	76.70	5.15	12405.5	267.025	530360
314.0	3528.736	-75.6612	29.7283	75.12	5.62	11157.6	76.73	5.03	12469.0	270.579	532583
316.0	3529.093	-75.5949	29.7436	75.16	5.49	11221.3	76.75	4.91	12533.1	274.153	534765
318.0	3529.443	-75.5282	29.7589	75.20	5.35	11285.4	76.78	4.79	12597.6	277.749	536907
320.0	3529.786	-75.4612	29.7743	75.24	5.22	11350.1	76.81	4.68	12662.7	281.365	539010
322.0	3530.123	-75.3937	29.7897	75.28	5.09	11415.4	76.84	4.57	12728.3	285.003	541072
324.0	3530.453	-75.3258	29.8051	75.33	4.96	11481.1	76.87	4.45	12794.4	288.661	543095
326.0	3530.777	-75.2574	29.8206	75.37	4.84	11547.4	76.90	4.34	12861.0	292.342	545079
328.0	3531.094	-75.1887	29.8362	75.41	4.72	11614.1	76.93	4.24	12928.1	296.043	547024
330.0	3531.405	-75.1195	29.8518	75.46	4.60	11681.4	76.96	4.13	12995.7	299.767	548931
332.0	3531.710	-75.0499	29.8674	75.50	4.48	11749.2	76.99	4.03	13063.8	303.513	550801
334.0	3532.009	-74.9798	29.8831	75.54	4.36	11817.6	77.02	3.92	13132.5	307.280	552633
336.0	3532.302	-74.9094	29.8988	75.59	4.24	11886.5	77.06	3.82	13201.6	311.070	554427
338.0	3532.588	-74.8384	29.9146	75.63	4.13	11955.9	77.09	3.72	13271.4	314.882	556184
340.0	3532.868	-74.7671	29.9304	75.67	4.02	12025.9	77.12	3.62	13341.6	318.717	557904
342.0	3533.143	-74.6952	29.9463	75.72	3.91	12096.5	77.15	3.53	13412.4	322.574	559588

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
344.0	3533.411	-74.6230	29.9622	75.76	3.80	12167.6	77.18	3.43	13483.8	326.454	561237
346.0	3533.674	-74.5502	29.9782	75.81	3.70	12239.2	77.22	3.34	13555.7	330.357	562850
348.0	3533.931	-74.4770	29.9942	75.85	3.59	12311.5	77.25	3.25	13628.1	334.284	564428
350.0	3534.182	-74.4034	30.0102	75.90	3.49	12384.2	77.28	3.16	13701.1	338.233	565971
352.0	3534.427	-74.3293	30.0263	75.94	3.39	12457.6	77.32	3.07	13774.7	342.207	567480
354.0	3534.667	-74.2547	30.0425	75.99	3.30	12531.4	77.35	2.98	13848.8	346.203	568954
356.0	3534.902	-74.1796	30.0586	76.04	3.20	12605.9	77.38	2.90	13923.4	350.224	570395
358.0	3535.131	-74.1041	30.0749	76.08	3.11	12680.8	77.42	2.81	13998.6	354.269	571804
360.0	3535.354	-74.0281	30.0911	76.13	3.01	12756.4	77.45	2.73	14074.3	358.338	573179
362.0	3535.572	-73.9516	30.1075	76.18	2.92	12832.6	77.49	2.65	14150.7	362.431	574522
364.0	3535.785	-73.8746	30.1238	76.22	2.84	12909.4	77.52	2.57	14227.6	366.549	575833
366.0	3535.993	-73.7972	30.1402	76.27	2.75	12986.7	77.56	2.50	14305.1	370.691	577112
368.0	3536.195	-73.7192	30.1567	76.32	2.67	13064.6	77.60	2.42	14383.2	374.859	578360
370.0	3536.393	-73.6407	30.1731	76.37	2.58	13143.0	77.63	2.35	14461.8	379.051	579578
372.0	3536.585	-73.5618	30.1897	76.41	2.50	13222.2	77.67	2.27	14541.1	383.269	580765
374.0	3536.773	-73.4823	30.2062	76.46	2.42	13302.0	77.71	2.20	14621.0	387.512	581922
376.0	3536.955	-73.4023	30.2228	76.51	2.35	13382.3	77.74	2.14	14701.5	391.781	583050
378.0	3537.133	-73.3218	30.2395	76.56	2.27	13463.2	77.78	2.07	14782.5	396.075	584149
380.0	3537.307	-73.2408	30.2562	76.61	2.20	13544.8	77.82	2.00	14864.2	400.396	585219
382.0	3537.475	-73.1593	30.2729	76.66	2.12	13627.0	77.86	1.94	14946.5	404.743	586262
384.0	3537.639	-73.0772	30.2897	76.71	2.05	13710.0	77.89	1.87	15029.6	409.116	587276
386.0	3537.799	-72.9947	30.3065	76.76	1.99	13793.6	77.93	1.81	15113.3	413.516	588264
388.0	3537.954	-72.9115	30.3234	76.81	1.92	13877.8	77.97	1.75	15197.7	417.942	589224
390.0	3538.105	-72.8279	30.3403	76.86	1.85	13962.6	78.01	1.69	15282.6	422.396	590158
392.0	3538.251	-72.7437	30.3572	76.91	1.79	14048.1	78.05	1.64	15368.2	426.877	591067
394.0	3538.394	-72.6589	30.3742	76.96	1.73	14134.3	78.09	1.58	15454.4	431.385	591951
396.0	3538.532	-72.5736	30.3912	77.01	1.67	14221.2	78.13	1.53	15541.4	435.921	592810
398.0	3538.666	-72.4877	30.4082	77.06	1.61	14308.7	78.17	1.47	15629.1	440.485	593644
400.0	3538.797	-72.4013	30.4253	77.11	1.55	14396.9	78.21	1.42	15717.4	445.077	594453
402.0	3538.923	-72.3143	30.4424	77.16	1.50	14485.9	78.25	1.37	15806.4	449.697	595239
404.0	3539.045	-72.2268	30.4596	77.22	1.44	14575.5	78.29	1.32	15896.1	454.346	596002
406.0	3539.164	-72.1386	30.4768	77.27	1.39	14665.9	78.34	1.27	15986.5	459.023	596743
408.0	3539.279	-72.0499	30.4940	77.32	1.34	14757.0	78.38	1.23	16077.7	463.729	597461
410.0	3539.391	-71.9606	30.5113	77.37	1.29	14848.8	78.42	1.18	16169.6	468.465	598158
412.0	3539.499	-71.8707	30.5286	77.43	1.24	14941.3	78.46	1.14	16262.2	473.230	598834
414.0	3539.604	-71.7802	30.5460	77.48	1.20	15034.6	78.51	1.10	16355.5	478.025	599490
416.0	3539.706	-71.6892	30.5633	77.54	1.15	15128.7	78.55	1.06	16449.6	482.849	600126
418.0	3539.804	-71.5975	30.5807	77.59	1.11	15223.5	78.60	1.02	16544.6	487.704	600743
420.0	3539.900	-71.5052	30.5982	77.65	1.07	15319.2	78.64	0.98	16640.3	492.589	601341
422.0	3539.992	-71.4123	30.6157	77.70	1.03	15415.6	78.68	0.94	16736.8	497.505	601921
424.0	3540.081	-71.3187	30.6332	77.76	0.99	15512.8	78.73	0.91	16834.0	502.452	602483
426.0	3540.168	-71.2246	30.6507	77.81	0.95	15610.8	78.78	0.88	16932.0	507.429	603028
428.0	3540.252	-71.1298	30.6683	77.87	0.91	15709.6	78.82	0.84	17030.9	512.439	603556

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
430.0	3540.333	-71.0343	30.6859	77.92	0.88	15809.2	78.87	0.81	17130.5	517.479	604069
432.0	3540.412	-70.9383	30.7035	77.98	0.85	15909.7	78.91	0.78	17231.1	522.552	604566
434.0	3540.488	-70.8415	30.7212	78.04	0.82	16011.1	78.96	0.75	17332.5	527.657	605049
436.0	3540.562	-70.7442	30.7389	78.10	0.79	16113.4	79.01	0.73	17434.8	532.795	605517
438.0	3540.634	-70.6461	30.7566	78.15	0.76	16216.3	79.06	0.70	17537.8	537.965	605972
440.0	3540.704	-70.5474	30.7743	78.21	0.73	16320.1	79.11	0.68	17641.6	543.168	606418
442.0	3540.773	-70.4481	30.7921	78.27	0.71	16424.8	79.15	0.65	17746.4	548.404	606858
444.0	3540.840	-70.3480	30.8099	78.33	0.68	16530.7	79.20	0.63	17852.3	553.674	607286
446.0	3540.905	-70.2473	30.8277	78.39	0.66	16637.6	79.25	0.61	17959.2	558.978	607697
448.0	3540.966	-70.1459	30.8456	78.45	0.64	16745.4	79.30	0.59	18067.0	564.317	608089
450.0	3541.026	-70.0438	30.8634	78.51	0.62	16853.9	79.35	0.57	18175.6	569.690	608469
452.0	3541.084	-69.9409	30.8813	78.57	0.60	16963.3	79.40	0.56	18285.0	575.097	608844
454.0	3541.142	-69.8374	30.8992	78.63	0.58	17073.4	79.46	0.54	18395.1	580.540	609217
456.0	3541.199	-69.7332	30.9172	78.69	0.57	17184.8	79.51	0.53	18506.5	586.018	609582
458.0	3541.255	-69.6282	30.9351	78.75	0.55	17297.2	79.56	0.52	18619.0	591.532	609941
460.0	3541.310	-69.5225	30.9531	78.81	0.54	17410.7	79.61	0.50	18732.5	597.082	610294
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
460.750	3541.330	-69.4827	30.9599	78.84	0.54	17453.5	79.63	0.50	18775.3	599.172	610425
462.0	3541.364	-69.4161	30.9711	78.88	0.52	17513.8	79.67	0.49	18835.7	602.667	610641
464.0	3541.415	-69.3091	30.9891	78.94	0.50	17606.2	79.72	0.46	18928.1	608.281	610973
466.0	3541.464	-69.2014	31.0071	79.00	0.47	17699.1	79.77	0.44	19021.0	613.927	611291
468.0	3541.512	-69.0932	31.0251	79.06	0.45	17792.5	79.82	0.42	19114.5	619.601	611597
470.0	3541.557	-68.9843	31.0431	79.12	0.44	17886.1	79.88	0.41	19208.0	625.306	611892
472.0	3541.601	-68.8749	31.0610	79.18	0.43	17980.0	79.93	0.41	19301.9	631.040	612178
474.0	3541.643	-68.7648	31.0790	79.25	0.43	18074.3	79.99	0.40	19396.3	636.805	612455
476.0	3541.685	-68.6540	31.0969	79.31	0.43	18169.2	80.04	0.40	19491.1	642.600	612726
478.0	3541.726	-68.5427	31.1149	79.37	0.43	18264.1	80.10	0.40	19586.0	648.426	613000
480.0	3541.770	-68.4307	31.1328	79.44	0.44	18360.1	80.16	0.41	19682.1	654.281	613284
482.0	3541.816	-68.3181	31.1507	79.50	0.44	18456.8	80.21	0.41	19778.8	660.168	613581
484.0	3541.863	-68.2049	31.1686	79.57	0.45	18554.3	80.27	0.42	19876.3	666.085	613890
486.0	3541.913	-68.0910	31.1865	79.63	0.45	18652.6	80.33	0.42	19974.7	672.033	614208
488.0	3541.964	-67.9765	31.2044	79.70	0.46	18751.8	80.38	0.43	20073.9	678.013	614539
490.0	3542.017	-67.8613	31.2222	79.76	0.47	18851.0	80.44	0.44	20173.1	684.024	614882
492.0	3542.071	-67.7456	31.2400	79.83	0.47	18939.1	80.50	0.44	20261.2	690.064	615230
494.0	3542.124	-67.6292	31.2578	79.90	0.46	19018.2	80.56	0.43	20340.4	696.131	615571
496.0	3542.175	-67.5124	31.2755	79.97	0.45	19096.5	80.62	0.42	20418.7	702.224	615900
498.0	3542.224	-67.3950	31.2932	80.04	0.44	19175.1	80.69	0.41	20497.3	708.342	616218
500.0	3542.272	-67.2770	31.3109	80.11	0.43	19254.2	80.75	0.40	20576.5	714.485	616528
502.0	3542.319	-67.1586	31.3284	80.18	0.42	19333.7	80.81	0.39	20656.0	720.653	616834
504.0	3542.366	-67.0396	31.3460	80.25	0.41	19413.8	80.87	0.39	20736.0	726.847	617135
506.0	3542.411	-66.9200	31.3635	80.32	0.41	19494.2	80.94	0.38	20816.5	733.067	617432

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
508.0	3542.457	-66.7999	31.3809	80.39	0.40	19575.0	81.00	0.38	20897.3	739.312	617726
510.0	3542.502	-66.6793	31.3983	80.46	0.40	19656.1	81.06	0.37	20978.5	745.582	618019
512.0	3542.547	-66.5581	31.4156	80.53	0.40	19737.8	81.13	0.37	21060.2	751.879	618311
514.0	3542.592	-66.4364	31.4328	80.60	0.40	19820.1	81.19	0.37	21142.5	758.202	618604
516.0	3542.637	-66.3141	31.4500	80.67	0.39	19902.9	81.26	0.37	21225.4	764.551	618896
518.0	3542.682	-66.1913	31.4672	80.74	0.39	19986.3	81.32	0.37	21308.8	770.927	619188
520.0	3542.727	-66.0679	31.4843	80.82	0.39	20070.2	81.39	0.37	21392.7	777.329	619481
522.0	3542.772	-65.9440	31.5013	80.89	0.39	20154.7	81.46	0.37	21477.2	783.759	619774
524.0	3542.817	-65.8194	31.5182	80.96	0.39	20239.7	81.52	0.37	21562.3	790.215	620068
526.0	3542.863	-65.6943	31.5351	81.04	0.39	20325.4	81.59	0.37	21648.0	796.698	620363
528.0	3542.909	-65.5686	31.5520	81.11	0.39	20411.6	81.66	0.37	21734.2	803.209	620661
530.0	3542.955	-65.4424	31.5687	81.19	0.40	20498.4	81.72	0.37	21821.0	809.747	620961
532.0	3543.002	-65.3155	31.5854	81.26	0.40	20585.8	81.79	0.37	21908.4	816.313	621263
534.0	3543.049	-65.1881	31.6020	81.33	0.40	20673.8	81.86	0.38	21996.5	822.907	621569
536.0	3543.097	-65.0601	31.6186	81.41	0.41	20762.4	81.93	0.38	22085.1	829.529	621879
538.0	3543.146	-64.9315	31.6350	81.49	0.41	20851.5	82.00	0.39	22174.3	836.180	622193
540.0	3543.196	-64.8023	31.6514	81.56	0.42	20941.2	82.07	0.39	22264.0	842.859	622511
542.0	3543.246	-64.6724	31.6677	81.64	0.42	21031.5	82.14	0.40	22354.3	849.566	622836
544.0	3543.297	-64.5420	31.6840	81.71	0.43	21122.4	82.21	0.40	22445.2	856.302	623167
546.0	3543.350	-64.4110	31.7001	81.79	0.44	21213.8	82.28	0.41	22536.7	863.068	623504
548.0	3543.404	-64.2793	31.7162	81.87	0.45	21306.1	82.35	0.42	22628.9	869.862	623850
550.0	3543.459	-64.1470	31.7322	81.95	0.46	21399.1	82.42	0.43	22721.9	876.686	624203
552.0	3543.517	-64.0141	31.7481	82.02	0.47	21492.8	82.49	0.44	22815.7	883.543	624570
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
552.340	3543.527	-63.9914	31.7508	82.04	0.47	21508.8	82.50	0.44	22831.7	884.711	624632
S-II/S-IVB SEPARATION COMMAND											
553.200	3543.551	-63.9341	31.7576	82.07	0.46	21517.8	82.53	0.43	22840.7	887.667	624790
554.0	3543.575	-63.8807	31.7640	82.10	0.45	21518.0	82.56	0.42	22841.0	890.420	624938
556.0	3543.627	-63.7473	31.7796	82.18	0.41	21518.9	82.64	0.39	22841.9	897.294	625272
558.0	3543.676	-63.6138	31.7951	82.26	0.38	21524.1	82.71	0.36	22847.2	904.172	625591
560.0	3543.723	-63.4801	31.8105	82.34	0.37	21554.9	82.79	0.35	22877.9	911.056	625890
562.0	3543.767	-63.3462	31.8257	82.42	0.35	21588.8	82.86	0.33	22911.9	917.949	626178
564.0	3543.810	-63.2120	31.8408	82.50	0.34	21623.5	82.93	0.32	22946.7	924.854	626456
566.0	3543.852	-63.0776	31.8557	82.58	0.32	21658.8	83.01	0.30	22981.9	931.770	626722
568.0	3543.890	-62.9429	31.8706	82.66	0.30	21695.2	83.08	0.29	23018.4	938.697	626975
570.0	3543.927	-62.8080	31.8852	82.74	0.28	21731.5	83.15	0.27	23054.7	945.636	627213
572.0	3543.961	-62.6727	31.8998	82.81	0.27	21768.1	83.23	0.25	23091.3	952.586	627438
574.0	3543.994	-62.5372	31.9142	82.89	0.25	21805.0	83.30	0.23	23128.2	959.547	627650
576.0	3544.024	-62.4014	31.9285	82.98	0.23	21842.0	83.38	0.22	23165.2	966.521	627849

