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POSTFLIGHT TRAJECTORY
AS-511

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TRACKING AND FLIGHT RECONSTRUCTION
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ABSTRACT AND LIST OF KEY WORDS

This document presents the postflight trajectory for the Apollo/Saturn V AS-511 flight. Included is an analysis of the orbital and powered flight trajectories of the launch vehicle and the free flight trajectories of the expended S-IC and S-II stages. Trajectory dependent parameters are provided in earth-fixed launch site, 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 significant parameters at engine cutoff, stage separation, parking orbit insertion, and translunar injection are included in this document. Figures of such parameters as altitude, surface and cross range, and the magnitude of total velocity and acceleration as a function of range time for the powered flight trajectories are presented.

Apollo/Saturn V
AS-511
Postflight Trajectory
Powered Flight Trajectory
Orbital Trajectory
Spent Stage Trajectory
Apollo 16

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REFERENCES

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

2. NASA Document MPR-SAT-FE-72-1, "Saturn V Launch Vehicle Flight Evaluation Report - AS-511 Apollo 16 Mission," June 19, 1972.

3. Boeing Document D5-15551(F)-11B, "Revised April 16 AS-511 Operational Trajectory Reflecting Measured RP-1 Batch Density," April 7, 1972.

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

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GLOSSARY OF TERMS

Altitude	The distance between the vehicle and its subvehicle point on the surface of the Fischer Ellipsoid.
Ascent Phase	The segment of the vehicle flight from launch to parking orbit insertion.
Azimuth Angle	The angle, positive clockwise, from true north to the projection of the slant range vector on the ground station tangent plane (PACSS3a).
Cross Range	The vehicle lateral position measured in the earth-fixed launch site centered coordinate system (PACSS10).
Dynamic Pressure	The force per unit area of the atmosphere on the vehicle resulting from its motion through the atmosphere.
Elevation Angle	The angle between the slant range vector and its projection on the ground station tangent plane. This angle is positive above the ground station tangent plane (PACSS3a).
Flight Path Angle	The angle between the vehicle space-fixed velocity vector and a plane normal to a vector from the center of the earth to the vehicle. This angle is positive above the plane.
Inertial Acceleration	The magnitude of the vehicle acceleration in the launch vehicle platform accelerometer coordinate system (PACSS12).
Latitude (geodetic)	The angle between the equatorial plane and the line normal to the ellipsoidal surface at a specified point, measured positive north in the meridian of the point.

GLOSSARY OF TERMS (Continued)

Longitude	The angle between the plane of the Greenwich Meridian and the plane of the meridian containing the specified point measured positive eastward from the Greenwich Meridian.
Mach Number	The ratio of the vehicle velocity relative to the surrounding atmosphere to the speed of sound in the atmosphere.
Measured Parameter	A primary measurement made by any ground station, e.g., elevation angle.
Parking Orbit Phase	The segment of the vehicle flight from parking orbit insertion to S-IVB restart preparation.
Second Burn Phase	The segment of the vehicle flight from S-IVB restart preparation to TLI.
Slant Range	The distance between a ground station and the vehicle (PACSS3a, PACSS3c, and PACSS3d).
Slant Range Rate	The velocity of the vehicle along a vector from the ground station to the vehicle (PACSS3c and PACSS3d).
Space-Fixed Velocity	The magnitude of the vehicle velocity in the launch vehicle navigation coordinate system (PACSS13).
Subvehicle Point	The point of intersection of the ellipsoidal surface and a line normal to this surface passing through the vehicle center of mass.
Surface Range	The arc length between the launch site and subvehicle point measured along the surface of the Fischer Ellipsoid.
Translunar Orbit Phase	The segment of the vehicle flight from TLI to CSM separation.

GLOSSARY OF TERMS (Continued)

X-Angle	30' Antennas - The angle measured in the plane of the ground station prime vertical from the zenith to the projection of the slant range vector onto this plane, positive eastward. (PACSS3c) 85' Antennas - The angle measured in the meridian plane of the ground station from the zenith to the projection of the slant range vector onto this plane, positive southward. (PACSS3d)
Y-Angle	30' Antennas - The angle between the slant range vector and its projection onto the plane of the ground station prime vertical, positive when the slant range vector is north of the plane. (PACSS3c) 85' Antennas - The angle between the slant range vector and its projection onto the meridian plane of the radar site, positive when the slant range vector is east of the meridian plane. (PACSS3d)

LIST OF ABBREVIATIONS

ABBREVIATION	DEFINITION/STATION
BDA (67.16)	Bermuda (FPS-16M) C-Band
BDQ (67.18)	Bermuda (FPQ-6) C-Band
BDS	Bermuda S-Band
CECO	Center Engine Cutoff
CNV (1.16)	Cape Kennedy C-Band
CRO	Carnarvon C-Band
CSM	Command Service Module
EMR	Engine Mixture Ratio
EPO	Earth Parking Orbit
GATE	Guidance and Tracking Evaluation Program
GCS1 (First GCS)	First Guidance Cutoff Signal
GCS2 (Second GCS)	Second Guidance Cutoff Signal
GDS	Goldstone, Califronia S-Band
GRR	Range Time of Guidance Reference Release
GTK (7.18)	Grand Turk C-Band
HSK	Honeysuckle S-Band
HWI	Hawaii S-Band
IP Raw MP	Impact Predictor Raw Measured Parameters
IU	Instrument Unit
LH2	Liquid Hydrogen
LM	Lunar Module
MAD	Madrid S-Band
MIL	Merritt Island S-Band
MLA (19.18)	Merritt Island C-Band
MSFN	Manned Space Flight Network
OCP	Orbital Correction Program
OECO	Outboard Engine Cutoff
OMPT	Observed Mass Point Trajectory
PACSS	Project Apollo Coordinate System Standards
PAT (0.18)	Patrick Air Force Base C-Band
PIR	Goldstone Wing S-Band
POI	Parking Orbit Insertion
REV	Revolution
RID	Madrid Wing S-Band
rss	Root Sum Square
STDV	Start Tank Discharge Valve
TEX	Corpus Christi S-Band
TLI	Translunar Injection
USB	Unified S-Band

SOURCE DATA PAGE

The following listed government-furnished documentation was used in the preparation of this document:

EXHIBIT FF LINE ITEM NUMBER	GFD TITLE	DATE RECEIVED
S&E-AERO-P-#35c	OMPT Format	3/1/72
S&E-AERO-P-#17	Tracking and Network Specifications	4/1/72
	Postlaunch Operational Trajectory Certified Data	4/1/72
I-MO-#4a	Insertion Point and/or Orbital Elements	4/13/72
I-MO-#4c	Six Seconds Raw Radar	4/18/72
I-MO-#4f	Meteorological Data (Final)	4/23/72
I-MO-#6	IP Raw MP	4/17/72
I-MO-#9	Pulse Radar: BDA, BDQ, MLA, and CRO Data	4/18/72
	USB: MIL, BDS, HAW, TEX, RID, MAD, PIR, and GDS Data	4/18/72
I-MO-#17c	Final Significant Time of Events	5/3/72
I-MO-#18b	Final Guidance Velocities	
	Ascent Phase	4/17/72
	2nd Burn Phase	4/17/72
I-MO-#18c	Orbital Venting Acceleration Data Cards	4/26/72

SECTION 1

SUMMARY AND INTRODUCTION

The Apollo Saturn V AS-511 vehicle was launched from Launch Complex 39, Pad A, at the Kennedy Space Center on April 16, 1972, at 12:54:00 P.M. Eastern Standard Time (Range Time Zero) at an azimuth of 90 degrees east of north. Guidance Reference Release (GRR) occurred at -16.963 seconds. First motion occurred at 0.3 second. A roll maneuver was initiated at 12.7 seconds to place the vehicle on a flight azimuth of 72.034 degrees east of north.

All trajectory parameters were close to nominal from liftoff to parking orbit insertion. The vehicle was inserted into parking orbit at 716.21 seconds at an altitude of 172.9 km (93.4 nmi) and a total space-fixed velocity of 7,804.7 m/s (25,606.0 ft/s). The vehicle remained in orbit for approximately one and one-half revolutions. The S-IVB stage was restarted during the second revolution over Australia at 9,216.5 seconds.

At 9,568.42 seconds, the vehicle was injected into a near-nominal translunar trajectory at an altitude of 317.1 km (171.2 nmi) and a total space-fixed velocity of 10,840.5 m/s (35,565.9 ft/s). At 11,099.0 seconds, the CSM separated from the launch vehicle at an altitude of 7,167.9 km (3,870.4 nmi) and a total space-fixed velocity of 7,566.6 m/s (24,824.8 ft/s).

The impact location of the spent S-IC stage was determined to be 30.207 degrees north latitude and 74.147 degrees west longitude at 547.1 seconds. The impact location of the spent S-II stage was determined to be 31.726 degrees north latitude and 35.990 degrees west longitude at 1,202.4 seconds.

A more detailed description of the postflight mass point launch vehicle trajectory and launch parameters is given in Section 2. The trajectory is divided into the following phases, each discussed in a separate subsection of Section 2:

a. Ascent (guidance reference release to parking orbit insertion)
b. Parking orbit (orbit insertion to S-IVB restart preparation)
c. Second burn (S-IVB restart preparation to translunar injection)
d. Translunar orbit (translunar injection to CSM separation)
e. Free flight (expended S-IC and S-II stages)

SECTION 1 (Continued)

The trajectories for the first four of the above phases were established from external C-band radar and S-band tracking data and ST-124M inertial platform onboard telemetered guidance velocity data. Since no tracking data were available for the S-IC and S-II spent stages, the trajectory phases outlined in (e) above were simulated using actual separation conditions and nominal drag and retrorocket performance data.

Section 3 contains a description of the trajectory reconstruction methods, a summary of the tracking data used in the analysis with the resulting residual plots, and an estimate of the uncertainty in the reconstructed trajectory.

Appendix A provides a definition of the symbols, nomenclature, and coordinate systems used in the report. Appendix B is a tabular history of selected trajectory parameters in metric units. Appendix C presents the same parameters expressed in English units.

SECTION 2

TRAJECTORY DESCRIPTION

This section describes the reconstructed trajectory, referenced to the Instrument Unit (IU), by providing plotted histories of pertinent variables and tables of important parameters at significant event times. The complete time history of selected Observed Mass Point Trajectory (OMPT) parameters, in both metric and English units, is tabulated in Appendices B and C, respectively. These tabulations are given in accordance with "Project Apollo Coordinate System Standards" (PACSS, Reference 1) and are in earth-fixed launch site (PACSS10), launch vehicle navigation (PACSS13), and geographic polar (PACSS1) coordinate systems. For convenience, these systems are described in Appendix A along with a definition of other terms and symbols used.

A comparison of actual and nominal times for significant flight events is presented in Table 2-I. The actual times for these events are taken from Reference 2. The nominal data and times are taken from Reference 3. Range time, which is referenced to Range Time Zero, is used throughout this documentation unless otherwise specified. Range Time Zero was established at 17:54:00 Greenwich Mean Time on April 16, 1972.

The Fischer Ellipsoid of 1960 (Reference 4) 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 Instrument Unit of the launch vehicle above the reference ellipsoid is 111.65m (366.31 ft).

The azimuth alignments are as follows:

Launch Azimuth	90.0 degrees east of north
Flight Azimuth	72.034 degrees east of north
ST-124M Platform Azimuth	72.035 degrees east of north

The 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

SECTION 2 (Continued)

translunar targeting parameters. The translunar targeting parameters are functions of the moon position, earth parking orbit inclination, earth-moon distance, and moon travel rate.

2.1 ASCENT PHASE

The trajectory parameters from guidance reference release to parking orbit insertion were close to nominal. The space-fixed velocity and altitude at S-IC OECO were 10.5 m/s (34.5 ft/s) and 0.8 km (0.4 nmi) less than nominal, respectively. At S-II OECO, the space-fixed velocity and altitude were 4.7 m/s (15.4 ft/s) and 0.2 km (0.1 nmi) less than nominal. The altitude was nominal, and the space-fixed velocity was 0.4 m/s (1.3 ft/s) greater than nominal at S-IVB first guidance cutoff signal. The maximum acceleration was 37.46 m/s^2 (3.82g) during the S-IC phase.

Significant trajectory events, such as Mach 1, maximum acceleration, etc., are tabulated in Table 2-II. Trajectory parameters at engine cutoff times are presented in Table 2-III. Table 2-IV shows trajectory parameters at stage separation times.

To supplement these tabulations at discrete times, a number of quantities are plotted over the entire ascent phase. Figure 2-1 shows the vehicle ground track and the location of the tracking stations used in the reconstruction. Altitude, surface range, and cross range are plotted versus time in Figures 2-2 through 2-4, respectively. Space-fixed velocity and flight path angle are shown in Figure 2-5. Figure 2-6 gives total inertial acceleration. Dynamic pressure and mach number are plotted in Figure 2-7. The ascent phase trajectory is tabulated in Tables B-I through B-III in metric units, and in Tables C-I through C-III in English units.

2.2 PARKING ORBIT PHASE

The parking orbit spans the interval from insertion to S-IVB restart preparation at 8,638.6 seconds. Figure 2-8 gives the vehicle ground track following parking orbit insertion (POI) and shows the vehicle position at significant event times (see Table 2-I).

The S-IVB/LM/CSM was inserted into a near circular earth parking orbit (EPO) at 716.21 seconds, 0.72 second later than nominal. The parking orbit insertion conditions were close to nominal. Table 2-V gives the actual parking orbit insertion conditions and provides a comparison with the nominal values.

2.2 (Continued)

During the parking orbit, no major thrusting occurred; however, the orbit was continuously perturbed by low-level LH_2 venting. The small perturbation was considered in this analysis. An acceleration model was built from telemetered guidance velocity data from the ST-124M guidance platform. The guidance velocity data were fitted in segments by polynomials in time. The polynomials were analytically differentiated to model the component accelerations sensed by the guidance platform. Table 2-VI lists the acceleration polynomials derived by this method. Figure 2-9 reflects the best estimate of the total parking orbit acceleration (rss of components) after modeling biases have been removed.

The parking orbit phase is tabulated in Table B-IV in metric units and in Table C-IV in English units.

2.3 SECOND BURN PHASE

The second burn trajectory phase spans the interval from S-IVB restart preparation at 8,638.6 seconds to translunar injection. The S-IVB stage was restarted 0.6 second later than nominal at 9,216.5 seconds on the second pass over Australia (see Table 2-I for significant event times). The vehicle ground track during this trajectory phase is shown in Figure 2-8 as a continuation of the parking orbit phase. Vehicle altitude is plotted in Figure 2-10. Figure 2-11 shows the space-fixed velocity and the flight path angle. Total inertial acceleration is shown in Figure 2-12.

The second guidance cutoff signal conditions, depicted in Table 2-III, were near nominal. Cutoff occurred 1.78 seconds earlier than nominal with the altitude 1.6 km (0.9 nmi) less than nominal, the space-fixed velocity 1.6 m/s (5.2 ft/s) greater than nominal, and the flight path angle 0.154 degree less than nominal.

The second burn phase is tabulated in Tables B-V through B-VII in metric units and Tables C-V through C-VII in English units.

2.4 TRANSLUNAR ORBIT PHASE

The translunar orbit phase spans the interval from injection to S-IVB/CSM separation. Figure 2-8 shows the ground track continued through this trajectory phase.

Translunar injection occurred at 9,568.42 seconds, 1.78 seconds earlier than nominal (see Table 2-I). The translunar injection conditions were close to nominal. Table 2-VII

2.4 (Continued)

gives the actual translunar orbit injection conditions and provides a comparison with the nominal values.

Accelerations during the period between translunar injection and CSM separation were treated as in parking orbit, representing them as segmented polynomials. Table 2-VIII lists these polynomial coefficients and time spans. The best estimate of the total translunar orbit acceleration (rss of components) after modeling biases have been removed is plotted in Figure 2-13.

Trajectory parameters at CSM separation (defined as the end of the launch vehicle trajectory) are listed in Table 2-IX. The translunar orbit phase is tabulated in Tables B-V through B-VII in metric units and Tables C-V through C-VII in English units.

2.5 FREE FLIGHT PHASES

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

2.5.1 S-IC Spent Stage Trajectory

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 2-X. The ground track is shown in Figure 2-14.

2.5.2 S-II Spent Stage Trajectory

Three separate theoretical trajectories, corresponding to the zero-degree, ninety-degree, and tumbling-case trajec-

2.5.2 (Continued)

tories 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 2-XI. The ground track is shown in Figure 2-14.

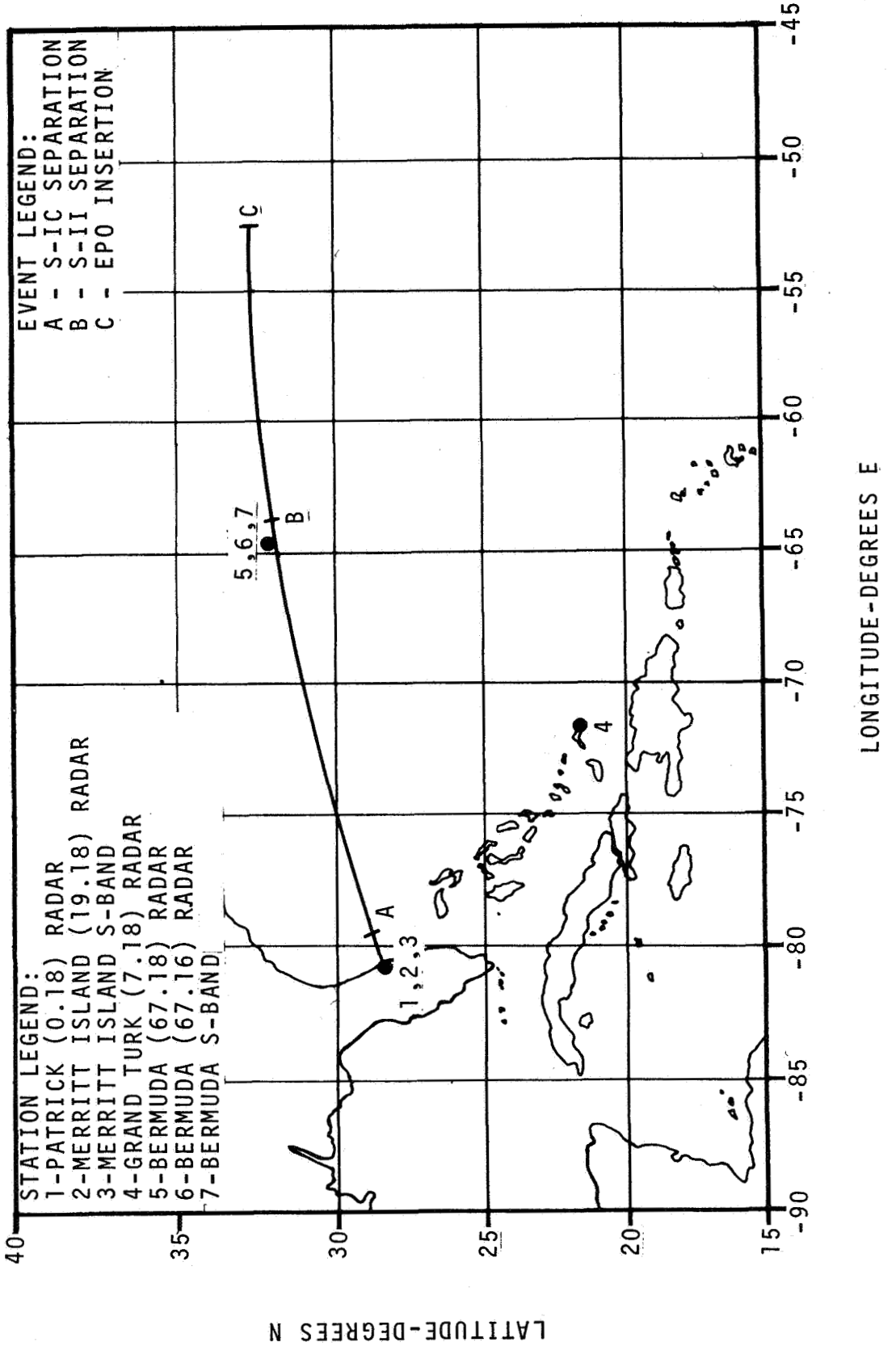


FIGURE 2-1. GROUNDTRACK AND TRACKING STATIONS - ASCENT PHASE

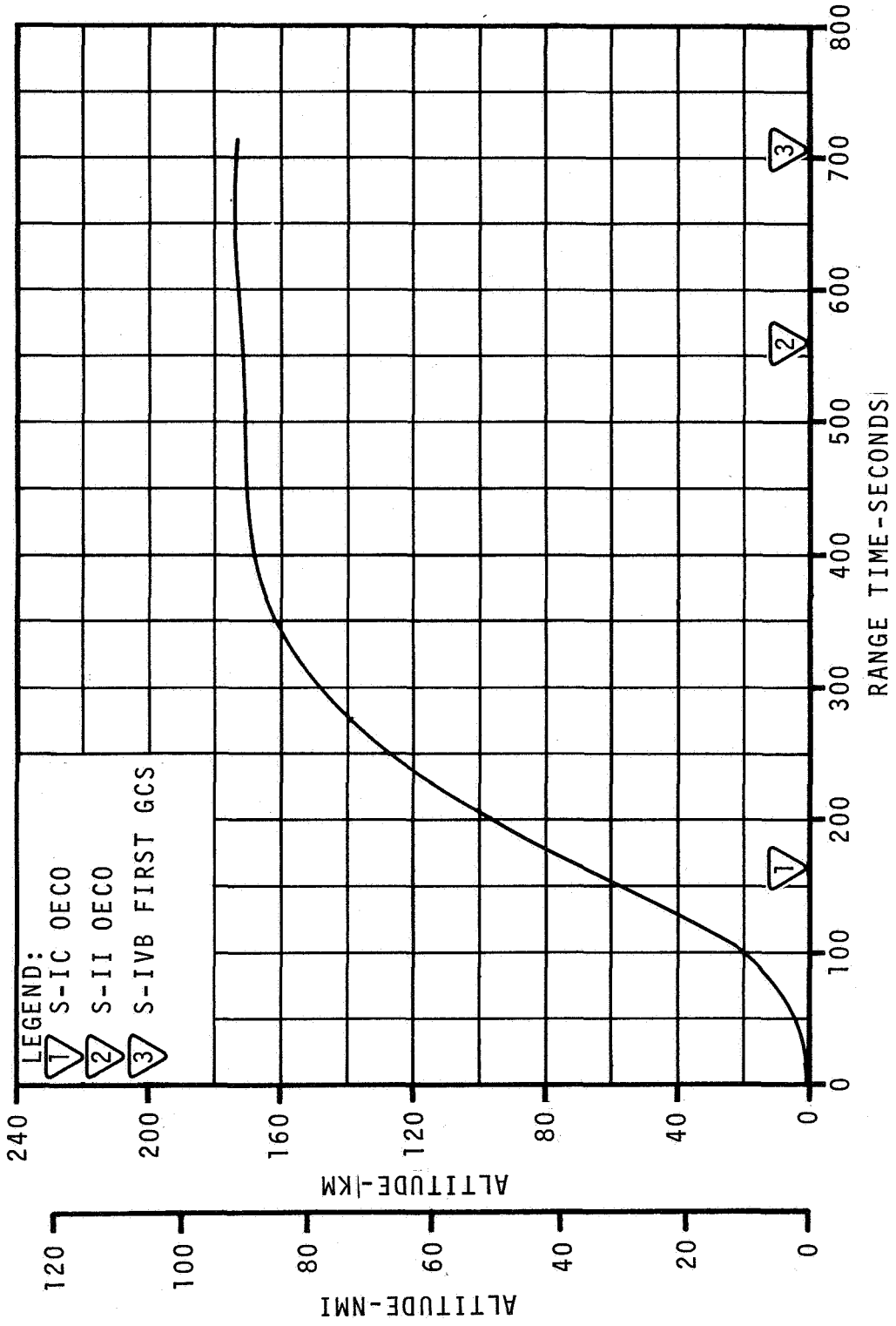


FIGURE 2-2. ALTITUDE-ASCENT PHASE

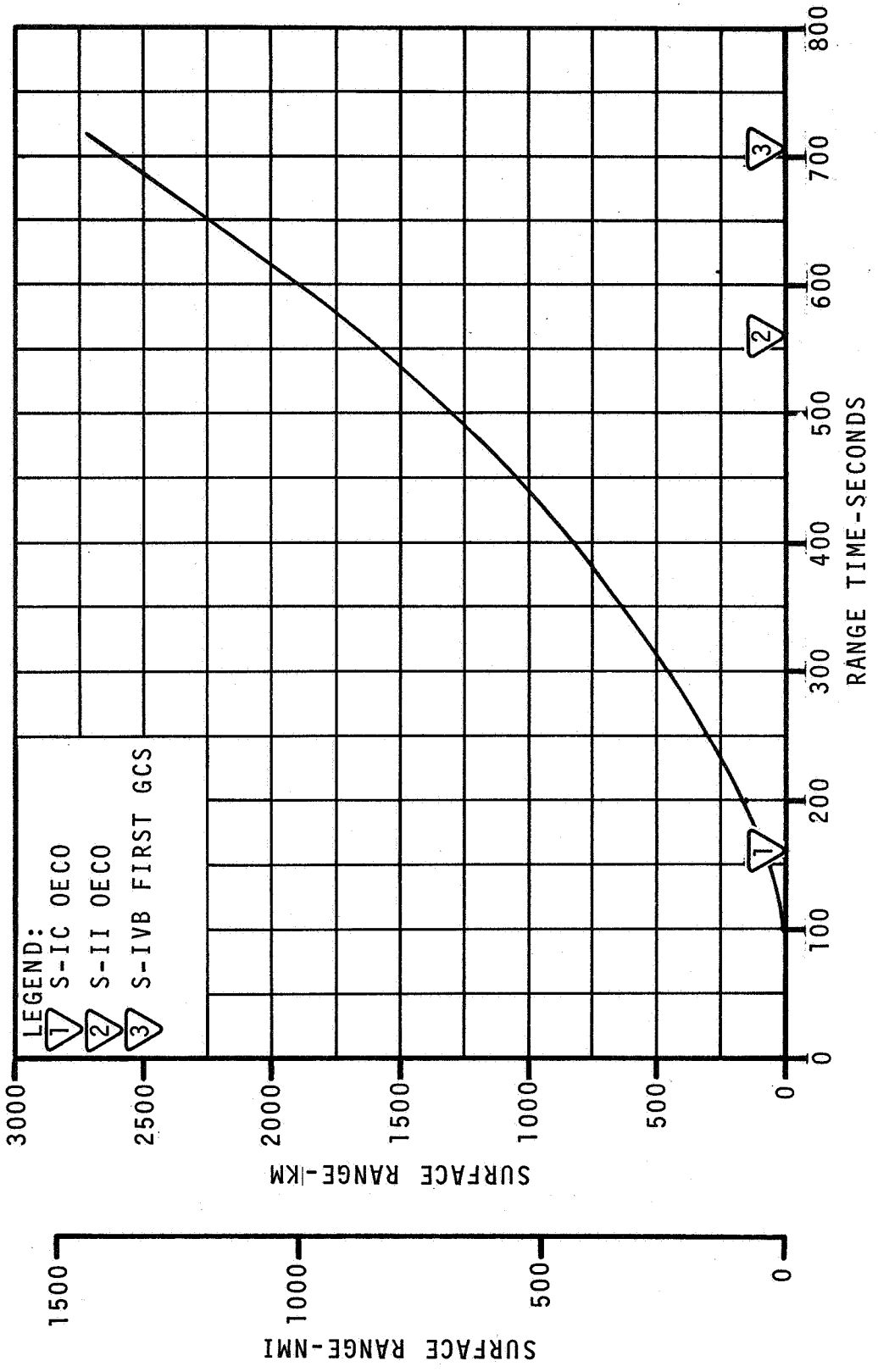


FIGURE 2-3. SURFACE RANGE-ASCENT PHASE

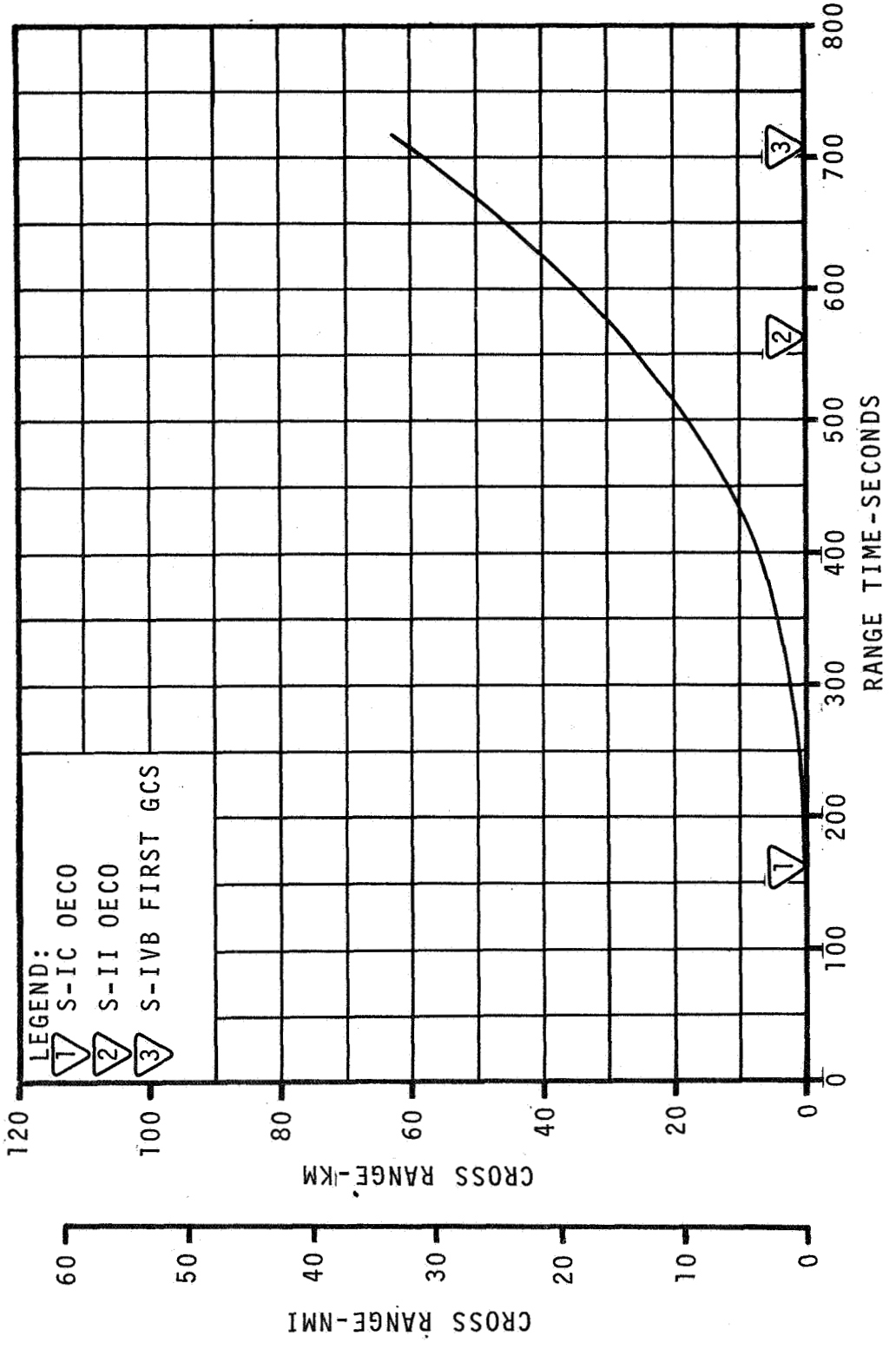


FIGURE 2-4. CROSS RANGE-ASCENT PHASE

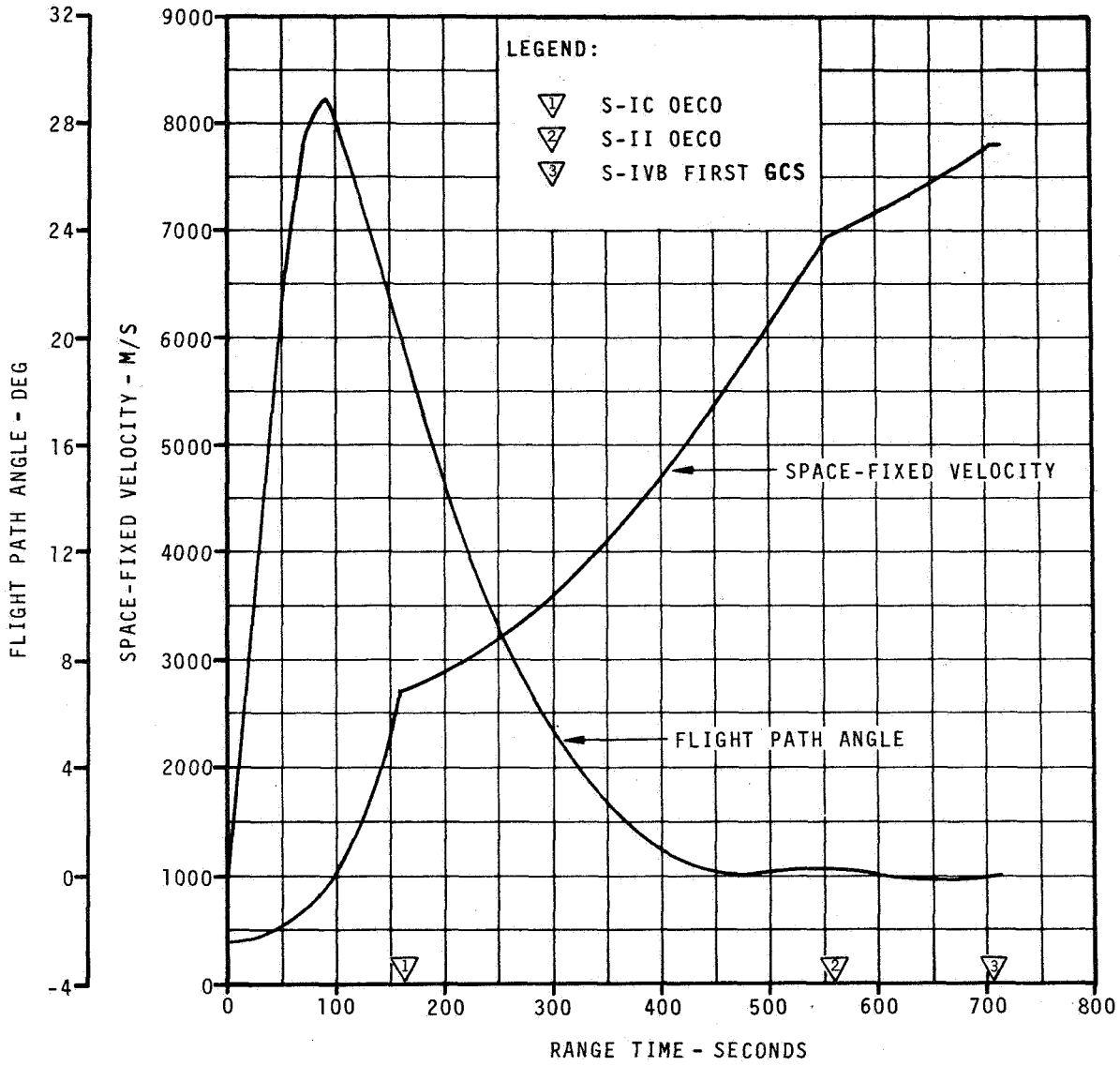


FIGURE 2-5. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - ASCENT PHASE

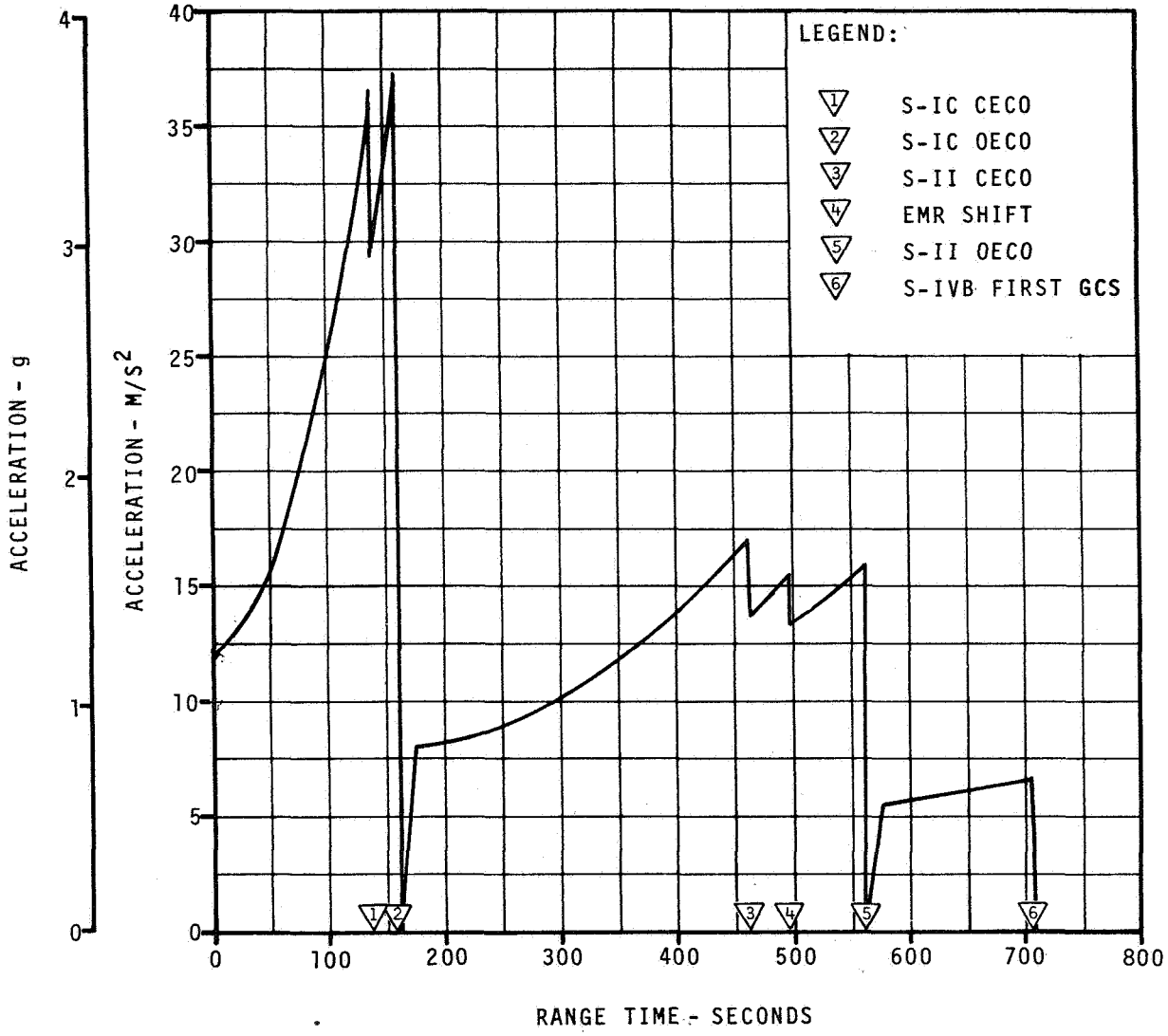


FIGURE 2-6. TOTAL INERTIAL ACCELERATION - ASCENT PHASE

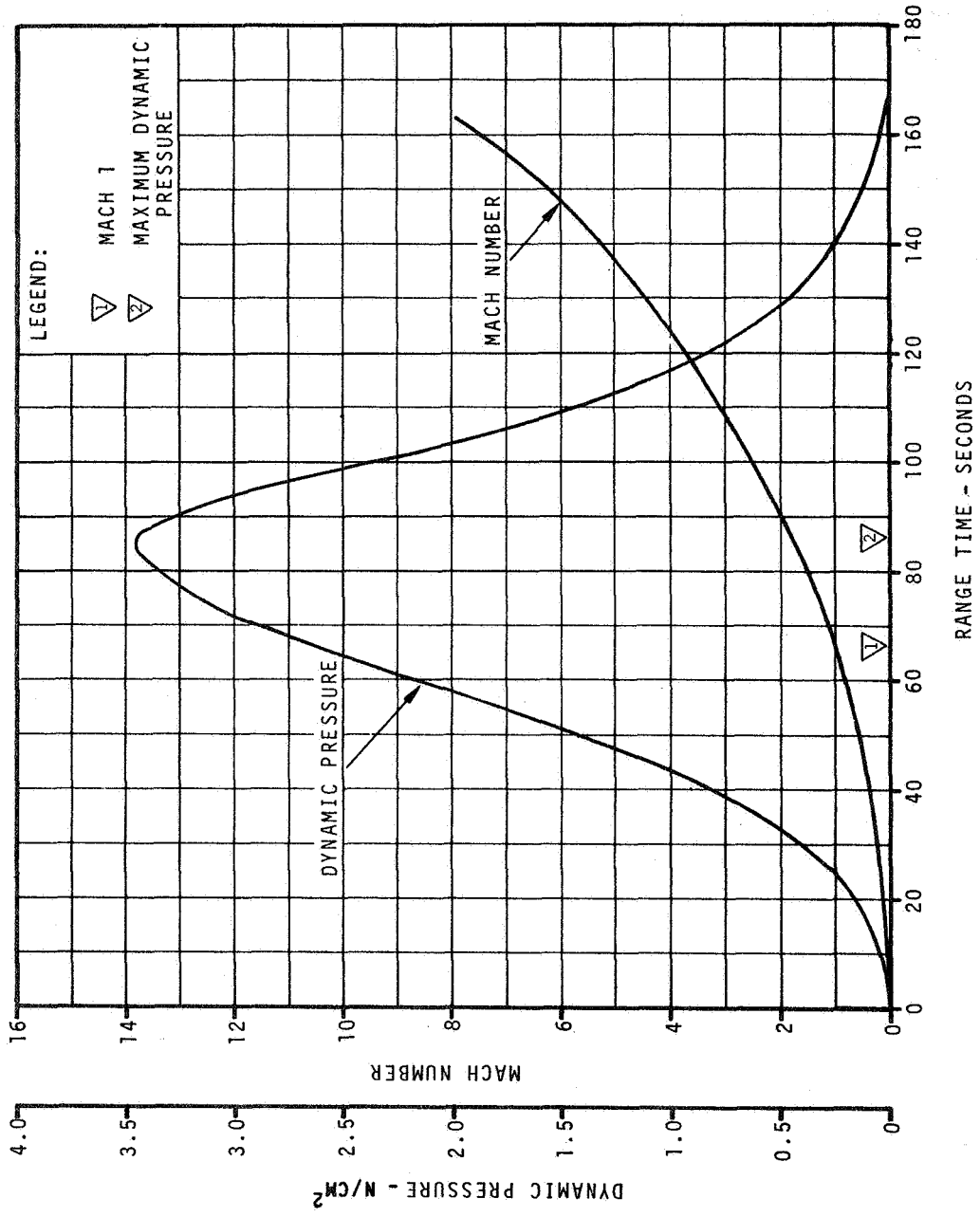


FIGURE 2-7. MACH NUMBER AND DYNAMIC PRESSURE - ASCENT PHASE

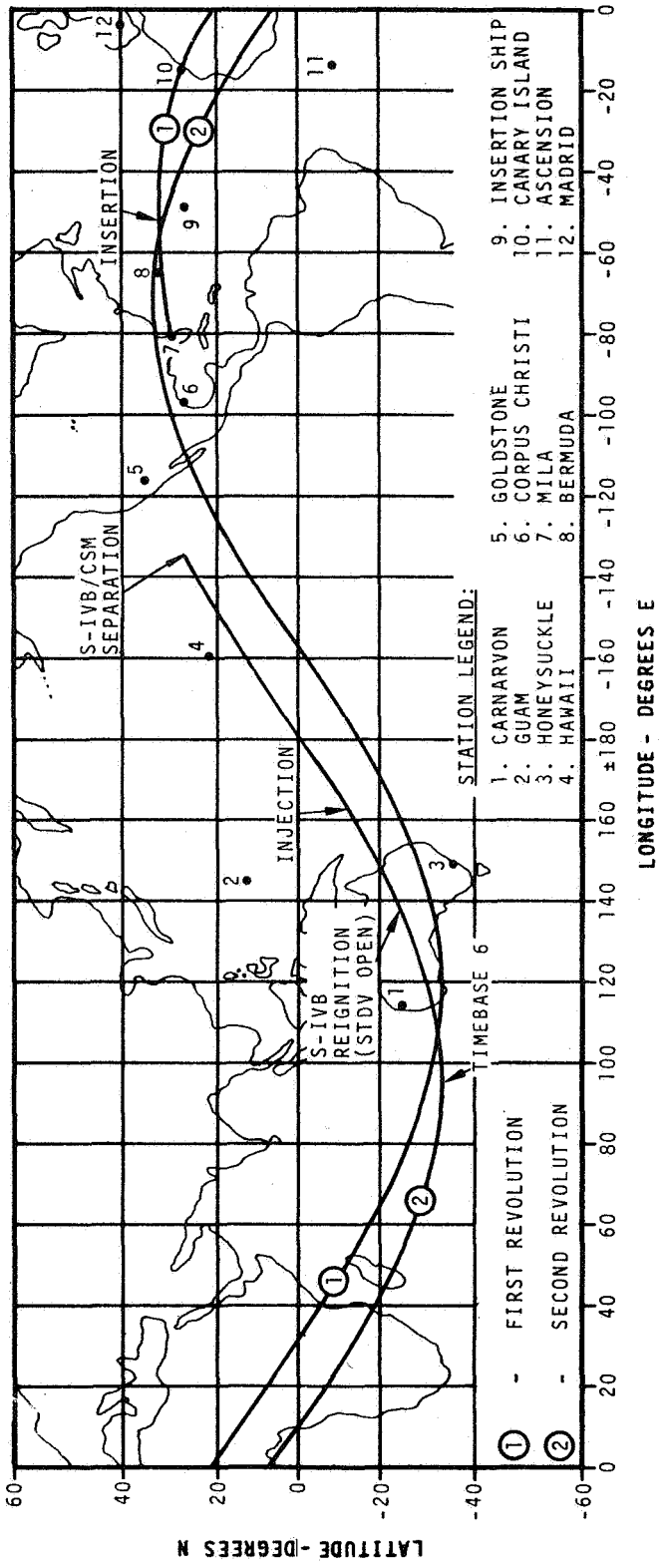
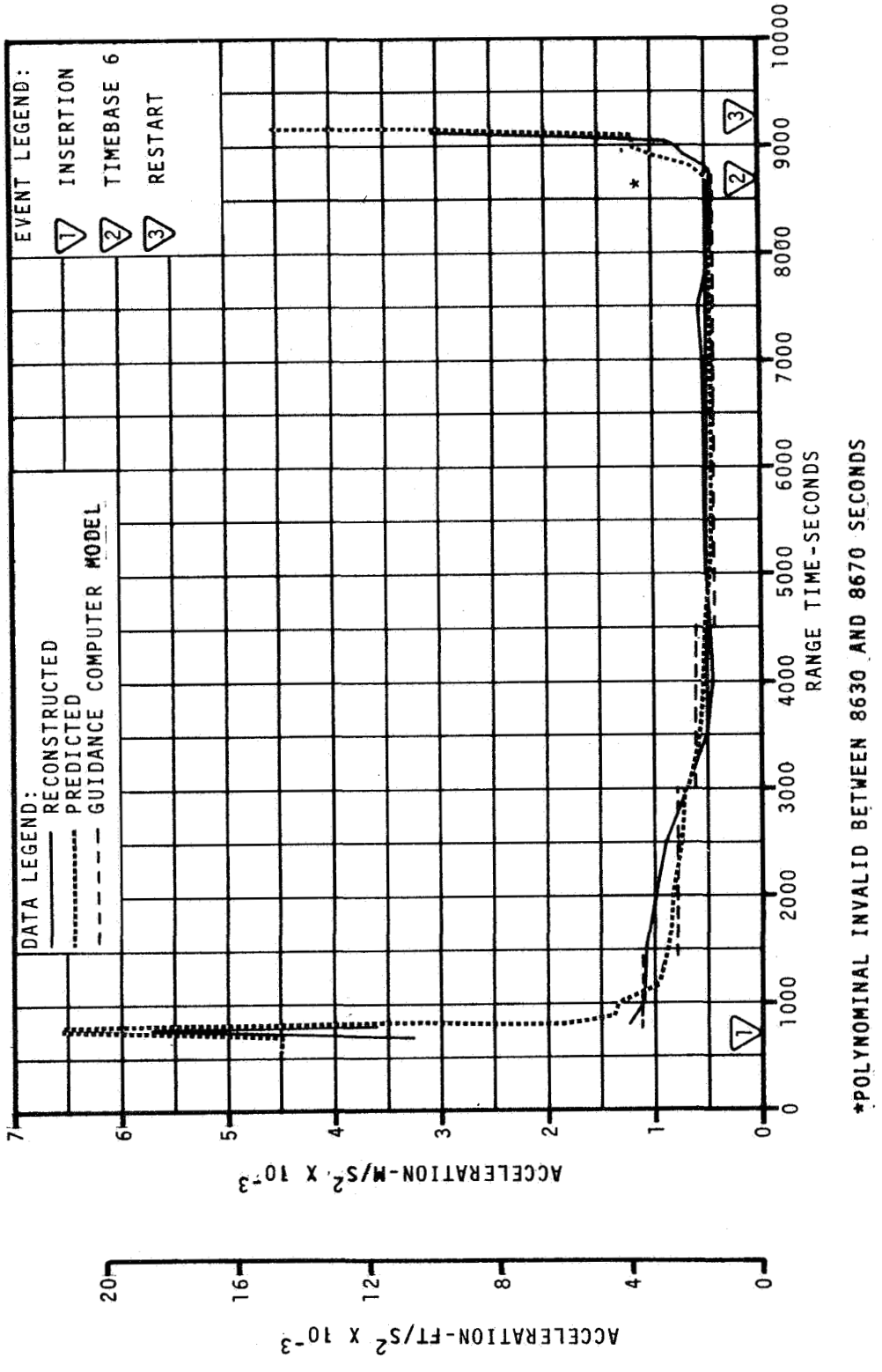


FIGURE 2-8. AS-511 LAUNCH VEHICLE GROUNDTRACK



*POLYNOMINAL INVALID BETWEEN 8630 AND 8670 SECONDS

FIGURE 2-9. PARKING ORBIT ACCELERATION

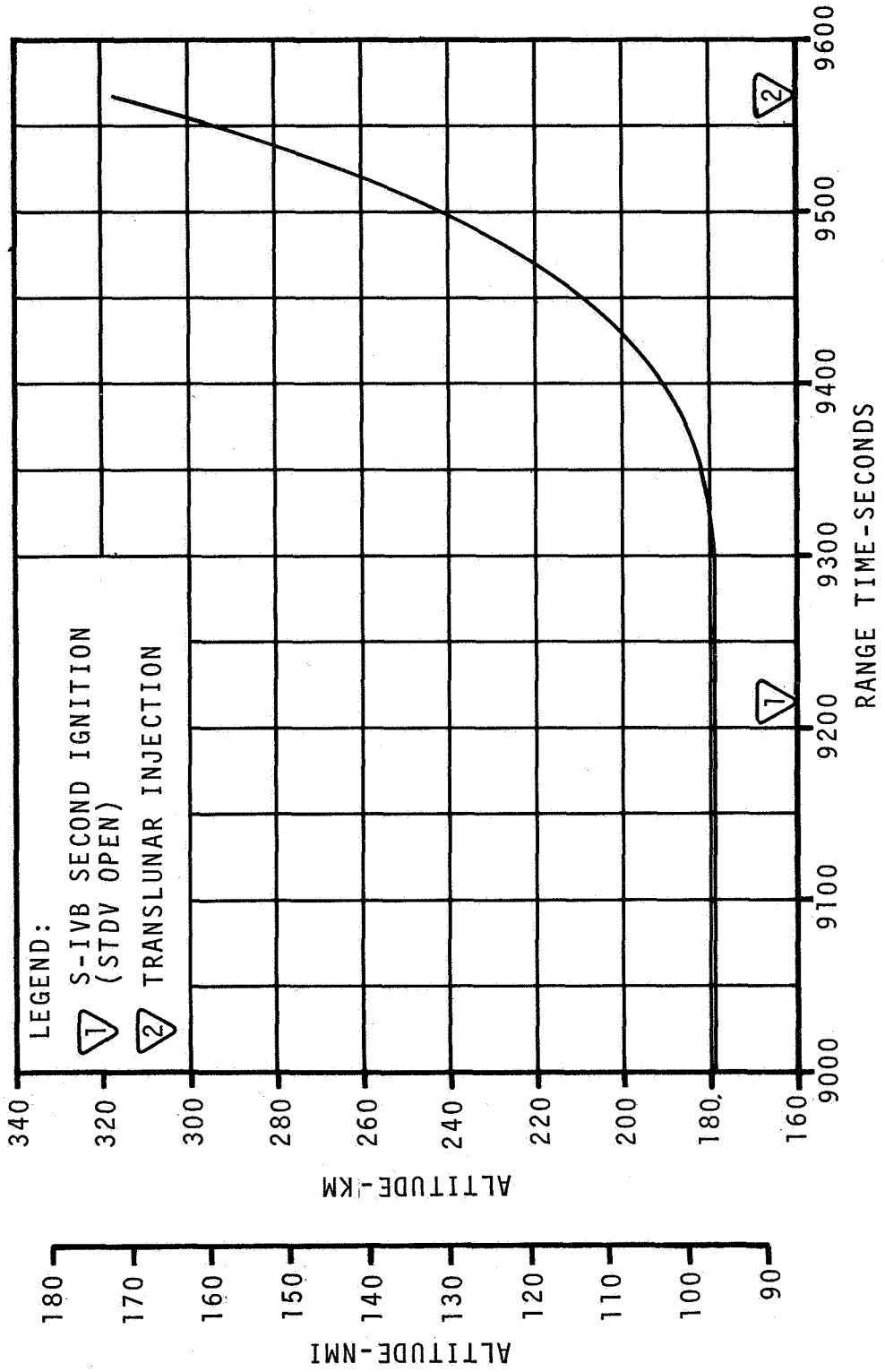


FIGURE 2-10. ALTITUDE - SECOND BURN PHASE

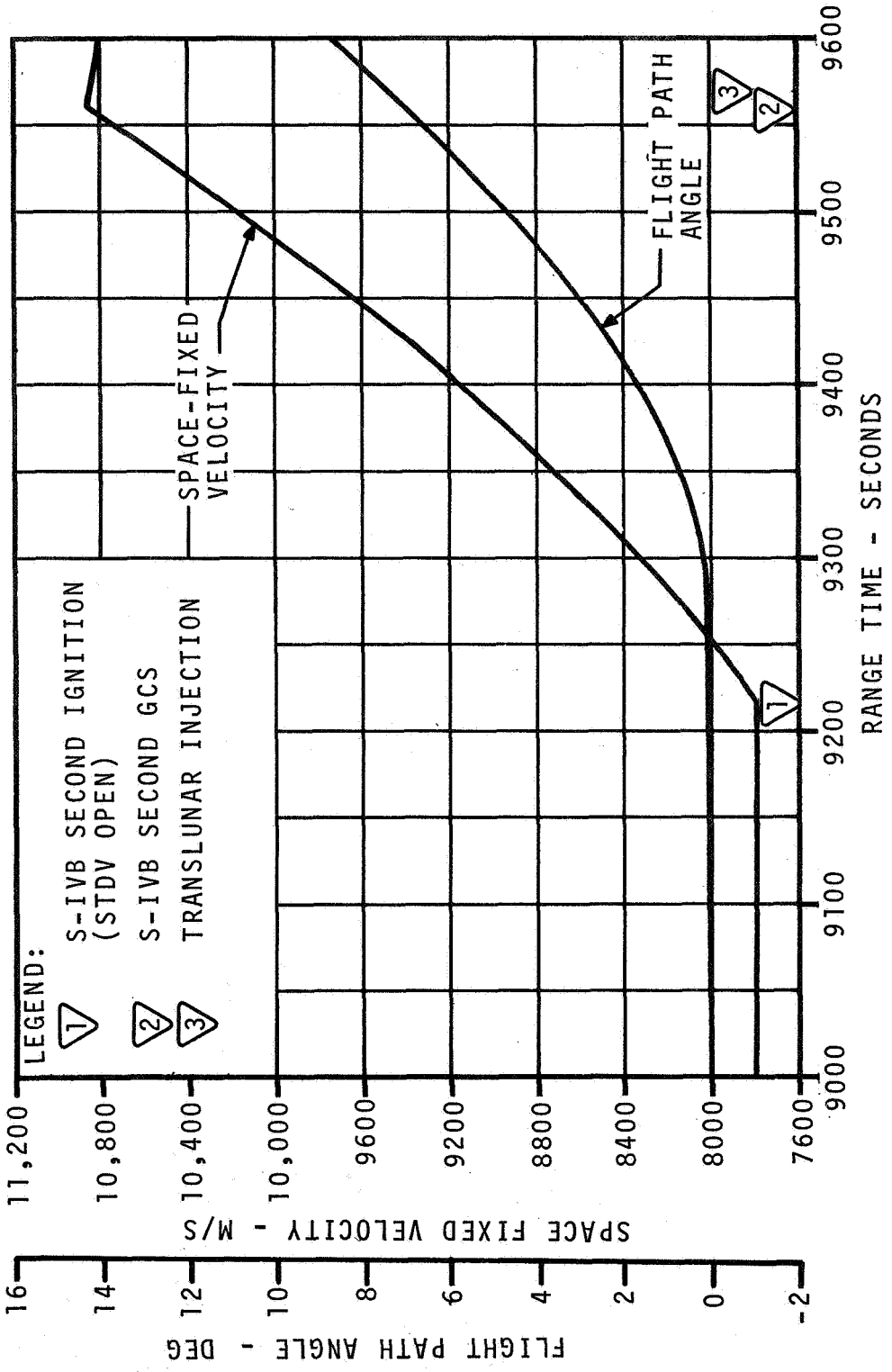


FIGURE 2-11. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - SECOND BURN PHASE

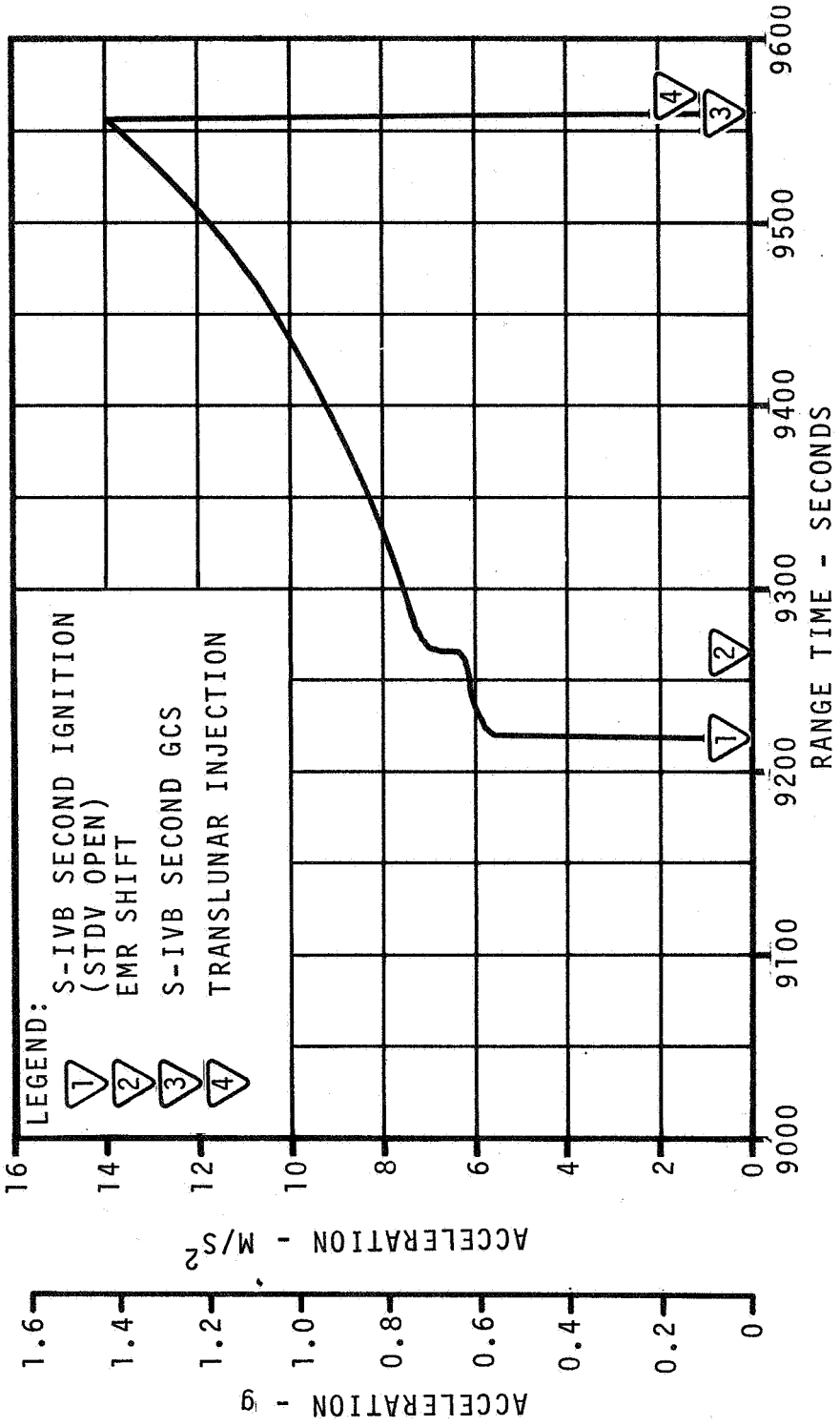
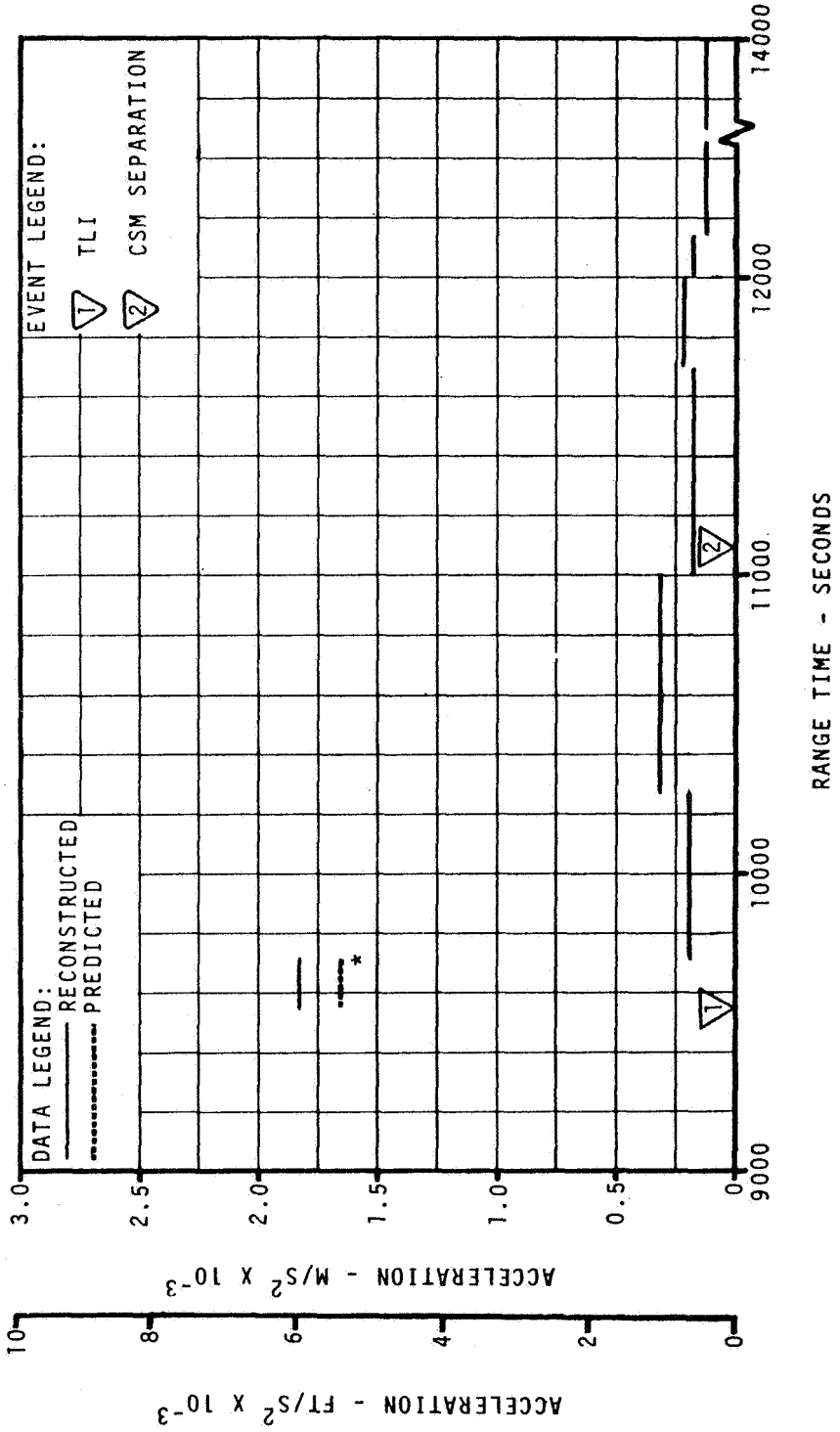


FIGURE 2-12. TOTAL INERTIAL ACCELERATION - SECOND BURN PHASE



*PREDICTED DATA WENT TO ZERO AT 9711 SECONDS.