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
578.0	3544.052	-62.2654	31.9427	83.06	0.21	21879.1	83.45	0.20	23202.4	973.506	628035
580.0	3544.078	-62.1290	31.9567	83.14	0.20	21916.3	83.53	0.19	23239.6	980.504	628208
582.0	3544.102	-61.9924	31.9705	83.22	0.18	21953.6	83.61	0.17	23276.9	987.513	628367
584.0	3544.123	-61.8555	31.9842	83.30	0.16	21990.9	83.68	0.15	23314.3	994.533	628513
586.0	3544.143	-61.7184	31.9978	83.38	0.15	22028.4	83.76	0.14	23351.8	1001.566	628647
588.0	3544.160	-61.5809	32.0113	83.46	0.13	22066.1	83.84	0.12	23389.4	1008.611	628767
590.0	3544.175	-61.4432	32.0246	83.55	0.11	22103.8	83.91	0.11	23427.2	1015.668	628875
592.0	3544.189	-61.3052	32.0377	83.63	0.10	22141.7	83.99	0.09	23465.1	1022.737	628972
594.0	3544.200	-61.1670	32.0507	83.71	0.08	22179.7	84.07	0.08	23503.1	1029.818	629056
596.0	3544.210	-61.0284	32.0636	83.79	0.07	22217.9	84.14	0.07	23541.3	1036.911	629130
598.0	3544.218	-60.8896	32.0763	83.88	0.06	22256.2	84.22	0.05	23579.7	1044.016	629193
600.0	3544.224	-60.7505	32.0888	83.96	0.04	22294.8	84.30	0.04	23618.3	1051.134	629245
602.0	3544.229	-60.6111	32.1012	84.04	0.03	22333.4	84.38	0.03	23656.9	1058.263	629286
604.0	3544.232	-60.4714	32.1135	84.13	0.02	22372.1	84.46	0.02	23695.6	1065.406	629318
606.0	3544.233	-60.3315	32.1256	84.21	0.01	22410.8	84.54	0.00	23734.3	1072.560	629340
608.0	3544.233	-60.1912	32.1375	84.30	-0.01	22449.7	84.62	-0.01	23773.3	1079.727	629353
610.0	3544.232	-60.0507	32.1493	84.38	-0.02	22488.8	84.69	-0.02	23812.3	1086.907	629356
612.0	3544.229	-59.9099	32.1610	84.47	-0.03	22527.9	84.77	-0.03	23851.5	1094.098	629351
614.0	3544.224	-59.7688	32.1725	84.55	-0.04	22567.2	84.85	-0.04	23890.7	1101.303	629337
616.0	3544.219	-59.6275	32.1838	84.63	-0.05	22606.5	84.93	-0.05	23930.1	1108.520	629315
618.0	3544.212	-59.4858	32.1949	84.72	-0.06	22645.9	85.01	-0.05	23969.5	1115.749	629286
620.0	3544.204	-59.3439	32.2060	84.80	-0.07	22685.5	85.09	-0.06	24009.1	1122.992	629249
622.0	3544.195	-59.2017	32.2168	84.89	-0.07	22725.2	85.17	-0.07	24048.8	1130.246	629206
624.0	3544.185	-59.0592	32.2275	84.97	-0.08	22765.0	85.25	-0.08	24088.6	1137.514	629155
626.0	3544.173	-58.9164	32.2380	85.06	-0.09	22805.1	85.33	-0.08	24128.7	1144.794	629099
628.0	3544.161	-58.7733	32.2484	85.15	-0.10	22845.3	85.41	-0.09	24168.9	1152.088	629037
630.0	3544.148	-58.6299	32.2586	85.23	-0.10	22885.7	85.49	-0.10	24209.3	1159.394	628969
632.0	3544.134	-58.4863	32.2686	85.32	-0.11	22926.2	85.57	-0.10	24249.8	1166.713	628897
634.0	3544.120	-58.3423	32.2785	85.40	-0.11	22966.7	85.66	-0.11	24290.3	1174.045	628819
636.0	3544.105	-58.1981	32.2882	85.49	-0.12	23007.4	85.74	-0.11	24331.0	1181.390	628738
638.0	3544.089	-58.0536	32.2978	85.58	-0.12	23048.2	85.82	-0.12	24371.8	1188.748	628652
640.0	3544.072	-57.9088	32.3071	85.66	-0.13	23089.0	85.90	-0.12	24412.6	1196.119	628562
642.0	3544.055	-57.7637	32.3164	85.75	-0.13	23130.0	85.98	-0.12	24453.6	1203.503	628469
644.0	3544.038	-57.6183	32.3254	85.84	-0.13	23171.1	86.06	-0.12	24494.7	1210.900	628374
646.0	3544.020	-57.4726	32.3343	85.92	-0.13	23212.3	86.14	-0.13	24536.0	1218.311	628276
648.0	3544.002	-57.3266	32.3430	86.01	-0.14	23253.7	86.23	-0.13	24577.3	1225.735	628177
650.0	3543.984	-57.1804	32.3515	86.10	-0.14	23295.2	86.31	-0.13	24618.8	1233.172	628076
652.0	3543.966	-57.0339	32.3598	86.18	-0.14	23336.7	86.39	-0.13	24660.4	1240.622	627974
654.0	3543.948	-56.8870	32.3680	86.27	-0.14	23378.5	86.47	-0.13	24702.1	1248.086	627872
656.0	3543.929	-56.7399	32.3760	86.36	-0.14	23420.3	86.55	-0.13	24743.9	1255.563	627770
658.0	3543.911	-56.5924	32.3838	86.45	-0.13	23462.3	86.64	-0.13	24785.9	1263.053	627668
660.0	3543.893	-56.4447	32.3915	86.53	-0.13	23504.4	86.72	-0.13	24828.0	1270.557	627567
662.0	3543.876	-56.2967	32.3990	86.62	-0.13	23546.6	86.80	-0.12	24870.2	1278.075	627468

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE (CONT.)

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
664.0	3543.858	-56.1484	32.4062	86.71	-0.13	23589.0	86.89	-0.12	24912.6	1285.606	627370
666.0	3543.841	-55.9998	32.4134	86.80	-0.12	23631.5	86.97	-0.12	24955.1	1293.150	627274
668.0	3543.824	-55.8510	32.4203	86.89	-0.12	23674.1	87.05	-0.12	24997.7	1300.709	627181
670.0	3543.808	-55.7018	32.4270	86.98	-0.12	23716.8	87.14	-0.11	25040.4	1308.281	627089
672.0	3543.792	-55.5523	32.4336	87.06	-0.11	23759.6	87.22	-0.11	25083.2	1315.866	627000
674.0	3543.777	-55.4025	32.4400	87.15	-0.11	23802.6	87.30	-0.10	25126.2	1323.465	626915
676.0	3543.763	-55.2525	32.4462	87.24	-0.10	23845.7	87.39	-0.10	25169.3	1331.079	626835
678.0	3543.749	-55.1021	32.4522	87.33	-0.10	23888.9	87.47	-0.09	25212.5	1338.706	626759
680.0	3543.736	-54.9515	32.4580	87.42	-0.09	23932.2	87.56	-0.08	25255.8	1346.346	626688
682.0	3543.725	-54.8006	32.4637	87.51	-0.08	23975.6	87.64	-0.08	25299.2	1354.001	626624
684.0	3543.714	-54.6493	32.4691	87.60	-0.07	24019.2	87.72	-0.07	25342.7	1361.670	626566
686.0	3543.705	-54.4978	32.4744	87.69	-0.06	24062.8	87.81	-0.06	25386.4	1369.352	626517
688.0	3543.697	-54.3460	32.4795	87.78	-0.05	24106.6	87.89	-0.05	25430.2	1377.049	626475
690.0	3543.691	-54.1939	32.4843	87.87	-0.04	24150.6	87.98	-0.04	25474.2	1384.759	626442
692.0	3543.686	-54.0415	32.4890	87.96	-0.03	24194.5	88.06	-0.03	25518.1	1392.484	626419
S-IVB 1ST GUIDANCE CUTOFF											
693.910	3543.683	-53.8956	32.4933	88.04	-0.02	24236.6	88.15	-0.02	25560.2	1399.874	626406
694.0	3543.683	-53.8888	32.4935	88.05	-0.02	24238.6	88.15	-0.01	25562.2	1400.223	626406
696.0	3543.681	-53.7359	32.4978	88.14	-0.02	24241.7	88.24	-0.02	25565.3	1407.968	626398
698.0	3543.679	-53.5830	32.5019	88.23	-0.01	24242.1	88.32	-0.01	25565.7	1415.716	626391
700.0	3543.677	-53.4301	32.5058	88.32	-0.01	24242.0	88.41	-0.01	25565.6	1423.463	626383
702.0	3543.675	-53.2772	32.5094	88.41	-0.01	24242.3	88.50	-0.01	25565.9	1431.210	626375
PARKING ORBIT INSERTION											
703.910	3543.672	-53.1311	32.5128	88.50	-0.01	24242.3	88.58	-0.01	25565.9	1438.608	626360

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE

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
PARKING ORBIT INSERTION								
703.910	3543.672	-53.1311	32.5128	32.6823	88.58	-0.01	25565.9	103.086
750.0	3543.624	-49.6047	32.5356	32.7053	90.58	-0.01	25567.0	103.042
800.0	3543.569	-45.7822	32.4365	32.6058	92.75	-0.02	25568.0	102.968
850.0	3543.510	-41.9741	32.2090	32.3778	94.91	-0.02	25568.9	102.868
900.0	3543.449	-38.1914	31.8550	32.0228	97.03	-0.02	25569.8	102.743
950.0	3543.385	-34.4443	31.3772	31.5435	99.11	-0.02	25570.8	102.593
1000.0	3543.319	-30.7420	30.7790	30.9435	101.13	-0.02	25572.0	102.420
1050.0	3543.251	-27.0925	30.0646	30.2269	103.09	-0.02	25573.1	102.226
1100.0	3543.182	-23.5024	29.2390	29.3986	104.98	-0.02	25574.4	102.013
1150.0	3543.111	-19.9767	28.3075	28.4638	106.78	-0.02	25575.7	101.783
1200.0	3543.038	-16.5191	27.2760	27.4285	108.49	-0.02	25577.0	101.539
1250.0	3542.965	-13.1317	26.1503	26.2985	110.11	-0.02	25578.4	101.282
1300.0	3542.890	-9.8155	24.9369	25.0801	111.64	-0.02	25579.8	101.017
1350.0	3542.815	-6.5701	23.6418	23.7795	113.06	-0.02	25581.3	100.745
1400.0	3542.739	-3.3942	22.2715	22.4030	114.39	-0.02	25582.7	100.470
1450.0	3542.662	-0.2853	20.8322	20.9568	115.61	-0.02	25584.2	100.194
1500.0	3542.585	2.7595	19.3300	19.4471	116.73	-0.02	25585.6	99.921
1550.0	3542.508	5.7441	17.7709	17.8798	117.75	-0.02	25587.0	99.654
1600.0	3542.430	8.6728	16.1606	16.2609	118.67	-0.02	25588.4	99.395
1650.0	3542.353	11.5502	14.5050	14.5959	119.49	-0.02	25589.8	99.147
1700.0	3542.276	14.3815	12.8094	12.8905	120.21	-0.02	25591.1	98.912
1750.0	3542.200	17.1719	11.0791	11.1499	120.83	-0.02	25592.3	98.694
1800.0	3542.124	19.9268	9.3195	9.3794	121.36	-0.02	25593.5	98.494
1850.0	3542.050	22.6520	7.5353	7.5841	121.79	-0.02	25594.6	98.315
1900.0	3541.976	25.3531	5.7317	5.7690	122.13	-0.02	25595.6	98.158
1950.0	3541.905	28.0360	3.9133	3.9388	122.37	-0.02	25596.5	98.025
2000.0	3541.836	30.7064	2.0848	2.0985	122.52	-0.02	25597.4	97.917
2050.0	3541.769	33.3703	0.2510	0.2527	122.58	-0.02	25598.1	97.835
2100.0	3541.705	36.0335	-1.5835	-1.5938	122.55	-0.02	25598.7	97.780
2150.0	3541.644	38.7019	-3.4140	-3.4363	122.42	-0.02	25599.2	97.751
2200.0	3541.587	41.3813	-5.2360	-5.2701	122.20	-0.01	25599.6	97.750
2250.0	3541.534	44.0778	-7.0447	-7.0904	121.89	-0.01	25599.9	97.775
2300.0	3541.486	46.7969	-8.8354	-8.8923	121.48	-0.01	25600.1	97.826
2350.0	3541.444	49.5445	-10.6030	-10.6709	120.98	-0.01	25600.1	97.902
2400.0	3541.406	52.3263	-12.3427	-12.4211	120.39	-0.01	25600.1	98.002
2450.0	3541.376	55.1478	-14.0493	-14.1376	119.69	-0.01	25599.9	98.125
2500.0	3541.352	58.0143	-15.7175	-15.8153	118.90	-0.01	25599.7	98.269
2550.0	3541.335	60.9311	-17.3417	-17.4485	118.01	-0.00	25599.3	98.431
2600.0	3541.326	63.9028	-18.9165	-19.0315	117.02	-0.00	25598.9	98.611
2650.0	3541.325	66.9339	-20.4360	-20.5586	115.92	0.00	25598.4	98.805

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
2700.0	3541.333	70.0284	-21.8941	-22.0238	114.72	0.00	25597.8	99.011
2750.0	3541.350	73.1895	-23.2848	-23.4209	113.43	0.01	25597.1	99.228
2800.0	3541.376	76.4199	-24.6018	-24.7436	112.03	0.01	25596.3	99.452
2850.0	3541.413	79.7210	-25.8388	-25.9858	110.53	0.01	25595.5	99.681
2900.0	3541.459	83.0936	-26.9894	-27.1409	108.93	0.01	25594.7	99.912
2950.0	3541.516	86.5371	-28.0475	-28.2029	107.24	0.02	25593.8	100.144
3000.0	3541.583	90.0496	-29.0068	-29.1656	105.46	0.02	25592.8	100.374
3050.0	3541.661	93.6278	-29.8615	-30.0232	103.59	0.02	25591.9	100.600
3100.0	3541.750	97.2670	-30.6060	-30.7701	101.65	0.03	25590.9	100.820
3150.0	3541.849	100.9609	-31.2353	-31.4013	99.64	0.03	25589.9	101.031
3200.0	3541.959	104.7019	-31.7450	-31.9125	97.57	0.03	25588.9	101.233
3250.0	3542.080	108.4811	-32.1314	-32.3000	95.45	0.03	25587.8	101.423
3300.0	3542.210	112.2883	-32.3915	-32.5608	93.30	0.04	25586.8	101.601
3350.0	3542.351	116.1126	-32.5234	-32.6930	91.13	0.04	25585.8	101.766
3400.0	3542.501	119.9427	-32.5261	-32.6957	88.96	0.04	25584.8	101.917
3450.0	3542.660	123.7669	-32.3995	-32.5688	86.79	0.04	25583.9	102.053
3500.0	3542.828	127.5738	-32.1448	-32.3134	84.64	0.05	25582.9	102.174
3550.0	3543.004	131.3524	-31.7639	-31.9314	82.52	0.05	25581.9	102.281
3600.0	3543.187	135.0927	-31.2597	-31.4258	80.45	0.05	25581.0	102.373
3650.0	3543.376	138.7857	-30.6360	-30.8001	78.44	0.05	25580.1	102.452
3700.0	3543.572	142.4238	-29.8972	-30.0589	76.50	0.05	25579.2	102.517
3750.0	3543.772	146.0007	-29.0483	-29.2072	74.63	0.06	25578.4	102.570
3800.0	3543.977	149.5116	-28.0950	-28.2505	72.84	0.06	25577.5	102.613
3850.0	3544.184	152.9534	-27.0430	-27.1946	71.15	0.06	25576.7	102.646
3900.0	3544.394	156.3240	-25.8985	-26.0456	69.55	0.06	25575.9	102.672
3950.0	3544.606	159.6229	-24.6678	-24.8098	68.05	0.06	25575.1	102.691
4000.0	3544.817	162.8507	-23.3572	-23.4935	66.65	0.06	25574.4	102.706
4050.0	3545.028	166.0091	-21.9731	-22.1030	65.34	0.06	25573.6	102.718
4100.0	3545.238	169.1005	-20.5215	-20.6445	64.14	0.06	25572.9	102.729
4150.0	3545.445	172.1283	-19.0088	-19.1241	63.05	0.06	25572.1	102.741
4200.0	3545.648	175.0963	-17.4407	-17.5479	62.05	0.05	25571.4	102.756
4250.0	3545.847	178.0090	-15.8232	-15.9215	61.15	0.05	25570.6	102.775
4300.0	3546.040	-179.1289	-14.1618	-14.2507	60.36	0.05	25569.9	102.800
4350.0	3546.227	-176.3122	-12.4620	-12.5410	59.66	0.05	25569.2	102.833
4400.0	3546.407	-173.5356	-10.7290	-10.7975	59.06	0.05	25568.4	102.875
4450.0	3546.580	-170.7935	-8.9679	-9.0256	58.55	0.05	25567.7	102.928
4500.0	3546.743	-168.0804	-7.1837	-7.2302	58.14	0.04	25566.9	102.991
4550.0	3546.898	-165.3905	-5.3813	-5.4163	57.82	0.04	25566.2	103.066
4600.0	3547.043	-162.7180	-3.5654	-3.5886	57.59	0.04	25565.4	103.154
4650.0	3547.178	-160.0572	-1.7406	-1.7519	57.46	0.04	25564.6	103.254
4700.0	3547.302	-157.4021	0.0885	0.0891	57.42	0.03	25563.9	103.368
4750.0	3547.415	-154.7468	1.9172	1.9297	57.47	0.03	25563.1	103.493
4800.0	3547.516	-152.0857	3.7410	3.7654	57.61	0.03	25562.3	103.631