FIGURE 2-13. TRANSLUNAR ORBIT ACCELERATION

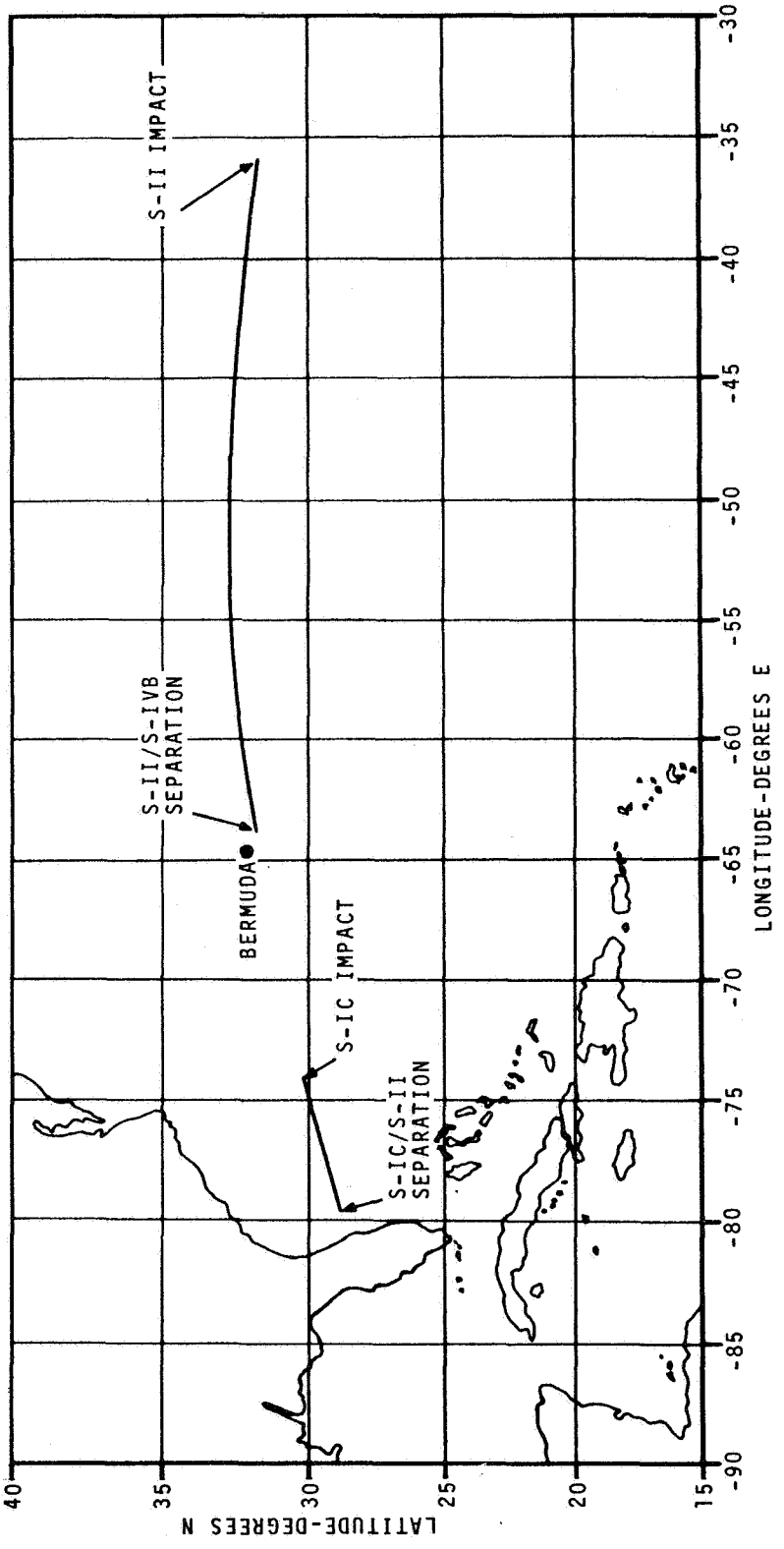


FIGURE 2-14. GROUND TRACKS FOR S-IC AND S-II SPENT STAGES

TABLE 2-I. TIMES OF SIGNIFICANT EVENTS

EVENT	ACTUAL	NOMINAL	ACT-NOM
Guidance Reference Release	-16.963	-16.990	0.027
First Motion	0.3	0.3	0.0
Start of Timebase 1	0.6	0.7	-0.1
Mach 1	67.5	67.1	0.4
Maximum Dynamic Pressure	86.0	81.9	4.1
S-IC Center Engine Cutoff	137.85	137.96	-0.11
S-IC Outboard Engine Cutoff	161.78	162.09	-0.31
S-IC/S-II Separation Command	163.5	163.8	-0.3
S-II Center Engine Cutoff	461.77	462.10	-0.33
S-II Outboard Engine Cutoff	559.54	559.21	0.33
S-II/S-IVB Separation Command	560.5	560.2	0.3
S-IVB First Guidance Cutoff	706.21	705.49	0.72
Parking Orbit Insertion	716.21	715.49	0.72
Begin S-IVB Restart Preparations	8,638.6	8,637.9	0.7
S-IVB Engine Reignition (STDV Open)	9,216.5	9,215.9	0.6
S-IVB Second Guidance Cutoff	9,558.42	9,560.20	-1.78
Translunar Injection	9,568.42	9,570.20	-1.78
CSM Separation (Initial)	11,099.0	11,060.4	38.6

TABLE 2-II. SIGNIFICANT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
First Motion	Range Time, sec	0.3
	Total Inertial Acceleration, m/s^2	10.58
	(ft/s^2)	(34.71)
	(g)	(1.08)
Mach 1	Range Time, sec	67.5
	Altitude, km	7.9
	(n mi)	(4.3)
Maximum Dynamic Pressure	Range Time, sec	86.0
	Dynamic Pressure, N/cm^2	3.47
	(lbf/ft^2)	(724.7)
	Altitude, km	14.4
	(n mi)	(7.8)
Maximum Total Inertial Acceleration: S-IC	Range Time, sec	161.78
	Acceleration, m/s^2	37.46
	(ft/s^2)	(122.90)
	(g)	(3.82)
S-II	Range Time, sec	461.77
	Acceleration, m/s^2	17.07
	(ft/s^2)	(56.00)
	(g)	(1.74)
S-IVB First Burn	Range Time, sec	706.21
	Acceleration, m/s^2	6.58
	(ft/s^2)	(21.59)
	(g)	(0.67)
S-IVB Second Burn	Range Time, sec	9,558.42
	Acceleration, m/s^2	13.91
	(ft/s^2)	(45.64)
	(g)	(1.42)
Maximum Earth-Fixed Velocity: S-IC	Range Time, sec	162.5
	Velocity, m/s	2,371.2
	(ft/s)	(7,779.5)
S-II	Range Time, sec	560.0
	Velocity, m/s	6,568.7
	(ft/s)	(21,550.9)
S-IVB First Burn	Range Time, sec	716.21
	Velocity, m/s	7,402.4
	(ft/s)	(24,286.1)
S-IVB Second Burn	Range Time, sec	9,560.0
	Velocity, m/s	10,445.2
	(ft/s)	(34,269.0)

TABLE 2-III. ENGINE CUTOFF CONDITIONS

PARAMETER	S-IC CECO	S-IC OECO	S-II CECO	S-II OECO	S-IVB FIRST GUIDANCE CUTOFF	S-IVB SECOND GUIDANCE CUTOFF
Range Time, sec	137.85	161.78	461.77	559.54	706.21	9,558.42
Altitude, km (n mi)	45.5 (24.6)	66.1 (35.7)	171.2 (92.4)	173.1 (93.5)	172.9 (93.4)	303.6 (163.9)
Space Fixed Velocity, m/s (ft/s)	2,029.6 (6,658.8)	2,731.5 (8,961.6)	5,595.4 (18,357.6)	6,967.3 (22,858.6)	7,802.9 (25,600.1)	10,847.9 (35,590.2)
Flight Path Angle, deg	23.105	19.914	0.116	0.367	0.001	7.008
Heading Angle, deg	76.125	75.328	79.535	82.585	88.496	59.695
Surface Range, km (n mi)	49.7 (26.8)	92.5 (49.9)	1,097.6 (592.7)	1,655.8 (894.1)	2,648.6 (1,430.1)	
Cross Range, km (n mi)	0.0 (0.0)	0.1 (0.1)	13.3 (7.2)	26.9 (14.5)	60.0 (32.4)	
Cross Range Velocity, m/s (ft/s)	2.5 (8.2)	6.6 (21.7)	107.3 (352.0)	177.8 (583.3)	277.4 (910.1)	
Inclination, deg						32.511
Decending Node, deg						122.463
Eccentricity						0.9727
*C_3, m^2/s^2 (ft^2/s^2)						-1,652,483 (-17,787,179)

*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 2-IV. STAGE SEPARATION CONDITIONS

S-IC/S-II SEPARATION		S-II/S-IVB SEPARATION		S-IVB/CSM SEPARATION	
PARAMETER	VALUE	PARAMETER	VALUE	PARAMETER	VALUE
Range Time, sec	163.5	Range Time, sec	560.5	Range Time, sec	11,099.0
Altitude, km (n mi)	67.7 (36.6)	Altitude, km (n mi)	173.1 (93.5)	Altitude, km (n mi)	7,167.9 (3,870.4)
Space-Fixed Velocity, m/s (ft/s)	2,736.9 (8,979.3)	Space-Fixed Velocity, m/s (ft/s)	6,970.7 (22,869.8)	Space-Fixed Velocity, m/s (ft/s)	7,566.6 (24,824.8)
Flight Path Angle, deg	19.641	Flight Path Angle, deg	0.356	Flight Path Angle, deg	45.397
Heading Angle, deg	75.339	Heading Angle, deg	82.622	Heading Angle, deg	69.807
Surface Range, km (n mi)	96.2 (51.9)	Surface Range, km (n mi)	1,662.0 (897.4)	Geodetic Latitude, deg N	26.101
Cross Range, km (n mi)	0.1 (0.1)	Cross Range, km (n mi)	27.1 (14.6)	Longitude, deg E	-134.562
Cross Range Velocity, m/s (ft/s)	6.8 (22.3)	Cross Range Velocity, m/s (ft/s)	178.5 (585.6)		
Geodetic Latitude, deg N	28.872	Geodetic Latitude, deg N	31.949		
Longitude, deg E	-79.667	Longitude, deg E	-63.746		

NOTE: Times used are vehicle times.

TABLE 2-V. PARKING ORBIT INSERTION CONDITIONS AND COMPARISONS

PARAMETER	ACTUAL	NOMINAL	ACT-NOM
Range Time, sec	716.21	715.49	0.72
Altitude, km (n mi)	172.9 (93.4)	172.9 (93.4)	0.0 (0.0)
Space-Fixed Velocity, m/s (ft/s)	7,804.7 (25,606.0)	7,804.2 (25,604.3)	0.5 (1.6)
Flight Path Angle, deg	0.001	0.000	0.001
Heading Angle, deg	88.932	88.907	0.025
Inclination, deg	32.542	32.542	0.000
Descending Node, deg	123.123	123.138	-0.015
Eccentricity	0.0002	0.0000	0.0002
Apogee*, km (n mi)	169.1 (91.3)	167.1 (90.2)	2.0 (1.1)
Perigee*, km (n mi)	166.7 (90.0)	166.7 (90.0)	0.0 (0.0)
Period, min	87.85	87.83	0.02
Geodetic Latitude, deg N	32.696	32.696	0.000
Longitude, deg E	-52.530	-52.558	0.028

NOTE: Times used are vehicle times.
*Based on a spherical earth of radius 6,378.165 km (3,443.934 n mi).

TABLE 2-VI. PARKING ORBIT ACCELERATION POLYNOMIALS

SEG. NO.	START TIME	END TIME	C_0	C_1	C_2	C_3	C_4	C_5
X1	716.21	806.00	$.125690 \times 10^{-5}$	$-.151451 \times 10^{-6}$	$.1398840 \times 10^{-8}$	.0	.0	.0
X2	806.00	8,630.00	$-.471725 \times 10^{-6}$	$-.231764 \times 10^{-8}$	$.225311 \times 10^{-11}$	$-.676388 \times 10^{-15}$	$.806580 \times 10^{-19}$	$-.331528 \times 10^{-23}$
X3	8,630.00	9,150.00	$.181577 \times 10^{-5}$	$-.439079 \times 10^{-7}$	$.330897 \times 10^{-9}$	$-.928199 \times 10^{-12}$	$.887388 \times 10^{-15}$	.0
Y1	716.21	806.00	$.910019 \times 10^{-6}$	.0	.0	.0	.0	.0
Y2	806.00	8,630.00	$.243266 \times 10^{-6}$	$.708891 \times 10^{-11}$	.0	.0	.0	.0
Y3	8,630.00	9,150.00	$.311250 \times 10^{-6}$	.0	.0	.0	.0	.0
Z1	716.21	806.00	$.314742 \times 10^{-5}$	$.987822 \times 10^{-7}$	$-.114975 \times 10^{-8}$	.0	.0	.0
Z2	806.00	8,630.00	$.136973 \times 10^{-5}$	$-.180863 \times 10^{-8}$	$.164062 \times 10^{-12}$	$.235225 \times 10^{-15}$	$-.597905 \times 10^{-19}$	$-.391658 \times 10^{-23}$
Z3	8,630.00	9,150.00	$-.821059 \times 10^{-6}$	$.633193 \times 10^{-8}$	$-.130877 \times 10^{-10}$	.0	.0	.0

POLYNOMIAL MODEL
ACCELERATION BIAS TERMS

$X = .905553 \times 10^{-7}$

$Y = -.161804 \times 10^{-6}$

$Z = -.173023 \times 10^{-6}$

POLYNOMIALS ARE OF THE FORM $A = C_0 + C_1 t + C_2 t^2 + C_3 t^3 + C_4 t^4 + C_5 t^5$

WHERE A IS THE ACCELERATION COMPONENT (KM/SEC^2) AND $t = T - T_S$ WHERE $T_S < t < T_E$

THE START TIME (T_S) AND END TIME (T_E) FOR EACH SEGMENT ARE EXPRESSED IN SECONDS RANGE TIME

THE ACCELERATION COMPONENTS ARE EXPRESSED IN THE LAUNCH VEHICLE PLATFORM - ACCELEROMETER SYSTEM (PACSS12).

TABLE 2-VII. TRANSLUNAR INJECTION CONDITIONS AND COMPARISONS

PARAMETER	ACTUAL	NOMINAL	ACT-NOM
Range Time, sec	9,568.42	9,570.20	-1.78
Altitude, km (n mi)	317.1 (171.2)	319.0 (172.2)	-1.9 (-1.0)
Space-Fixed Velocity, m/s (ft/s)	10,840.5 (35,565.9)	10,838.5 (35,559.4)	2.0 (6.5)
Flight Path Angle, deg	7.461	7.615	-0.154
Heading Angle, deg	59.524	59.451	0.073
Inclination, deg	32.511	32.519	-0.008
Descending Node, deg	122.463	122.456	0.007
Eccentricity	0.9741	0.9740	0.0001
C_3, m^2/s^2 (ft^2/s^2)	-1,568,337 (-16,881,439)	-1,578,558 (-16,991,457)	10,221 (110,018)

NOTE: Times used are vehicle times.

TABLE 2-VIII. TRANSLUNAR ORBIT ACCELERATION POLYNOMIALS

SEG. NO.	START TIME	END TIME	C_0	C_1	C_2	C_3	C_4	C_5
X1	9,568.42	9,718.00	$.182700 \times 10^{-5}$	.0	.0	.0	.0	.0
X2	9,718.00	10,250.00	$-.130770 \times 10^{-6}$	.0	.0	.0	.0	.0
X3	10,250.00	11,000.00	$-.233330 \times 10^{-6}$	.0	.0	.0	.0	.0
X4	11,000.00	12,140.00	$-.130770 \times 10^{-6}$	.0	.0	.0	.0	.0
X5	12,140.00	14,760.00	$-.581400 \times 10^{-7}$	.0	.0	.0	.0	.0
Y1	9,568.42	9,718.00	$.344830 \times 10^{-6}$	.0	.0	.0	.0	.0
Y2	9,718.00	10,250.00	$.288460 \times 10^{-6}$	.0	.0	.0	.0	.0
Y3	10,250.00	11,000.00	$.350800 \times 10^{-6}$	.0	.0	.0	.0	.0
Y4	11,000.00	11,700.00	$.257140 \times 10^{-6}$	.0	.0	.0	.0	.0
Y5	11,700.00	12,000.00	$.320000 \times 10^{-6}$	.0	.0	.0	.0	.0
Y6	12,000.00	14,760.00	$.257140 \times 10^{-6}$	.0	.0	.0	.0	.0
Z1	9,568.42	9,718.00	$.184610 \times 10^{-6}$	.0	.0	.0	.0	.0
Z2	9,718.00	10,250.00	$.184610 \times 10^{-6}$	.0	.0	.0	.0	.0
Z3	10,250.00	11,000.00	$.132800 \times 10^{-6}$	.0	.0	.0	.0	.0
Z4	11,000.00	11,700.00	$.184610 \times 10^{-6}$	.0	.0	.0	.0	.0
Z5	11,700.00	12,000.00	$.233330 \times 10^{-6}$	.0	.0	.0	.0	.0
Z6	12,000.00	14,760.00	$.184610 \times 10^{-6}$	.0	.0	.0	.0	.0

POLYNOMIAL MODEL
ACCELERATION BIAS TERMS

$X = -.180395 \times 10^{-7}$

$Y = -.169227 \times 10^{-6}$

$Z = -.228725 \times 10^{-6}$

POLYNOMIALS ARE OF THE FORM $A = C_0 + C_1 t + C_2 t^2 + C_3 t^3 + C_4 t^4 + C_5 t^5$

WHERE A IS THE ACCELERATION COMPONENT (KM/SEC^2) AND $t = T - T_S$ WHERE $T_S < t < T_E$

THE START TIME (T_S) AND END TIME (T_E) FOR EACH SEGMENT ARE EXPRESSED IN SECONDS RANGE TIME

THE ACCELERATION COMPONENTS ARE EXPRESSED IN THE LAUNCH VEHICLE PLATFORM - ACCELEROMETER SYSTEM (PACSS12).

TABLE 2-IX. CSM SEPARATION CONDITIONS

PARAMETER	VALUE
Range Time, sec	11,099.0
Altitude, km (n mi)	7,167.9 (3,870.4)
Space Fixed Velocity, m/s (ft/s)	7,566.6 (24,824.8)
Flight Path Angle, deg	45.397
Heading Angle, deg	69.807
Geodetic Latitude, deg N	26.101
Longitude, deg E	-134.562

TABLE 2-X. S-IC SPENT STAGE TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Range Time, sec	547.136
	Latitude, deg N	30.207
	Longitude, deg W	74.147
	Surface Range, km	651.2
	(n mi)	(351.6)
Impact: 0° Angle-of-Attack	Range Time, sec	506.425
	Latitude, deg N	30.226
	Longitude, deg W	74.056
	Surface Range, km	660.2
	(n mi)	(356.5)
Impact: 90° Angle-of-	Range Time, sec	581.669
	Latitude, deg N	30.194
	Longitude, deg W	74.209
	Surface Range, km	645.0
	(n mi)	(348.3)
Apex: Tumbling Case	Range Time, sec	270.973
	Altitude, km	116.8
	(n mi)	(63.1)
	Surface Range, km	323.7
	(n mi)	(174.8)

TABLE 2-XI. S-II SPENT STAGE TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Range Time, sec	1,202.390
	Latitude, deg N	31.726
	Longitude, deg W	35.990
	Surface Range, km	4,281.9
	(n mi)	(2,312.0)
Impact: 0° Angle-of-Attack	Range Time, sec	1,168.565
	Latitude, deg N	31.688
	Longitude, deg W	35.702
	Surface Range, km	4,309.6
	(n mi)	(2,327.0)
Impact: 90° Angle-of-Attack	Range Time, sec	1,241.504
	Latitude, deg N	31.765
	Longitude, deg W	36.287
	Surface Range, km	4,253.5
	(n mi)	(2,296.7)
Apex: Tumbling Case	Range Time, sec	584.122
	Altitude, km	173.6
	(n mi)	(93.7)
	Surface Range, km	1,812.5
	(n mi)	(978.7)

SECTION 3

TRAJECTORY ACCURACY

Trajectory reconstruction is an estimation process with the resulting confidence level or accuracy of the trajectory dependent upon the following factors:

a. Quantity of tracking data
b. Quality of tracking data
c. Consistency between tracking and guidance velocity data
d. Continuity between trajectory phases (boost, parking orbit, second burn, and translunar orbit)

These factors vary from flight to flight so that a rigorous statistical error analysis of the reconstructed trajectory is difficult to obtain. However, the extent to which systematic errors can be identified and corrected, plus random errors averaged out, determines the accuracy of the reconstruction. This section summarizes the results for the AS-511 flight and leads to the position and velocity uncertainties for the reconstructed trajectory. In addition, the basic analysis methods used in the reconstruction are presented in this section.

3.1 TRAJECTORY RECONSTRUCTION METHODS

The trajectory reconstruction process takes place in three stages:

a. Initial data preparation
b. Main analysis
c. Output data processing

The initial data preparation converts the raw tracking and guidance velocity data to a form compatible with the estimation programs. This includes correction for atmospheric refraction, conversion of doppler count to range rate, and data editing. The main analysis effort consists of iteratively developing separate but consistent powered and unpowered flight trajectory segments. The techniques used for the analysis are discussed below. After the main analysis is completed, the separate trajectory segments are merged together and transformed to several coordinate systems to provide the output trajectory listings and tapes. Included in this output data processing is a rework of the first 20 seconds of the ascent phase to better represent the early launch portion of the trajectory.

3.1 (Continued)

Also, the transient areas of the powered flight portions of the trajectory are reshaped in order to better represent the engine start, cutoff, and mixture ratio shift conditions as well as to incorporate the specific event times.

The main analysis effort is conducted with two separate estimation techniques, viz. weighted least squares and Kalman recursive estimation methods. These techniques are used to iteratively develop the separate powered and unpowered flight trajectory segments with the capability to incorporate end point constraints as required in order to provide trajectory continuity and consistency.

3.1.1 Weighted Least Squares Estimation

The weighted-least-squares estimation method is accomplished by the Orbit Correction Program (OCP) and is used to fit tracking data and determine the unpowered or coasting phases of the trajectory. A comprehensive orbital model, including perturbing accelerations such as venting, is used to simulate the trajectory. Differential corrections are applied to obtain, generally, the initial vehicle position and velocity plus the constant terms in the polynomials used to model the perturbing accelerations.

3.1.2 Kalman Recursive Estimation

The Kalman recursive estimation method is accomplished by the Guidance and Tracking Evaluation (GATE) program and is generally used to determine the powered flight phases of the trajectory (boost and second burn phases). Telemetered guidance velocity data from on-board the vehicle are used as generating parameters in conjunction with a comprehensive gravity model to produce a trajectory to fit the available tracking data. For coast phases, where the guidance data may be incomplete, and where data granularity limits the accuracy, a polynomial (like OCP) or a table can be used to represent non-gravitational accelerations. The Kalman estimation scheme is generally used to solve for coefficients of a guidance error model and, when desired, for corrections to initial position and velocity.

3.1.3 Estimation of Trajectory Segments

With both of these programs, the analysis proceeds by successive iterations to eliminate poor-quality and inconsistent tracking data from the solutions. Other estimation controls, such as relative data weights, are varied from run to run until an overall best-estimate

3.1.3 (Continued)

trajectory is obtained. State vectors from adjacent segments can be used in a particular segment and weighted appropriately to provide initial or final constraining state vectors. This constraint feature permits the development of a continuous and consistent trajectory when the segments are later merged. The criteria for evaluating a particular solution include the magnitudes and shapes of tracking residuals (differences between actual tracking and the simulated trajectory), the values of the guidance error model coefficients or polynomial bias terms, and the consistency between the separately estimated trajectory segments. A state vector comparison is used for judging the consistency between the various state vectors developed at time points common to two trajectory segments. Generally, the time points used for this state vector consistency judgment are Earth Parking Orbit Insertion (EPO), Restart Preparation (somewhere in Timebase 6), and Translunar Injection (TLI).

3.2 TRAJECTORY DATA SOURCES

3.2.1 Tracking Data-Quantity

Time periods for which C-band radar and S-band tracking data were available for AS-511 reconstruction are illustrated in Figure 3-1. The geographic locations of the tracking stations are shown on ground track Figures 2-1 and 2-8 and are itemized in Table 3-I. Most of the tracking data was used except for isolated points or for data segments which were inconsistent with adjacent data.

The C-band tracking data were provided in azimuth angle, elevation angle, and slant range measured parameters. These measurements are defined in Reference 1 and are designated as PACSS3a. The USB tracking data were provided in X-angle, Y-angle, range and range rate measured parameters. These, also, are defined in Reference 1, and are designated as PACSS3c and 3d, for the 30-foot and 85-foot antennas, respectively. The Goldstone Wing data had hour angle and declination instead of X and Y angles; this system is designated PACSS3b.

As shown in Figure 3-1, adequate data existed in order to determine the AS-511 trajectory. In general, tracking coverage was redundant except for the second burn phase where no tracking was available.

3.2.2 Tracking Data - Quality

Measured parameter comparisons between the tracking data and the trajectory phases were calculated in the various PACSS3 coordinate systems. The position components of the trajectory in PACSS10 were transformed into the measured parameters of the PACSS3 system appropriate to each tracker. Residual differences or deviations (observed tracking data minus calculated tracking data, O-C) were determined for the various tracking data sets. These residual differences are used for assessing the quality of the tracking data as well as determining how well the reconstructed trajectory fits the data.

The ascent phase measured parameter residuals are shown in Figures 3-2 through 3-7. Merritt Island, Patrick, Grand Turk, and Bermuda C-band residuals are given in Figures 3-2 through 3-5. Residuals for the Merritt Island and Bermuda S-band trackers are shown in Figures 3-6 and 3-7.

Measured parameter residuals during the parking orbit phase are given in Figures 3-8 through 3-16. First pass Bermuda and Carnarvon C-band residuals are shown in Figures 3-8 through 3-10; Figures 3-11 and 3-12 give residuals for the Honeysuckle and Texas S-band trackers. C-band residuals for second pass Merritt Island, Bermuda and Carnarvon radars are given in Figures 3-13 through 3-16.

The translunar phase measured parameter residuals are given in Figures 3-17 through 3-23. S-band residuals for the Hawaii, Texas, Goldstone, Goldstone Wing, and Merritt Island trackers are shown in Figures 3-17 through 3-22. Figure 3-23 shows the Merritt Island C-band radar residuals.

It is to be noted that the above measured parameter residuals for all phases of the flight depict the consistent data sets which were used in the reconstruction of the various trajectory phases.

3.2.3 Guidance Velocity Data

Guidance velocity data throughout the separate trajectory phases were received from the ST-124M inertial platform. The velocity data during the powered phases (ascent and second burn) were used directly by the GATE program as non-gravitational generating parameters. Velocity data during the orbit phases (parking and translunar) were fitted with polynomials and used by the OCP and GATE programs to provide non-gravitational effects (see Paragraphs 2.2 and 2.4, and Figures 2-9 and 2-13).

3.3 CONSISTENCY BETWEEN TRACKING AND GUIDANCE VELOCITY DATA

The consistency between tracking and guidance velocity data can be obtained by examining 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 which fit the tracking data.

The guidance velocity error plots for the ascent phase had reasonable shapes and magnitudes. The maximum error amounted to 0.4 m/s (1.3 ft/s) in the vertical direction, 2.2 m/s (7.2 ft/s) in the crossrange direction, and 0.5 m/s (1.6 ft/s) in the downrange direction, referenced to the launch vehicle platform accelerometer coordinate system (PACSS12).

The guidance velocity error plots for the second burn phase also had reasonable shapes and magnitudes particularly in view of the exacting constraints of the beginning and the end of the second burn phase to the end of the parking orbit and the beginning of the translunar orbit phases, respectively. The maximum error amounted to 0.7 m/s (2.3 ft/s) in the vertical direction, 3.1 m/s (10.2 ft/s) in the crossrange direction, and 2.9 m/s (9.5 ft/s) in the downrange direction, referenced to PACSS12.

3.4 CONTINUITY BETWEEN TRAJECTORY PHASES

The continuity between independently estimated trajectory segments is used as one of the indicators of the trajectory accuracy. A measure of the continuity between two adjacent trajectory segments is obtained by differencing the state vectors at a time point common to both segments. As noted in Paragraph 3.1.3, the time points normally used for continuity judgments are parking orbit insertion, a point somewhere during S-IVB restart preparation after TB6, and translunar injection. Comparisons at these time points were made for the AS-511 analysis and are described below. Following these comparisons, the separate trajectory segments were merged together, in the manner also described below, to provide the complete trajectory from GRR to CSM separation.

Comparisons of the state vectors at parking orbit insertion obtained independently by the powered flight and parking orbit analyses yielded excellent agreement. The position and velocity components of the two best-estimate solutions had a spread of 52 m (171 ft) and 0.1 m/s (0.3 ft/s) in the vertical direction, 60 m (197 ft) and 0.0 m/s (0.0 ft/s) in the cross range direction, and 14 m (46 ft) and 0.2 m/s

3.4 (Continued)

(0.7 ft/s) in the downrange direction, referenced to the earth-fixed launch site coordinate system (PACSS10). Since these differences are very small and since the confidence for the boost trajectory segment is greater at EPO than the parking orbit segment (because the boost fit had available more data near EPO), the EPO point quoted in this document is taken from the boost trajectory segment. The parking orbit segment, however, is generated from the state vector which was obtained by the composite fit of the available parking orbit tracking data.

Since no tracking data were available during the second burn period but the Carnarvon second pass tracking data were available during S-IVB restart preparation, a comparison was made between state vectors taken from the end of the parking orbit phase (which used the Carnarvon data in the solution) and a restart trajectory segment determined from a fit of the Carnarvon second pass tracking data alone. The position and velocity components of the solutions had a spread of 337 m (1,106 ft) and 0.7 m/s (2.3 ft/sec) in the vertical direction, 248 m (814 ft) and 0.7 m/s (2.3 ft/s) in the cross range direction, and 32 m (105 ft) and 0.1 m/s (0.3 ft/s) in the downrange direction, referenced to the PACSS10 system. Since these solutions agree well and since the confidence in the parking orbit trajectory segment is greater (because the composite solution uses several trackers) than the single tracking station restart solution, a parking orbit state vector at 9,150.0 seconds range time was used to initialize the second burn trajectory segment.

The second burn trajectory segment was developed by using the ST-124 guidance data as generating parameters and integrating from the parking orbit state vector at 9,150.0 seconds to the translunar orbit state vector at translunar injection. State vector differences at TLI (presented below) between the constrained integration and an unconstrained second burn integration are compatible with possible guidance errors. It should be pointed out that no tracking data were available to establish the post-TLI trajectory until 314 seconds after TLI. This increases the uncertainties in the TLI vector, and constraining the solution to fit this TLI state vector will cause the guidance errors to reflect these uncertainties. The position and velocity components of the two second burn integrations had a spread at TLI of 442 m (1,450 ft) and 2.6 m/s (8.5 ft/s) in the vertical direction, 695 m (2,280 ft) and 3.4 m/s (11.2 ft/s) in the cross range direction, and 61 m (200 ft) and 0.9 m/s (3.0 ft/s) in the downrange direction, referenced to the PACSS10 system. The second burn guidance velocity errors resulting from constraining to

3.4 (Continued)

the injection vector had, as noted in Paragraph 3.3, reasonable shapes and magnitudes.

Several injection vectors were obtained by solving for different translunar trajectory segments using various tracking data combinations. The position and velocity components from a set of these solutions had a spread at TLI of 459 m (1,506 ft) and 0.1 m/s (0.3 ft/s) in the vertical direction, 796 m (2,612 ft) and 0.5 m/s (1.6 ft/s) in the cross range direction and 526 m (1,726 ft) and 0.4 m/s (1.3 ft/s) in the downrange direction, referenced to the PACSS10 system.

As an additional validity check on the translunar phase, the CSM separation state vector was propogated forward to lunar impact with the various S-IVB velocity increments modeled. The resultant lunar impact point is in excellent agreement with AS-511 lunar impact points quoted in Reference 2.

As noted above, the TLI state vector from the translunar segment was used for the end of the second burn segment. The continuity thus provided at TLI plus the continuity at restart, discussed above, provides a completely continuous trajectory from the start of the parking orbit segment to the end of the translunar orbit segment at CSM separation.

3.5 TRAJECTORY UNCERTAINTIES

As an aid in estimating the trajectory accuracy, some of the tracking data throughout the various trajectory phases were transformed into the earth-fixed launch site coordinate system (PACSS10) position components and differenced with the reconstructed trajectory. The resulting residuals or deviations provide a direct indication of the spread of the tracking data about the trajectory.

The position deviations during the ascent phase are shown for the C-band trackers in Figures 3-24 through 3-27. Deviations for parking orbit are shown in Figures 3-28 through 3-32, for Carnarvon C-band (first pass), Honeysuckle S-band, Texas S-band, Bermuda C-band, and Carnarvon C-band (second pass) trackers, respectively. Translunar deviations for the Hawaii and Goldstone S-band trackers are given in Figures 3-33 and 3-34, respectively.

Based upon the information of the above paragraphs and a priori knowledge, the trajectory uncertainties were conservatively estimated. The uncertainties for the ascent phase are shown in Figure 3-35. At S-IC OECO, the uncertainties

3.5 (Continued)

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 ±1,500 m (±4,921 ft) in position components and ±1.5 m/s (4.9 ft/s) in velocity components at TLI and throughout the post-TLI trajectory. The total radius and velocity magnitude uncertainties throughout the parking orbit phase are estimated at ±300 m (±984 ft) and ±0.5 m/s (±1.6 ft/s). Similarly, the total radius and velocity magnitude uncertainties throughout the translunar orbit phase are estimated at ±1,000 m (±3,281 ft) and ±1.0 m/s (±3.3 ft/s).

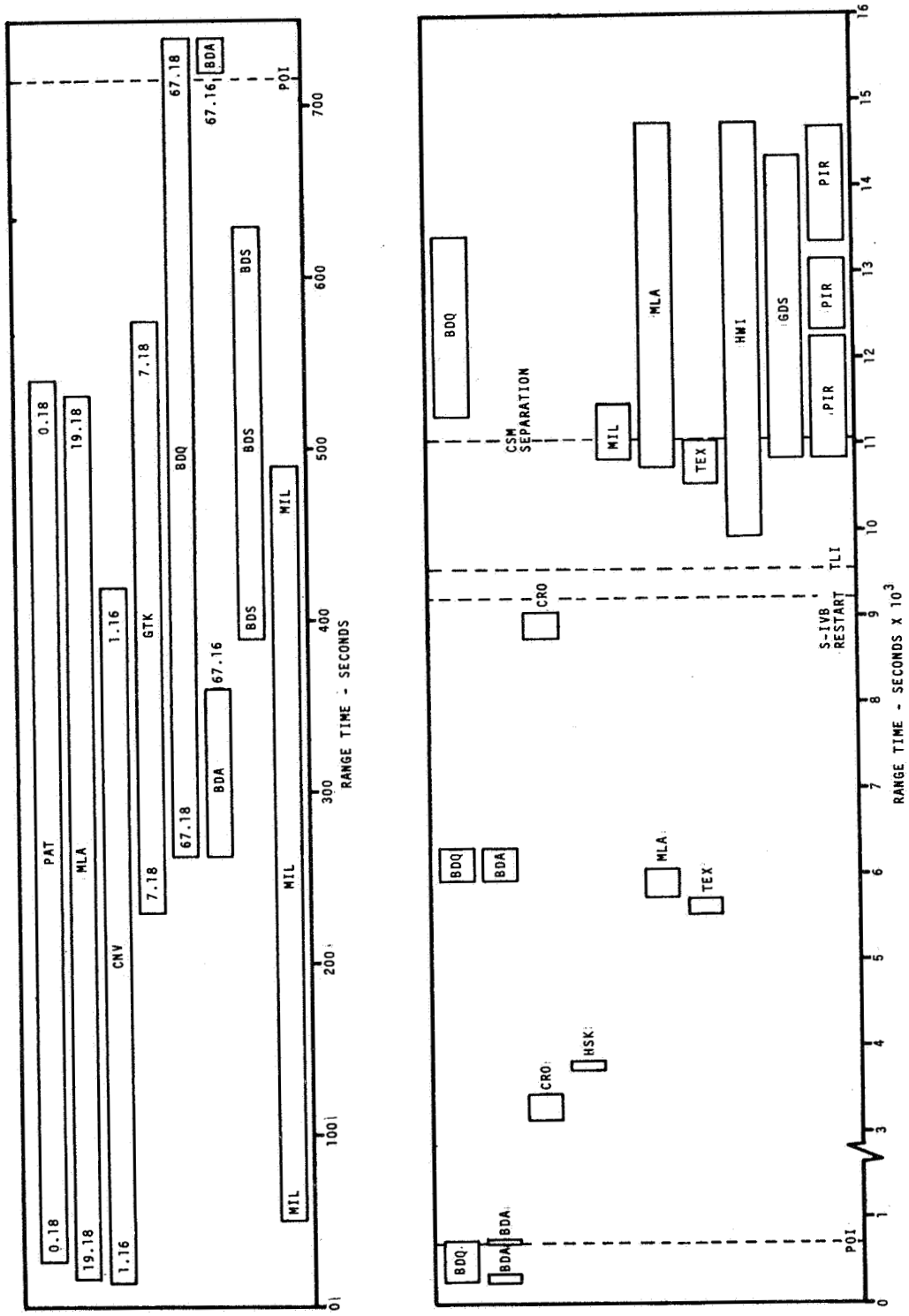


FIGURE 3-1. AS-511 TRACKING DATA COVERAGE

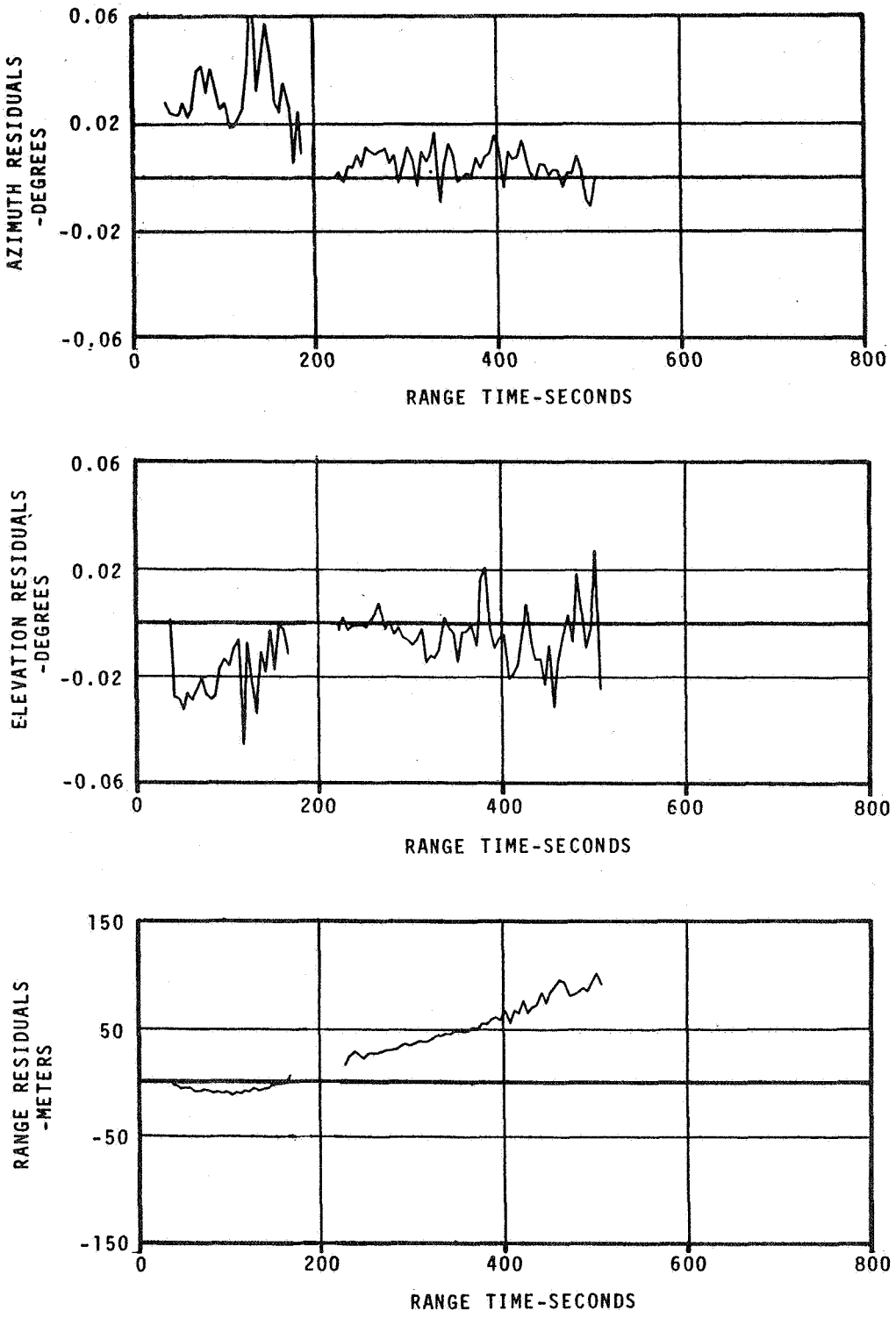


FIGURE 3-2. MERRITT ISLAND C-BAND RADAR TRACKING DEVIATIONS - ASCENT PHASE - (MLA)

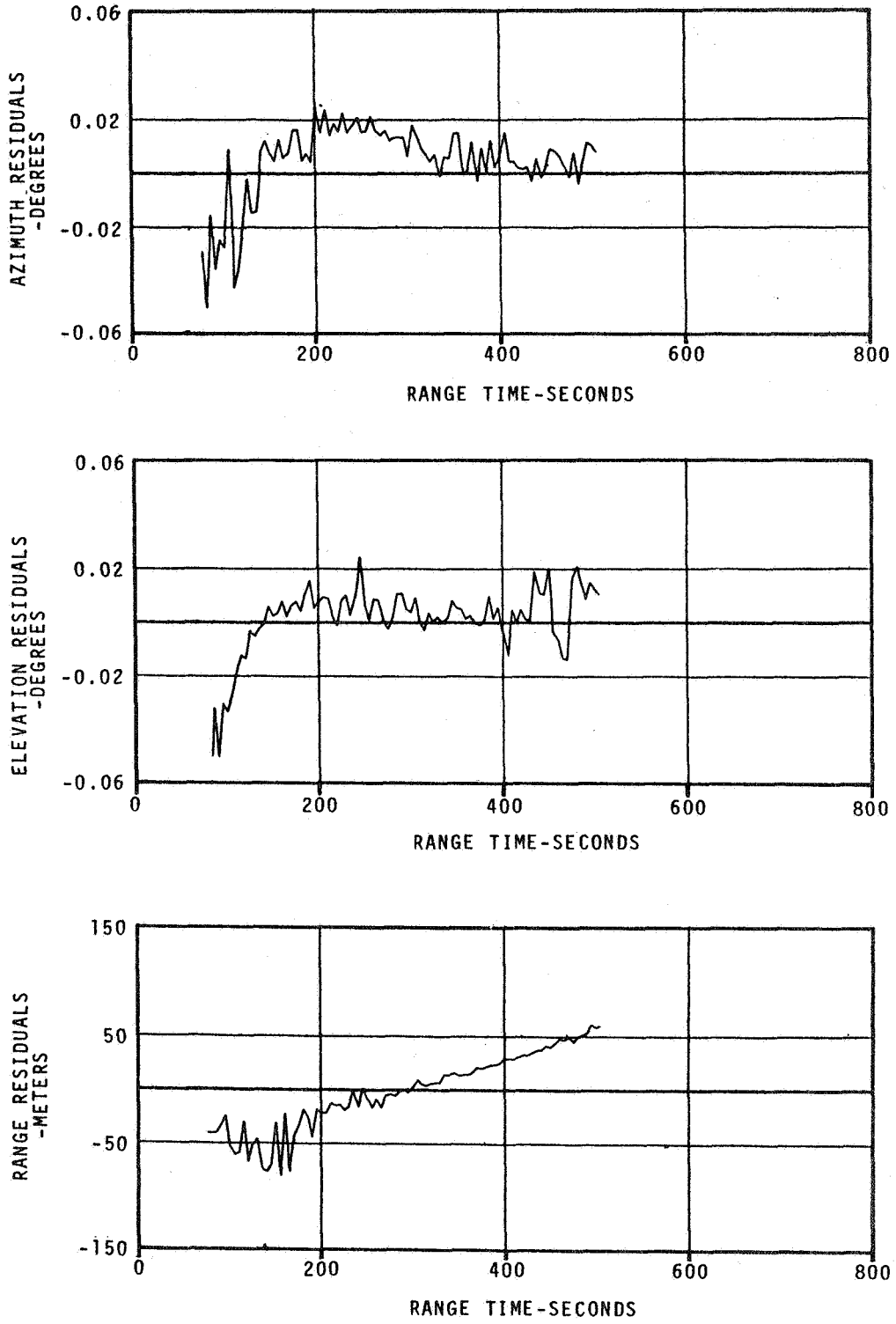


FIGURE 3-3. PATRICK AFB C-BAND RADAR TRACKING DEVIATIONS - ASCENT PHASE - (PAT)

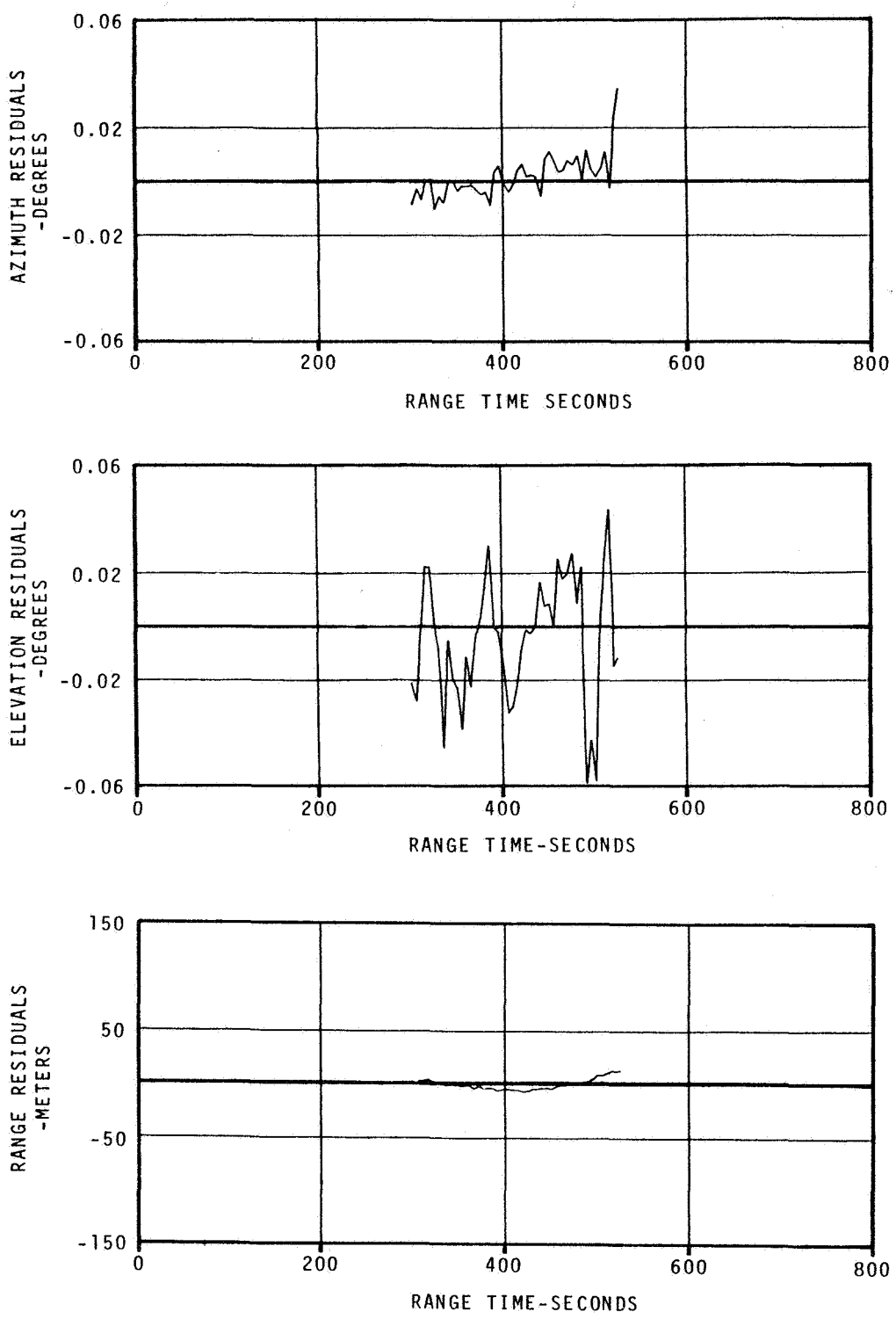


FIGURE 3-4. GRAND TURK ISLAND C-BAND RADAR TRACKING DEVIATIONS - ASCENT PHASE (GTK)

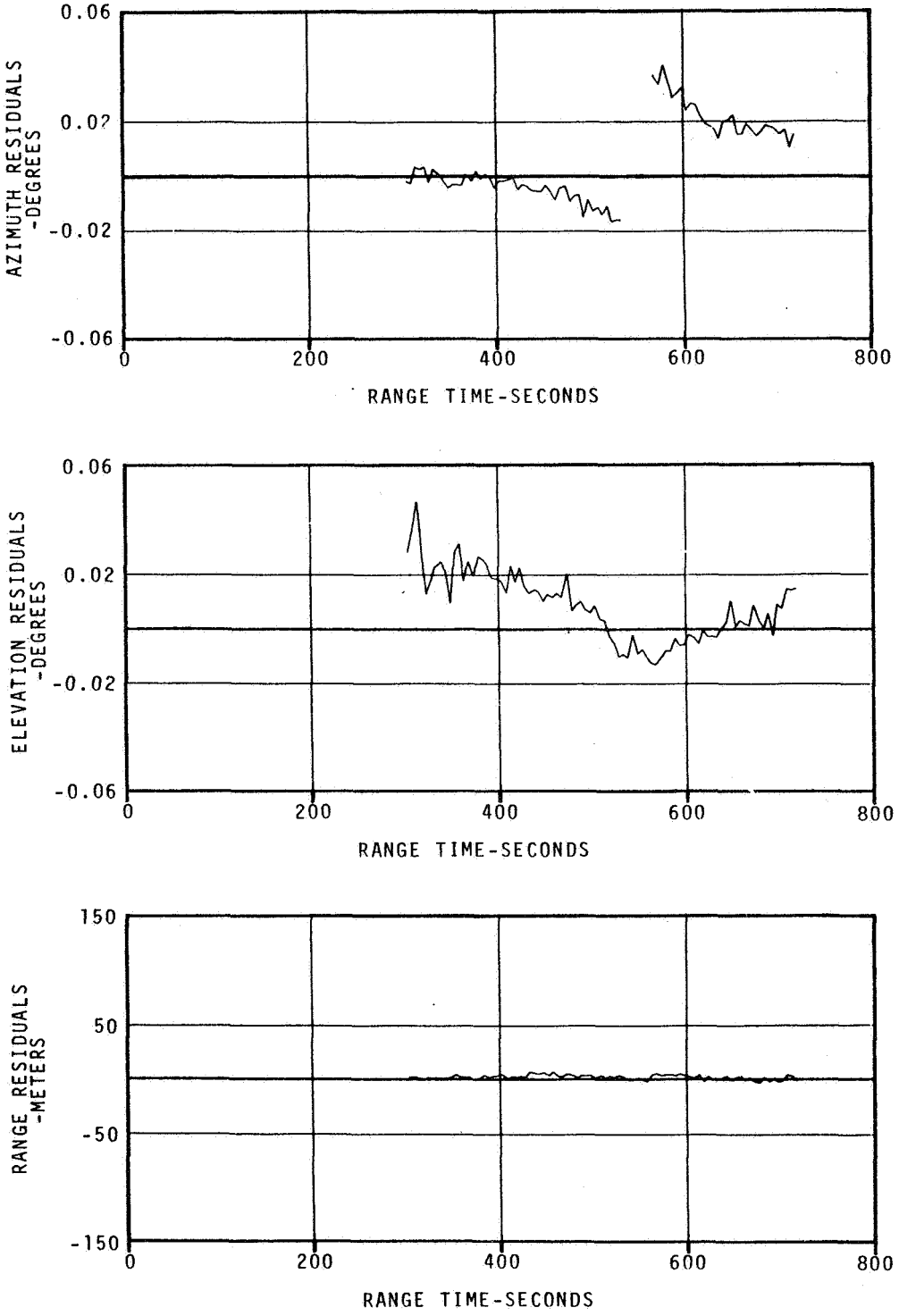
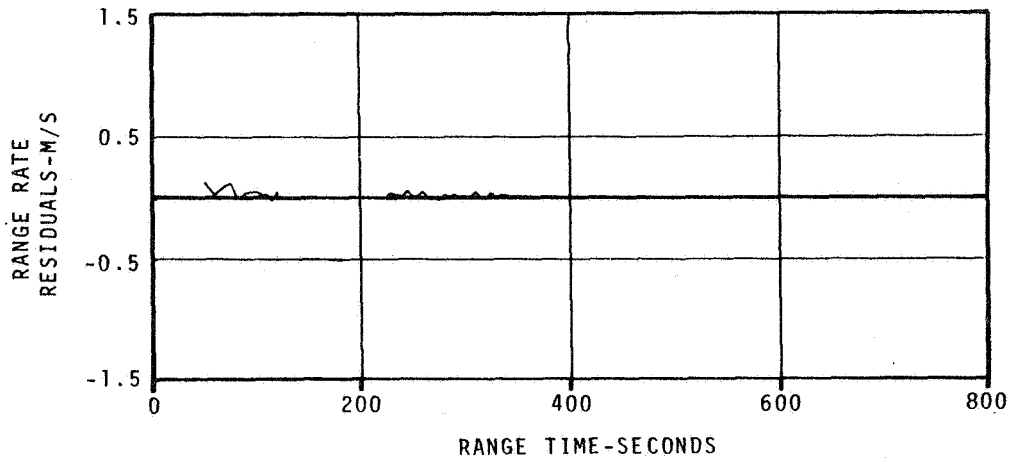


FIGURE 3-5. BERMUDA C-BAND RADAR TRACKING DEVIATIONS - ASCENT PHASE (BDQ)



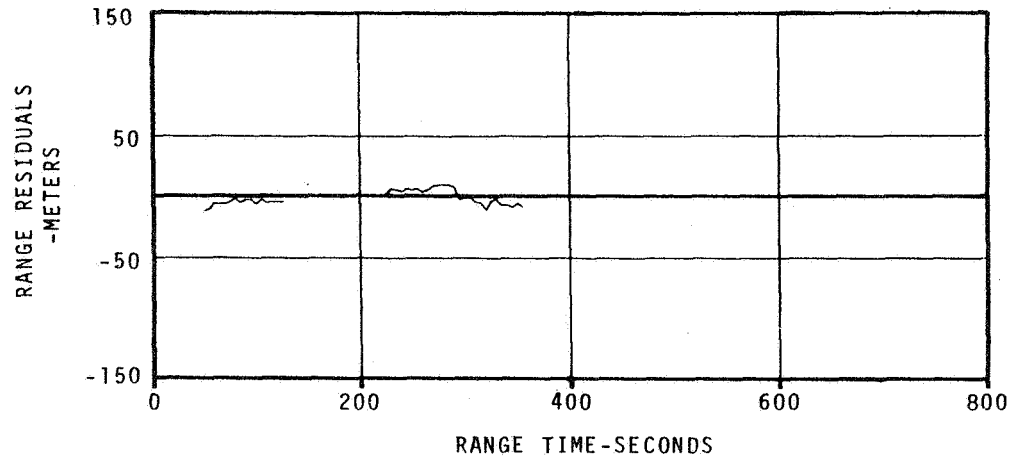


FIGURE 3-6. MERRITT ISLAND S-BAND TRACKING DEVIATIONS - ASCENT PHASE (MIL)

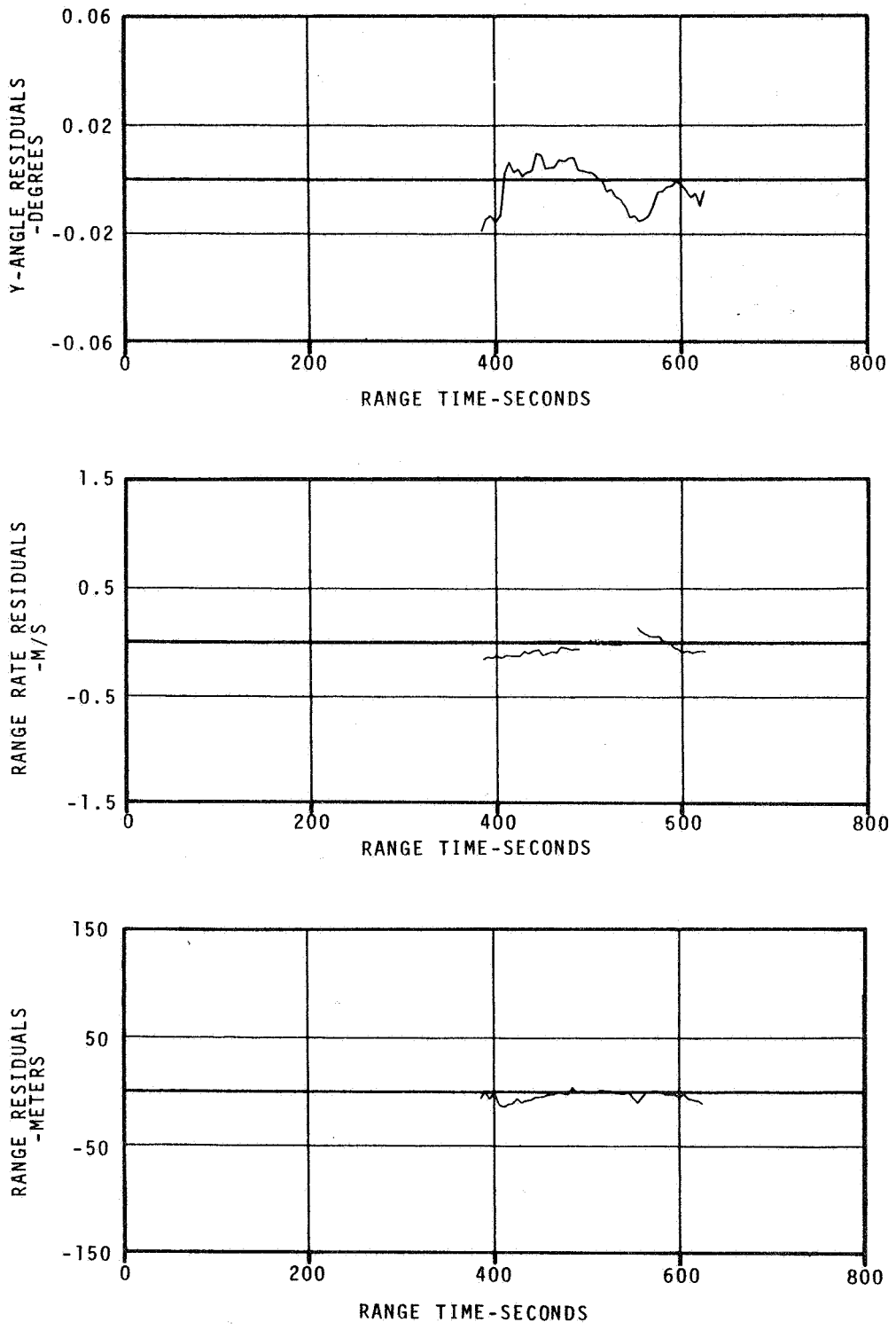
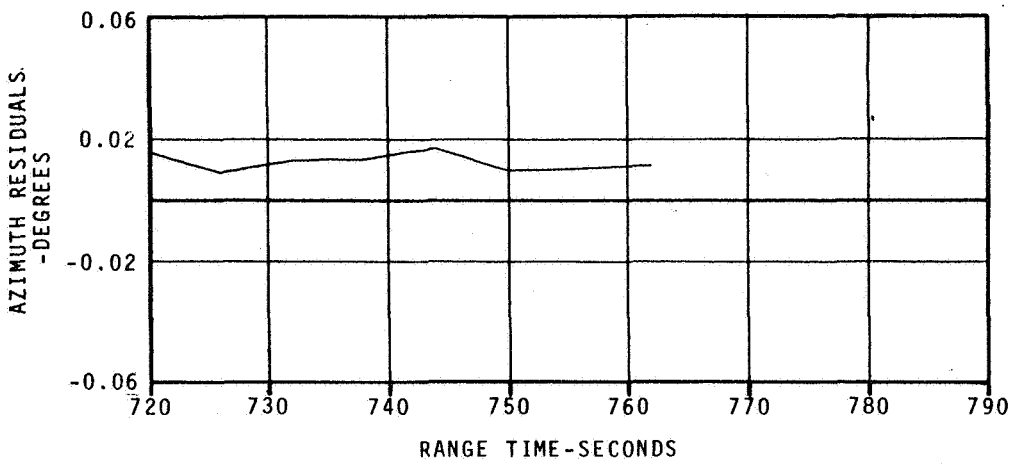


FIGURE 3-7. BERMUDA S-BAND TRACKING DEVIATIONS - ASCENT PHASE (BDS)