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
4850.0	3547.606	-149.4127	5.5553	5.5914	57.85	0.02	25561.5	103.781
4900.0	3547.685	-146.7221	7.3553	7.4029	58.17	0.02	25560.8	103.941
4950.0	3547.751	-144.0082	9.1365	9.1952	58.59	0.02	25560.0	104.110
5000.0	3547.806	-141.2652	10.8939	10.9634	59.11	0.01	25559.3	104.287
5050.0	3547.850	-138.4874	12.6226	12.7024	59.72	0.01	25558.6	104.470
5100.0	3547.882	-135.6695	14.3174	14.4072	60.43	0.01	25557.9	104.657
5150.0	3547.903	-132.8062	15.9733	16.0723	61.23	0.00	25557.3	104.847
5200.0	3547.913	-129.8923	17.5846	17.6924	62.14	0.00	25556.7	105.037
5250.0	3547.912	-126.9231	19.1459	19.2619	63.14	-0.00	25556.1	105.226
5300.0	3547.902	-123.8943	20.6514	20.7749	64.25	-0.00	25555.6	105.410
5350.0	3547.881	-120.8021	22.0951	22.2256	65.45	-0.01	25555.2	105.588
5400.0	3547.852	-117.6432	23.4711	23.6078	66.76	-0.01	25554.8	105.757
5450.0	3547.813	-114.4152	24.7730	24.9153	68.17	-0.01	25554.5	105.915
5500.0	3547.767	-111.1166	25.9947	26.1420	69.68	-0.01	25554.3	106.060
5550.0	3547.713	-107.7468	27.1298	27.2816	71.28	-0.02	25554.1	106.189
5600.0	3547.651	-104.3066	28.1723	28.3279	72.98	-0.02	25554.1	106.301
5650.0	3547.584	-100.7979	29.1159	29.2749	74.77	-0.02	25554.1	106.394
5700.0	3547.510	-97.2241	29.9550	30.1168	76.64	-0.02	25554.2	106.465
5750.0	3547.431	-93.5899	30.6841	30.8482	78.58	-0.02	25554.4	106.515
5800.0	3547.348	-89.9019	31.2982	31.4641	80.59	-0.02	25554.8	106.541
5850.0	3547.260	-86.1675	31.7930	31.9604	82.66	-0.02	25555.2	106.542
5900.0	3547.168	-82.3958	32.1648	32.3332	84.78	-0.03	25555.7	106.518
5950.0	3547.074	-78.5967	32.4108	32.5799	86.92	-0.03	25556.3	106.468
6000.0	3546.976	-74.7813	32.5292	32.6986	89.09	-0.03	25557.0	106.393
6050.0	3546.877	-70.9608	32.5189	32.6883	91.26	-0.03	25557.8	106.291
6100.0	3546.776	-67.1467	32.3800	32.5491	93.42	-0.03	25558.7	106.165
6150.0	3546.673	-63.3504	32.1137	32.2820	95.57	-0.03	25559.7	106.014
6200.0	3546.570	-59.5826	31.7218	31.8890	97.67	-0.03	25560.8	105.839
6250.0	3546.466	-55.8531	31.2073	31.3730	99.73	-0.03	25562.0	105.643
6300.0	3546.362	-52.1710	30.5740	30.7377	101.74	-0.03	25563.2	105.426
6350.0	3546.257	-48.5435	29.8262	29.9876	103.67	-0.03	25564.5	105.190
6400.0	3546.153	-44.9769	28.9690	29.1275	105.53	-0.03	25565.8	104.938
6450.0	3546.050	-41.4758	28.0079	28.1630	107.30	-0.03	25567.2	104.672
6500.0	3545.947	-38.0434	26.9487	27.0999	108.99	-0.03	25568.7	104.393
6550.0	3545.845	-34.6814	25.7975	25.9442	110.58	-0.03	25570.1	104.106
6600.0	3545.744	-31.3904	24.5606	24.7021	112.07	-0.03	25571.6	103.813
6650.0	3545.644	-28.1697	23.2441	23.3798	113.47	-0.03	25573.1	103.515
6700.0	3545.545	-25.0177	21.8543	21.9837	114.76	-0.03	25574.6	103.218
6750.0	3545.448	-21.9318	20.3975	20.5198	115.95	-0.03	25576.0	102.922
6800.0	3545.352	-18.9086	18.8797	18.9944	117.04	-0.03	25577.5	102.632
6850.0	3545.258	-15.9444	17.3068	17.4132	118.03	-0.03	25578.9	102.350
6900.0	3545.165	-13.0346	15.6845	15.7821	118.92	-0.02	25580.3	102.079
6950.0	3545.075	-10.1745	14.0186	14.1067	119.71	-0.02	25581.6	101.822

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
7000.0	3544.987	-7.3589	12.3144	12.3925	120.40	-0.02	25582.8	101.580
7050.0	3544.900	-4.5826	10.5771	10.6447	120.99	-0.02	25584.0	101.357
7100.0	3544.816	-1.8400	8.8118	8.8686	121.49	-0.02	25585.1	101.155
7150.0	3544.735	0.8745	7.0236	7.0691	121.89	-0.02	25586.1	100.974
7200.0	3544.656	3.5666	5.2172	5.2512	122.20	-0.02	25587.0	100.818
7250.0	3544.581	6.2421	3.3975	3.4197	122.42	-0.02	25587.9	100.688
7300.0	3544.509	8.9069	1.5691	1.5794	122.55	-0.02	25588.6	100.583
7350.0	3544.440	11.5668	-0.2633	-0.2650	122.58	-0.02	25589.2	100.506
7400.0	3544.375	14.2277	-2.0951	-2.1088	122.52	-0.02	25589.7	100.457
7450.0	3544.315	16.8953	-3.9217	-3.9473	122.37	-0.02	25590.1	100.435
7500.0	3544.259	19.5757	-5.7385	-5.7758	122.12	-0.01	25590.4	100.441
7550.0	3544.208	22.2745	-7.5407	-7.5895	121.79	-0.01	25590.6	100.473
7600.0	3544.162	24.9976	-9.3235	-9.3834	121.36	-0.01	25590.6	100.532
7650.0	3544.122	27.7507	-11.0820	-11.1527	120.83	-0.01	25590.6	100.617
7700.0	3544.088	30.5394	-12.8112	-12.8922	120.21	-0.01	25590.4	100.725
7750.0	3544.061	33.3691	-14.5059	-14.5968	119.49	-0.01	25590.2	100.855
7800.0	3544.041	36.2453	-16.1609	-16.2611	118.67	-0.00	25589.8	101.006
7850.0	3544.029	39.1727	-17.7705	-17.8795	117.75	-0.00	25589.4	101.175
7900.0	3544.024	42.1563	-19.3293	-19.4463	116.73	-0.00	25588.8	101.360
7950.0	3544.028	45.2003	-20.8312	-20.9557	115.61	0.00	25588.2	101.560
8000.0	3544.040	48.3084	-22.2703	-22.4017	114.39	0.00	25587.6	101.771
8050.0	3544.061	51.4837	-23.6405	-23.7781	113.07	0.01	25586.8	101.992
8100.0	3544.092	54.7286	-24.9355	-25.0787	111.64	0.01	25586.0	102.219
8150.0	3544.132	58.0444	-26.1491	-26.2972	110.12	0.01	25585.1	102.450
8200.0	3544.183	61.4315	-27.2748	-27.4273	108.50	0.02	25584.3	102.683
8250.0	3544.243	64.8889	-28.3065	-28.4628	106.78	0.02	25583.3	102.915
8300.0	3544.314	68.4145	-29.2382	-29.3977	104.98	0.02	25582.4	103.145
8350.0	3544.395	72.0045	-30.0640	-30.2262	103.10	0.02	25581.4	103.369
8400.0	3544.486	75.6539	-30.7786	-30.9430	101.14	0.03	25580.4	103.587
8450.0	3544.588	79.3561	-31.3770	-31.5433	99.11	0.03	25579.4	103.795
8500.0	3544.700	83.1031	-31.8551	-32.0228	97.03	0.03	25578.4	103.993
8550.0	3544.822	86.8857	-32.2093	-32.3780	94.91	0.03	25577.4	104.180
8600.0	3544.954	90.6936	-32.4369	-32.6062	92.76	0.04	25576.4	104.353
8650.0	3545.095	94.5158	-32.5364	-32.7059	90.59	0.04	25575.4	104.513
8700.0	3545.246	98.3408	-32.5067	-32.6762	88.41	0.04	25574.4	104.658
8750.0	3545.405	102.1571	-32.3484	-32.5174	86.25	0.04	25573.4	104.788
8800.0	3545.572	105.9533	-32.0626	-32.2308	84.11	0.05	25572.5	104.904
8850.0	3545.748	109.7188	-31.6515	-31.8185	82.01	0.05	25571.6	105.004
8900.0	3545.929	113.4437	-31.1182	-31.2837	79.95	0.05	25570.7	105.090
8950.0	3546.118	117.1195	-30.4667	-30.6301	77.96	0.05	25569.8	105.163
9000.0	3546.311	120.7388	-29.7016	-29.8625	76.04	0.05	25569.0	105.222
9050.0	3546.510	124.2958	-28.8279	-28.9859	74.19	0.05	25568.2	105.270
9100.0	3546.712	127.7861	-27.8514	-28.0059	72.43	0.06	25567.4	105.308

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - PARKING ORBIT PHASE (CONT.)

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
9150.0	3546.917	131.2068	-26.7779	-26.9284	70.76	C.C6	25566.6	105.336
9200.C	3547.124	134.5563	-25.6136	-25.7595	69.18	0.C6	25565.8	105.356
9250.C	3547.332	137.8343	-24.3649	-24.5055	67.71	C.C6	25565.1	105.371
9300.0	3547.54C	141.C416	-23.0379	-23.1726	66.33	0.06	25564.4	105.381
9350.C	3547.747	144.1802	-21.6389	-21.7672	65.05	0.C6	25563.6	105.390
9400.0	3547.952	147.2527	-20.1742	-20.2953	63.88	C.C6	25562.9	105.397
9450.0	3548.154	15C.2625	-18.6498	-18.7632	62.81	0.05	25562.2	105.406
BEGIN S-IVB RESTART PREPARATICNS -- START CF TIME BASE 6								
9464.500	3548.212	151.1242	-18.1974	-18.3084	62.51	0.05	25562.0	105.409

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE

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
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6									
9464.500	-35270496	-5172545	-15226285	17947.1	-7770.3	-14333.1	18.09	5.40	19.72
9470.0	-35171514	-5215199	-15304818	18046.3	-7740.4	-14224.3	17.97	5.47	19.82
9480.0	-34990157	-5292328	-15446068	18224.8	-7685.2	-14025.3	17.74	5.58	19.99
9490.0	-34807026	-5368899	-15585318	18401.0	-7628.8	-13824.5	17.51	5.70	20.16
9500.0	-34622144	-5444900	-15722552	18575.0	-7571.2	-13622.1	17.28	5.81	20.33
9510.0	-34435535	-5520320	-15857754	18746.6	-7512.6	-13418.0	17.04	5.92	20.49
9520.0	-34247221	-5595147	-15990906	18915.8	-7452.8	-13212.3	16.80	6.04	20.65
9530.0	-34057227	-5669371	-16121994	19082.7	-7391.8	-13005.0	16.57	6.15	20.81
9540.0	-33865576	-5742980	-16251000	19247.1	-7329.7	-12796.1	16.32	6.26	20.97
9550.0	-33672293	-5815962	-16377910	19409.1	-7266.6	-12585.7	16.08	6.37	21.12
9560.0	-33477401	-5888307	-16502708	19568.7	-7202.3	-12373.7	15.84	6.48	21.27
9570.0	-33280926	-5960004	-16625379	19725.9	-7136.9	-12160.3	15.59	6.59	21.42
9580.0	-33082892	-6031041	-16745909	19880.5	-7070.4	-11945.4	15.34	6.70	21.56
9590.0	-32883325	-6101407	-16864282	20032.6	-7002.8	-11729.0	15.09	6.81	21.70
9600.0	-32682248	-6171093	-16980485	20182.3	-6934.1	-11511.3	14.84	6.92	21.84
9610.0	-32479688	-6240086	-17094504	20329.3	-6864.4	-11292.2	14.58	7.03	21.98
9620.0	-32275670	-6308377	-17206325	20473.9	-6793.6	-11071.7	14.32	7.13	22.11
9630.0	-32070220	-6375954	-17315934	20615.8	-6721.7	-10850.0	14.07	7.24	22.24
9640.0	-31863363	-6442807	-17423319	20755.2	-6648.8	-10626.9	13.80	7.34	22.37
9650.0	-31655125	-6508926	-17528467	20891.9	-6574.8	-10402.5	13.54	7.45	22.50
9660.0	-31445533	-6574300	-17631366	21026.0	-6499.8	-10177.0	13.28	7.55	22.62
9670.0	-31234614	-6638919	-17732003	21157.5	-6423.8	-9950.2	13.01	7.65	22.74
9680.0	-31022393	-6702773	-17830366	21286.3	-6346.8	-9722.2	12.75	7.75	22.85
9690.0	-30808898	-6765852	-17926444	21412.4	-6268.7	-9493.1	12.48	7.85	22.97
9700.0	-30594154	-6828145	-18020225	21535.8	-6189.7	-9262.9	12.21	7.95	23.08
9710.0	-30378190	-6889643	-18111698	21656.5	-6109.7	-9031.6	11.94	8.05	23.18
9720.0	-30161033	-6950335	-18200853	21774.5	-6028.7	-8799.2	11.66	8.15	23.29
9730.0	-29942709	-7010213	-18287680	21889.8	-5946.7	-8565.9	11.39	8.25	23.39
9740.0	-29723246	-7069266	-18372167	22002.3	-5863.8	-8331.5	11.11	8.34	23.49
9750.0	-29502673	-7127485	-18454306	22112.0	-5779.9	-8096.1	10.83	8.44	23.58
9760.0	-29281015	-7184860	-18534087	22218.9	-5695.0	-7859.8	10.55	8.53	23.67
9770.0	-29058303	-7241383	-18611500	22323.1	-5609.3	-7622.6	10.27	8.62	23.76
9780.0	-28834563	-7297043	-18686537	22424.4	-5522.6	-7384.6	9.99	8.71	23.85
9790.0	-28609824	-7351832	-18759188	22523.0	-5435.0	-7145.7	9.71	8.80	23.93
9800.0	-28384113	-7405740	-18829447	22618.6	-5346.5	-6905.9	9.43	8.89	24.01
9810.0	-28157460	-7458759	-18897304	22711.5	-5257.1	-6665.4	9.14	8.98	24.09
9820.0	-27929893	-7510880	-18962753	22801.5	-5166.9	-6424.2	8.85	9.07	24.16
9830.0	-27701441	-7562094	-19025785	22888.6	-5075.8	-6182.2	8.57	9.16	24.23
9840.0	-27472131	-7612393	-19086394	22972.8	-4983.8	-5939.5	8.28	9.24	24.30
9850.0	-27241994	-7661767	-19144573	23054.1	-4891.0	-5696.2	7.99	9.32	24.37

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
9860.0	-27011059	-7710210	-19200315	23132.5	-4797.3	-5452.2	7.70	9.41	24.43
9870.0	-26779354	-7757711	-19253615	23208.1	-4702.9	-5207.8	7.43	9.48	24.47
9880.0	-26546907	-7804264	-19304468	23280.7	-4607.6	-4962.6	7.07	9.58	24.56
9890.0	-26313749	-7849861	-19352866	23350.4	-4511.5	-4717.0	6.82	9.65	24.59
9900.0	-26079909	-7894492	-19398806	23417.1	-4414.7	-4470.9	6.52	9.73	24.64
9910.0	-25845417	-7938152	-19442282	23480.8	-4317.0	-4224.2	6.23	9.80	24.68
9920.0	-25610302	-7980831	-19483290	23541.7	-4218.6	-3977.2	5.93	9.88	24.73
9930.0	-25374594	-8022522	-19521825	23599.6	-4119.5	-3729.7	5.69	9.95	24.78
9940.0	-25138320	-8063218	-19557883	23654.6	-4019.6	-3481.9	5.34	10.03	24.80
9950.0	-24901512	-8102912	-19591461	23706.5	-3919.0	-3233.7	5.04	10.10	24.83
9960.0	-24664200	-8141596	-19622555	23755.4	-3817.7	-2985.2	4.74	10.17	24.86
9970.0	-24426413	-8179263	-19651163	23801.5	-3715.7	-2736.5	4.45	10.23	24.89
9980.0	-24188181	-8215908	-19677283	23844.6	-3613.0	-2487.4	4.17	10.30	24.90
9990.0	-23949532	-8251521	-19700911	23884.6	-3509.7	-2238.2	3.88	10.36	24.91
10000.0	-23710498	-8286099	-19722047	23921.7	-3405.6	-1988.8	3.58	10.44	24.97
10010.0	-23471108	-8319632	-19740687	23955.8	-3301.0	-1739.2	3.24	10.50	24.97
10020.0	-23231392	-8352116	-19756832	23986.8	-3195.7	-1489.6	2.93	10.56	24.97
10030.0	-22991381	-8383544	-19770479	24014.9	-3089.8	-1239.8	2.63	10.62	24.98
10040.0	-22751104	-8413910	-19781627	24040.1	-2983.3	-990.0	2.35	10.68	24.98
	S-IVB RE-IGNITION (STDV OPEN)								
10042.800	-22683783	-8422221	-19784301	24046.7	-2953.4	-920.0	2.50	10.54	24.92
10044.0	-22654922	-8425759	-19785388	24054.2	-2941.3	-890.4	12.38	9.54	24.37
10046.0	-22606779	-8431623	-19787120	24090.5	-2923.5	-842.4	20.58	8.60	23.82
10048.0	-22558557	-8437453	-19788757	24132.4	-2906.2	-794.5	21.19	8.68	24.10
10050.0	-22510248	-8443248	-19790298	24175.0	-2889.2	-746.4	21.33	8.49	23.99
10052.0	-22461854	-8449009	-19791743	24218.3	-2872.2	-698.6	21.51	8.54	23.89
10054.0	-22413374	-8454737	-19793092	24261.4	-2855.5	-650.0	21.58	8.14	24.56
10056.0	-22364808	-8460432	-19794343	24304.4	-2839.7	-600.3	21.46	7.59	25.14
10058.0	-22316157	-8466096	-19795493	24347.3	-2824.8	-549.9	21.43	7.32	25.24
10060.0	-22267419	-8471731	-19796542	24390.3	-2810.1	-499.6	21.57	7.49	25.05
10062.0	-22218595	-8477336	-19797491	24433.5	-2794.9	-449.5	21.64	7.72	25.01
10064.0	-22169685	-8482910	-19798340	24476.8	-2779.3	-399.4	21.60	7.78	25.09
10066.0	-22120688	-8488454	-19799089	24520.0	-2763.8	-349.2	21.59	7.80	25.09
10068.0	-22071605	-8493965	-19799737	24563.2	-2748.0	-299.1	21.63	7.93	25.04
10070.0	-22022435	-8499445	-19800285	24606.5	-2732.0	-249.0	21.66	8.10	25.06
10072.0	-21973179	-8504893	-19800733	24649.8	-2715.7	-198.8	21.67	8.23	25.15
10074.0	-21923836	-8510308	-19801081	24693.1	-2699.2	-148.5	21.65	8.29	25.19
10076.0	-21874407	-8515690	-19801327	24736.4	-2682.5	-98.1	21.66	8.33	25.16
10078.0	-21824890	-8521038	-19801473	24779.8	-2665.8	-47.8	21.67	8.40	25.14
10080.0	-21775288	-8526353	-19801518	24823.1	-2648.9	2.5	21.65	8.49	25.15
10082.0	-21725598	-8531634	-19801463	24866.4	-2631.9	52.8	21.67	8.57	25.14