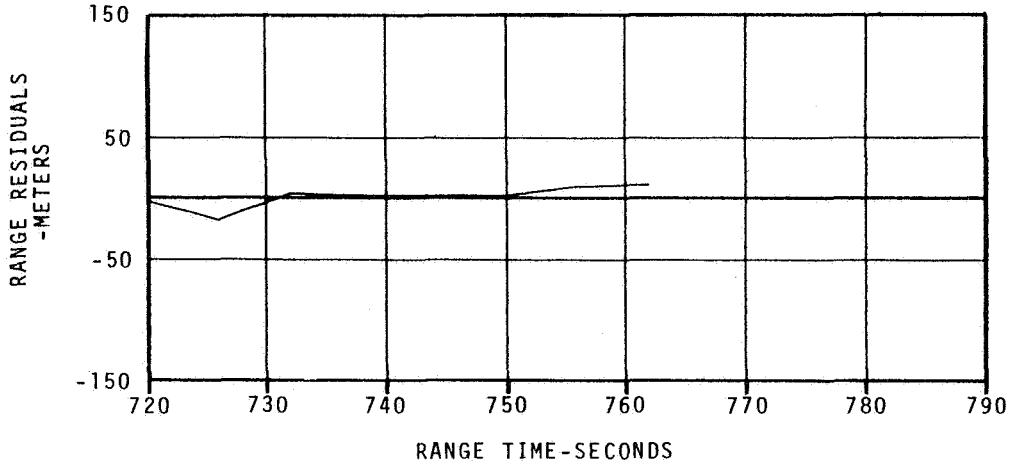
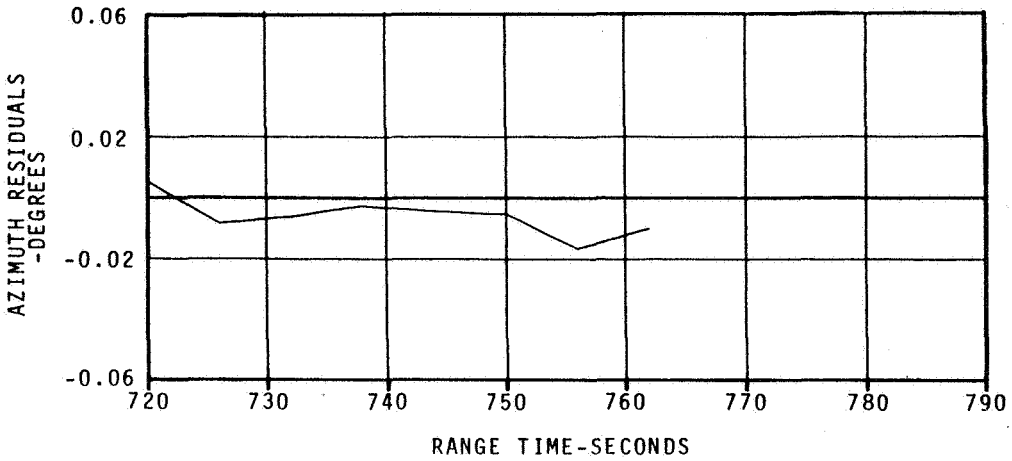


FIGURE 3-8. BERMUDA C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1 (BDQ)



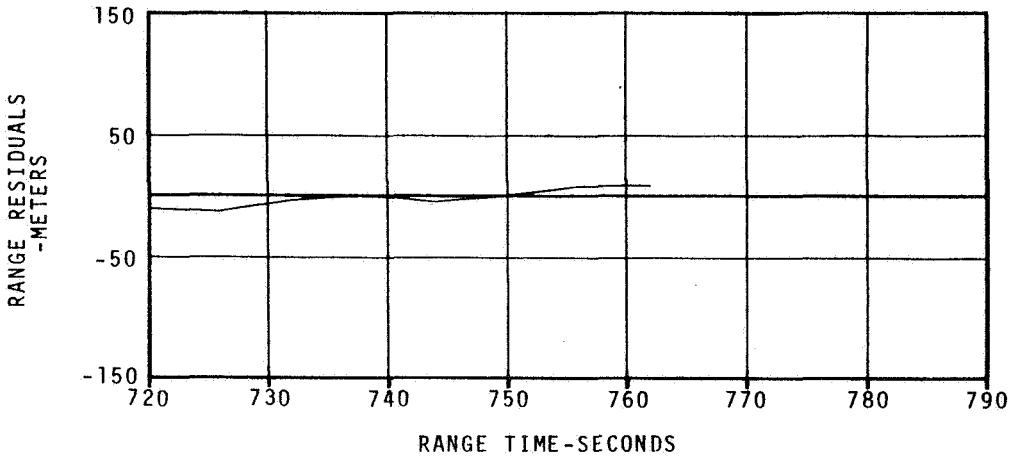


FIGURE 3-9. BERMUDA C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1 (BDA)

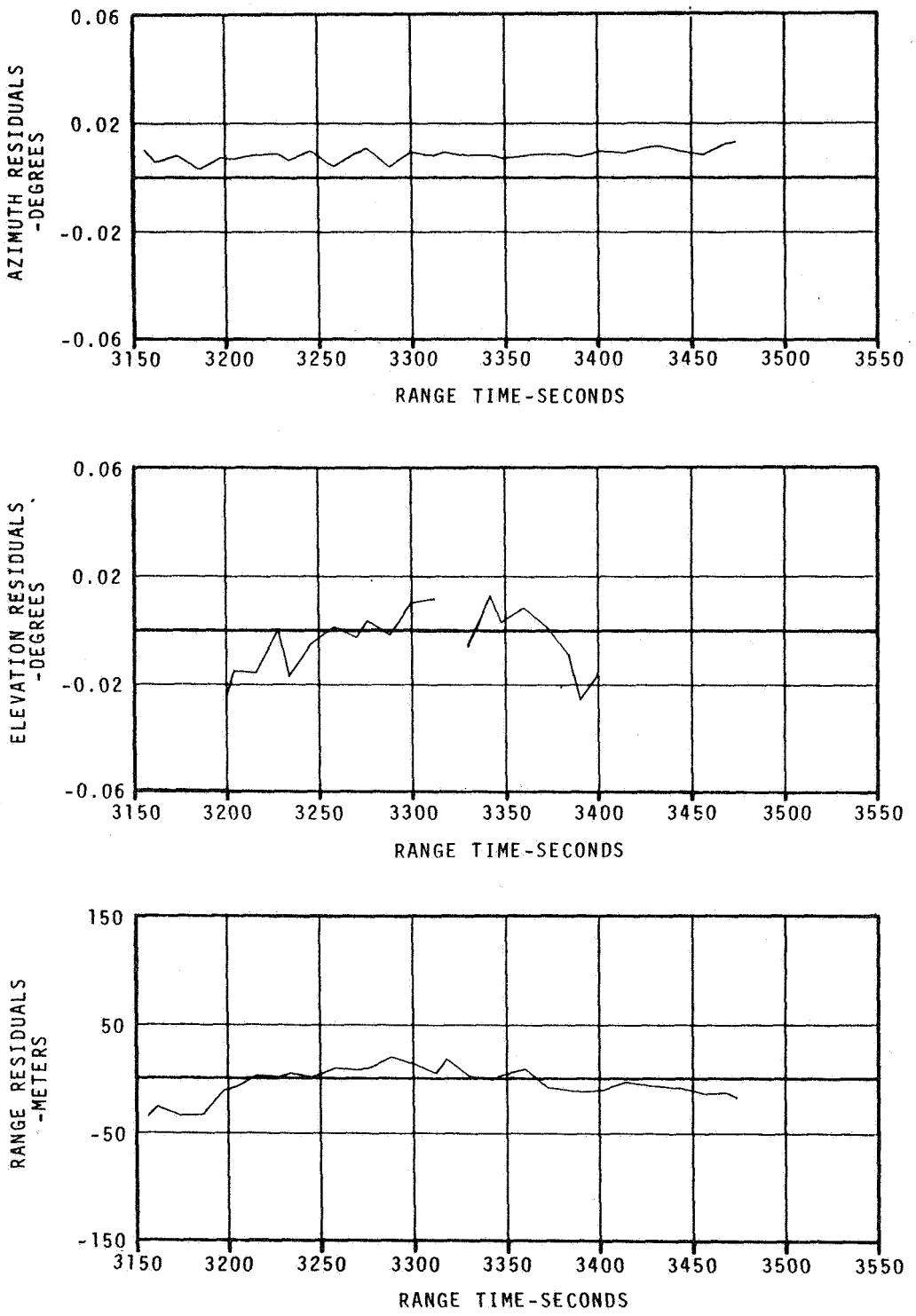


FIGURE 3-10. CARNARVON C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1 (CRO)

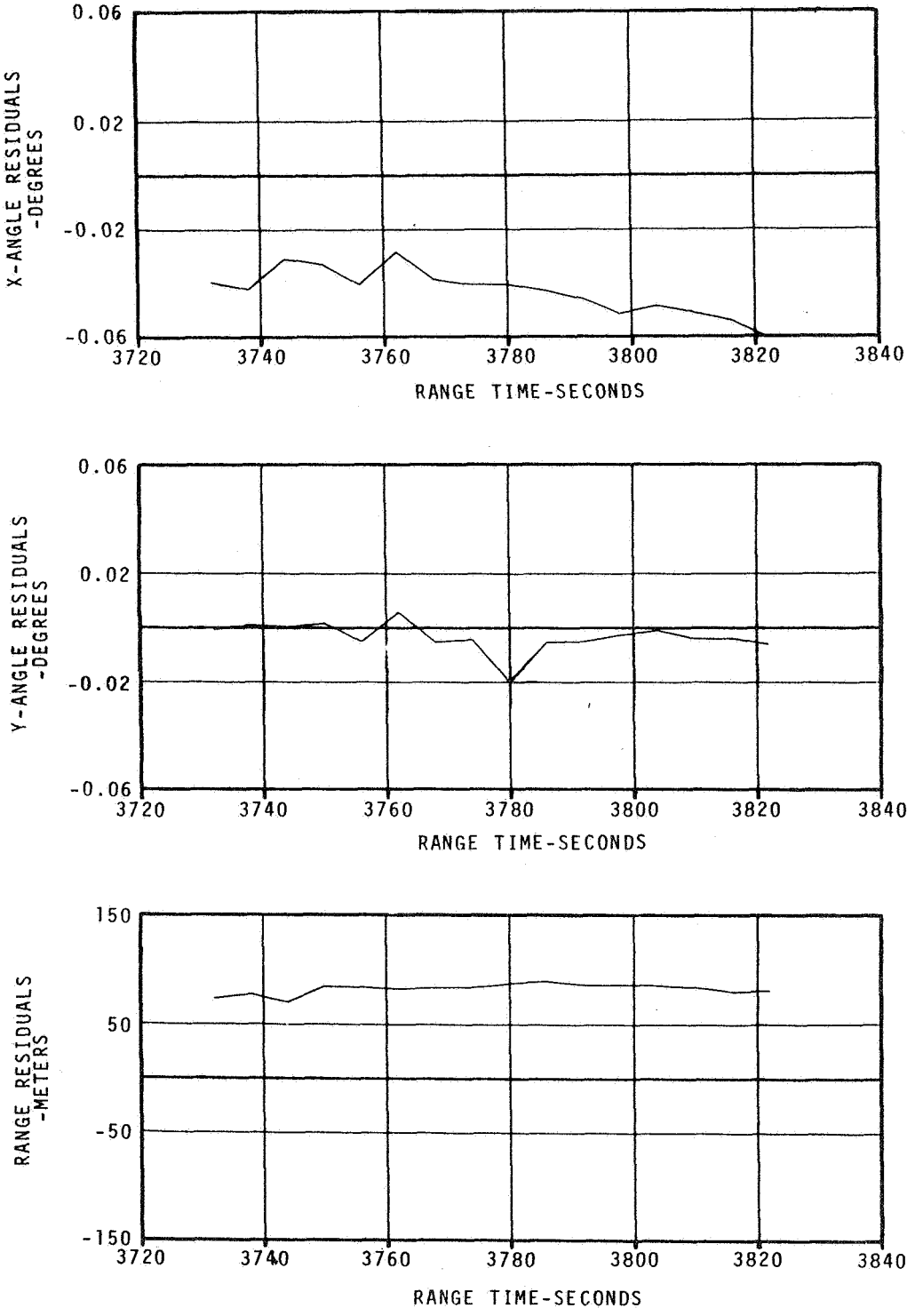


FIGURE 3-11. HONEYSUCKLE S-BAND TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1 (HSK)

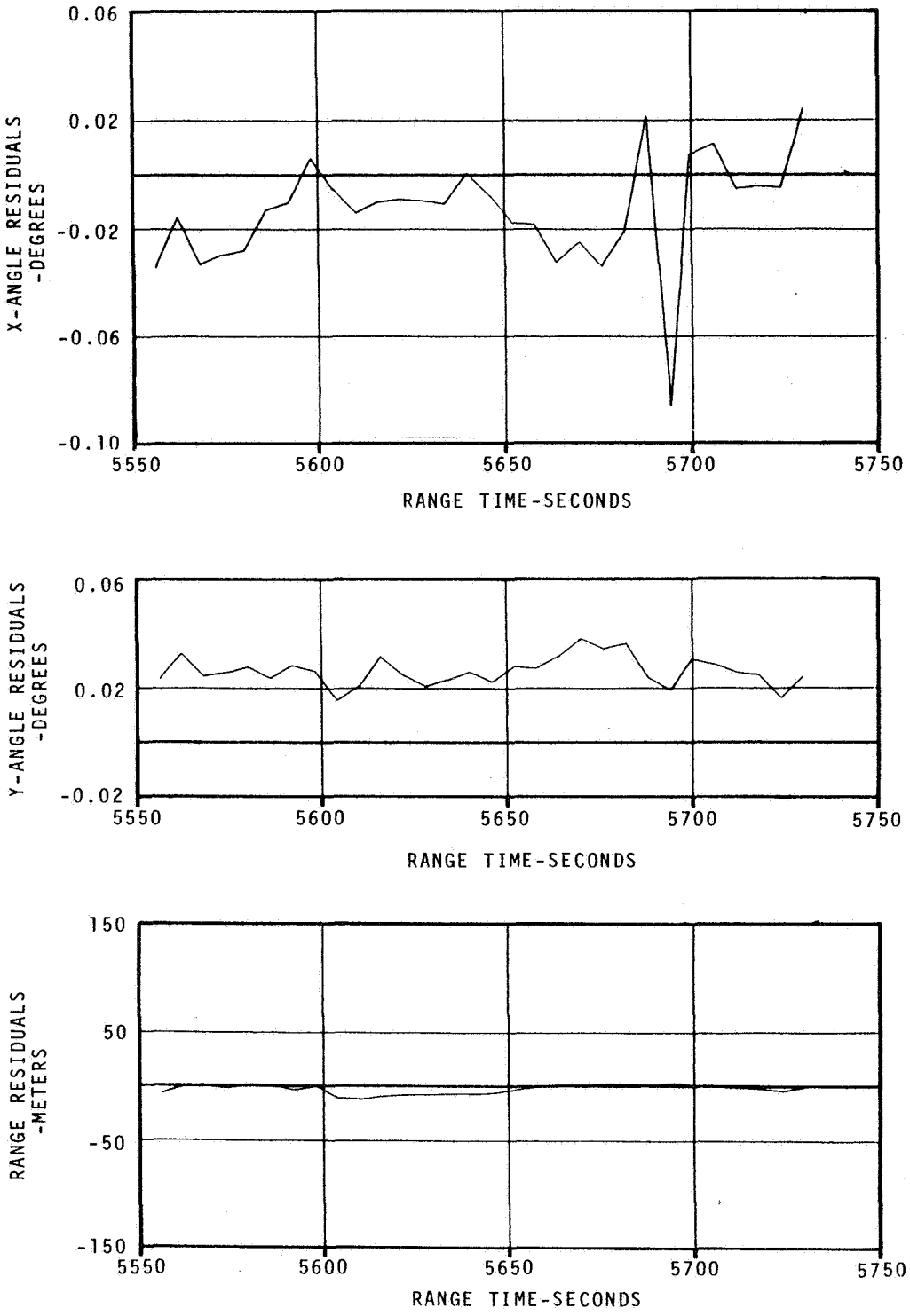
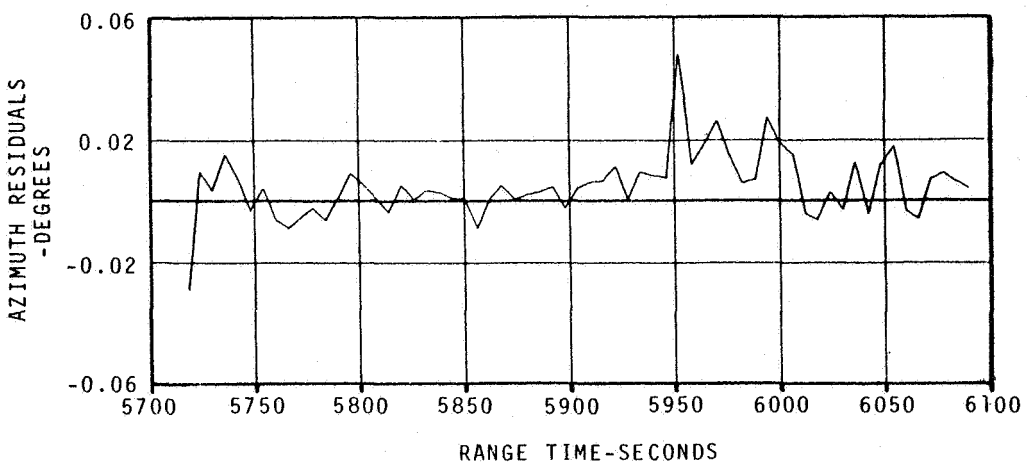


FIGURE 3-12. TEXAS S-BAND TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1 (TEX)



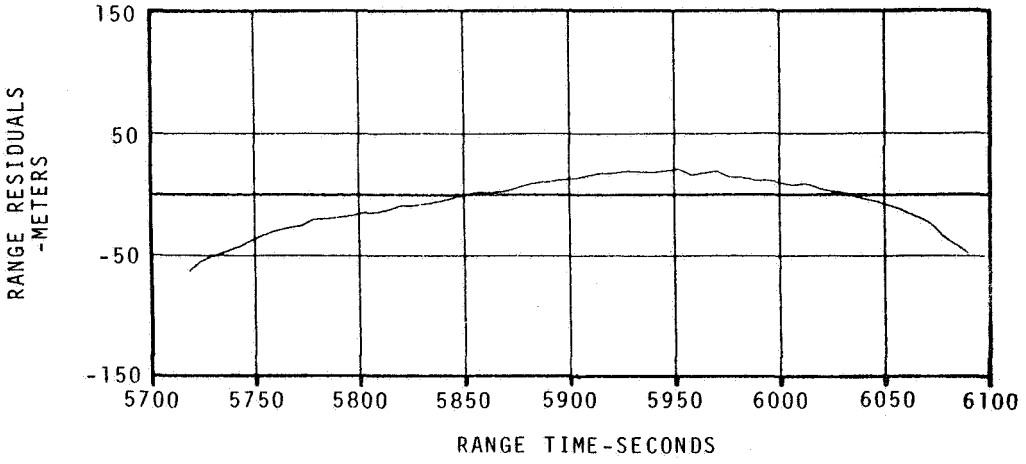


FIGURE 3-13. MERRITT ISLAND C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1/2 (MLA)

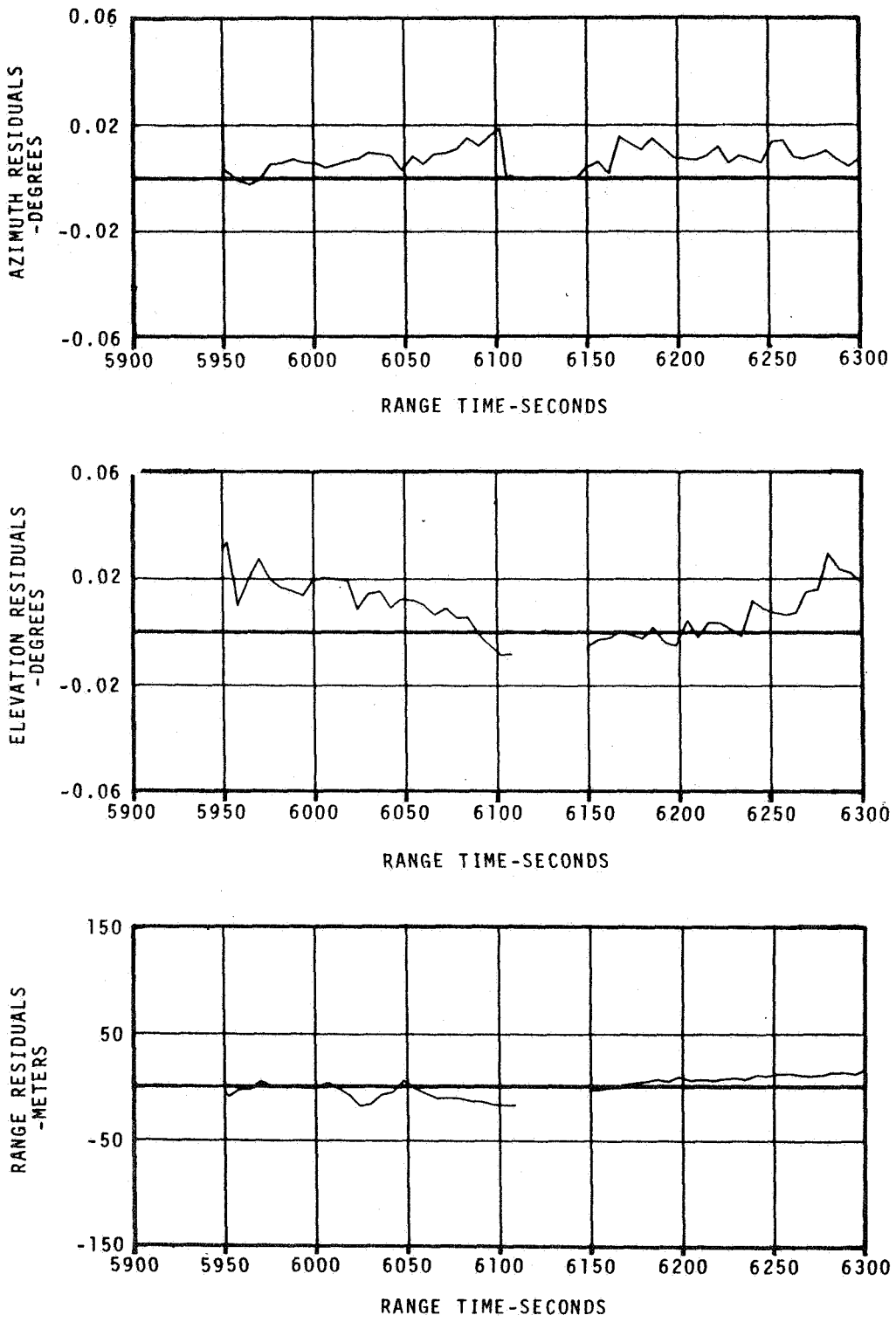


FIGURE 3-14. BERMUDA C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1/2 (BDQ)

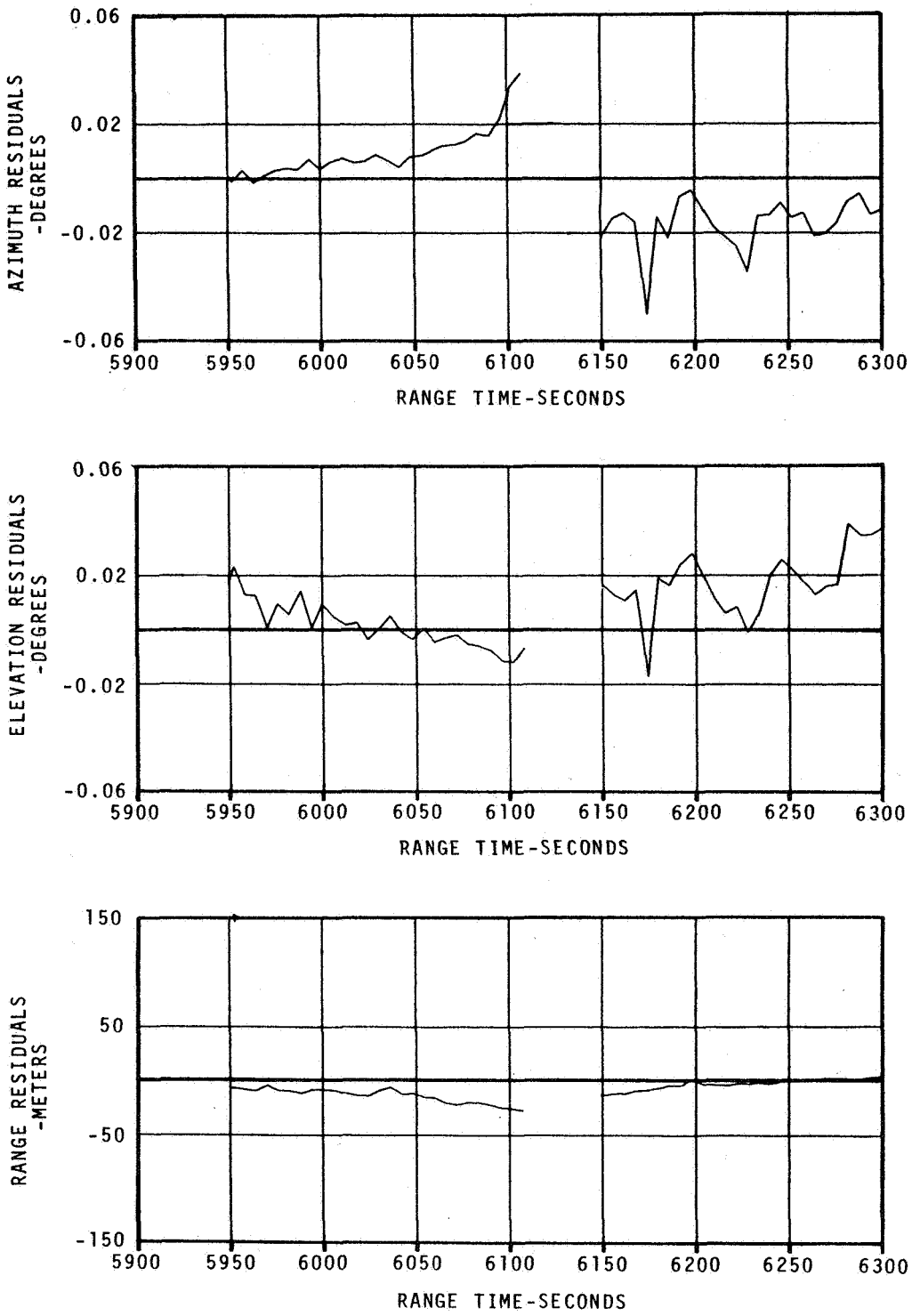


FIGURE 3-15. BERMUDA C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 1/2 (BDA)

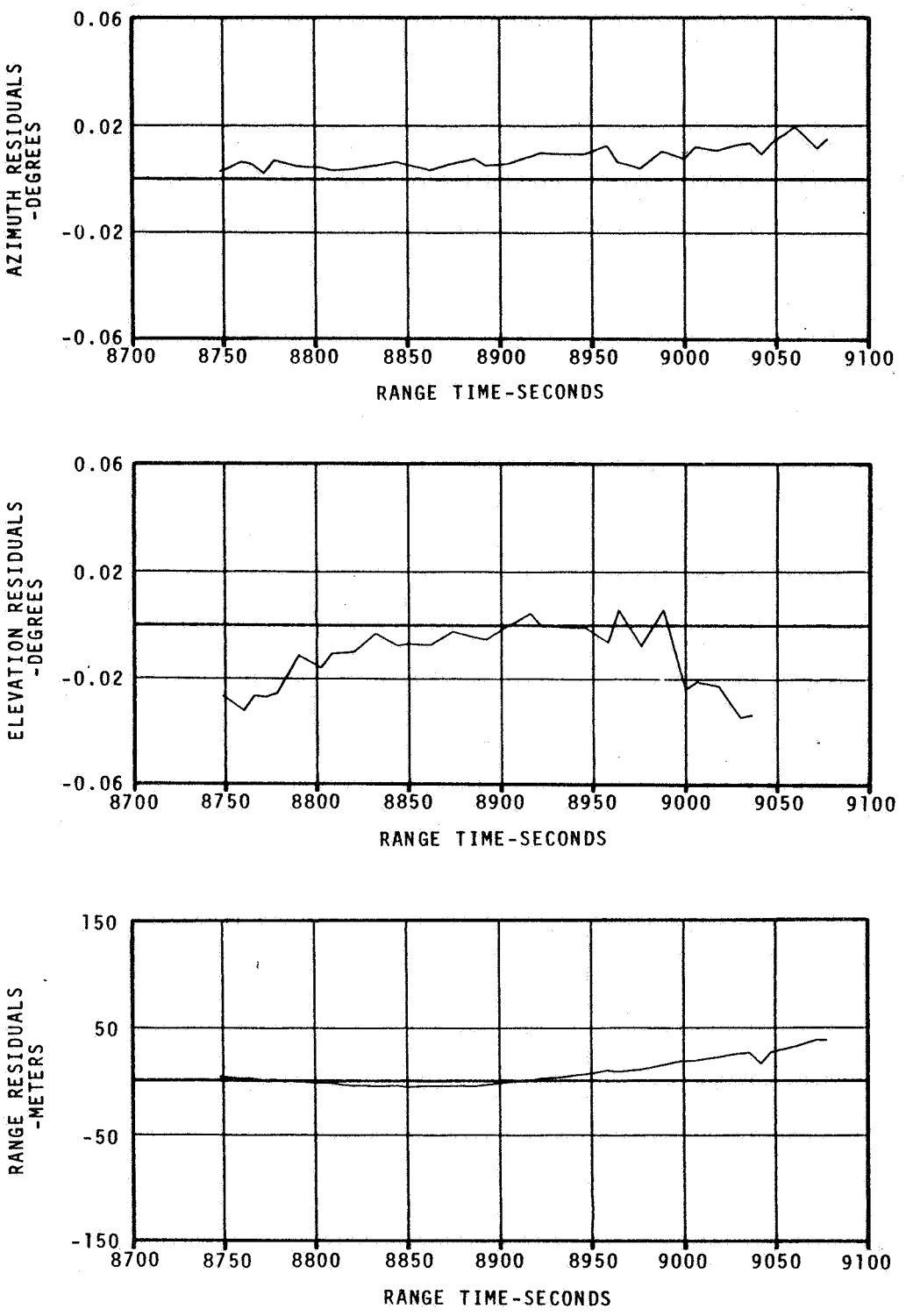


FIGURE 3-16. CARNARVON C-BAND RADAR TRACKING DEVIATIONS - PARKING ORBIT PHASE-REV. 2 (CRO)