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10084.0	-21675822	-8536880	-19801307	24909.7	-2614.7	103.1	21.69	8.62	25.13
10086.0	-21625959	-8542092	-19801051	24953.1	-2597.4	153.3	21.68	8.70	25.13
10088.0	-21576010	-8547270	-19800694	24996.5	-2579.9	203.6	21.68	8.77	25.12
10090.0	-21525973	-8552412	-19800236	25039.8	-2562.3	253.8	21.68	8.85	25.08
10092.0	-21475850	-8557519	-19799679	25083.2	-2544.5	303.9	21.68	8.92	25.05
10094.0	-21425640	-8562590	-19799021	25126.6	-2526.6	354.0	21.68	8.97	25.07
10096.0	-21375344	-8567625	-19798263	25169.9	-2508.6	404.2	21.71	9.03	25.09
10098.0	-21324961	-8572624	-19797404	25213.4	-2490.5	454.4	21.74	9.07	25.08
10100.0	-21274490	-8577587	-19796445	25256.9	-2472.3	504.5	21.74	9.13	25.04
10102.0	-21223933	-8582513	-19795386	25300.3	-2454.0	554.6	21.73	9.21	25.01
10104.0	-21173289	-8587403	-19794227	25343.8	-2435.5	604.6	21.75	9.28	25.00
10106.0	-21122558	-8592255	-19792968	25387.3	-2416.9	654.6	21.76	9.33	25.00
10108.0	-21071740	-8597070	-19791609	25430.9	-2398.1	704.6	21.76	9.41	24.99
10110.0	-21020834	-8601847	-19790150	25474.4	-2379.2	754.5	21.78	9.49	24.98
10112.0	-20969842	-8606587	-19788591	25518.0	-2360.2	804.5	21.78	9.54	24.97
10114.0	-20918763	-8611288	-19786932	25561.5	-2341.1	854.4	21.77	9.58	24.95
10116.0	-20867596	-8615951	-19785173	25605.0	-2321.8	904.3	21.76	9.66	24.92
10118.0	-20816342	-8620575	-19783315	25648.6	-2302.4	954.1	21.79	9.73	24.90
10120.0	-20765002	-8625161	-19781357	25692.2	-2282.9	1003.9	21.83	9.80	24.91
10122.0	-20713574	-8629707	-19779299	25735.9	-2263.2	1053.7	21.85	9.88	24.90
10124.0	-20662058	-8634213	-19777142	25779.6	-2243.4	1103.5	21.83	9.93	24.89
10126.0	-20610455	-8638680	-19774885	25823.2	-2223.5	1153.3	21.80	9.97	24.87
10128.0	-20558765	-8643107	-19772529	25866.8	-2203.5	1203.0	21.79	10.03	24.83
10130.0	-20506988	-8647494	-19770073	25910.4	-2183.4	1252.6	21.81	10.09	24.82
10132.0	-20455124	-8651841	-19767518	25954.0	-2163.2	1302.2	21.85	10.15	24.80
10134.0	-20403172	-8656147	-19764864	25997.7	-2142.8	1351.8	21.88	10.23	24.77
10136.0	-20351133	-8660412	-19762111	26041.5	-2122.2	1401.3	21.82	10.31	24.77
10138.0	-20299006	-8664636	-19759259	26085.2	-2101.6	1450.9	21.86	10.35	24.79
10140.0	-20246792	-8668818	-19756308	26128.9	-2080.9	1500.3	21.82	10.37	24.69
10142.0	-20194491	-8672959	-19753257	26172.6	-2060.0	1549.7	21.95	10.51	24.71
10144.0	-20142102	-8677058	-19750109	26216.5	-2039.0	1599.1	21.88	10.51	24.69
10146.0	-20089624	-8681115	-19746861	26262.5	-2017.9	1648.5	24.33	10.59	24.65
10148.0	-20037050	-8685130	-19743515	26312.3	-1996.7	1697.8	25.54	10.56	24.63
10150.0	-19984374	-8689102	-19740070	26363.2	-1975.4	1746.9	25.71	10.77	24.51
10152.0	-19931596	-8693031	-19736527	26414.8	-1953.6	1796.0	25.82	11.08	24.52
10154.0	-19878715	-8696916	-19732886	26466.4	-1931.3	1844.9	25.82	11.20	24.49
10156.0	-19825730	-8700756	-19729148	26517.7	-1909.0	1893.6	25.56	11.10	24.25
10158.0	-19772644	-8704552	-19725312	26568.9	-1886.8	1942.2	25.50	11.12	24.24
10160.0	-19719455	-8708304	-19721379	26619.7	-1864.6	1990.5	25.44	11.12	24.24
10162.0	-19666165	-8712011	-19717350	26670.7	-1842.4	2039.1	25.51	11.02	24.33
10164.0	-19612772	-8715673	-19713223	26721.8	-1820.5	2087.9	25.65	10.89	24.53
10166.0	-19559277	-8719293	-19708998	26773.2	-1798.8	2137.1	25.75	10.85	24.70
10168.0	-19505679	-8722869	-19704674	26824.8	-1777.0	2186.5	25.82	10.94	24.62

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10170.0	-19451978	-8726401	-19700252	26876.5	-1755.0	2235.7	25.98	11.09	24.61
10172.0	-19398173	-8729888	-19695731	26928.4	-1732.8	2284.8	25.89	11.11	24.49
10174.0	-19344264	-8733332	-19691113	26980.2	-1710.5	2333.8	25.87	11.15	24.49
10176.0	-19290252	-8736730	-19686396	27032.1	-1688.0	2382.7	25.97	11.36	24.41
10178.0	-19236136	-8740083	-19681582	27084.1	-1665.1	2431.5	26.09	11.59	24.33
10180.0	-19181916	-8743390	-19676670	27136.3	-1641.8	2480.1	26.06	11.64	24.29
10182.0	-19127591	-8746651	-19671662	27188.3	-1618.5	2528.6	26.00	11.64	24.27
10184.0	-19073162	-8749864	-19666556	27240.4	-1595.1	2577.1	26.05	11.76	24.22
10186.0	-19018629	-8753031	-19661353	27292.6	-1571.4	2625.5	26.18	11.94	24.14
10188.0	-18963992	-8756150	-19656054	27345.1	-1547.5	2673.7	26.25	12.06	24.07
10190.0	-18909249	-8759221	-19650659	27397.6	-1523.3	2721.8	26.27	12.12	24.06
10192.0	-18854401	-8762243	-19645167	27450.2	-1498.9	2769.9	26.32	12.19	24.04
10194.0	-18799448	-8765216	-19639579	27502.9	-1474.5	2817.9	26.41	12.28	23.98
10196.0	-18744390	-8768141	-19633895	27555.7	-1449.9	2865.8	26.40	12.34	23.90
10198.0	-18689225	-8771016	-19628116	27608.5	-1425.1	2913.6	26.41	12.41	23.90
10200.0	-18633955	-8773841	-19622241	27661.5	-1400.2	2961.5	26.52	12.53	23.95
10202.0	-18578579	-8776616	-19616270	27714.6	-1375.0	3009.3	26.62	12.63	23.93
10204.0	-18523097	-8779341	-19610203	27767.9	-1349.7	3057.1	26.63	12.71	23.85
10206.0	-18467508	-8782015	-19604041	27821.2	-1324.2	3104.7	26.65	12.79	23.79
10208.0	-18411812	-8784637	-19597784	27874.5	-1298.5	3152.3	26.71	12.87	23.75
10210.0	-18356010	-8787209	-19591432	27928.0	-1272.7	3199.8	26.79	12.95	23.72
10212.0	-18300100	-8789728	-19584985	27981.6	-1246.7	3247.2	26.83	13.04	23.70
10214.0	-18244083	-8792195	-19578444	28035.3	-1220.5	3294.6	26.82	13.14	23.69
10216.0	-18187959	-8794610	-19571807	28089.0	-1194.1	3341.9	26.88	13.27	23.65
10218.0	-18131727	-8796971	-19565076	28142.9	-1167.5	3389.1	26.99	13.33	23.56
10220.0	-18075387	-8799280	-19558251	28196.9	-1140.8	3436.2	27.07	13.38	23.50
10222.0	-18018939	-8801534	-19551331	28251.1	-1113.9	3483.2	27.10	13.47	23.51
10224.0	-17962383	-8803735	-19544318	28305.4	-1086.9	3530.2	27.17	13.58	23.50
10226.0	-17905718	-8805882	-19537210	28359.8	-1059.6	3577.2	27.25	13.68	23.43
10228.0	-17848943	-8807974	-19530009	28414.3	-1032.2	3624.0	27.29	13.76	23.37
10230.0	-17792060	-8810010	-19522714	28468.9	-1004.6	3670.7	27.34	13.83	23.37
10232.0	-17735068	-8811992	-19515326	28523.7	-976.9	3717.4	27.41	13.91	23.34
10234.0	-17677965	-8813918	-19507845	28578.6	-948.9	3764.1	27.48	14.01	23.28
10236.0	-17620753	-8815788	-19500270	28633.6	-920.8	3810.6	27.52	14.11	23.25
10238.0	-17563431	-8817601	-19492602	28688.7	-892.5	3857.1	27.60	14.21	23.24
10240.0	-17505998	-8819357	-19484842	28744.0	-864.0	3903.5	27.69	14.31	23.20
10242.0	-17448455	-8821057	-19476988	28799.4	-835.2	3949.9	27.73	14.43	23.16
10244.0	-17390801	-8822698	-19469042	28854.9	-806.3	3996.2	27.79	14.50	23.13
10246.0	-17333035	-8824282	-19461004	28910.6	-777.2	4042.4	27.88	14.56	23.11
10248.0	-17275158	-8825807	-19452872	28966.4	-748.0	4088.6	27.95	14.68	23.07
10250.0	-17217169	-8827274	-19444649	29022.4	-718.5	4134.7	28.00	14.79	23.00
10252.0	-17159068	-8828681	-19436334	29078.5	-688.9	4180.7	28.09	14.84	22.98
10254.0	-17100855	-8830029	-19427927	29134.7	-659.1	4226.6	28.15	14.97	22.97

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10256.0	-17042529	-8831317	-19419427	29191.1	-629.0	4272.5	28.23	15.13	22.91
10258.0	-16984091	-8832545	-19410837	29247.6	-598.6	4318.2	28.32	15.22	22.85
10260.0	-16925539	-8833712	-19402155	29304.4	-568.1	4363.9	28.40	15.29	22.84
10262.0	-16866873	-8834817	-19393381	29361.2	-537.4	4409.6	28.47	15.38	22.83
10264.0	-16808094	-8835861	-19384516	29418.3	-506.6	4455.2	28.55	15.45	22.78
10266.0	-16749200	-8836844	-19375560	29475.5	-475.6	4500.7	28.65	15.54	22.73
10268.0	-16690192	-8837764	-19366513	29532.8	-444.4	4546.1	28.71	15.67	22.69
10270.0	-16631069	-8838621	-19357376	29590.3	-412.9	4591.5	28.77	15.81	22.68
10272.0	-16571830	-8839415	-19348148	29647.9	-381.2	4636.8	28.86	15.90	22.67
10274.0	-16512477	-8840146	-19338828	29705.8	-349.4	4682.2	28.96	15.98	22.66
10276.0	-16453007	-8840813	-19329419	29763.8	-317.2	4727.4	29.03	16.13	22.61
10278.0	-16393422	-8841415	-19319919	29821.9	-284.8	4772.6	29.10	16.27	22.55
10280.0	-16333720	-8841952	-19310328	29880.2	-252.2	4817.7	29.20	16.37	22.52
10282.0	-16273901	-8842423	-19300648	29938.7	-219.4	4862.7	29.32	16.47	22.50
10284.0	-16213964	-8842829	-19290878	29997.5	-186.3	4907.7	29.42	16.59	22.47
10286.0	-16153911	-8843168	-19281017	30056.4	-153.0	4952.6	29.50	16.68	22.43
10288.0	-16093739	-8843441	-19271067	30115.5	-119.5	4997.4	29.60	16.80	22.39
10290.0	-16033448	-8843646	-19261028	30174.8	-85.8	5042.2	29.71	16.94	22.38
10292.0	-15973039	-8843784	-19250899	30234.3	-51.8	5086.9	29.77	17.07	22.38
10294.0	-15912511	-8843853	-19240680	30293.9	-17.6	5131.7	29.85	17.15	22.35
10296.0	-15851864	-8843854	-19230372	30353.8	16.8	5176.3	29.98	17.26	22.33
10298.0	-15791096	-8843786	-19219975	30413.8	51.5	5221.0	30.09	17.40	22.32
10300.0	-15730208	-8843648	-19209488	30474.1	86.4	5265.6	30.20	17.54	22.30
10302.0	-15669199	-8843440	-19198912	30534.6	121.7	5310.2	30.29	17.67	22.28
10304.0	-15608070	-8843161	-19188247	30595.3	157.1	5354.8	30.40	17.82	22.29
10306.0	-15546818	-8842811	-19177493	30656.2	192.9	5399.3	30.52	17.95	22.26
10308.0	-15485445	-8842389	-19166650	30717.4	228.9	5443.8	30.62	18.07	22.21
10310.0	-15423948	-8841895	-19155718	30778.7	265.2	5488.2	30.72	18.20	22.18
10312.0	-15362329	-8841328	-19144697	30840.3	301.7	5532.6	30.84	18.33	22.21
10314.0	-15300587	-8840688	-19133588	30902.1	338.5	5577.0	30.93	18.43	22.21
10316.0	-15238721	-8839974	-19122390	30964.0	375.5	5621.4	31.01	18.56	22.16
10318.0	-15176731	-8839186	-19111103	31026.2	412.7	5665.7	31.15	18.69	22.14
10320.0	-15114616	-8838323	-19099727	31088.6	450.2	5710.0	31.27	18.81	22.16
10322.0	-15052376	-8837385	-19088263	31151.2	488.0	5754.3	31.38	18.95	22.19
10324.0	-14990011	-8836371	-19076710	31214.1	526.1	5798.7	31.52	19.12	22.19
10326.0	-14927520	-8835281	-19065068	31277.4	564.5	5843.1	31.70	19.33	22.18
10328.0	-14864902	-8834113	-19053337	31340.9	603.4	5887.4	31.85	19.54	22.16
10330.0	-14802156	-8832867	-19041518	31404.7	642.6	5931.7	31.96	19.68	22.18
10332.0	-14739283	-8831542	-19029610	31468.8	682.1	5976.1	32.09	19.79	22.22
10334.0	-14676281	-8830138	-19017614	31533.1	721.8	6020.6	32.28	19.91	22.26
10336.0	-14613150	-8828655	-19005528	31597.8	761.7	6065.2	32.41	19.99	22.28
10338.0	-14549889	-8827092	-18993353	31662.8	801.8	6109.8	32.50	20.10	22.32
10340.0	-14486499	-8825448	-18981089	31727.9	842.1	6154.4	32.63	20.30	22.36