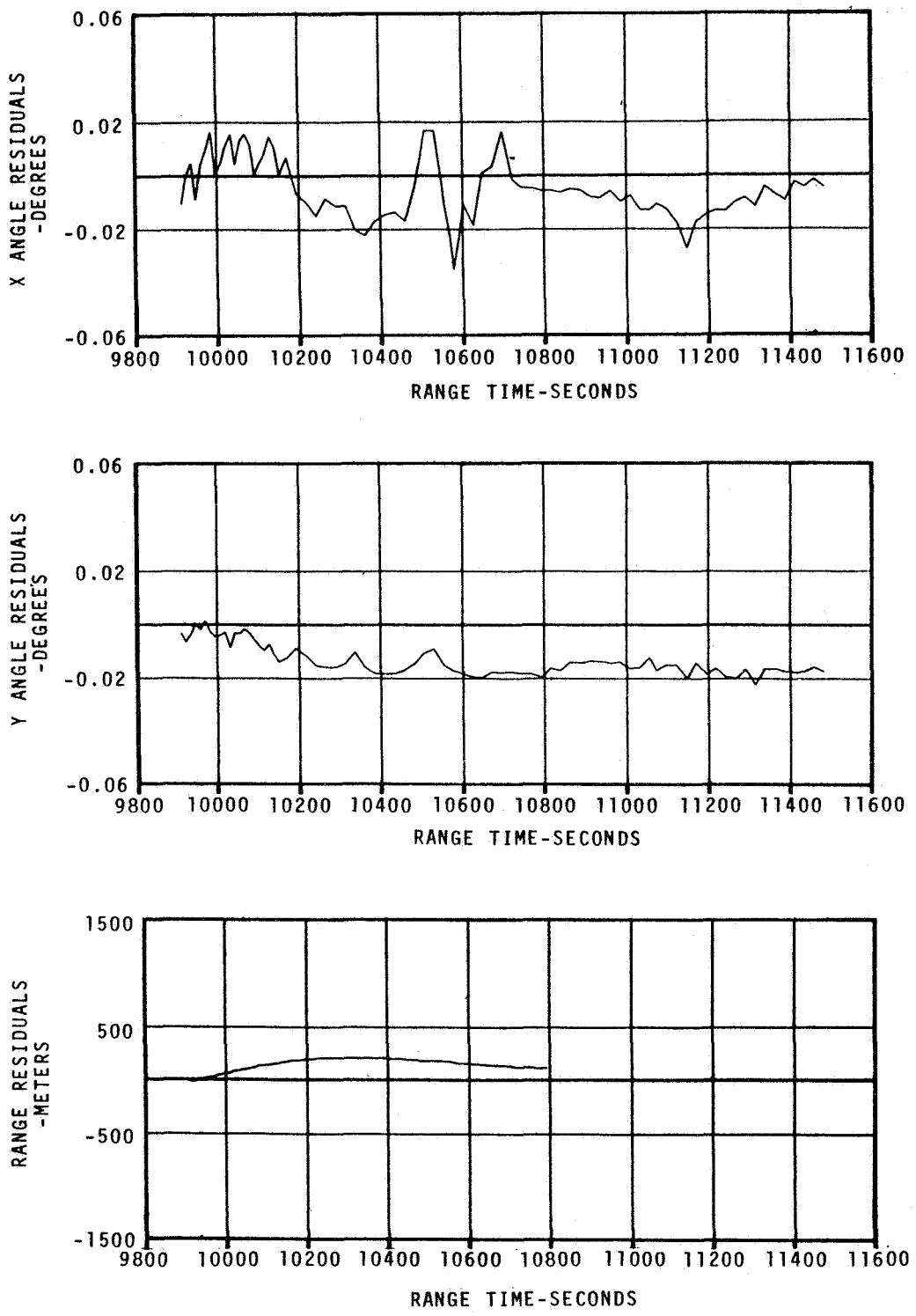


FIGURE 3-17. HAWAII TRACKING DEVIATIONS - TRANSLUNAR ORBIT PHASE (HWI)

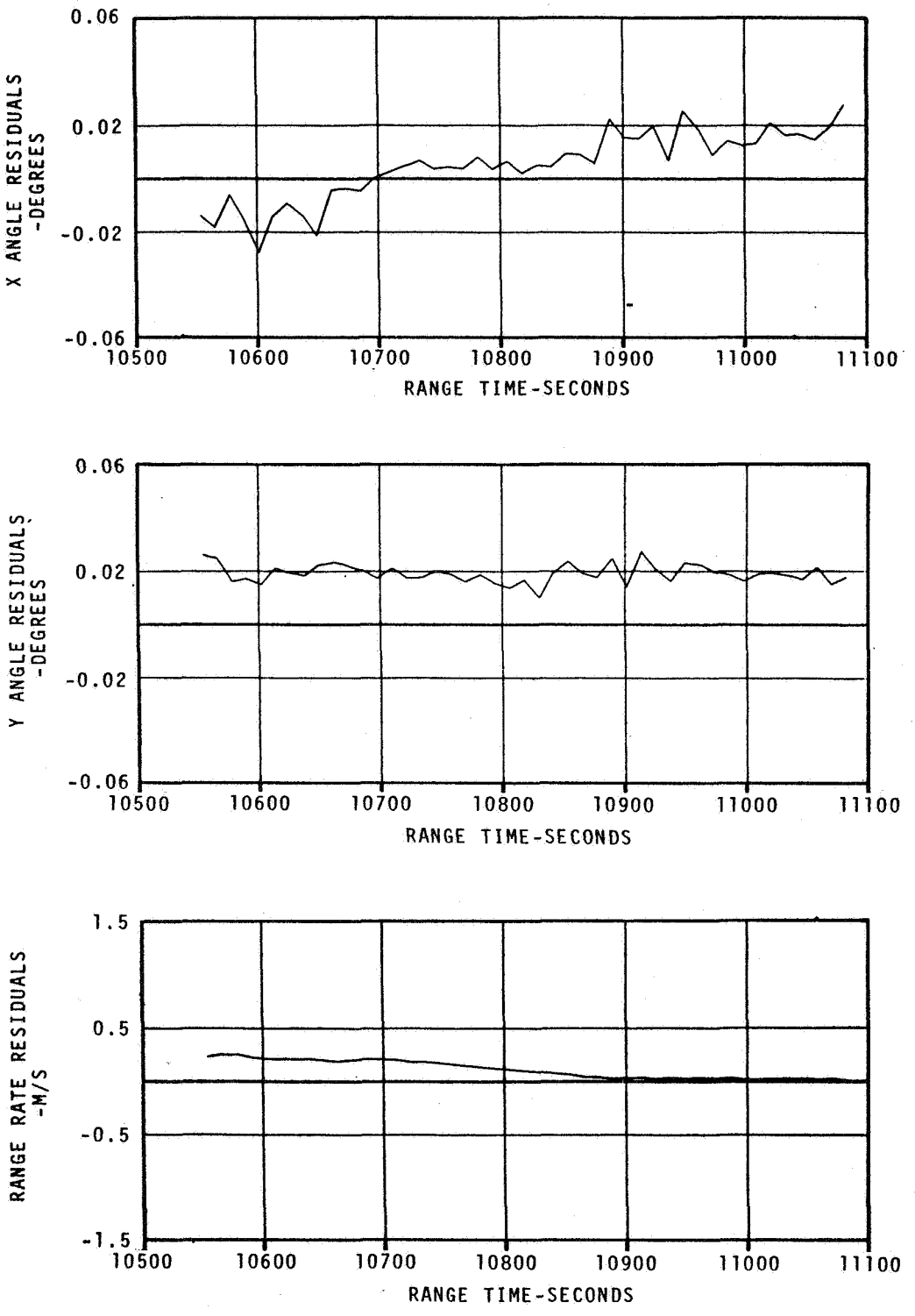


FIGURE 3-18. TEXAS TRACKING DEVIATIONS - TRANSLUNAR ORBIT PHASE (TEX)

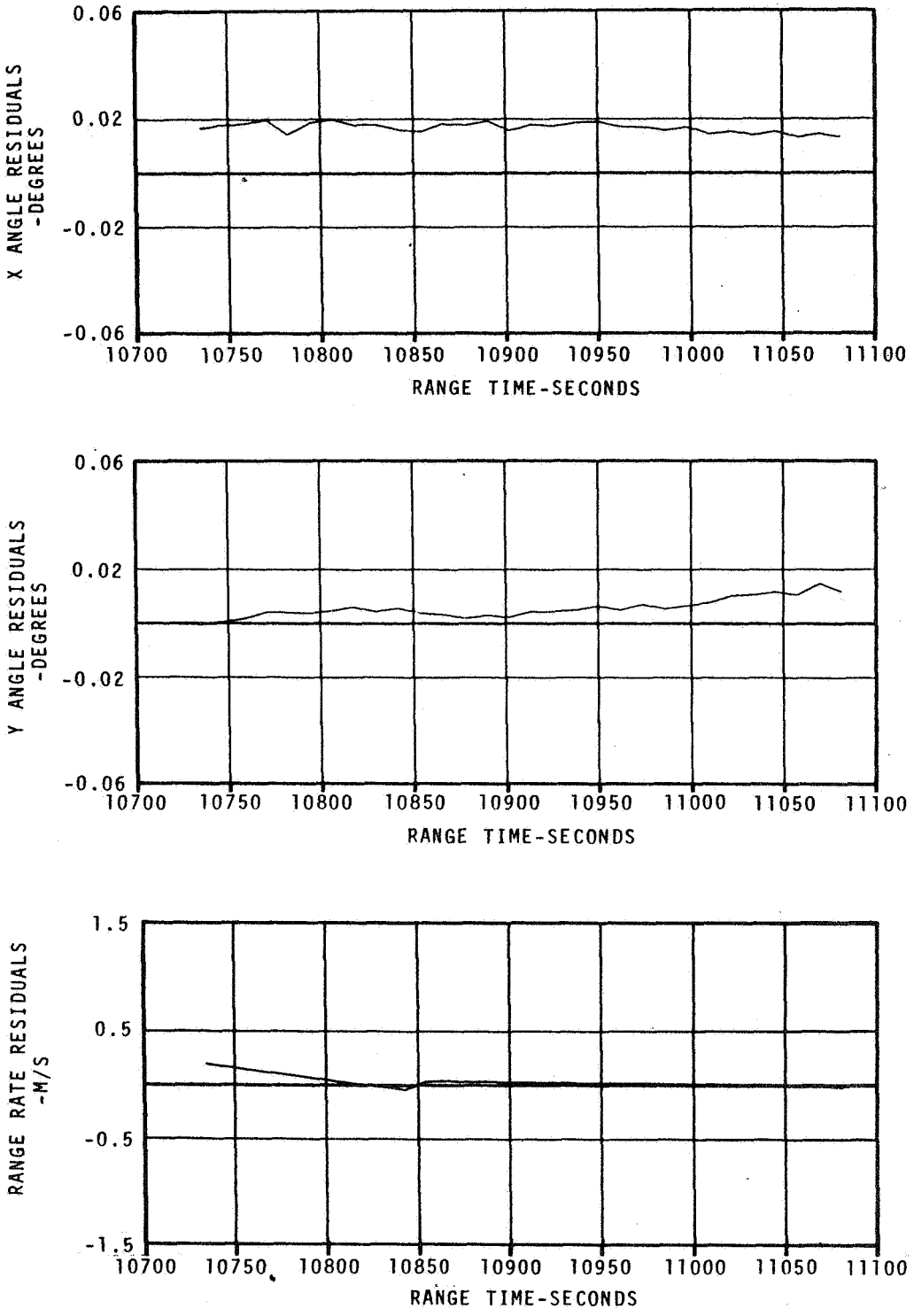
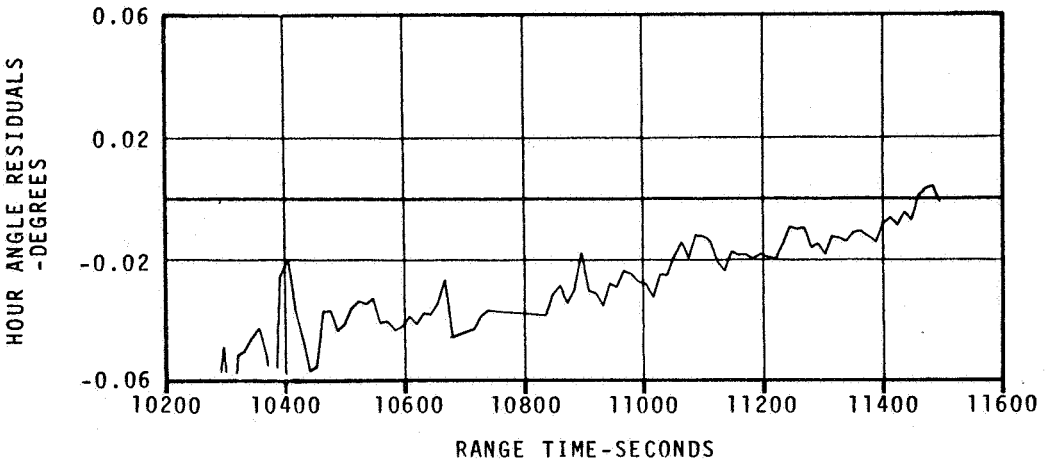


FIGURE 3-19. GOLDSTONE TRACKING DEVIATIONS - TRANSLUNAR ORBIT PHASE (GDS)



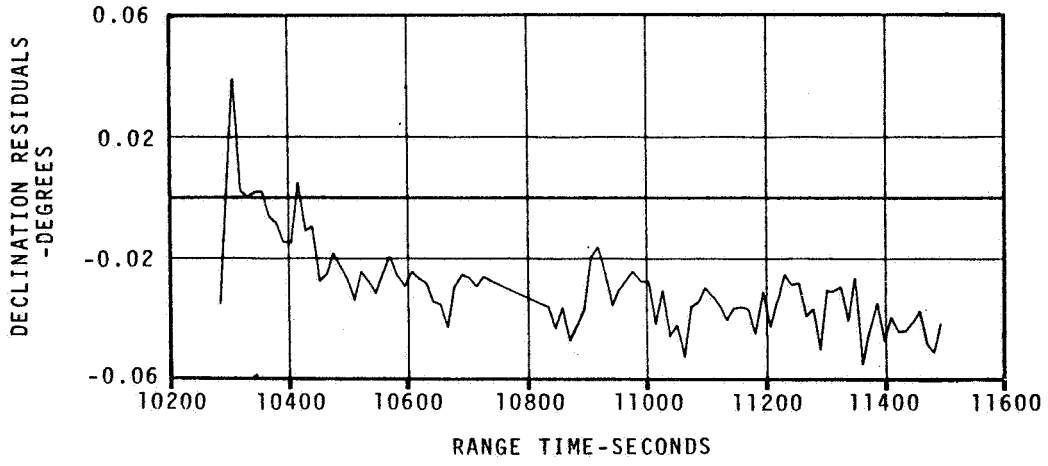


FIGURE 3-20. GOLDSTONE WINGSITE HOUR ANGLE AND DECLINATION DEVIATIONS - TRANSLUNAR ORBIT PHASE (PIR)

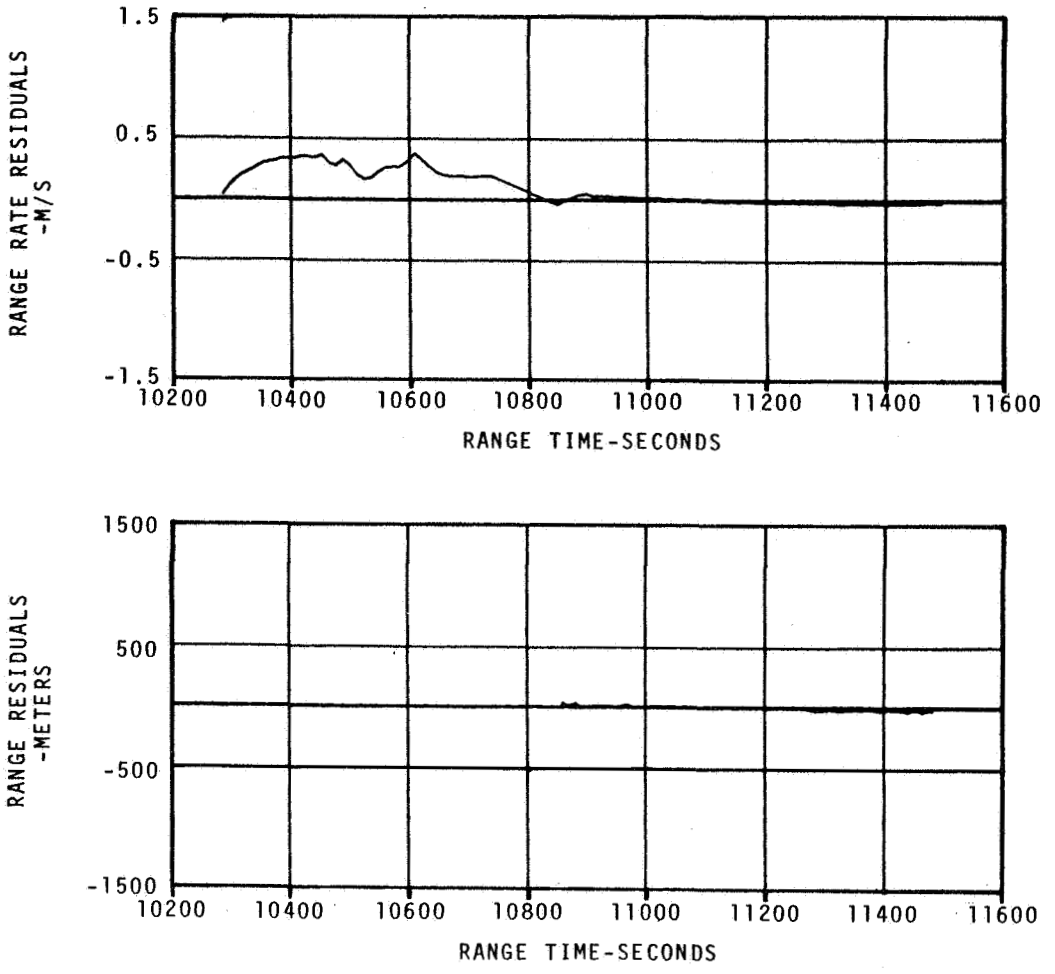


FIGURE 3-21. GOLDSTONE WINGSITE RANGE RATE AND RANGE DEVIATIONS - TRANSLUNAR ORBIT PHASE (PIR)

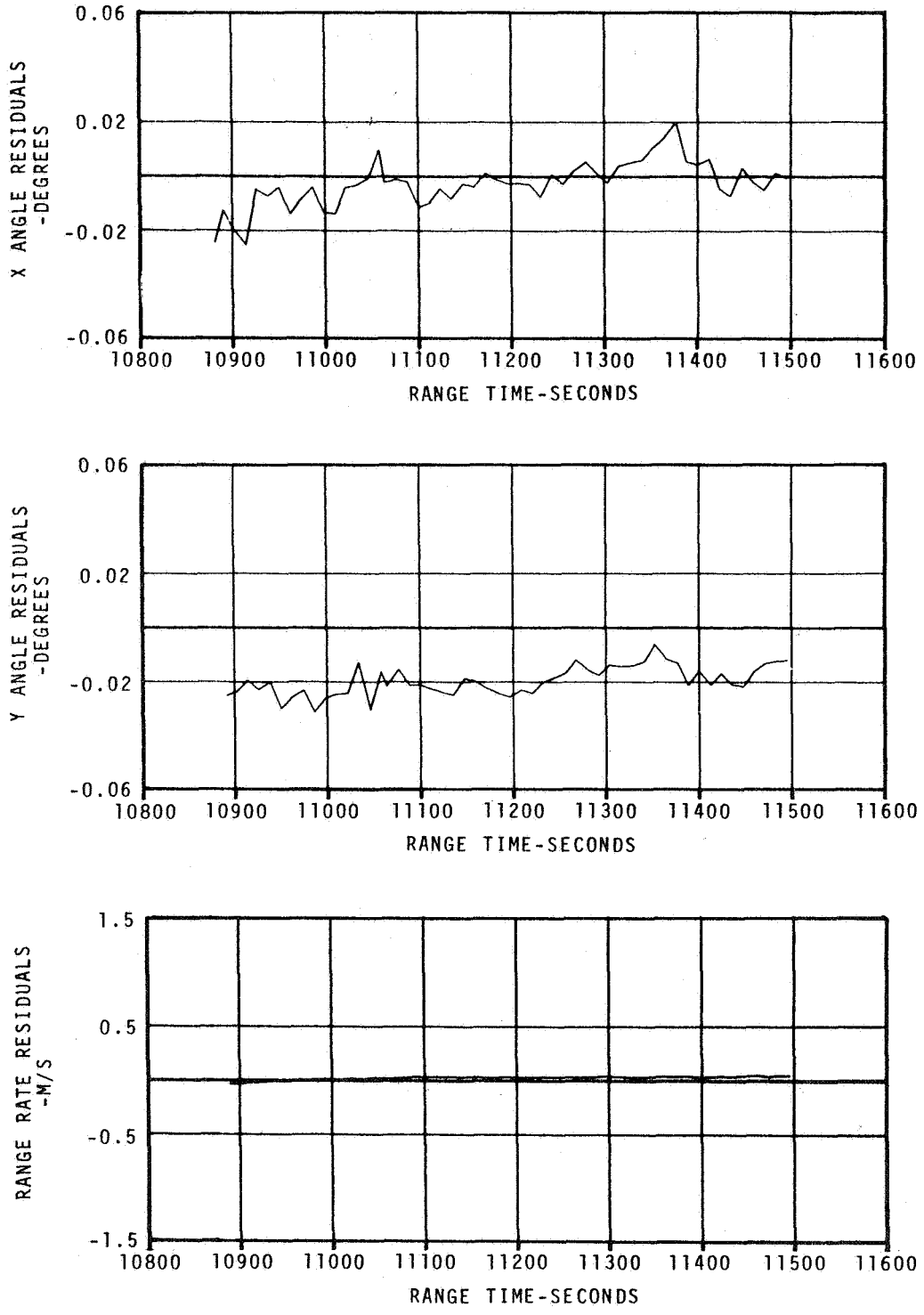


FIGURE 3-22. MERRITT ISLAND S-BAND TRACKING DEVIATIONS - TRANSLUNAR ORBIT PHASE - (MIL)

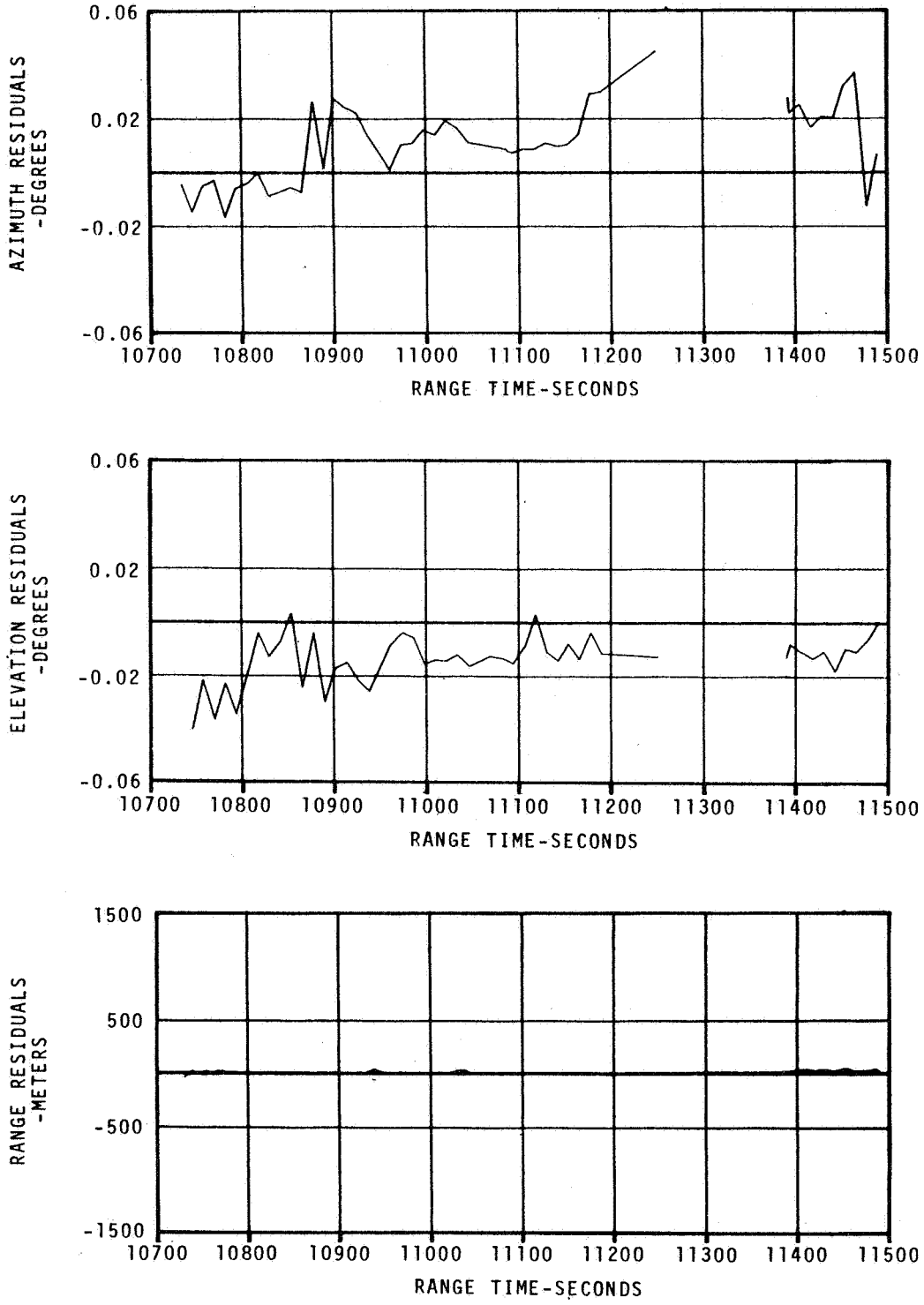


FIGURE 3-23. MERRITT ISLAND C-BAND RADAR TRACKING DEVIATIONS - TRANSLUNAR ORBIT PHASE - (MLA)

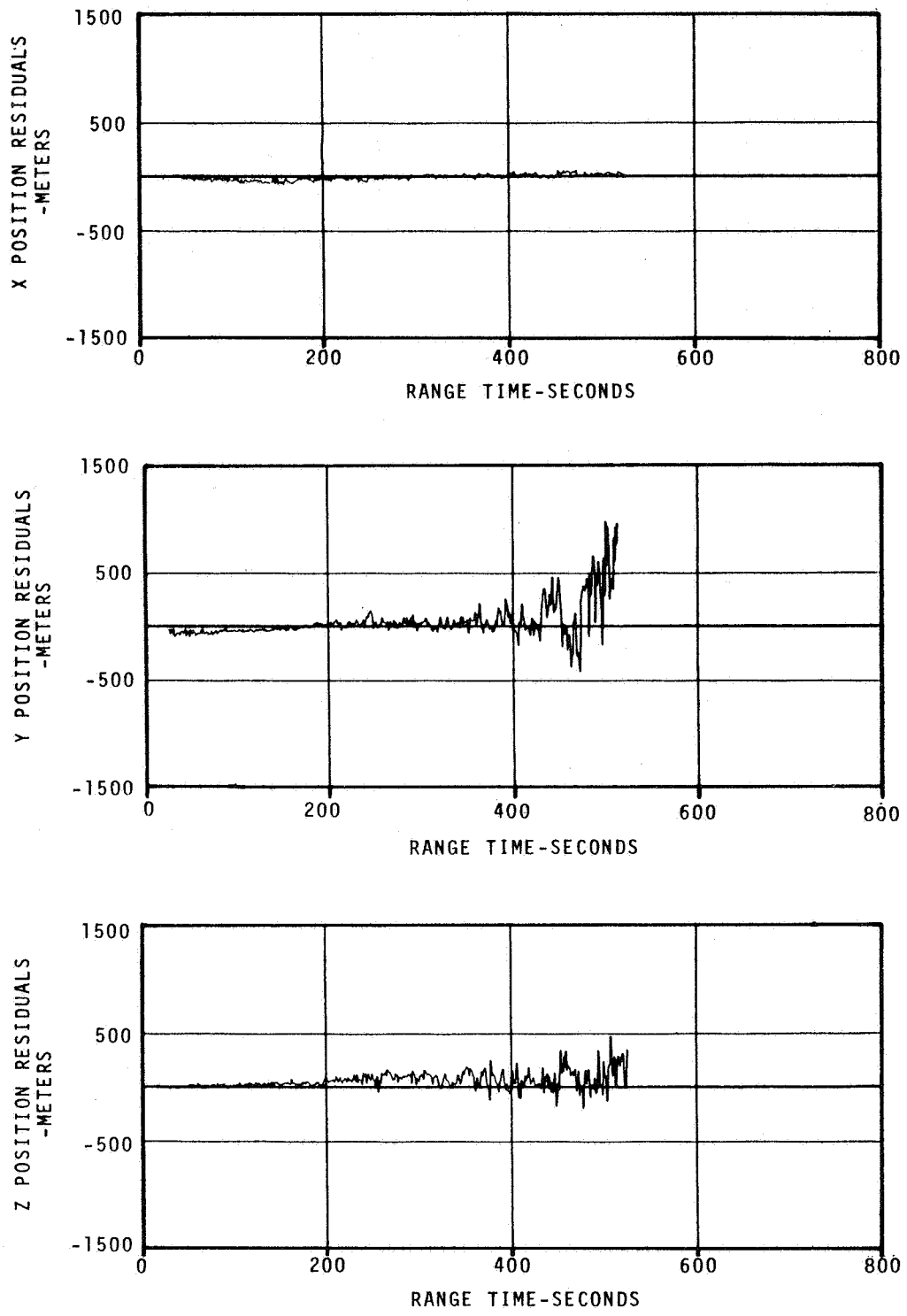


FIGURE 3-24. PACSS10 POSITION DEVIATIONS - ASCENT PHASE (MLA)

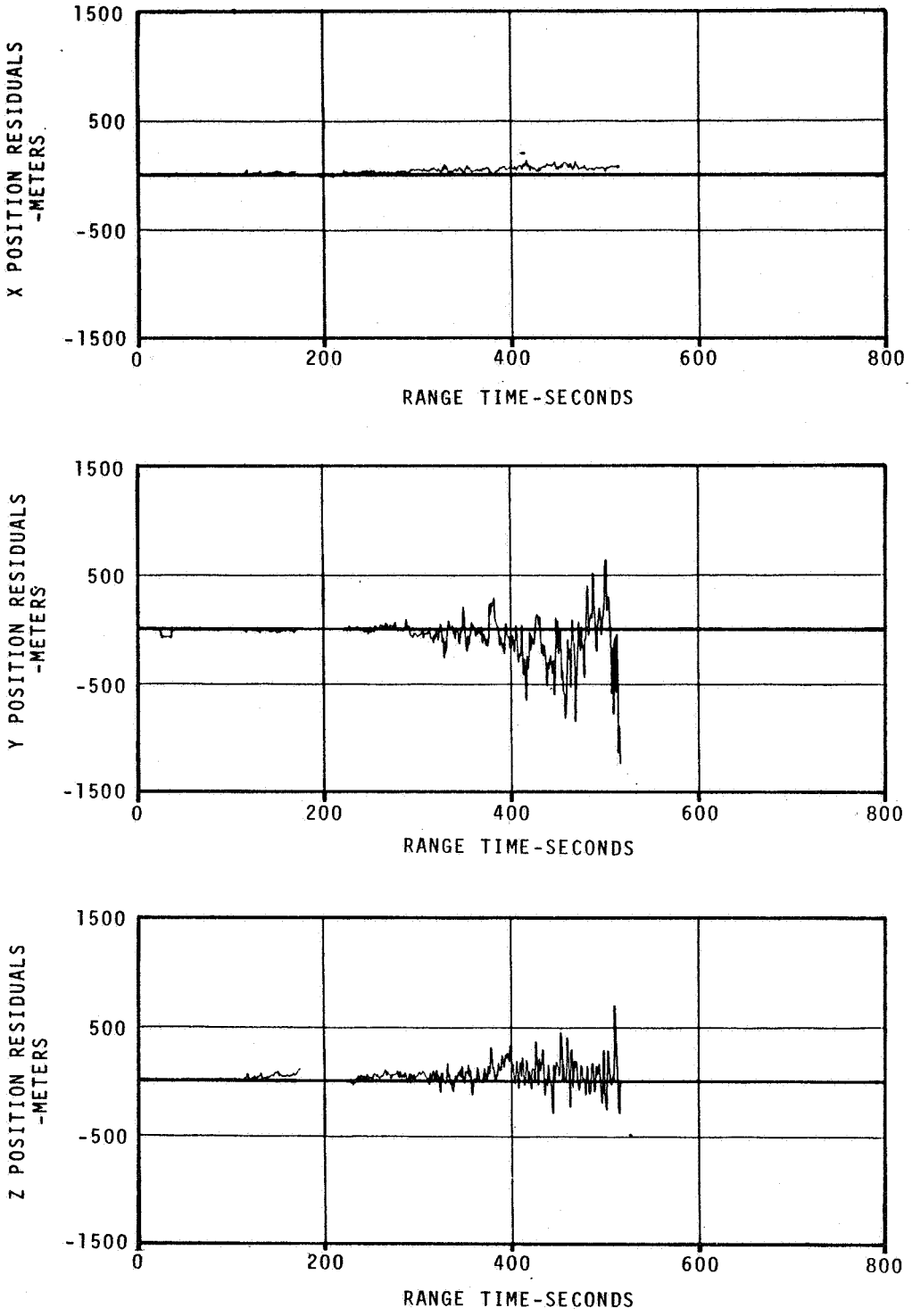


FIGURE 3-25. PACSS10 POSITION DEVIATIONS - ASCENT PHASE (PAT)