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10342.0	-14422977	-8823723	-18968735	31793.3	883.0	6199.2	32.79	20.52	22.37
10344.0	-14359325	-8821916	-18956292	31859.0	924.2	6244.0	32.94	20.71	22.41
10346.0	-14295541	-8820026	-18943759	31925.1	965.8	6288.9	33.12	20.93	22.49
10348.0	-14231624	-8818052	-18931137	31991.6	1008.0	6333.9	33.35	21.20	22.58
10350.0	-14167575	-8815994	-18918423	32058.4	1050.5	6379.1	33.49	21.35	22.61
10352.0	-14103391	-8813850	-18905620	32125.4	1093.2	6424.3	33.49	21.37	22.57
10354.0	-14039073	-8811621	-18892726	32192.5	1136.0	6469.4	33.61	21.45	22.59
10356.0	-13974621	-8809305	-18879742	32259.9	1179.3	6514.9	33.81	21.86	22.89
10358.0	-13910033	-8806903	-18866666	32327.5	1223.8	6561.4	33.83	22.62	23.56
10360.0	-13845310	-8804409	-18853496	32395.2	1269.6	6608.9	33.81	23.15	24.02
10362.0	-13780452	-8801824	-18840230	32463.0	1316.0	6657.0	33.98	23.24	24.04
10364.0	-13715458	-8799145	-18826868	32531.1	1362.5	6705.0	34.22	23.26	23.94
10366.0	-13650327	-8796374	-18813410	32599.8	1409.2	6752.9	34.45	23.39	23.94
10368.0	-13585059	-8793509	-18799856	32668.9	1456.0	6800.7	34.65	23.41	23.88
10370.0	-13519652	-8790550	-18786207	32738.4	1502.8	6848.4	34.86	23.40	23.83
10372.0	-13454105	-8787497	-18772463	32808.4	1549.6	6896.0	35.10	23.42	23.76
10374.0	-13388418	-8784351	-18758623	32878.8	1596.5	6943.5	35.36	23.50	23.70
10376.0	-13322589	-8781111	-18744689	32949.8	1643.6	6990.9	35.60	23.55	23.68
10378.0	-13256618	-8777777	-18730660	33021.2	1690.7	7038.2	35.83	23.58	23.65
10380.0	-13190504	-8774349	-18716536	33093.1	1737.6	7085.4	36.08	23.53	23.62
10382.0	-13124245	-8770827	-18702318	33165.4	1784.5	7132.7	36.32	23.46	23.59
S-IVB 2ND GUIDANCE CUTOFF									
10383.940	-13059835	-8767321	-18688436	33236.0	1829.1	7178.2	36.56	23.36	23.56
10384.0	-13057841	-8767211	-18688006	33238.3	1830.4	7179.6	36.57	23.35	23.50
10386.0	-12991369	-8763524	-18673605	33230.2	1854.8	7220.6	-9.38	10.59	20.15
10388.0	-12924926	-8759793	-18659123	33211.3	1876.0	7261.0	-9.45	10.56	20.09
10390.0	-12858525	-8756020	-18644561	33192.3	1897.1	7301.2	-9.52	10.54	20.04
10392.0	-12792161	-8752205	-18629919	33172.4	1918.1	7341.2	-9.58	10.52	19.99
TRANSLUNAR INJECTION (TLI)									
10393.940	-12727824	-8748463	-18615639	33153.8	1938.5	7379.9	-9.64	10.51	19.94
10400.0	-12527090	-8736522	-18570552	33094.8	2002.1	7500.2	-9.82	10.46	19.78
10450.0	-10885260	-8623552	-18171398	32566.1	2512.5	8454.0	-11.29	9.95	18.35
10500.0	-9271593	-8485723	-17726400	31970.7	2995.8	9332.8	-12.48	9.37	16.78
10550.0	-7689060	-8324483	-17239454	31323.0	3448.6	10131.4	-13.38	8.74	15.15
10600.0	-6139931	-8141404	-16714630	30636.8	3869.0	10847.8	-14.02	8.08	13.51
10650.0	-4625812	-7938137	-16156033	29924.7	4256.1	11482.6	-14.42	7.41	11.89
10700.0	-3147697	-7716353	-15567697	29198.4	4609.8	12037.9	-14.60	6.75	10.34
10750.0	-1706047	-7477697	-14953507	28467.7	4931.1	12517.5	-14.60	6.11	8.87
10800.0	-300863	-7223756	-14317128	27741.0	5221.5	12926.2	-14.45	5.51	7.50

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

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
10850.0	1068235	-6956037	-13661975	27025.2	5482.6	13269.4	-14.17	4.94	6.25
10900.0	2401924	-6675948	-12991184	26325.5	5716.6	13552.7	-13.80	4.42	5.11
10950.0	3701119	-6384796	-12307606	25646.0	5925.5	13781.8	-13.37	3.94	4.08
11000.0	4966905	-6083776	-11613813	24989.5	6111.6	13962.2	-12.88	3.51	3.16
11050.0	6200489	-5773978	-10912108	24358.1	6277.0	14099.2	-12.37	3.11	2.34
11100.0	7403153	-5456385	-10204540	23752.8	6423.7	14197.5	-11.84	2.76	1.61
11150.0	8576210	-5131889	-9492930	23174.0	6553.5	14261.6	-11.31	2.44	0.97
11200.0	9721004	-4801288	-8778884	22622.2	6668.1	14295.7	-10.77	2.15	0.41
11250.0	10838873	-4465302	-8063801	22097.0	6769.1	14303.5	-10.24	1.90	-0.08
11300.0	11931136	-4124573	-7348914	21597.9	6858.1	14288.4	-9.73	1.67	-0.51
11350.0	12999081	-3779665	-6635297	21124.1	6936.6	14253.1	-9.23	1.47	-0.89
11400.0	14043957	-3431073	-5923893	20674.9	7005.6	14200.3	-8.75	1.29	-1.22
11450.0	15066963	-3079244	-5215518	20249.2	7066.2	14132.3	-8.29	1.13	-1.50
11500.0	16069247	-2724577	-4510881	19845.8	7119.3	14051.1	-7.85	0.99	-1.74
11550.0	17051903	-2367430	-3810594	19463.9	7165.6	13958.6	-7.43	0.86	-1.96
11600.0	18015972	-2008117	-3115189	19102.2	7206.0	13856.1	-7.04	0.75	-2.14
11650.0	18962444	-1646922	-2425124	18759.8	7241.0	13745.2	-6.66	0.65	-2.29
11700.0	19892253	-1284095	-1740790	18435.6	7271.3	13627.0	-6.31	0.56	-2.43
11750.0	20806287	-919861	-1062525	18128.6	7297.4	13502.6	-5.97	0.48	-2.54
11800.0	21705382	-554418	-390618	17837.9	7319.7	13372.9	-5.66	0.41	-2.64
11850.0	22590329	-187944	274688	17562.5	7338.7	13238.6	-5.36	0.35	-2.72
	CSM SEPARATION								
11884.900	23200036	68380	735046	17379.0	7350.1	13142.7	-5.16	0.31	-2.77

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6									
9464.500	-461.231	-78.405	-3517.233	25341.7	32.7	-3348.3	3.94	0.64	30.06
9470.0	-438.283	-78.374	-3520.189	25363.0	36.3	-3183.0	3.75	0.64	30.08
9480.0	-396.511	-78.309	-3525.180	25398.8	42.7	-2882.0	3.39	0.64	30.12
9490.0	-354.683	-78.234	-3529.675	25431.0	49.2	-2580.6	3.03	0.64	30.16
9500.0	-312.805	-78.147	-3533.674	25459.7	55.6	-2278.8	2.68	0.64	30.20
9510.0	-270.882	-78.051	-3537.176	25484.7	62.1	-1976.8	2.32	0.64	30.22
9520.0	-228.922	-77.943	-3540.180	25506.2	68.5	-1674.4	1.96	0.64	30.25
9530.0	-186.928	-77.825	-3542.687	25524.1	74.9	-1371.9	1.60	0.64	30.27
9540.0	-144.909	-77.696	-3544.696	25538.5	81.4	-1069.1	1.24	0.64	30.29
9550.0	-102.869	-77.557	-3546.206	25549.2	87.8	-766.2	0.88	0.64	30.30
9560.0	-60.814	-77.407	-3547.218	25556.3	94.2	-463.2	0.52	0.64	30.31
9570.0	-18.750	-77.247	-3547.731	25559.8	100.6	-160.1	0.16	0.64	30.31
9580.0	23.316	-77.076	-3547.745	25559.8	107.0	143.0	-0.20	0.63	30.31
9590.0	65.380	-76.895	-3547.260	25556.1	113.4	446.0	-0.56	0.63	30.31
9600.0	107.434	-76.703	-3546.277	25548.9	119.8	749.0	-0.92	0.63	30.30
9610.0	149.474	-76.501	-3544.795	25538.0	126.1	1051.9	-1.28	0.63	30.29
9620.0	191.493	-76.288	-3542.814	25523.6	132.5	1354.7	-1.63	0.63	30.27
9630.0	233.485	-76.065	-3540.336	25505.6	138.8	1657.2	-1.99	0.63	30.25
9640.0	275.444	-75.831	-3537.360	25483.9	145.1	1959.5	-2.35	0.63	30.22
9650.0	317.365	-75.587	-3533.886	25458.7	151.4	2261.5	-2.71	0.62	30.19
9660.0	359.242	-75.333	-3529.916	25430.0	157.7	2563.2	-3.07	0.62	30.16
9670.0	401.068	-75.068	-3525.449	25397.6	164.0	2864.6	-3.42	0.62	30.12
9680.0	442.838	-74.793	-3520.487	25361.7	170.2	3165.5	-3.78	0.62	30.08
9690.0	484.546	-74.507	-3515.030	25322.2	176.5	3466.0	-4.14	0.62	30.03
9700.0	526.186	-74.212	-3509.079	25279.1	182.7	3766.0	-4.49	0.62	29.98
9710.0	567.752	-73.906	-3502.634	25232.5	188.9	4065.4	-4.85	0.61	29.92
9720.0	609.238	-73.590	-3495.697	25182.3	195.0	4364.3	-5.20	0.61	29.86
9730.0	650.640	-73.264	-3488.269	25128.6	201.2	4662.6	-5.56	0.61	29.80
9740.0	691.949	-72.928	-3480.350	25071.4	207.3	4960.2	-5.91	0.61	29.73
9750.0	733.162	-72.582	-3471.942	25010.6	213.4	5257.1	-6.26	0.60	29.66
9760.0	774.272	-72.226	-3463.047	24946.3	219.5	5553.3	-6.61	0.60	29.58
9770.0	815.273	-71.859	-3453.664	24878.6	225.5	5848.6	-6.96	0.60	29.50
9780.0	856.160	-71.483	-3443.796	24807.3	231.5	6143.2	-7.31	0.60	29.42
9790.0	896.926	-71.097	-3433.444	24732.5	237.5	6436.9	-7.66	0.59	29.33
9800.0	937.567	-70.702	-3422.609	24654.2	243.5	6729.6	-8.01	0.59	29.23
9810.0	978.075	-70.296	-3411.293	24572.5	249.4	7021.5	-8.35	0.59	29.14
9820.0	1018.447	-69.881	-3399.498	24487.3	255.3	7312.3	-8.70	0.58	29.04
9830.0	1058.676	-69.455	-3387.225	24398.7	261.2	7602.1	-9.04	0.58	28.93
9840.0	1098.755	-69.021	-3374.476	24306.7	267.0	7890.8	-9.38	0.58	28.82
9850.0	1138.681	-68.577	-3361.252	24211.2	272.8	8178.4	-9.73	0.57	28.71

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
9860.0	1178.447	-68.123	-3347.556	24112.3	278.6	8464.8	-10.07	0.57	28.59
9870.0	1218.047	-67.660	-3333.390	24010.2	284.3	8750.0	-10.38	0.57	28.47
9880.0	1257.476	-67.187	-3318.756	23904.5	290.1	9034.0	-10.79	0.56	28.34
9890.0	1296.728	-66.705	-3303.655	23795.6	295.7	9316.8	-11.08	0.56	28.21
9900.0	1335.799	-66.213	-3288.090	23683.2	301.3	9598.2	-11.41	0.56	28.08
9910.0	1374.682	-65.713	-3272.062	23567.5	306.9	9878.2	-11.74	0.55	27.94
9920.0	1413.371	-65.203	-3255.575	23448.5	312.5	10156.9	-12.07	0.55	27.80
9930.0	1451.863	-64.684	-3238.631	23326.4	318.0	10434.1	-12.36	0.55	27.69
9940.0	1490.150	-64.156	-3221.231	23200.8	323.5	10710.0	-12.73	0.54	27.50
9950.0	1528.228	-63.620	-3203.379	23072.0	328.9	10984.2	-13.05	0.54	27.35
9960.0	1566.092	-63.074	-3185.077	22940.0	334.3	11256.9	-13.38	0.53	27.19
9970.0	1603.735	-62.519	-3166.327	22804.8	339.7	11528.0	-13.69	0.53	27.03
9980.0	1641.154	-61.956	-3147.132	22666.5	345.0	11797.7	-13.99	0.52	26.88
9990.0	1678.342	-61.384	-3127.495	22524.9	350.2	12065.5	-14.30	0.52	26.70
10000.0	1715.294	-60.803	-3107.419	22380.1	355.5	12331.7	-14.63	0.52	26.57
10010.0	1752.006	-60.214	-3086.906	22232.3	360.6	12596.1	-14.96	0.51	26.35
10020.0	1788.472	-59.616	-3065.959	22081.4	365.8	12858.7	-15.28	0.51	26.17
10030.0	1824.687	-59.010	-3044.581	21927.3	370.8	13119.6	-15.59	0.50	25.99
10040.0	1860.646	-58.395	-3022.776	21770.3	375.9	13378.7	-15.87	0.50	25.80
S-IVB RE-IGNITION (STDV OPEN)									
10042.800	1870.668	-58.222	-3016.594	21725.9	377.3	13451.0	-15.70	0.39	25.81
10044.0	1874.557	-58.147	-3013.934	21710.9	377.7	13484.2	-7.21	0.45	30.97
10046.0	1882.102	-58.023	-3009.484	21706.6	378.6	13552.1	-0.09	0.43	35.17
10048.0	1889.247	-57.898	-3005.012	21706.8	379.5	13623.1	0.22	0.43	35.76
10050.0	1896.393	-57.773	-3000.516	21707.6	380.1	13694.6	0.43	0.31	35.71
10052.0	1903.538	-57.648	-2995.996	21709.0	380.9	13766.3	0.60	0.41	35.76
10054.0	1910.684	-57.522	-2991.453	21710.0	381.0	13838.4	0.40	-0.23	36.21
10056.0	1917.830	-57.397	-2986.886	21710.5	379.8	13911.0	0.14	-0.96	36.43
10058.0	1924.976	-57.272	-2982.295	21710.8	377.6	13983.9	0.14	-1.26	36.42
10060.0	1932.123	-57.148	-2977.681	21711.3	375.3	14056.7	0.29	-1.03	36.40
10062.0	1939.269	-57.025	-2973.042	21711.8	373.4	14129.6	0.28	-0.80	36.48
10064.0	1946.416	-56.903	-2968.379	21712.3	371.9	14202.5	0.18	-0.80	36.53
10066.0	1953.563	-56.780	-2963.692	21712.7	370.3	14275.6	0.16	-0.78	36.52
10068.0	1960.710	-56.659	-2958.981	21713.0	368.9	14348.6	0.17	-0.65	36.54
10070.0	1967.857	-56.538	-2954.246	21713.3	367.7	14421.8	0.11	-0.51	36.63
10072.0	1975.004	-56.417	-2949.487	21713.4	366.8	14495.2	0.02	-0.43	36.73
10074.0	1982.151	-56.296	-2944.704	21713.4	366.0	14568.7	-0.04	-0.39	36.77
10076.0	1989.298	-56.176	-2939.896	21713.4	365.3	14642.2	-0.04	-0.35	36.76
10078.0	1996.445	-56.056	-2935.064	21713.3	364.6	14715.7	-0.06	-0.29	36.77
10080.0	2003.592	-55.936	-2930.209	21713.1	364.1	14789.3	-0.12	-0.21	36.79
10082.0	2010.739	-55.816	-2925.328	21712.9	363.8	14862.9	-0.13	-0.15	36.82

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
10084.0	2017.886	-55.696	-2920.424	21712.6	363.5	14936.5	-0.14	-0.09	36.83
10086.0	2025.033	-55.577	-2915.495	21712.3	363.4	15010.2	-0.18	-0.04	36.85
10088.0	2032.180	-55.457	-2910.543	21711.9	363.4	15083.9	-0.21	0.03	36.86
10090.0	2039.326	-55.337	-2905.566	21711.5	363.6	15157.6	-0.22	0.11	36.85
10092.0	2046.473	-55.218	-2900.564	21711.1	363.8	15231.3	-0.24	0.17	36.85
10094.0	2053.619	-55.098	-2895.539	21710.6	364.2	15305.0	-0.28	0.21	36.88
10096.0	2060.765	-54.978	-2890.489	21710.0	364.7	15378.8	-0.30	0.25	36.93
10098.0	2067.911	-54.858	-2885.414	21709.4	365.2	15452.7	-0.29	0.29	36.95
10100.0	2075.057	-54.737	-2880.316	21708.9	365.9	15526.6	-0.31	0.35	36.93
10102.0	2082.202	-54.617	-2875.193	21708.2	366.7	15600.4	-0.33	0.43	36.93
10104.0	2089.348	-54.496	-2870.046	21707.6	367.6	15674.3	-0.34	0.49	36.94
10106.0	2096.493	-54.375	-2864.874	21706.9	368.6	15748.2	-0.35	0.53	36.97
10108.0	2103.638	-54.253	-2859.679	21706.2	369.8	15822.1	-0.39	0.60	36.98
10110.0	2110.782	-54.131	-2854.458	21705.4	371.0	15896.1	-0.41	0.67	37.01
10112.0	2117.927	-54.009	-2849.214	21704.6	372.4	15970.1	-0.43	0.71	37.02
10114.0	2125.071	-53.886	-2843.945	21703.7	373.9	16044.2	-0.45	0.75	37.00
10116.0	2132.215	-53.763	-2838.652	21702.8	375.5	16118.1	-0.47	0.83	36.99
10118.0	2139.358	-53.639	-2833.334	21701.9	377.2	16192.2	-0.48	0.89	37.02
10120.0	2146.501	-53.515	-2827.992	21700.9	379.1	16266.2	-0.48	0.95	37.07
10122.0	2153.644	-53.389	-2822.626	21700.0	381.0	16340.4	-0.50	1.02	37.09
10124.0	2160.787	-53.264	-2817.235	21698.9	383.1	16414.6	-0.54	1.06	37.08
10126.0	2167.929	-53.137	-2811.820	21697.8	385.3	16488.7	-0.57	1.10	37.06
10128.0	2175.071	-53.010	-2806.380	21696.7	387.6	16562.8	-0.59	1.16	37.04
10130.0	2182.212	-52.882	-2800.916	21695.5	389.9	16636.9	-0.60	1.21	37.06
10132.0	2189.353	-52.753	-2795.428	21694.3	392.4	16711.0	-0.58	1.27	37.09
10134.0	2196.494	-52.624	-2789.915	21693.2	395.0	16785.2	-0.59	1.35	37.10
10136.0	2203.634	-52.493	-2784.378	21692.0	397.8	16859.4	-0.67	1.41	37.09
10138.0	2210.774	-52.362	-2778.816	21690.7	400.7	16933.7	-0.67	1.44	37.14
10140.0	2217.913	-52.229	-2773.230	21689.3	403.6	17007.8	-0.67	1.49	37.05
10142.0	2225.052	-52.096	-2767.620	21688.1	406.7	17082.1	-0.63	1.61	37.18
10144.0	2232.191	-51.962	-2761.985	21686.8	409.9	17156.4	-0.69	1.61	37.13
10146.0	2239.329	-51.826	-2756.325	21687.2	413.4	17232.0	1.25	1.87	38.58
10148.0	2246.468	-51.689	-2750.641	21690.7	417.2	17309.8	2.22	1.94	39.29
10150.0	2253.609	-51.552	-2744.930	21695.0	421.3	17388.2	2.35	2.18	39.35
10152.0	2260.751	-51.412	-2739.194	21699.7	425.9	17467.1	2.33	2.47	39.51
10154.0	2267.894	-51.271	-2733.431	21704.3	431.0	17546.0	2.29	2.59	39.52
10156.0	2275.039	-51.128	-2727.643	21708.9	436.2	17624.6	2.23	2.56	39.15
10158.0	2282.185	-50.984	-2721.829	21713.3	441.3	17703.0	2.16	2.57	39.12
10160.0	2289.333	-50.838	-2715.989	21717.5	446.4	17781.1	2.10	2.55	39.08
10162.0	2296.482	-50.690	-2710.123	21721.8	451.4	17859.3	2.13	2.43	39.17
10164.0	2303.633	-50.541	-2704.232	21726.1	456.1	17937.8	2.15	2.24	39.37
10166.0	2310.785	-50.390	-2698.314	21730.4	460.4	18016.6	2.14	2.13	39.55
10168.0	2317.938	-50.238	-2692.371	21734.7	464.8	18095.9	2.20	2.24	39.56

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
10170.0	2325.093	-50.084	-2686.402	21739.2	469.5	18175.0	2.28	2.39	39.69
10172.0	2332.249	-49.929	-2680.406	21743.8	474.3	18254.3	2.24	2.44	39.55
10174.0	2339.407	-49.772	-2674.385	21748.2	479.2	18333.4	2.20	2.46	39.55
10176.0	2346.567	-49.613	-2668.337	21752.7	484.3	18412.6	2.25	2.69	39.61
10178.0	2353.727	-49.453	-2662.263	21757.3	490.0	18491.8	2.32	2.93	39.68
10180.0	2360.890	-49.290	-2656.164	21761.9	495.9	18571.2	2.28	2.98	39.65
10182.0	2368.054	-49.126	-2650.038	21766.4	501.9	18650.4	2.23	2.93	39.60
10184.0	2375.219	-48.960	-2643.886	21770.9	508.0	18729.6	2.25	3.11	39.63
10186.0	2382.386	-48.792	-2637.708	21775.5	514.4	18808.9	2.33	3.30	39.69
10188.0	2389.554	-48.621	-2631.503	21780.2	521.1	18888.3	2.37	3.44	39.72
10190.0	2396.724	-48.449	-2625.273	21784.9	528.1	18967.8	2.36	3.50	39.74
10192.0	2403.895	-48.274	-2619.017	21789.7	535.2	19047.3	2.37	3.56	39.78
10194.0	2411.068	-48.096	-2612.734	21794.5	542.4	19126.9	2.43	3.67	39.80
10196.0	2418.243	-47.917	-2606.425	21799.4	549.8	19206.4	2.44	3.74	39.75
10198.0	2425.419	-47.734	-2600.090	21804.2	557.4	19286.0	2.41	3.80	39.79
10200.0	2432.597	-47.550	-2593.729	21809.1	565.1	19365.7	2.43	3.89	39.92
10202.0	2439.777	-47.362	-2587.341	21814.0	573.0	19445.6	2.47	4.00	40.00
10204.0	2446.958	-47.173	-2580.928	21819.0	581.1	19525.6	2.49	4.09	39.97
10206.0	2454.140	-46.980	-2574.487	21824.0	589.3	19605.5	2.49	4.19	39.96
10208.0	2461.325	-46.785	-2568.021	21829.0	597.8	19685.4	2.52	4.27	39.99
10210.0	2468.511	-46.586	-2561.528	21834.1	606.4	19765.5	2.56	4.35	40.04
10212.0	2475.698	-46.385	-2555.009	21839.2	615.2	19845.6	2.57	4.43	40.07
10214.0	2482.888	-46.181	-2548.463	21844.3	624.2	19925.7	2.52	4.53	40.09
10216.0	2490.079	-45.974	-2541.892	21849.4	633.4	20005.9	2.54	4.66	40.13
10218.0	2497.272	-45.764	-2535.293	21854.6	642.8	20086.2	2.64	4.75	40.15
10220.0	2504.466	-45.551	-2528.669	21859.9	652.3	20166.5	2.71	4.81	40.16
10222.0	2511.662	-45.335	-2522.017	21865.3	662.1	20246.9	2.69	4.89	40.22
10224.0	2518.860	-45.115	-2515.340	21870.7	671.9	20327.4	2.70	4.99	40.29
10226.0	2526.060	-44.892	-2508.636	21876.2	682.0	20408.0	2.75	5.11	40.31
10228.0	2533.262	-44.666	-2501.905	21881.7	692.3	20488.6	2.78	5.20	40.31
10230.0	2540.465	-44.437	-2495.148	21887.3	702.8	20569.2	2.78	5.26	40.36
10232.0	2547.671	-44.204	-2488.364	21892.9	713.4	20650.0	2.82	5.34	40.41
10234.0	2554.878	-43.967	-2481.553	21898.6	724.2	20730.8	2.87	5.46	40.43
10236.0	2562.087	-43.727	-2474.716	21904.4	735.2	20811.7	2.86	5.56	40.46
10238.0	2569.298	-43.483	-2467.853	21910.1	746.5	20892.7	2.90	5.65	40.53
10240.0	2576.511	-43.235	-2460.962	21916.0	757.9	20973.8	2.94	5.76	40.59
10242.0	2583.725	-42.984	-2454.045	21921.9	769.5	21055.0	2.95	5.88	40.61
10244.0	2590.942	-42.729	-2447.102	21927.8	781.3	21136.3	2.97	5.95	40.65
10246.0	2598.161	-42.470	-2440.131	21933.8	793.3	21217.6	3.02	6.02	40.71
10248.0	2605.381	-42.206	-2433.134	21939.9	805.5	21299.1	3.05	6.14	40.75
10250.0	2612.604	-41.939	-2426.109	21946.0	817.9	21380.6	3.08	6.26	40.76
10252.0	2619.829	-41.668	-2419.058	21952.2	830.5	21462.1	3.13	6.32	40.82
10254.0	2627.056	-41.393	-2411.981	21958.5	843.2	21543.8	3.13	6.44	40.88

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
10256.0	2634.284	-41.113	-2404.876	21964.8	856.3	21625.6	3.16	6.61	40.93
10258.0	2641.515	-40.829	-2397.744	21971.2	869.6	21707.5	3.23	6.71	40.97
10260.0	2648.748	-40.540	-2390.585	21977.7	883.1	21789.5	3.27	6.78	41.03
10262.0	2655.984	-40.248	-2383.400	21984.3	896.7	21871.7	3.28	6.86	41.09
10264.0	2663.221	-39.950	-2376.187	21990.9	910.5	21953.9	3.33	6.94	41.12
10266.0	2670.461	-39.648	-2368.947	21997.6	924.5	22036.2	3.40	7.04	41.17
10268.0	2677.702	-39.341	-2361.680	22004.5	938.7	22118.5	3.41	7.17	41.22
10270.0	2684.946	-39.030	-2354.386	22011.3	953.2	22201.0	3.41	7.31	41.28
10272.0	2692.193	-38.714	-2347.065	22018.2	967.9	22283.7	3.44	7.39	41.36
10274.0	2699.441	-38.393	-2339.716	22025.1	982.8	22366.5	3.49	7.47	41.44
10276.0	2706.692	-38.067	-2332.341	22032.1	997.9	22449.4	3.51	7.62	41.49
10278.0	2713.945	-37.736	-2324.938	22039.2	1013.3	22532.4	3.55	7.77	41.53
10280.0	2721.201	-37.400	-2317.507	22046.3	1028.9	22615.6	3.60	7.87	41.60
10282.0	2728.459	-37.059	-2310.049	22053.6	1044.8	22698.9	3.65	7.98	41.69
10284.0	2735.719	-36.712	-2302.564	22061.0	1060.9	22782.3	3.70	8.10	41.75
10286.0	2742.982	-36.360	-2295.051	22068.4	1077.2	22865.8	3.74	8.20	41.80
10288.0	2750.247	-36.003	-2287.511	22076.0	1093.7	22949.5	3.80	8.32	41.87
10290.0	2757.515	-35.640	-2279.943	22083.6	1110.5	23033.3	3.83	8.46	41.96
10292.0	2764.785	-35.272	-2272.348	22091.3	1127.5	23117.3	3.83	8.57	42.04
10294.0	2772.058	-34.898	-2264.725	22099.0	1144.7	23201.5	3.86	8.65	42.10
10296.0	2779.333	-34.518	-2257.074	22106.7	1162.1	23285.8	3.92	8.76	42.19
10298.0	2786.611	-34.133	-2249.396	22114.6	1179.8	23370.2	3.97	8.90	42.29
10300.0	2793.892	-33.742	-2241.689	22122.6	1197.7	23454.9	4.00	9.04	42.38
10302.0	2801.175	-33.344	-2233.955	22130.7	1215.9	23539.7	4.03	9.16	42.46
10304.0	2808.461	-32.941	-2226.193	22138.8	1234.4	23624.8	4.06	9.29	42.58
10306.0	2815.749	-32.532	-2218.402	22147.0	1253.1	23710.0	4.11	9.43	42.67
10308.0	2823.040	-32.116	-2210.584	22155.2	1272.1	23795.4	4.17	9.56	42.72
10310.0	2830.334	-31.694	-2202.737	22163.6	1291.4	23881.0	4.20	9.69	42.81
10312.0	2837.631	-31.266	-2194.863	22172.1	1310.8	23966.7	4.23	9.79	42.94
10314.0	2844.930	-30.831	-2186.960	22180.6	1330.5	24052.7	4.26	9.88	43.02
10316.0	2852.233	-30.390	-2179.028	22189.1	1350.4	24138.7	4.30	10.02	43.07
10318.0	2859.538	-29.942	-2171.069	22197.8	1370.6	24225.0	4.35	10.15	43.18
10320.0	2866.846	-29.488	-2163.081	22206.5	1391.0	24311.5	4.39	10.25	43.31
10322.0	2874.157	-29.026	-2155.064	22215.3	1411.6	24398.2	4.40	10.37	43.43
10324.0	2881.471	-28.558	-2147.019	22224.2	1432.6	24485.2	4.44	10.53	43.57
10326.0	2888.787	-28.083	-2138.945	22233.2	1453.8	24572.5	4.52	10.73	43.73
10328.0	2896.107	-27.601	-2130.842	22242.3	1475.5	24660.1	4.57	10.93	43.87
10330.0	2903.430	-27.112	-2122.711	22251.4	1497.5	24748.0	4.58	11.06	43.99
10332.0	2910.756	-26.615	-2114.550	22260.6	1519.7	24836.1	4.62	11.15	44.14
10334.0	2918.084	-26.111	-2106.361	22270.0	1542.1	24924.6	4.70	11.24	44.31
10336.0	2925.416	-25.600	-2098.142	22279.4	1564.7	25013.3	4.75	11.32	44.44
10338.0	2932.751	-25.081	-2089.894	22288.9	1587.4	25102.3	4.75	11.40	44.56
10340.0	2940.089	-24.555	-2081.617	22298.4	1610.4	25191.6	4.75	11.56	44.72

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
10342.0	2947.431	-24.021	-2073.310	22308.0	1633.7	25281.2	4.79	11.77	44.90
10344.0	2954.775	-23.480	-2064.974	22317.6	1657.4	25371.2	4.82	11.93	45.07
10346.0	2962.123	-22.930	-2056.608	22327.2	1681.4	25461.5	4.83	12.11	45.30
10348.0	2969.473	-22.373	-2048.212	22336.9	1705.9	25552.4	4.86	12.33	45.59
10350.0	2976.827	-21.807	-2039.786	22346.7	1730.7	25643.8	4.90	12.46	45.73
10352.0	2984.185	-21.233	-2031.330	22356.5	1755.6	25735.2	4.90	12.48	45.72
10354.0	2991.545	-20.651	-2022.844	22366.4	1780.7	25826.8	4.94	12.55	45.83
10356.0	2998.909	-20.061	-2014.328	22376.2	1806.0	25918.8	4.79	12.82	46.29
10358.0	3006.276	-19.462	-2005.781	22385.1	1832.1	26012.2	4.21	13.25	47.01
10360.0	3013.645	-18.855	-1997.204	22393.2	1858.9	26106.7	3.77	13.54	47.49
10362.0	3021.017	-18.239	-1988.595	22400.8	1886.1	26201.8	3.85	13.62	47.63
10364.0	3028.392	-17.613	-1979.955	22408.6	1913.4	26297.2	4.07	13.68	47.72
10366.0	3035.769	-16.979	-1971.283	22416.9	1940.9	26392.8	4.19	13.82	47.90
10368.0	3043.149	-16.335	-1962.580	22425.5	1968.6	26488.7	4.36	13.86	47.99
10370.0	3050.532	-15.683	-1953.845	22434.4	1996.3	26584.8	4.54	13.88	48.08
10372.0	3057.918	-15.021	-1945.079	22443.7	2024.1	26681.0	4.74	13.94	48.19
10374.0	3065.307	-14.350	-1936.281	22453.4	2052.1	26777.5	4.93	14.04	48.33
10376.0	3072.700	-13.670	-1927.451	22463.4	2080.3	26874.3	5.10	14.11	48.47
10378.0	3080.095	-12.981	-1918.589	22473.7	2108.5	26971.4	5.27	14.15	48.61
10380.0	3087.495	-12.282	-1909.695	22484.6	2136.6	27068.6	5.48	14.13	48.73
10382.0	3094.897	-11.574	-1900.769	22495.7	2164.7	27166.2	5.69	14.08	48.84
S-IVB 2ND GUIDANCE CUTOFF									
10383.940	3102.082	-10.879	-1892.080	22507.2	2191.3	27260.6	5.91	14.01	48.94
10384.0	3102.304	-10.857	-1891.811	22507.7	2192.1	27263.6	5.94	14.03	48.90
10386.0	3109.706	-10.135	-1882.830	22465.4	2195.8	27301.3	-24.72	0.11	14.96
10388.0	3117.093	-9.412	-1873.839	22415.7	2196.0	27331.3	-24.74	0.09	14.86
10390.0	3124.462	-8.689	-1864.838	22366.2	2196.2	27360.9	-24.76	0.09	14.77
10392.0	3131.816	-7.966	-1855.827	22316.0	2196.3	27389.8	-24.79	0.08	14.67
TRANSLUNAR INJECTION (TLI)									
10393.940	3138.934	-7.265	-1847.077	22267.9	2196.4	27418.2	-24.81	0.08	14.59
10400.0	3161.068	-5.074	-1819.688	22117.5	2196.9	27505.8	-24.86	0.06	14.32
10450.0	3337.928	13.007	-1590.557	20864.6	2196.3	28164.0	-25.21	-0.08	12.01
10500.0	3504.432	31.054	-1356.482	19603.2	2188.9	28707.8	-25.20	-0.21	9.75
10550.0	3660.577	49.016	-1118.390	18349.5	2175.8	29141.1	-24.90	-0.32	7.61
10600.0	3806.485	66.849	-877.165	17117.1	2157.7	29470.8	-24.36	-0.41	5.61
10650.0	3942.379	84.515	-633.625	15917.3	2135.2	29705.1	-23.61	-0.49	3.79
10700.0	4068.564	101.980	-388.518	14758.8	2109.1	29853.3	-22.71	-0.55	2.17
10750.0	4185.409	119.218	-142.511	13648.0	2080.2	29925.2	-21.71	-0.60	0.74
10800.0	4293.324	136.209	103.806	12589.1	2049.1	29930.5	-20.64	-0.64	-0.50

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN PHASE (CONT.)