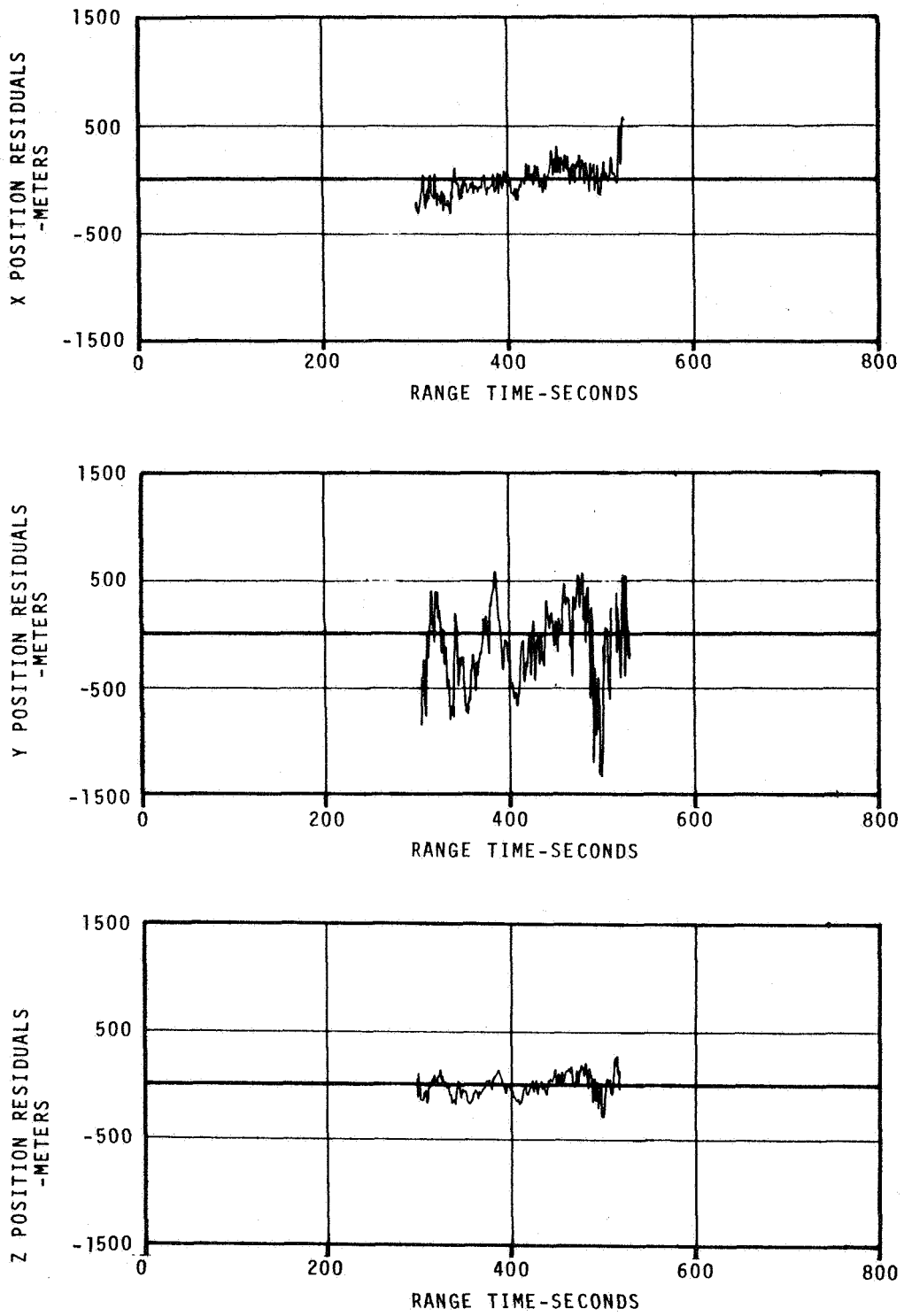


FIGURE 3-26. PACSS10 POSITION DEVIATIONS - ASCENT PHASE (GTK)

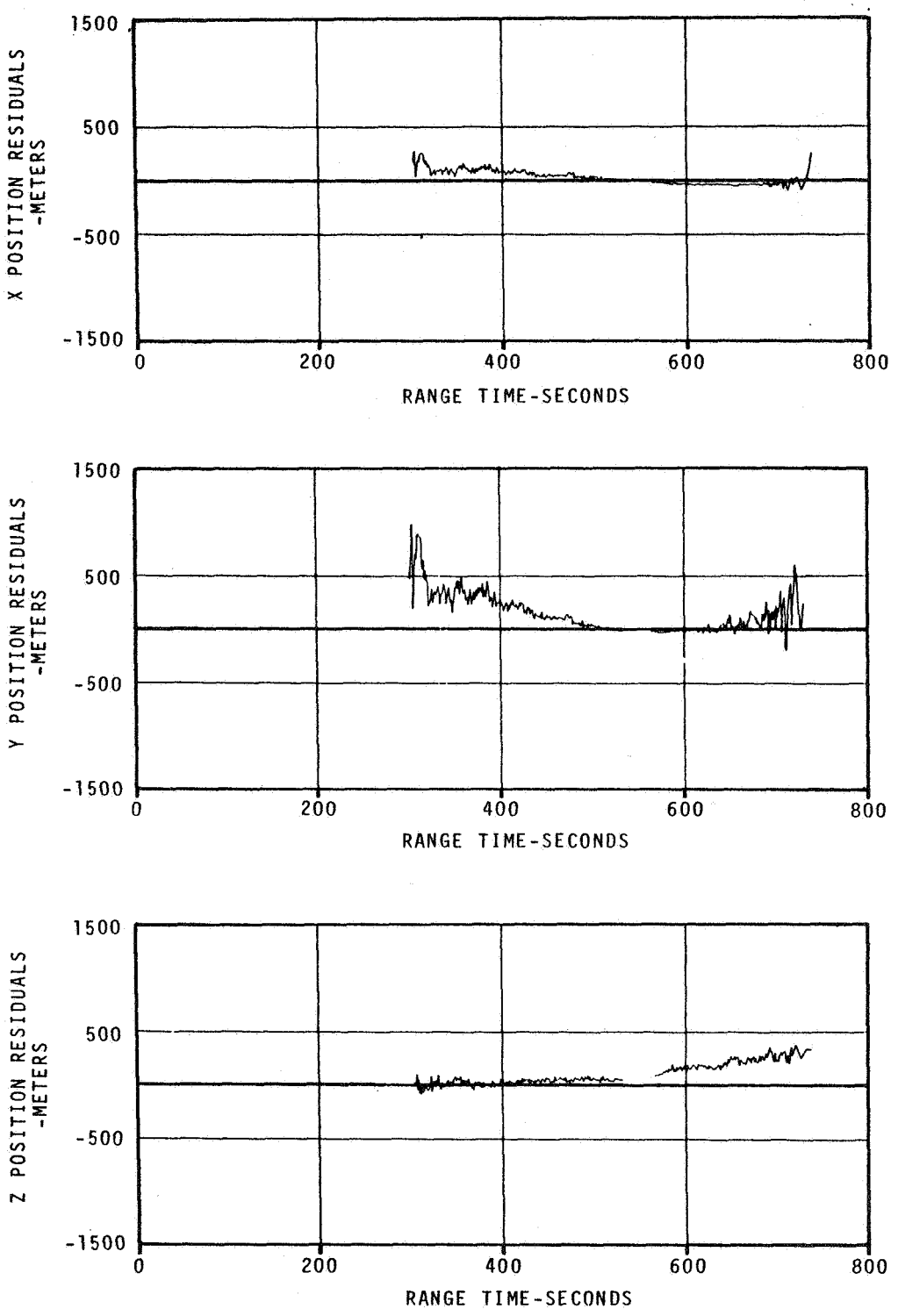


FIGURE 3-27. PACSS10 POSITION DEVIATIONS - ASCENT PHASE (BDQ)

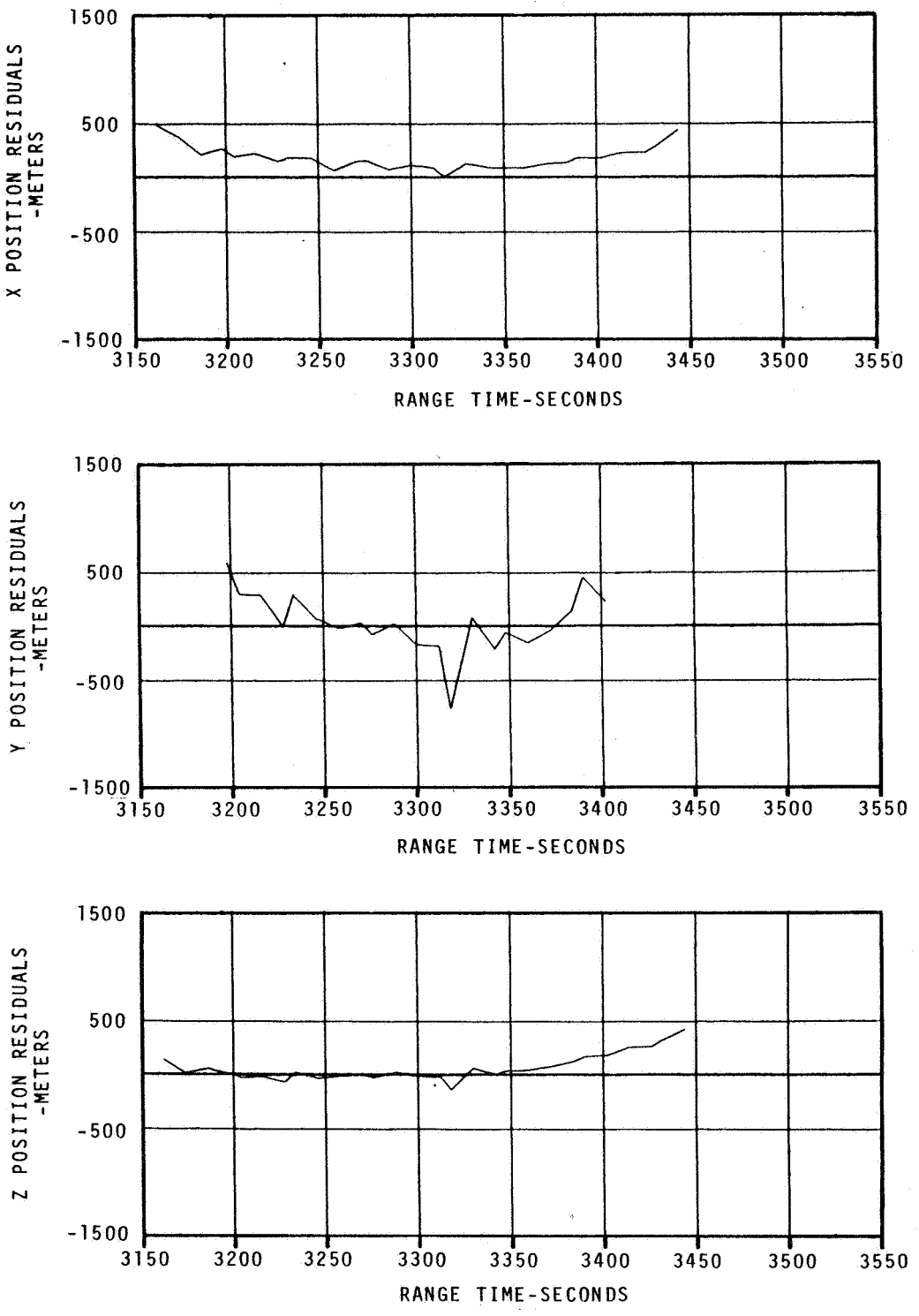


FIGURE 3-28. PACSS10 POSITION DEVIATIONS - PARKING ORBIT PHASE - REV. 1 (CRO)

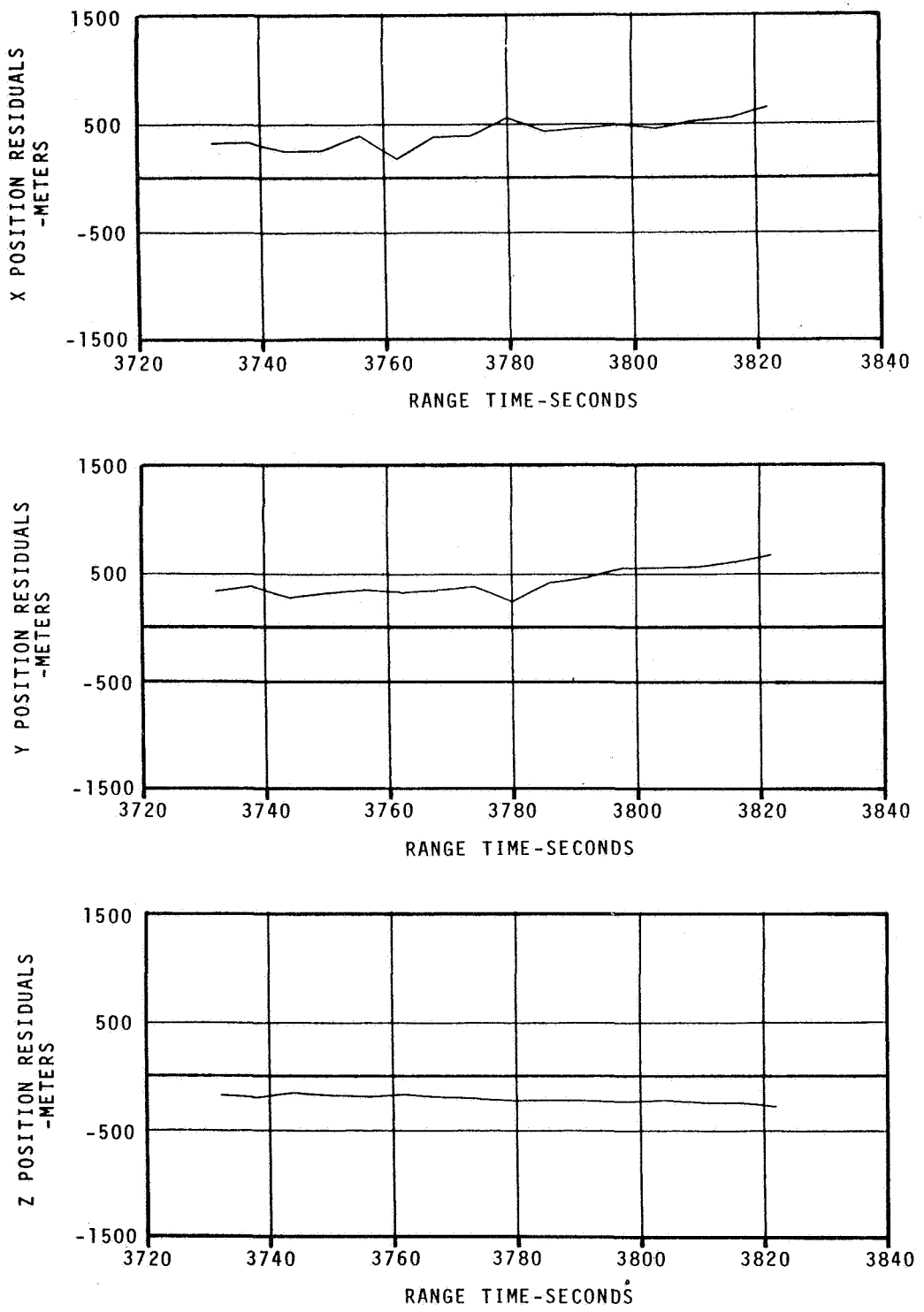


FIGURE 3-29. PACSS10 POSITION DEVIATIONS - PARKING ORBIT PHASE (HSK)

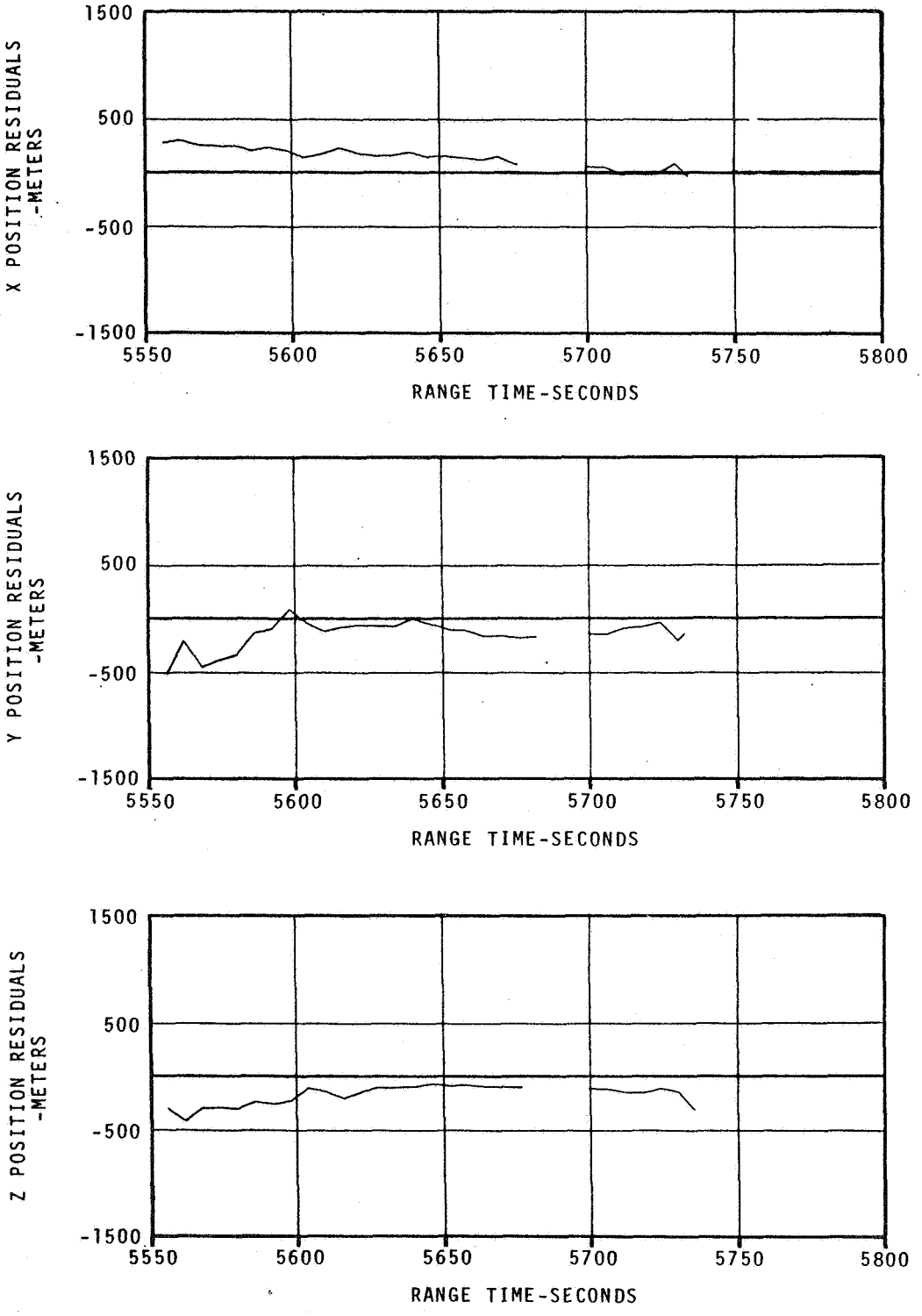


FIGURE 3-30. PACSS10 POSITION DEVIATIONS - PARKING ORBIT PHASE (TEX)

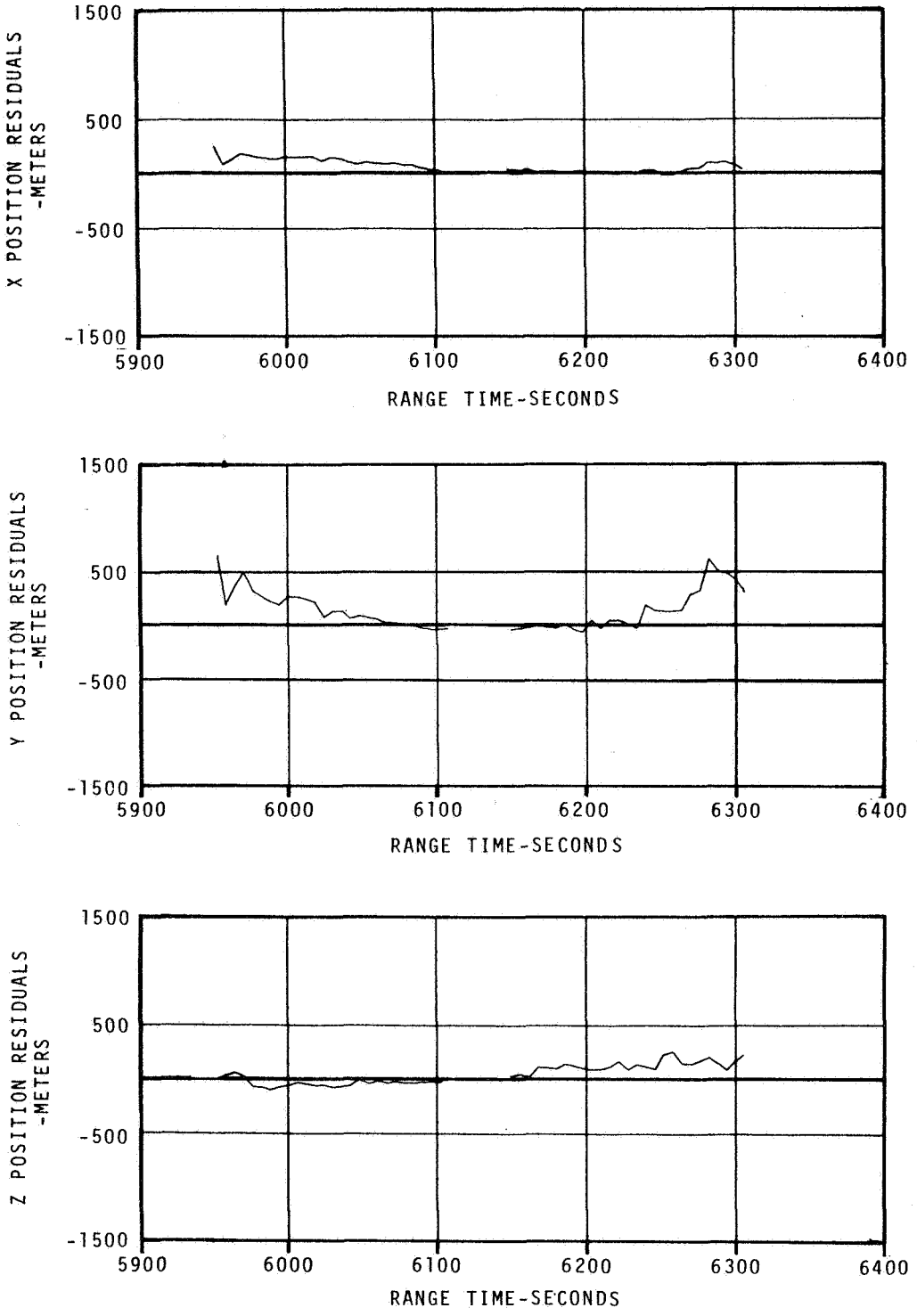


FIGURE 3-31. PACSS10 POSITION DEVIATIONS - PARKING ORBIT PHASE (BDQ)

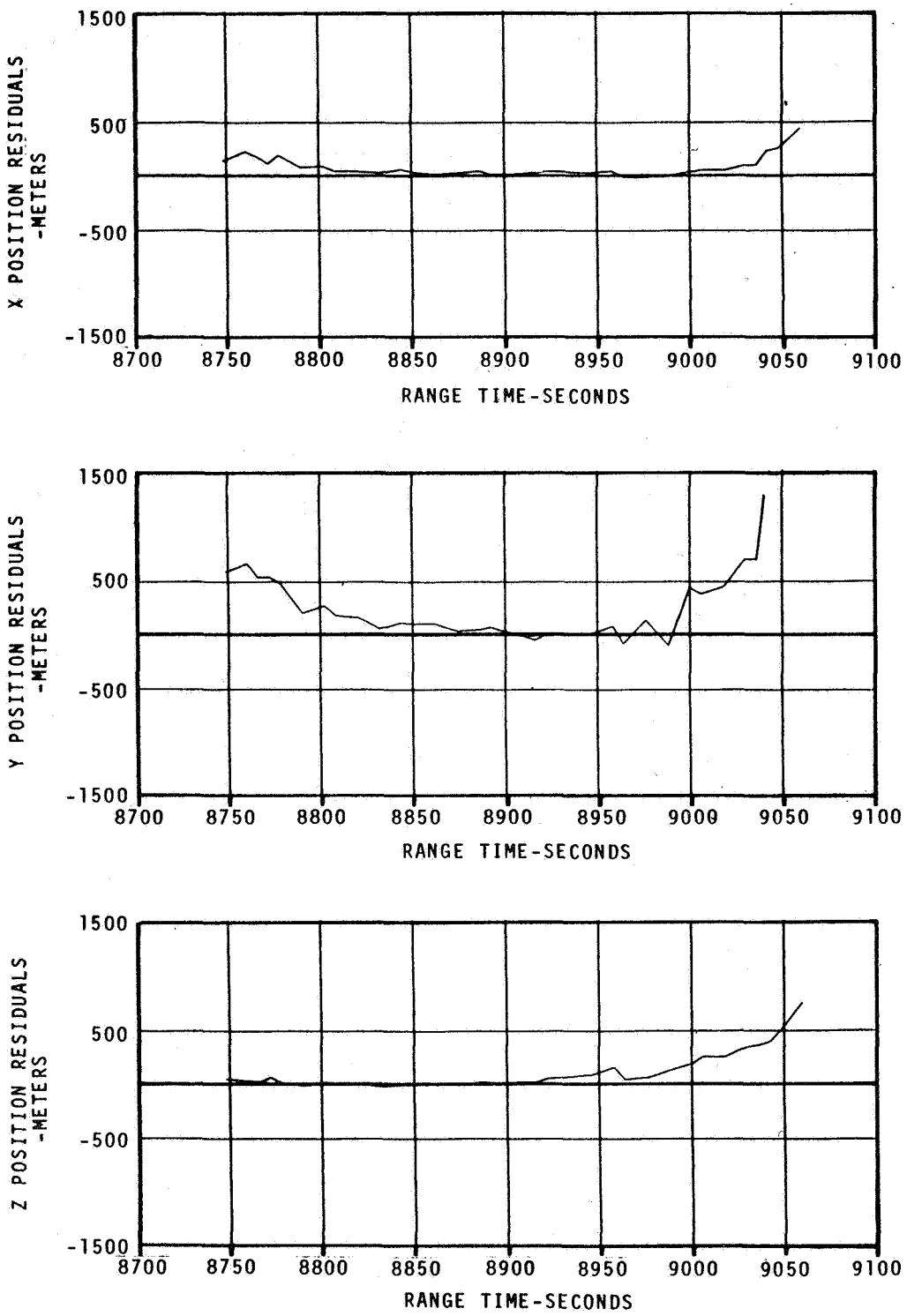


FIGURE 3-32. PACSS10 POSITION DEVIATIONS - PARKING ORBIT PHASE - REV. 2 (CRO)

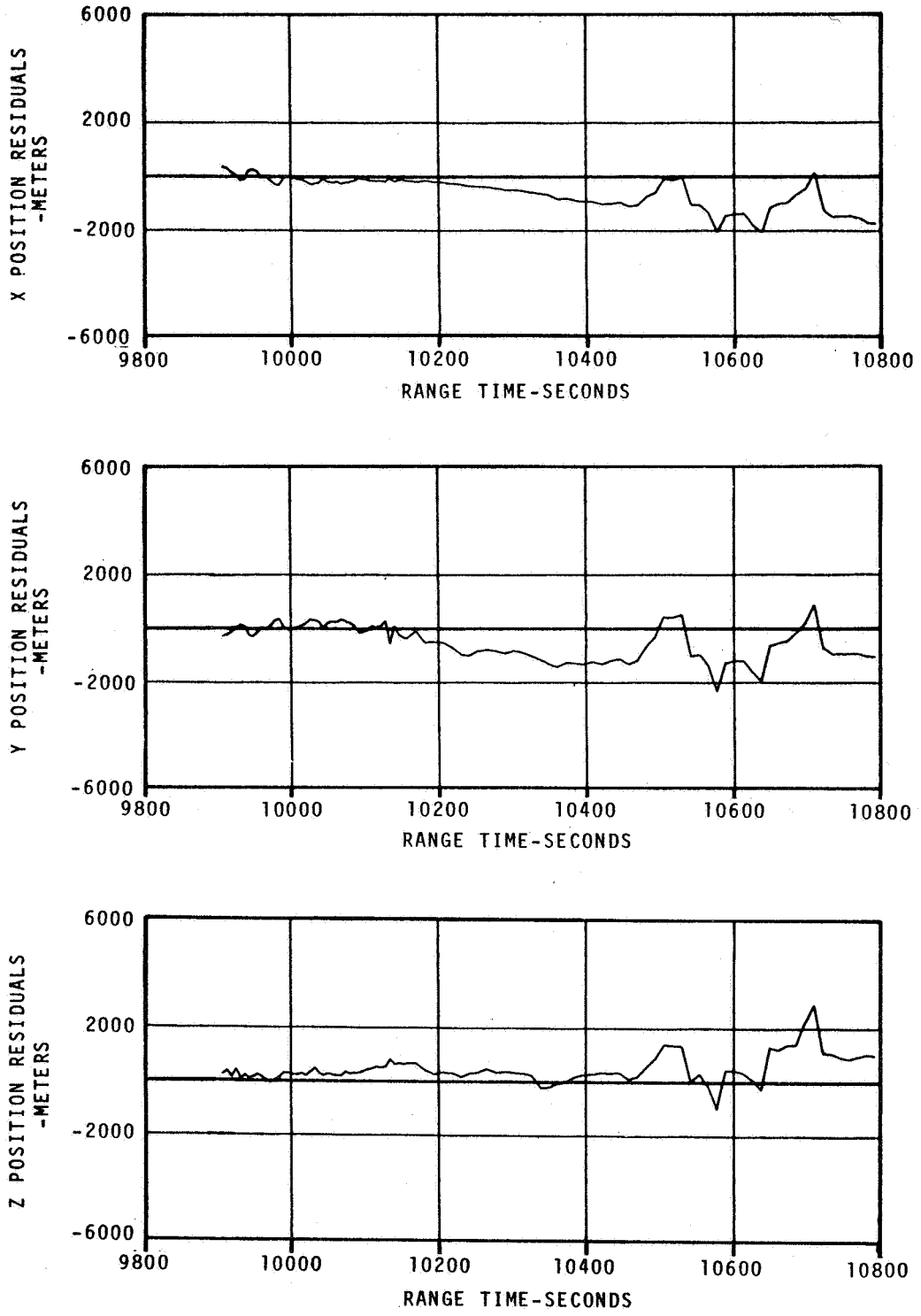
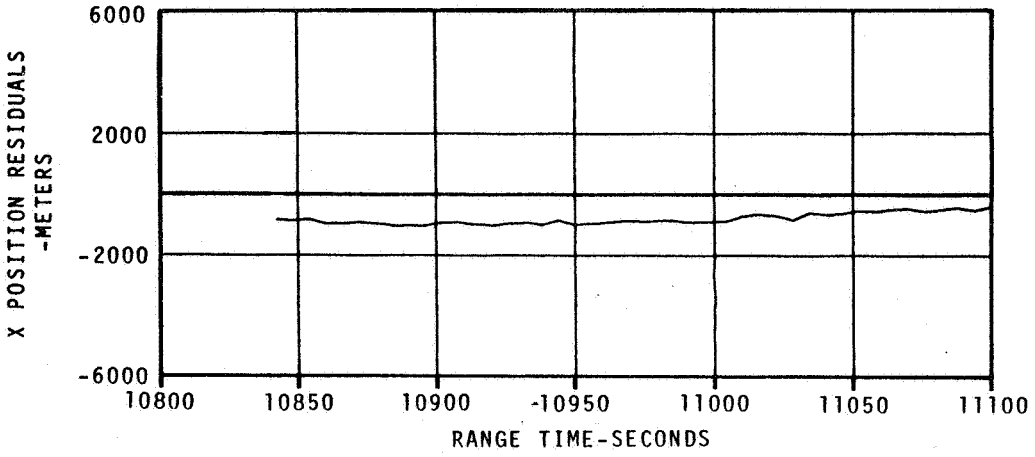
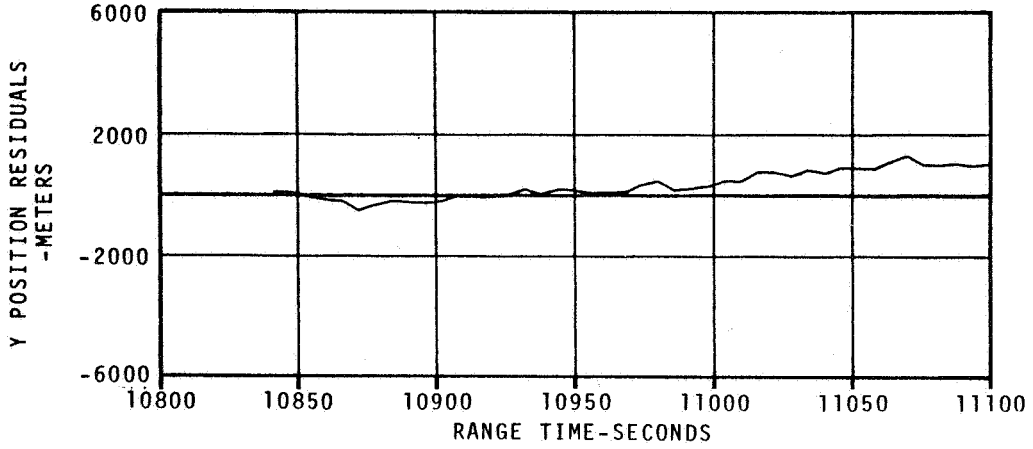