TIME SEC	XS NM	YS NM	ZS NM	DXS FT/S	DYS FT/S	DZS FT/S	DDXS FT/S SQ	DDYS FT/S SQ	DDZS FT/S SQ
10850.0	4392.747	152.938	349.924	11584.4	2016.5	29878.5	-19.54	-0.67	-1.55
10900.0	4484.131	169.393	595.408	10635.0	1982.7	29777.8	-18.43	-0.68	-2.45
10950.0	4567.929	185.567	839.892	9740.7	1948.3	29636.4	-17.34	-0.69	-3.19
11000.0	4644.590	201.457	1083.069	8900.2	1913.6	29461.4	-16.28	-0.69	-3.79
11050.0	4714.550	217.061	1324.690	8111.8	1878.9	29259.0	-15.26	-0.69	-4.28
11100.0	4778.228	232.381	1564.551	7373.1	1844.4	29034.5	-14.29	-0.69	-4.68
11150.0	4836.025	247.418	1802.488	6681.8	1810.4	28792.5	-13.37	-0.68	-4.99
11200.0	4888.319	262.177	2038.377	6035.2	1776.8	28537.1	-12.50	-0.67	-5.22
11250.0	4935.467	276.662	2272.122	5430.6	1743.7	28271.8	-11.69	-0.65	-5.38
11300.0	4977.803	290.877	2503.653	4865.4	1711.4	27999.6	-10.93	-0.64	-5.50
11350.0	5015.641	304.830	2732.922	4336.9	1680.0	27722.7	-10.22	-0.61	-5.57
11400.0	5049.273	318.530	2959.902	3842.5	1649.7	27443.2	-9.56	-0.60	-5.60
11450.0	5078.969	331.983	3184.576	3380.0	1620.3	27162.7	-8.95	-0.58	-5.61
11500.0	5104.981	345.198	3406.943	2946.9	1591.7	26882.5	-8.38	-0.56	-5.59
11550.0	5127.544	358.182	3627.009	2541.2	1564.0	26603.7	-7.85	-0.54	-5.56
11600.0	5146.873	370.941	3844.791	2160.9	1537.2	26327.2	-7.37	-0.53	-5.50
11650.0	5163.171	383.484	4060.308	1804.1	1511.3	26053.8	-6.91	-0.51	-5.44
11700.0	5176.624	395.817	4273.590	1469.1	1486.2	25783.9	-6.49	-0.49	-5.36
11750.0	5187.405	407.947	4484.667	1154.3	1462.0	25518.0	-6.10	-0.48	-5.27
11800.0	5195.674	419.880	4693.574	858.3	1438.5	25256.4	-5.74	-0.46	-5.18
11850.0	5201.579	431.624	4900.347	579.8	1415.8	24999.4	-5.41	-0.45	-5.09
CSM SEPARATION 11884.900	5204.375	439.711	5043.430	395.0	1400.4	24822.9	-5.19	-0.44	-5.02

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

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	ALTITUDE FT
BEGIN S-IVB RESTART PREPARATIONS -- START OF TIME BASE 6										
9464.500	3548.212	151.1242	-18.1974	60.89	0.06	24246.9	62.51	0.05	25562.0	640477
9470.0	3548.234	151.4498	-18.0246	60.77	0.06	24246.9	62.41	0.05	25561.9	640484
9480.0	3548.273	152.0400	-17.7089	60.56	0.06	24246.9	62.21	0.05	25561.8	640498
9490.0	3548.313	152.6280	-17.3912	60.36	0.06	24246.9	62.02	0.05	25561.7	640513
9500.0	3548.352	153.2138	-17.0716	60.16	0.06	24246.9	61.83	0.05	25561.5	640529
9510.0	3548.391	153.7974	-16.7500	59.96	0.06	24247.0	61.65	0.05	25561.4	640547
9520.0	3548.430	154.3788	-16.4265	59.77	0.06	24247.0	61.47	0.05	25561.2	640565
9530.0	3548.469	154.9582	-16.1012	59.58	0.06	24247.0	61.30	0.05	25561.1	640585
9540.0	3548.507	155.5355	-15.7741	59.40	0.06	24247.0	61.13	0.05	25561.0	640606
9550.0	3548.545	156.1109	-15.4453	59.22	0.05	24247.0	60.96	0.05	25560.8	640629
9560.0	3548.583	156.6842	-15.1147	59.05	0.05	24247.0	60.80	0.05	25560.7	640653
9570.0	3548.621	157.2556	-14.7825	58.88	0.05	24247.0	60.64	0.05	25560.5	640678
9580.0	3548.658	157.8251	-14.4487	58.71	0.05	24247.0	60.49	0.05	25560.4	640705
9590.0	3548.696	158.3928	-14.1134	58.55	0.05	24247.0	60.34	0.05	25560.3	640734
9600.0	3548.733	158.9587	-13.7765	58.39	0.05	24247.0	60.19	0.05	25560.1	640765
9610.0	3548.769	159.5228	-13.4381	58.24	0.05	24247.0	60.05	0.05	25560.0	640797
9620.0	3548.806	160.0852	-13.0982	58.09	0.05	24247.0	59.91	0.05	25559.8	640832
9630.0	3548.842	160.6459	-12.7570	57.95	0.05	24246.9	59.77	0.05	25559.7	640868
9640.0	3548.878	161.2049	-12.4144	57.81	0.05	24246.9	59.64	0.05	25559.6	640907
9650.0	3548.913	161.7624	-12.0705	57.67	0.05	24246.9	59.51	0.05	25559.4	640947
9660.0	3548.948	162.3183	-11.7253	57.54	0.05	24246.9	59.39	0.05	25559.3	640990
9670.0	3548.983	162.8727	-11.3789	57.41	0.05	24246.9	59.27	0.05	25559.2	641035
9680.0	3549.018	163.4257	-11.0313	57.28	0.05	24246.8	59.15	0.05	25559.0	641082
9690.0	3549.052	163.9772	-10.6825	57.16	0.05	24246.8	59.04	0.05	25558.9	641132
9700.0	3549.086	164.5274	-10.3326	57.05	0.05	24246.8	58.93	0.05	25558.7	641183
9710.0	3549.120	165.0762	-9.9817	56.93	0.05	24246.7	58.83	0.05	25558.6	641238
9720.0	3549.153	165.6237	-9.6297	56.83	0.05	24246.7	58.73	0.05	25558.5	641294
9730.0	3549.186	166.1700	-9.2767	56.72	0.05	24246.6	58.63	0.04	25558.3	641353
9740.0	3549.218	166.7151	-8.9227	56.62	0.05	24246.6	58.54	0.04	25558.2	641415
9750.0	3549.251	167.2591	-8.5679	56.53	0.05	24246.5	58.45	0.04	25558.0	641479
9760.0	3549.282	167.8019	-8.2121	56.43	0.05	24246.5	58.36	0.04	25557.9	641546
9770.0	3549.314	168.3437	-7.8556	56.35	0.04	24246.4	58.28	0.04	25557.8	641616
9780.0	3549.345	168.8845	-7.4982	56.26	0.04	24246.4	58.20	0.04	25557.6	641688
9790.0	3549.375	169.4243	-7.1400	56.18	0.04	24246.3	58.13	0.04	25557.5	641763
9800.0	3549.406	169.9632	-6.7812	56.11	0.04	24246.2	58.06	0.04	25557.4	641841
9810.0	3549.436	170.5013	-6.4216	56.03	0.04	24246.2	57.99	0.04	25557.2	641921
9820.0	3549.465	171.0385	-6.0614	55.97	0.04	24246.1	57.93	0.04	25557.1	642005
9830.0	3549.494	171.5749	-5.7006	55.90	0.04	24246.0	57.87	0.04	25557.0	642091
9840.0	3549.523	172.1105	-5.3392	55.84	0.04	24245.9	57.81	0.04	25556.8	642180
9850.0	3549.551	172.6455	-4.9773	55.79	0.04	24245.8	57.76	0.04	25556.7	642272

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE FT
9860.0	3549.579	173.1799	-4.6149	55.73	0.04	24245.7	57.71	0.04	25556.5	642367
9870.0	3549.606	173.7136	-4.2520	55.69	0.04	24245.7	57.67	0.04	25556.5	642465
9880.0	3549.634	174.2468	-3.8887	55.64	0.04	24245.6	57.63	0.04	25556.3	642567
9890.0	3549.660	174.7795	-3.5250	55.60	0.04	24245.5	57.59	0.04	25556.2	642672
9900.0	3549.687	175.3118	-3.1610	55.57	0.04	24245.4	57.56	0.04	25556.0	642780
9910.0	3549.713	175.8436	-2.7966	55.53	0.04	24245.2	57.53	0.04	25555.9	642891
9920.0	3549.738	176.3750	-2.4320	55.50	0.04	24245.1	57.50	0.03	25555.7	643006
9930.0	3549.763	176.9062	-2.0671	55.48	0.04	24245.1	57.48	0.03	25555.6	643123
9940.0	3549.788	177.4371	-1.7020	55.46	0.04	24245.0	57.46	0.03	25555.6	643243
9950.0	3549.812	177.9677	-1.3368	55.44	0.03	24244.9	57.44	0.03	25555.4	643367
9960.0	3549.836	178.4982	-0.9714	55.43	0.03	24244.7	57.43	0.03	25555.3	643493
9970.0	3549.859	179.0285	-0.6060	55.42	0.03	24244.7	57.42	0.03	25555.3	643623
9980.0	3549.883	179.5588	-0.2405	55.42	0.03	24244.7	57.42	0.03	25555.3	643756
9990.0	3549.905	-179.9110	0.1251	55.42	0.03	24244.6	57.42	0.03	25555.2	643892
10000.0	3549.927	-179.3808	0.4906	55.42	0.03	24244.6	57.42	0.03	25555.2	644032
10010.0	3549.949	-178.8505	0.8561	55.43	0.03	24244.6	57.43	0.03	25555.2	644174
10020.0	3549.970	-178.3201	1.2215	55.44	0.03	24244.5	57.44	0.03	25555.2	644321
10030.0	3549.991	-177.7895	1.5867	55.45	0.03	24244.6	57.45	0.03	25555.2	644470
10040.0	3550.012	-177.2587	1.9518	55.47	0.03	24244.8	57.47	0.03	25555.4	644623
S-IVB RE-IGNITION (STDV OPEN)										
10042.800	3550.018	-177.1101	2.0540	55.48	0.03	24244.9	57.48	0.03	25555.5	644666
10044.0	3550.020	-177.0464	2.0978	55.48	0.03	24249.7	57.48	0.03	25560.3	644685
10046.0	3550.024	-176.9401	2.1709	55.49	0.03	24281.9	57.48	0.03	25592.6	644718
10048.0	3550.029	-176.8336	2.2440	55.49	0.03	24319.7	57.49	0.03	25630.4	644752
10050.0	3550.034	-176.7270	2.3172	55.50	0.04	24358.4	57.49	0.03	25669.1	644788
10052.0	3550.039	-176.6201	2.3906	55.51	0.04	24398.0	57.49	0.04	25708.7	644827
10054.0	3550.044	-176.5131	2.4640	55.51	0.04	24437.5	57.49	0.04	25748.2	644868
10056.0	3550.050	-176.4059	2.5376	55.51	0.04	24477.1	57.49	0.04	25787.7	644912
10058.0	3550.056	-176.2986	2.6113	55.51	0.04	24516.8	57.49	0.04	25827.3	644957
10060.0	3550.063	-176.1910	2.6851	55.51	0.05	24556.8	57.48	0.04	25867.2	645005
10062.0	3550.070	-176.0833	2.7590	55.51	0.05	24597.0	57.48	0.05	25907.3	645055
10064.0	3550.077	-175.9753	2.8331	55.52	0.05	24637.3	57.48	0.05	25947.6	645108
10066.0	3550.085	-175.8672	2.9072	55.52	0.06	24677.7	57.48	0.05	25987.9	645165
10068.0	3550.093	-175.7589	2.9815	55.52	0.06	24718.2	57.48	0.06	26028.3	645225
10070.0	3550.102	-175.6504	3.0559	55.53	0.07	24758.9	57.48	0.06	26069.0	645290
10072.0	3550.112	-175.5418	3.1304	55.53	0.07	24799.7	57.48	0.07	26109.7	645360
10074.0	3550.123	-175.4329	3.2050	55.53	0.08	24840.6	57.48	0.07	26150.6	645435
10076.0	3550.134	-175.3238	3.2797	55.54	0.08	24881.7	57.48	0.08	26191.6	645514
10078.0	3550.146	-175.2146	3.3546	55.55	0.09	24922.8	57.49	0.08	26232.6	645599
10080.0	3550.160	-175.1051	3.4296	55.55	0.10	24964.0	57.49	0.09	26273.8	645691
10082.0	3550.174	-174.9955	3.5046	55.56	0.10	25005.3	57.49	0.10	26315.1	645788

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUCE FT
10084.0	3550.189	-174.8856	3.5798	55.56	0.11	25046.8	57.50	0.11	26356.6	645893
10086.0	3550.206	-174.7755	3.6551	55.57	0.12	25088.4	57.50	0.11	26398.2	646006
10088.0	3550.224	-174.6653	3.7305	55.58	0.13	25130.1	57.50	0.12	26439.8	646126
10090.0	3550.243	-174.5548	3.8060	55.59	0.14	25171.9	57.51	0.13	26481.6	646256
10092.0	3550.264	-174.4442	3.8816	55.60	0.15	25213.8	57.51	0.14	26523.5	646394
10094.0	3550.286	-174.3333	3.9574	55.61	0.16	25255.7	57.52	0.15	26565.5	646542
10096.0	3550.310	-174.2222	4.0332	55.62	0.17	25297.9	57.53	0.16	26607.6	646700
10098.0	3550.335	-174.1110	4.1091	55.63	0.18	25340.2	57.53	0.17	26649.9	646869
10100.0	3550.363	-173.9995	4.1852	55.64	0.19	25382.6	57.54	0.18	26692.4	647049
10102.0	3550.392	-173.8878	4.2614	55.65	0.21	25425.1	57.55	0.20	26734.9	647241
10104.0	3550.423	-173.7758	4.3376	55.66	0.22	25467.7	57.55	0.21	26777.6	647445
10106.0	3550.457	-173.6637	4.4140	55.67	0.24	25510.5	57.56	0.22	26820.4	647662
10108.0	3550.492	-173.5514	4.4904	55.68	0.25	25553.4	57.57	0.24	26863.3	647893
10110.0	3550.530	-173.4388	4.5670	55.70	0.27	25596.4	57.58	0.25	26906.3	648138
10112.0	3550.570	-173.3260	4.6437	55.71	0.28	25639.5	57.59	0.27	26949.4	648397
10114.0	3550.613	-173.2130	4.7205	55.72	0.30	25682.7	57.60	0.28	26992.7	648671
10116.0	3550.658	-173.0998	4.7973	55.74	0.31	25726.0	57.61	0.30	27036.0	648961
10118.0	3550.706	-172.9864	4.8743	55.75	0.33	25769.4	57.62	0.32	27079.5	649267
10120.0	3550.756	-172.8727	4.9514	55.77	0.35	25813.0	57.63	0.33	27123.1	649590
10122.0	3550.810	-172.7588	5.0286	55.78	0.37	25856.7	57.64	0.35	27166.9	649931
10124.0	3550.866	-172.6447	5.1058	55.80	0.39	25900.5	57.65	0.37	27210.8	650289
10126.0	3550.925	-172.5304	5.1832	55.82	0.41	25944.4	57.67	0.39	27254.8	650666
10128.0	3550.998	-172.4158	5.2607	55.83	0.43	25988.3	57.68	0.41	27298.8	651062
10130.0	3551.053	-172.3010	5.3382	55.85	0.45	26032.3	57.69	0.43	27342.9	651478
10132.0	3551.122	-172.1860	5.4159	55.87	0.47	26076.5	57.71	0.45	27387.2	651915
10134.0	3551.194	-172.0707	5.4937	55.88	0.49	26120.9	57.72	0.47	27431.6	652372
10136.0	3551.270	-171.9552	5.5715	55.90	0.52	26165.4	57.73	0.49	27476.2	652851
10138.0	3551.350	-171.8395	5.6494	55.92	0.54	26209.9	57.75	0.51	27520.8	653352
10140.0	3551.433	-171.7236	5.7275	55.94	0.56	26254.5	57.76	0.54	27565.5	653876
10142.0	3551.520	-171.6074	5.8056	55.96	0.59	26299.3	57.78	0.56	27610.4	654424
10144.0	3551.611	-171.4909	5.8838	55.98	0.61	26344.2	57.80	0.58	27655.5	654996
10146.0	3551.705	-171.3742	5.9621	56.00	0.64	26391.4	57.81	0.61	27702.8	655592
10148.0	3551.805	-171.2573	6.0405	56.03	0.67	26442.6	57.83	0.64	27754.1	656214
10150.0	3551.908	-171.1401	6.1190	56.05	0.69	26494.8	57.85	0.66	27806.5	656863
10152.0	3552.016	-171.0226	6.1976	56.07	0.72	26547.8	57.87	0.69	27859.6	657540
10154.0	3552.129	-170.9048	6.2764	56.10	0.75	26600.8	57.89	0.72	27912.8	658245
10156.0	3552.246	-170.7868	6.3552	56.12	0.78	26653.7	57.91	0.75	27965.9	658979
10158.0	3552.368	-170.6684	6.4341	56.15	0.81	26706.5	57.93	0.78	28018.9	659744
10160.0	3552.496	-170.5498	6.5131	56.18	0.85	26759.1	57.95	0.81	28071.6	660540
10162.0	3552.628	-170.4309	6.5922	56.20	0.88	26811.9	57.97	0.84	28124.6	661367
10164.0	3552.766	-170.3117	6.6714	56.23	0.91	26865.0	58.00	0.87	28177.9	662228
10166.0	3552.910	-170.1922	6.7508	56.25	0.94	26918.5	58.02	0.90	28231.5	663121
10168.0	3553.058	-170.0724	6.8302	56.28	0.98	26972.4	58.04	0.93	28285.6	664048

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE FT
10170.0	3553.213	-169.9524	6.9097	56.30	1.01	27026.4	58.06	0.97	28339.8	665009
10172.0	3553.373	-169.8320	6.9893	56.33	1.05	27080.7	58.08	1.00	28394.3	666005
10174.0	3553.539	-169.7114	7.0690	56.36	1.08	27134.9	58.10	1.03	28448.7	667037
10176.0	3553.711	-169.5905	7.1489	56.39	1.12	27189.3	58.12	1.07	28503.3	668106
10178.0	3553.889	-169.4692	7.2288	56.41	1.16	27244.0	58.15	1.10	28558.1	669213
10180.0	3554.073	-169.3477	7.3088	56.44	1.20	27298.8	58.17	1.14	28613.2	670358
10182.0	3554.264	-169.2259	7.3889	56.47	1.23	27353.6	58.20	1.18	28668.2	671542
10184.0	3554.461	-169.1037	7.4691	56.50	1.27	27408.5	58.22	1.22	28723.3	672766
10186.0	3554.665	-168.9813	7.5494	56.54	1.31	27463.6	58.25	1.25	28778.7	674031
10188.0	3554.876	-168.8586	7.6297	56.57	1.36	27519.0	58.28	1.29	28834.3	675338
10190.0	3555.094	-168.7355	7.7102	56.60	1.40	27574.6	58.30	1.33	28890.1	676688
10192.0	3555.319	-168.6122	7.7907	56.63	1.44	27630.3	58.33	1.37	28946.1	678082
10194.0	3555.551	-168.4885	7.8714	56.67	1.48	27686.2	58.36	1.42	29002.3	679520
10196.0	3555.791	-168.3645	7.9521	56.70	1.53	27742.2	58.39	1.46	29058.6	681003
10198.0	3556.038	-168.2402	8.0329	56.74	1.57	27798.4	58.42	1.50	29115.0	682533
10200.0	3556.293	-168.1156	8.1137	56.77	1.62	27854.8	58.45	1.54	29171.7	684109
10202.0	3556.556	-167.9907	8.1947	56.81	1.66	27911.4	58.48	1.59	29228.6	685734
10204.0	3556.826	-167.8655	8.2757	56.84	1.71	27968.2	58.51	1.63	29285.7	687407
10206.0	3557.105	-167.7399	8.3568	56.88	1.76	28025.2	58.54	1.68	29342.9	689130
10208.0	3557.392	-167.6140	8.4380	56.92	1.81	28082.2	58.58	1.72	29400.3	690903
10210.0	3557.688	-167.4878	8.5193	56.96	1.85	28139.5	58.61	1.77	29457.9	692727
10212.0	3557.992	-167.3613	8.6006	56.99	1.90	28197.0	58.64	1.82	29515.7	694604
10214.0	3558.304	-167.2344	8.6820	57.03	1.95	28254.6	58.68	1.87	29573.6	696534
10216.0	3558.626	-167.1073	8.7635	57.07	2.00	28312.3	58.71	1.92	29631.6	698518
10218.0	3558.957	-166.9797	8.8450	57.11	2.06	28370.2	58.75	1.96	29689.9	700557
10220.0	3559.296	-166.8519	8.9267	57.15	2.11	28428.4	58.78	2.02	29748.4	702651
10222.0	3559.645	-166.7237	9.0083	57.19	2.16	28486.8	58.82	2.07	29807.2	704803
10224.0	3560.004	-166.5952	9.0901	57.24	2.22	28545.4	58.85	2.12	29866.1	707012
10226.0	3560.372	-166.4663	9.1719	57.28	2.27	28604.1	58.89	2.17	29925.2	709280
10228.0	3560.750	-166.3372	9.2538	57.32	2.33	28663.1	58.93	2.22	29984.5	711608
10230.0	3561.137	-166.2076	9.3357	57.36	2.38	28722.2	58.97	2.28	30044.0	713996
10232.0	3561.535	-166.0778	9.4177	57.41	2.44	28781.5	59.01	2.33	30103.7	716446
10234.0	3561.943	-165.9475	9.4997	57.45	2.49	28841.0	59.05	2.39	30163.6	718958
10236.0	3562.362	-165.8170	9.5818	57.50	2.55	28900.7	59.09	2.44	30223.6	721534
10238.0	3562.791	-165.6861	9.6640	57.54	2.61	28960.6	59.13	2.50	30283.9	724174
10240.0	3563.231	-165.5548	9.7462	57.59	2.67	29020.7	59.17	2.55	30344.4	726879
10242.0	3563.681	-165.4232	9.8285	57.64	2.73	29081.0	59.21	2.61	30405.1	729650
10244.0	3564.143	-165.2912	9.9108	57.68	2.79	29141.5	59.25	2.67	30466.0	732489
10246.0	3564.615	-165.1589	9.9931	57.73	2.85	29202.2	59.29	2.73	30527.2	735396
10248.0	3565.099	-165.0263	10.0755	57.78	2.91	29263.1	59.34	2.79	30588.5	738371
10250.0	3565.595	-164.8933	10.1580	57.83	2.98	29324.2	59.38	2.85	30650.0	741417
10252.0	3566.102	-164.7599	10.2405	57.88	3.04	29385.5	59.42	2.91	30711.8	744534
10254.0	3566.621	-164.6261	10.3230	57.93	3.10	29447.1	59.47	2.97	30773.7	747723

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE FT
10256.0	3567.152	-164.4920	10.4056	57.98	3.17	29508.8	59.51	3.03	30835.9	750985
10258.0	3567.695	-164.3576	10.4882	58.03	3.23	29570.8	59.56	3.10	30898.3	754321
10260.0	3568.250	-164.2227	10.5708	58.08	3.30	29633.0	59.61	3.16	30961.0	757732
10262.0	3568.818	-164.0875	10.6535	58.14	3.37	29695.4	59.65	3.22	31023.9	761219
10264.0	3569.399	-163.9520	10.7362	58.19	3.43	29758.0	59.70	3.29	31087.0	764783
10266.0	3569.992	-163.8160	10.8190	58.24	3.50	29820.9	59.75	3.35	31150.3	768425
10268.0	3570.598	-163.6797	10.9018	58.30	3.57	29884.0	59.80	3.42	31213.9	772147
10270.0	3571.218	-163.5431	10.9846	58.35	3.64	29947.3	59.85	3.49	31277.7	775948
10272.0	3571.850	-163.4060	11.0674	58.41	3.71	30010.8	59.90	3.55	31341.7	779831
10274.0	3572.496	-163.2686	11.1502	58.46	3.78	30074.5	59.95	3.62	31405.9	783796
10276.0	3573.156	-163.1308	11.2331	58.52	3.85	30138.5	60.00	3.69	31470.4	787843
10278.0	3573.830	-162.9926	11.3160	58.58	3.92	30202.7	60.05	3.76	31535.1	791975
10280.0	3574.517	-162.8540	11.3989	58.63	4.00	30267.2	60.10	3.83	31600.1	796191
10282.0	3575.219	-162.7151	11.4818	58.69	4.07	30331.9	60.16	3.90	31665.3	800494
10284.0	3575.935	-162.5757	11.5648	58.75	4.14	30396.9	60.21	3.97	31730.8	804884
10286.0	3576.665	-162.4360	11.6477	58.81	4.22	30462.1	60.26	4.04	31796.6	809362
10288.0	3577.410	-162.2959	11.7307	58.87	4.29	30527.6	60.32	4.11	31862.6	813930
10290.0	3578.170	-162.1554	11.8137	58.93	4.37	30593.3	60.37	4.19	31928.9	818588
10292.0	3578.945	-162.0145	11.8966	58.99	4.45	30659.3	60.43	4.26	31995.4	823337
10294.0	3579.735	-161.8732	11.9796	59.06	4.52	30725.5	60.49	4.33	32062.2	828178
10296.0	3580.540	-161.7315	12.0626	59.12	4.60	30792.0	60.54	4.41	32129.2	833113
10298.0	3581.361	-161.5895	12.1456	59.18	4.68	30858.7	60.60	4.48	32196.5	838142
10300.0	3582.198	-161.4470	12.2285	59.24	4.76	30925.8	60.66	4.56	32264.2	843267
10302.0	3583.050	-161.3041	12.3115	59.31	4.84	30993.1	60.72	4.64	32332.1	848488
10304.0	3583.918	-161.1608	12.3945	59.37	4.92	31060.8	60.78	4.71	32400.3	853807
10306.0	3584.803	-161.0172	12.4774	59.44	5.00	31128.7	60.84	4.79	32468.8	859224
10308.0	3585.703	-160.8731	12.5604	59.51	5.08	31196.9	60.90	4.87	32537.6	864740
10310.0	3586.621	-160.7286	12.6433	59.57	5.16	31265.3	60.96	4.95	32606.6	870357
10312.0	3587.555	-160.5837	12.7262	59.64	5.24	31334.1	61.02	5.03	32676.0	876076
10314.0	3588.506	-160.4384	12.8091	59.71	5.33	31403.1	61.08	5.11	32745.6	881898
10316.0	3589.474	-160.2927	12.8920	59.78	5.41	31472.4	61.15	5.19	32815.5	887823
10318.0	3590.459	-160.1465	12.9748	59.85	5.49	31541.9	61.21	5.27	32885.7	893853
10320.0	3591.461	-160.0000	13.0576	59.92	5.58	31611.8	61.27	5.35	32956.2	899989
10322.0	3592.481	-159.8530	13.1404	59.99	5.66	31682.0	61.34	5.43	33027.1	906232
10324.0	3593.519	-159.7056	13.2232	60.06	5.75	31752.5	61.41	5.51	33098.2	912583
10326.0	3594.575	-159.5578	13.3059	60.13	5.83	31823.5	61.47	5.60	33169.8	919043
10328.0	3595.648	-159.4096	13.3886	60.20	5.92	31894.8	61.54	5.68	33241.8	925613
10330.0	3596.740	-159.2610	13.4713	60.28	6.01	31966.5	61.61	5.76	33314.1	932294
10332.0	3597.851	-159.1119	13.5539	60.35	6.09	32038.5	61.67	5.85	33386.8	939086
10334.0	3598.980	-158.9624	13.6365	60.43	6.18	32110.9	61.74	5.93	33459.9	945992
10336.0	3600.127	-158.8125	13.7191	60.50	6.27	32183.7	61.81	6.02	33533.4	953012
10338.0	3601.294	-158.6621	13.8016	60.58	6.36	32256.8	61.88	6.10	33607.2	960146
10340.0	3602.479	-158.5113	13.8840	60.65	6.45	32330.2	61.95	6.19	33681.3	967397

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE FT
10342.0	3603.684	-158.3601	13.9664	60.73	6.54	32404.1	62.02	6.28	33755.8	974765
10344.0	3604.908	-158.2084	14.0487	60.81	6.63	32478.3	62.10	6.36	33830.7	982251
10346.0	3606.152	-158.0563	14.1310	60.89	6.72	32552.9	62.17	6.45	33906.1	989856
10348.0	3607.415	-157.9038	14.2133	60.97	6.81	32628.1	62.24	6.54	33982.0	997580
10350.0	3608.698	-157.7508	14.2954	61.05	6.90	32703.8	62.32	6.62	34058.4	1005425
10352.0	3610.002	-157.5973	14.3775	61.13	6.99	32779.7	62.39	6.71	34135.0	1013391
10354.0	3611.325	-157.4435	14.4596	61.21	7.08	32855.8	62.47	6.80	34211.8	1021480
10356.0	3612.668	-157.2891	14.5416	61.29	7.17	32932.3	62.54	6.89	34289.1	1029693
10358.0	3614.032	-157.1344	14.6235	61.37	7.26	33009.4	62.62	6.98	34366.9	1038029
10360.0	3615.416	-156.9791	14.7053	61.46	7.35	33086.8	62.70	7.06	34445.1	1046488
10362.0	3616.820	-156.8234	14.7871	61.54	7.44	33164.6	62.78	7.15	34523.7	1055066
10364.0	3618.244	-156.6673	14.8687	61.63	7.53	33242.9	62.86	7.23	34602.8	1063767
10366.0	3619.688	-156.5107	14.9503	61.71	7.62	33321.7	62.94	7.32	34682.4	1072591
10368.0	3621.152	-156.3536	15.0318	61.80	7.71	33401.0	63.02	7.41	34762.5	1081540
10370.0	3622.638	-156.1961	15.1133	61.88	7.80	33480.8	63.10	7.49	34843.0	1090615
10372.0	3624.144	-156.0381	15.1946	61.97	7.89	33561.1	63.18	7.58	34924.1	1099819
10374.0	3625.672	-155.8796	15.2758	62.06	7.99	33641.9	63.26	7.67	35005.7	1109153
10376.0	3627.222	-155.7207	15.3570	62.15	8.08	33723.3	63.34	7.77	35087.9	1118619
10378.0	3628.793	-155.5613	15.4381	62.23	8.18	33805.2	63.42	7.86	35170.6	1128219
10380.0	3630.387	-155.4014	15.5190	62.32	8.27	33887.6	63.50	7.95	35253.8	1137954
10382.0	3632.003	-155.2410	15.5999	62.41	8.37	33970.7	63.59	8.04	35337.6	1147826
S-IVB 2ND GUIDANCE CUTOFF										
10383.940	3633.593	-155.0851	15.6782	62.49	8.47	34051.5	63.66	8.14	35419.2	1157535
10384.0	3633.642	-155.0802	15.6807	62.50	8.47	34054.1	63.67	8.14	35421.8	1157838
10386.0	3635.302	-154.9191	15.7613	62.55	8.56	34056.1	63.72	8.23	35424.2	1167976
10388.0	3636.980	-154.7581	15.8417	62.60	8.66	34047.5	63.76	8.32	35415.9	1178223
10390.0	3638.676	-154.5970	15.9220	62.64	8.75	34038.7	63.81	8.41	35407.5	1188576
10392.0	3640.389	-154.4360	16.0020	62.69	8.84	34029.1	63.86	8.50	35398.2	1199036
TRANSLUNAR INJECTION (TLI)										
10393.940	3642.067	-154.2798	16.0794	62.74	8.93	34020.5	63.90	8.58	35389.9	1209284
10400.0	3647.415	-153.7921	16.3200	62.89	9.21	33993.1	64.05	8.85	35363.6	1241939
10450.0	3697.540	-149.7815	18.2279	64.17	11.50	33739.2	65.30	11.04	35119.3	1547837
10500.0	3757.932	-145.8080	19.9894	65.58	13.73	33439.6	66.67	13.17	34831.2	1916121
10550.0	3827.927	-141.8899	21.5958	67.08	15.89	33100.9	68.14	15.22	34505.7	2342730
10600.0	3906.816	-138.0448	23.0429	68.66	17.97	32730.1	69.68	17.20	34149.4	2823320
10650.0	3993.867	-134.2887	24.3308	70.30	19.97	32333.5	71.28	19.09	33768.5	3353412
10700.0	4088.344	-130.6358	25.4633	71.97	21.90	31917.2	72.90	20.90	33369.0	3928531
10750.0	4189.531	-127.0982	26.4472	73.66	23.74	31486.7	74.55	22.62	32956.2	4544304
10800.0	4296.738	-123.6856	27.2911	75.36	25.50	31047.0	76.18	24.26	32534.9	5196543

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE (CONT.)

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	ALTITUDE FT
10850.0	4409.316	-120.4049	28.0053	77.04	27.19	30602.2	77.81	25.81	32109.0	5881299
10900.0	4526.658	-117.2612	28.6006	78.69	28.80	30156.0	79.40	27.29	31682.1	6594895
10950.0	4648.207	-114.2569	29.0883	80.32	30.33	29711.4	80.95	28.69	31256.9	7333944
11000.0	4773.451	-111.3928	29.4793	81.90	31.80	29270.7	82.45	30.02	30835.9	8095352
11050.0	4901.928	-108.6677	29.7845	83.43	33.21	28835.8	83.91	31.27	30420.8	8876313
11100.0	5033.218	-106.0792	30.0136	84.91	34.55	28408.2	85.30	32.46	30012.8	9674291
11150.0	5166.945	-103.6237	30.1761	86.34	35.83	27988.8	86.64	33.59	29613.0	10487002
11200.0	5302.771	-101.2969	30.2803	87.72	37.06	27578.9	87.92	34.66	29222.4	11312409
11250.0	5440.396	-99.0938	30.3340	89.05	38.24	27178.8	89.13	35.68	28841.5	12148693
11300.0	5579.553	-97.0088	30.3439	90.32	39.37	26789.2	90.29	36.65	28470.6	12994237
11350.0	5720.004	-95.0364	30.3162	91.55	40.46	26410.1	91.39	37.57	28110.1	13847603
11400.0	5861.539	-93.1708	30.2562	92.72	41.51	26041.9	92.44	38.44	27760.0	14707521
11450.0	6003.971	-91.4064	30.1687	93.85	42.51	25684.3	93.43	39.27	27420.1	15572860
11500.0	6147.134	-89.7374	30.0578	94.94	43.48	25337.2	94.38	40.06	27090.3	16442619
11550.0	6290.882	-88.1584	29.9271	95.98	44.42	25000.6	95.27	40.82	26770.5	17315909
11600.0	6435.085	-86.6643	29.7797	96.99	45.33	24674.1	96.12	41.54	26460.5	18191947
11650.0	6579.628	-85.2499	29.6185	97.96	46.20	24357.6	96.93	42.23	26159.8	19070037
11700.0	6724.409	-83.9104	29.4457	98.90	47.05	24050.7	97.69	42.89	25868.4	19949565
11750.0	6869.340	-82.6415	29.2635	99.81	47.88	23753.3	98.41	43.52	25585.9	20829987
11800.0	7014.339	-81.4388	29.0736	100.69	48.68	23464.9	99.10	44.12	25311.9	21710822
11850.0	7159.338	-80.2983	28.8776	101.55	49.45	23185.3	99.76	44.70	25046.2	22591647
	CSM SEPARATION									
11884.900	7260.513	-79.5372	28.7378	102.13	49.98	22995.3	100.19	45.09	24865.5	23206254