FIGURE 3-33. PASCS10 POSITION DEVIATIONS - TRANSLUNAR ORBIT PHASE (HWI)





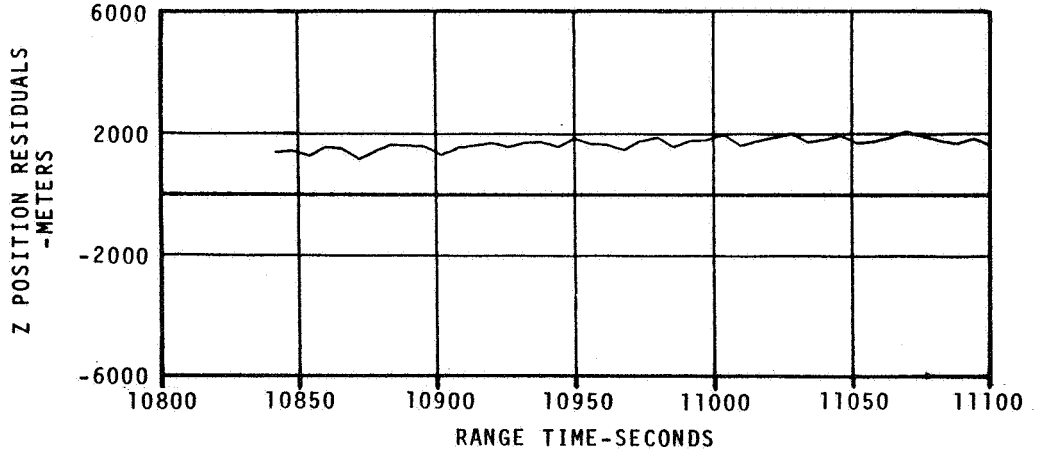


FIGURE 3-34. PACSS10 POSITION DEVIATIONS - TRANSLUNAR ORBIT PHASE (GDS)

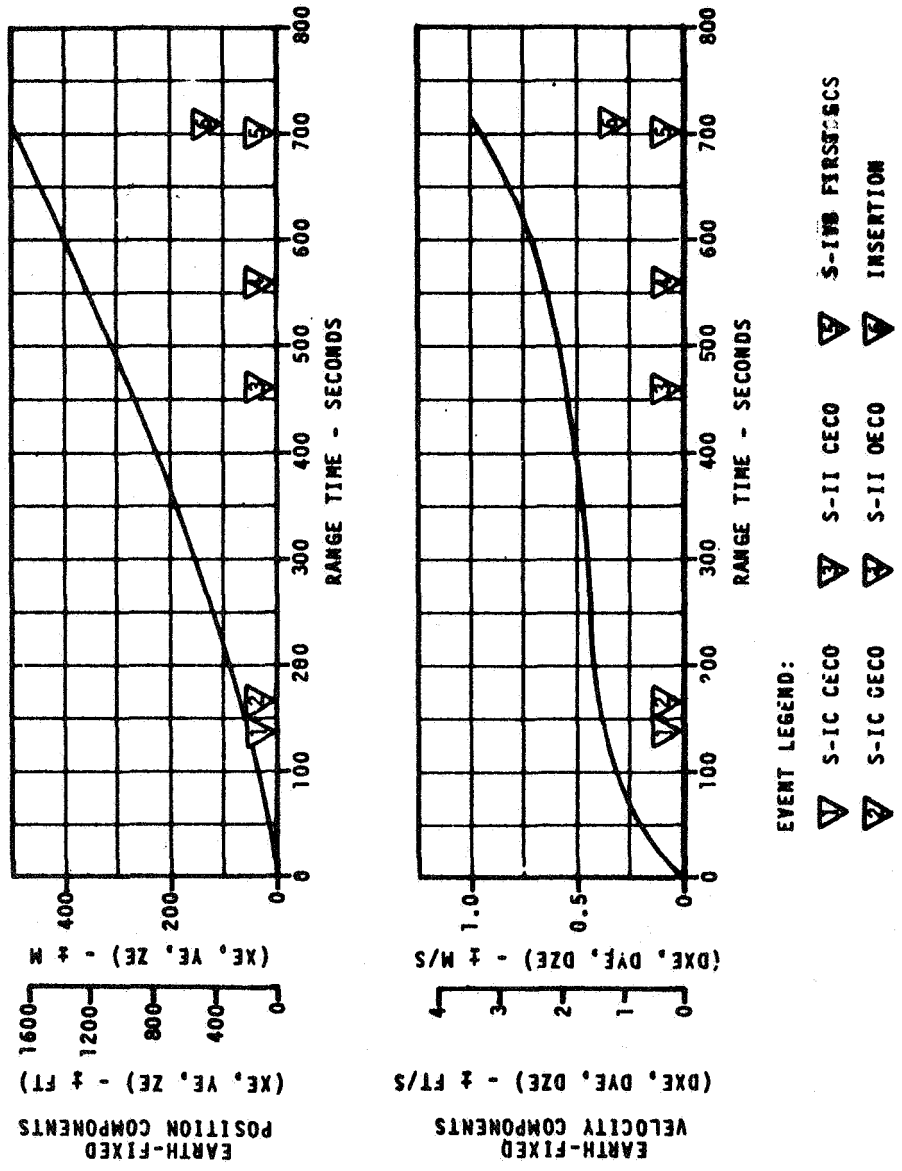


FIGURE 3-35. ESTIMATED TRAJECTORY UNCERTAINTY - ASCENT PHASE

TABLE 3-I. TRACKING STATION LOCATIONS

ABBREVIATION	NAME	LONGITUDE, E	LATITUDE, N	HEIGHT (m)
MLA	Merritt Island C-Band (19.18)	279.33559611	28.42486194	12.0
PAT	Patrick AFB C-Band (0.18)	279.40070833	28.22655278	15.0
GTK	Grand Turk C-Band (7.18)	288.86788611	21.46288889	28.0
BDQ	Bermuda C-Band (67.18)	295.34625833	32.34796389	19.0
BDA	Bermuda C-Band (67.16)	295.34620000	32.34810278	18.0
CRO	Carnarvon C-Band	113.71607778	-24.89740278	62.0
MIL	Merritt Island USB	279.30658333	28.50827222	10.0
HWI	Hawaii USB	200.33501111	22.12489722	1150.0
TEX	Texas USB	262.62153055	27.65375000	10.0
GDS	Goldstone USB	243.12680000	35.34159444	907.1
PIR	Goldstone MSFN Wing	243.15102778	35.38956944	971.1
BDS	Bermuda USB	295.34181944	32.35128611	21.0
HSK	Honeysuckle USB	148.97828611	-35.58349444	1144.0

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 Instrument Unit in Earth-Fixed Launch Site Coordinate System. The origin of this system is at the intersection of Fischer Ellipsoid (1960) and the normal to it which passes through the launch site. The X-axis coincides with the ellipsoid normal passing through the site, positive upward. The Z-axis is parallel to the earth-fixed flight azimuth, defined at guidance reference release time, and is positive downrange. 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 Instrument Unit 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 13 of Project Apollo Coordinate System Standards, abbreviated as PACSS13.
GC DIST GC LAT GD LAT LONG	Position components of vehicle Instrument Unit 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

APPENDIX A (Continued)

	distance from the geocenter to vehicle Instrument Unit. Geocentric latitude is the angle between the radius vector of the subvehicle point and the equatorial plane, positive north of the equatorial plane. Geodetic latitude is the angle between the normal to the Fischer Ellipsoid through the subvehicle point and the equatorial plane, positive north of the equatorial plane. Longitude is the angle between the projection of the radius vector into the equatorial plane and the Greenwich meridian, positive east of the Greenwich meridian. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
EF VEL VEL-AZ VEL-EL	Earth-fixed velocity of vehicle Instrument Unit 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 Instrument Unit 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 velocity vector and the local horizontal plane, positive above the horizontal

APPENDIX A (Continued)

	plane. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated at PACSS1.
ALTITUDE	Perpendicular distance from vehicle Instrument Unit 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 flight.

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

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

Table B-VII gives the geographic polar coordinates for the second burn and translunar phases of flight.

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									
-16.963	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	112	0	0	0.0	0.0	0.0	0.0	0.0	0.0
ALL HOLDDOWN ARMS RELEASED									
0.3	112	0	0	0.0	0.0	-0.0	0.79	-0.00	-0.01
LIFTOFF - START OF TIME BASE 1									
0.6	112	0	0	0.3	0.0	-0.0	0.96	-0.00	-0.01
1.0	112	0	0	0.9	-0.0	-0.0	2.02	-0.00	-0.01
2.0	114	0	0	3.0	-0.0	-0.0	2.18	0.00	-0.01
3.0	118	0	0	5.3	0.1	-0.0	2.23	0.12	-0.00
4.0	124	0	0	7.5	0.2	-0.0	2.28	0.25	0.00
5.0	133	1	0	9.8	0.5	-0.0	2.34	0.27	0.01
6.0	144	1	0	12.2	0.7	-0.0	2.40	0.17	0.02
7.0	158	2	0	14.6	0.9	0.0	2.46	0.15	0.02
8.0	173	3	0	17.1	1.1	0.0	2.52	0.26	0.03
9.0	192	4	0	19.7	1.4	0.1	2.57	0.31	0.03
10.0	213	6	0	22.3	1.7	0.1	2.63	0.34	0.04
11.0	236	8	0	24.9	2.0	0.2	2.68	0.21	0.05
12.0	263	10	0	27.6	2.1	0.2	2.74	0.03	0.04
13.0	292	12	1	30.4	2.1	0.2	2.79	-0.01	0.11
14.0	323	14	1	33.2	2.1	0.4	2.83	0.02	0.12

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	358	16	1	36.1	2.1	0.5	2.88	0.02	0.14
16.0	395	18	2	39.0	2.1	0.6	2.94	-0.02	0.14
17.0	436	20	3	41.9	2.1	0.8	3.00	-0.06	0.16
18.0	479	22	3	44.9	2.0	1.0	3.08	-0.11	0.18
19.0	526	24	5	48.0	1.9	1.2	3.12	-0.11	0.27
20.0	575	26	6	51.2	1.8	1.5	3.21	-0.10	0.34
21.0	628	28	8	54.4	1.7	1.9	3.27	-0.09	0.42
22.0	684	29	10	57.7	1.6	2.3	3.34	-0.08	0.49
23.0	744	31	12	61.1	1.5	2.8	3.41	-0.07	0.57
24.0	807	32	15	64.6	1.5	3.4	3.49	-0.07	0.65
25.0	873	34	19	68.1	1.4	4.1	3.56	-0.07	0.74
26.0	943	35	24	71.7	1.3	4.9	3.64	-0.07	0.84
27.0	1016	36	29	75.4	1.3	5.8	3.71	-0.07	0.95
28.0	1094	38	35	79.1	1.2	6.8	3.79	-0.07	1.06
29.0	1175	39	43	82.9	1.1	8.0	3.86	-0.07	1.16
30.0	1260	40	51	86.8	1.1	9.2	3.93	-0.06	1.27
31.0	1348	41	61	90.8	1.0	10.5	4.00	-0.06	1.37
32.0	1441	42	72	94.9	0.9	11.9	4.08	-0.05	1.48
33.0	1538	43	85	99.0	0.9	13.5	4.15	-0.05	1.60
34.0	1639	44	99	103.2	0.8	15.1	4.23	-0.03	1.71
35.0	1744	45	115	107.4	0.8	16.9	4.31	-0.02	1.84
36.0	1854	45	133	111.8	0.8	18.8	4.38	-0.01	1.96
37.0	1968	46	153	116.2	0.8	20.8	4.45	0.00	2.08
38.0	2086	47	175	120.7	0.8	22.9	4.52	-0.00	2.21
39.0	2209	48	199	125.2	0.8	25.2	4.60	-0.01	2.33
40.0	2337	49	225	129.9	0.8	27.6	4.67	-0.02	2.46
41.0	2469	49	254	134.6	0.7	30.2	4.75	-0.04	2.60
42.0	2606	50	286	139.4	0.7	32.8	4.83	-0.05	2.76
43.0	2748	51	320	144.2	0.7	35.7	4.90	-0.06	2.92
44.0	2895	51	357	149.2	0.6	38.7	4.98	-0.06	3.09
45.0	3046	52	397	154.2	0.5	41.8	5.05	-0.06	3.26
46.0	3203	52	441	159.3	0.5	45.2	5.12	-0.05	3.45
47.0	3365	53	488	164.4	0.4	48.8	5.19	-0.05	3.64
48.0	3532	53	538	169.7	0.4	52.5	5.27	-0.06	3.83
49.0	3704	54	593	175.0	0.3	56.4	5.35	-0.08	4.01
50.0	3882	54	651	180.4	0.2	60.5	5.43	-0.11	4.18
51.0	4065	54	714	185.8	0.1	64.8	5.50	-0.15	4.35
52.0	4254	54	781	191.4	-0.1	69.2	5.58	-0.20	4.52
53.0	4448	54	852	197.0	-0.3	73.8	5.64	-0.25	4.69
54.0	4647	53	928	202.6	-0.6	78.6	5.71	-0.29	4.86
55.0	4853	53	1009	208.4	-0.9	83.5	5.77	-0.32	5.04
56.0	5064	51	1095	214.2	-1.2	88.7	5.84	-0.33	5.23
57.0	5281	50	1187	220.1	-1.5	94.0	5.91	-0.32	5.41

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	5504	48	1283	226.0	-1.9	99.5	5.99	-0.30	5.61
59.0	5733	46	1386	232.1	-2.2	105.2	6.06	-0.29	5.80
60.0	5969	44	1494	238.1	-2.4	111.1	6.13	-0.26	6.01
61.0	6210	41	1608	244.3	-2.7	117.2	6.18	-0.24	6.22
62.0	6457	39	1728	250.5	-2.9	123.5	6.23	-0.21	6.44
63.0	6711	36	1855	256.8	-3.1	130.1	6.27	-0.17	6.65
64.0	6971	32	1989	263.0	-3.2	136.8	6.30	-0.13	6.86
65.0	7237	29	2129	269.3	-3.3	143.8	6.32	-0.08	7.06
66.0	7509	26	2276	275.7	-3.4	151.0	6.34	-0.04	7.26
67.0	7788	22	2431	282.0	-3.4	158.3	6.37	-0.00	7.46
MACH 1									
67.5	7930	21	2511	285.2	-3.4	162.1	6.39	0.01	7.57
68.0	8073	19	2593	288.4	-3.4	165.9	6.40	0.03	7.67
69.0	8365	16	2763	294.8	-3.4	173.7	6.44	0.05	7.88
70.0	8663	12	2940	301.3	-3.3	181.7	6.49	0.07	8.09
71.0	8968	9	3126	307.8	-3.3	189.9	6.55	0.08	8.31
72.0	9279	6	3320	314.4	-3.2	198.3	6.62	0.09	8.52
73.0	9597	3	3523	321.1	-3.1	206.9	6.69	0.09	8.73
74.0	9921	-1	3734	327.8	-3.0	215.7	6.77	0.09	8.95
75.0	10252	-4	3954	334.6	-2.9	224.8	6.83	0.07	9.17
76.0	10590	-6	4184	341.5	-2.9	234.1	6.90	0.06	9.40
77.0	10935	-9	4423	348.4	-2.8	243.6	6.96	0.04	9.65
78.0	11287	-12	4671	355.4	-2.8	253.4	7.01	0.04	9.93
79.0	11646	-15	4929	362.4	-2.7	263.5	7.06	0.05	10.21
80.0	12012	-17	5198	369.5	-2.7	273.8	7.11	0.08	10.50
81.0	12385	-20	5477	376.6	-2.5	284.5	7.16	0.13	10.79
82.0	12765	-23	5767	383.8	-2.4	295.4	7.23	0.17	11.07
83.0	13153	-25	6068	391.1	-2.2	306.6	7.29	0.19	11.35
84.0	13547	-27	6380	398.4	-2.0	318.1	7.33	0.20	11.64
85.0	13949	-29	6704	405.8	-1.8	329.9	7.36	0.21	11.95
MAXIMUM DYNAMIC PRESSURE									
86.0	14359	-31	7040	413.1	-1.6	342.0	7.36	0.21	12.30
87.0	14776	-32	7388	420.5	-1.4	354.5	7.35	0.22	12.67
88.0	15200	-34	7749	427.8	-1.2	367.4	7.32	0.24	13.08
89.0	15631	-35	8123	435.1	-0.9	380.7	7.27	0.26	13.51
90.0	16070	-35	8511	442.3	-0.6	394.4	7.21	0.28	13.94
91.0	16516	-36	8912	449.5	-0.4	408.6	7.15	0.29	14.37
92.0	16969	-36	9328	456.6	-0.1	423.1	7.09	0.29	14.79
93.0	17429	-36	9759	463.7	0.2	438.1	7.04	0.27	15.19

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
94.0	17896	-36	10205	470.7	0.5	453.5	6.99	0.22	15.59
95.0	18371	-35	10666	477.7	0.6	469.3	6.95	0.16	15.98
96.0	18852	-34	11143	484.6	0.8	485.5	6.90	0.10	16.37
97.0	19340	-34	11637	491.5	0.8	502.0	6.86	0.04	16.74
98.0	19835	-33	12147	498.3	0.9	519.0	6.82	-0.00	17.11
99.0	20336	-32	12675	505.1	0.9	536.2	6.80	-0.03	17.47
100.0	20845	-31	13220	511.9	0.8	553.9	6.79	-0.05	17.81
101.0	21360	-30	13783	518.7	0.8	571.9	6.80	-0.05	18.14
102.0	21883	-29	14364	525.6	0.7	590.2	6.82	-0.04	18.47
103.0	22411	-29	14963	532.4	0.7	608.8	6.85	-0.03	18.78
104.0	22947	-28	15582	539.3	0.6	627.7	6.88	-0.04	19.10
105.0	23490	-27	16219	546.1	0.6	647.0	6.89	-0.04	19.42
106.0	24040	-27	16876	553.0	0.6	666.6	6.89	-0.05	19.75
107.0	24596	-26	17552	559.9	0.5	686.5	6.88	-0.05	20.09
108.0	25159	-26	18249	566.8	0.5	706.8	6.86	-0.03	20.44
109.0	25730	-25	18966	573.6	0.5	727.4	6.84	-0.01	20.79
110.0	26307	-25	19704	580.5	0.5	748.3	6.83	0.01	21.14
111.0	26891	-24	20463	587.3	0.5	769.7	6.82	0.03	21.49
112.0	27481	-24	21243	594.1	0.5	791.3	6.84	0.05	21.83
113.0	28079	-23	22045	601.0	0.6	813.3	6.87	0.06	22.16
114.0	28683	-23	22870	607.9	0.6	835.6	6.93	0.06	22.48
115.0	29295	-22	23717	614.9	0.7	858.3	7.00	0.05	22.78
116.0	29913	-21	24586	621.9	0.7	881.2	7.09	0.05	23.08
117.0	30538	-21	25479	629.1	0.8	904.4	7.19	0.05	23.38
118.0	31171	-20	26395	636.3	0.8	928.0	7.27	0.05	23.69
119.0	31811	-19	27335	643.6	0.9	951.8	7.34	0.06	24.02
120.0	32458	-18	28299	650.9	0.9	976.0	7.38	0.08	24.37
121.0	33113	-17	29287	658.3	1.0	1000.6	7.40	0.10	24.75
122.0	33775	-16	30300	665.7	1.2	1025.5	7.39	0.12	25.14
123.0	34444	-15	31339	673.1	1.3	1050.9	7.38	0.13	25.55
124.0	35121	-14	32402	680.5	1.4	1076.6	7.37	0.14	25.96
125.0	35805	-12	33492	687.8	1.5	1102.8	7.38	0.13	26.37
126.0	36497	-10	34608	695.2	1.7	1129.4	7.41	0.12	26.77
127.0	37196	-9	35751	702.7	1.8	1156.3	7.45	0.10	27.17
128.0	37902	-7	36921	710.1	1.9	1183.7	7.51	0.09	27.57
129.0	38616	-5	38118	717.7	2.0	1211.5	7.55	0.07	27.98
130.0	39338	-3	39344	725.2	2.0	1239.7	7.60	0.06	28.42
131.0	40067	-1	40598	732.9	2.1	1268.3	7.64	0.06	28.87
132.0	40803	1	41881	740.5	2.1	1297.4	7.68	0.06	29.31
133.0	41548	3	43193	748.2	2.2	1327.0	7.73	0.11	29.76
134.0	42300	6	44535	756.0	2.3	1357.0	7.77	0.09	30.21
135.0	43060	8	45907	763.8	2.4	1387.4	7.82	0.08	30.66
136.0	43828	11	47309	771.6	2.5	1418.3	7.86	0.03	31.10

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
137.0	44603	13	48743	779.5	2.5	1449.6	7.90	0.04	31.55
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
137.85	45269	15	49987	786.2	2.5	1476.6	7.94	0.05	31.93
138.0	45387	16	50208	787.2	2.6	1481.3	5.48	0.06	30.64
139.0	46176	18	51701	792.1	2.6	1507.9	4.62	0.07	25.60
140.0	46971	21	53222	796.7	2.7	1533.5	4.62	0.08	25.93
141.0	47770	23	54769	801.3	2.8	1559.5	4.62	0.12	26.26
142.0	48574	26	56341	805.9	2.9	1585.8	4.62	0.14	26.58
143.0	49382	29	57940	810.6	3.1	1612.5	4.62	0.14	26.90
144.0	50195	32	59566	815.2	3.2	1639.5	4.62	0.16	27.22
145.0	51012	36	61219	819.8	3.4	1666.8	4.62	0.17	27.54
146.0	51834	39	62899	824.4	3.5	1694.5	4.64	0.17	27.87
147.0	52661	43	64607	829.1	3.7	1722.6	4.67	0.17	28.22
148.0	53492	47	66344	833.8	3.9	1751.0	4.70	0.17	28.60
149.0	54328	51	68109	838.5	4.1	1779.8	4.72	0.17	28.97
150.0	55169	55	69903	843.2	4.2	1808.9	4.75	0.16	29.35
151.0	56015	59	71727	847.9	4.4	1838.3	4.78	0.16	29.75
152.0	56865	64	73580	852.7	4.6	1868.2	4.81	0.17	30.17
153.0	57720	68	75463	857.5	4.7	1898.6	4.84	0.17	30.61
154.0	58580	73	77377	862.4	4.9	1929.4	4.85	0.18	31.05
155.0	59445	78	79322	867.2	5.1	1960.7	4.87	0.21	31.52
156.0	60315	83	81299	872.1	5.3	1992.5	4.89	0.21	31.98
157.0	61189	89	83307	877.0	5.5	2024.6	4.91	0.21	32.43
158.0	62069	94	85348	881.9	5.7	2057.3	4.92	0.22	32.91
159.0	62953	100	87422	886.9	5.9	2090.5	4.94	0.23	33.38
160.0	63842	106	89529	891.8	6.2	2124.0	4.96	0.23	33.83
161.0	64737	112	91670	896.8	6.4	2158.0	4.98	0.23	34.10
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.78	65437	117	93363	900.7	6.6	2184.7	4.99	0.18	34.37
162.0	65634	119	93842	900.9	6.6	2190.4	-2.65	0.16	16.81
163.0	66530	126	96031	893.4	6.7	2194.5	-9.23	0.13	-0.07
S-IC/S-II SEPARATION COMMAND									
163.5	66977	129	97132	888.8	6.8	2194.4	-9.23	0.12	-0.06
164.0	67420	132	98229	884.2	6.9	2194.4	-9.23	0.12	-0.05
166.0	69170	146	102617	865.8	7.1	2194.5	-8.99	0.12	0.52
168.0	70885	161	107011	850.0	7.4	2201.1	-6.93	0.13	5.28
170.0	72571	176	111424	836.4	7.6	2212.1	-6.77	0.15	5.76

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	74231	191	115861	823.4	8.0	2224.8	-6.33	0.15	6.62
174.0	75865	208	120324	810.8	8.2	2238.1	-6.29	0.16	6.79
176.0	77474	224	124814	798.2	8.6	2251.7	-6.26	0.16	6.85
178.0	79058	242	129331	785.7	8.9	2265.5	-6.24	0.17	6.86
180.0	80617	260	133876	773.3	9.2	2279.2	-6.22	0.17	6.90
182.0	82151	279	138448	760.8	9.6	2293.1	-6.20	0.17	6.93
184.0	83660	298	143048	748.4	9.9	2307.0	-6.17	0.17	6.96
186.0	85145	318	147676	736.1	10.2	2320.9	-6.15	0.17	6.99
188.0	86605	339	152332	723.9	10.6	2335.0	-6.12	0.17	7.02
190.0	88040	361	157016	711.6	10.9	2349.0	-6.10	0.18	7.05
192.0	89451	383	161728	699.4	11.3	2363.2	-6.08	0.18	7.08
194.0	90838	406	166469	687.3	11.7	2377.4	-6.05	0.18	7.12
196.0	92201	430	171238	675.2	12.0	2391.6	-6.03	0.19	7.15
198.0	93539	454	176035	663.2	12.4	2406.0	-6.01	0.19	7.19
200.0	94853	479	180862	651.2	12.8	2420.4	-5.99	0.19	7.23
202.0	96144	505	185717	639.3	13.1	2434.9	-5.96	0.19	7.28
204.0	97411	532	190601	627.4	13.5	2449.5	-5.90	0.19	7.30
206.0	98654	559	195515	615.7	13.9	2464.1	-5.81	0.18	7.28
208.0	99873	587	200457	604.2	14.2	2478.6	-5.66	0.17	7.25
210.0	101071	616	205429	593.0	14.6	2493.0	-5.51	0.16	7.21
212.0	102246	646	210430	582.1	14.9	2507.5	-5.40	0.15	7.20
214.0	103399	676	215459	571.4	15.2	2521.9	-5.35	0.15	7.21
216.0	104531	706	220517	560.7	15.5	2536.3	-5.35	0.16	7.25
218.0	105642	738	225604	550.0	15.8	2550.9	-5.36	0.16	7.28
220.0	106731	769	230721	539.3	16.1	2565.5	-5.36	0.16	7.32
222.0	107799	802	235866	528.5	16.4	2580.2	-5.36	0.16	7.37
224.0	108845	835	241041	517.8	16.8	2594.9	-5.36	0.17	7.41
226.0	109870	869	246246	507.1	17.1	2609.8	-5.37	0.17	7.44
228.0	110874	904	251480	496.4	17.5	2624.7	-5.37	0.18	7.48
230.0	111856	939	256745	485.6	17.8	2639.7	-5.36	0.18	7.52
232.0	112816	975	262039	474.9	18.2	2654.8	-5.36	0.19	7.55
234.0	113755	1012	267364	464.2	18.6	2669.9	-5.37	0.19	7.59
236.0	114673	1049	272719	453.4	18.9	2685.1	-5.36	0.19	7.63
238.0	115569	1087	278104	442.7	19.3	2700.4	-5.36	0.19	7.67
240.0	116444	1127	283521	432.0	19.7	2715.8	-5.35	0.19	7.70
242.0	117297	1166	288968	421.3	20.1	2731.2	-5.36	0.20	7.74
244.0	118129	1207	294446	410.6	20.5	2746.7	-5.36	0.20	7.78
246.0	118939	1248	299955	399.8	20.9	2762.4	-5.36	0.21	7.83
248.0	119728	1291	305495	389.1	21.3	2778.0	-5.36	0.21	7.86
250.0	120496	1334	311067	378.4	21.7	2793.8	-5.36	0.21	7.89
252.0	121242	1377	316670	367.7	22.1	2809.6	-5.36	0.21	7.94
254.0	121967	1422	322305	357.0	22.6	2825.5	-5.35	0.21	7.98
256.0	122670	1468	327972	346.3	23.0	2841.5	-5.35	0.21	8.02

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	123352	1514	333672	335.5	23.4	2857.6	-5.36	0.21	8.05
260.0	124012	1561	339403	324.8	23.8	2873.8	-5.37	0.22	8.10
262.0	124651	1609	345167	314.1	24.3	2890.0	-5.37	0.22	8.15
264.0	125268	1658	350963	303.3	24.7	2906.3	-5.37	0.22	8.19
266.0	125864	1708	356792	292.6	25.2	2922.8	-5.36	0.23	8.23
268.0	126439	1759	362654	281.9	25.6	2939.3	-5.37	0.23	8.27
270.0	126992	1811	368549	271.1	26.1	2955.8	-5.37	0.23	8.31
272.0	127523	1863	374477	260.4	26.6	2972.5	-5.38	0.23	8.36
274.0	128033	1917	380439	249.6	27.0	2989.3	-5.38	0.24	8.40
276.0	128522	1971	386435	238.9	27.5	3006.1	-5.38	0.25	8.45
278.0	128988	2027	392464	228.1	28.0	3023.1	-5.38	0.25	8.49
280.0	129434	2084	398527	217.3	28.5	3040.1	-5.39	0.25	8.54
282.0	129858	2141	404624	206.5	29.0	3057.2	-5.40	0.25	8.59
284.0	130260	2200	410756	195.7	29.5	3074.4	-5.41	0.25	8.64
286.0	130641	2259	416922	184.9	30.0	3091.7	-5.41	0.26	8.68
288.0	131000	2320	423123	174.1	30.5	3109.1	-5.41	0.27	8.72
290.0	131337	2381	429359	163.3	31.1	3126.6	-5.41	0.26	8.77
292.0	131653	2444	435629	152.5	31.6	3144.2	-5.42	0.26	8.82
294.0	131947	2508	441936	141.6	32.1	3161.9	-5.42	0.26	8.87
296.0	132219	2572	448277	130.8	32.6	3179.7	-5.42	0.27	8.92
298.0	132470	2638	454654	119.9	33.2	3197.6	-5.43	0.28	8.97
300.0	132699	2705	461068	109.0	33.8	3215.6	-5.44	0.28	9.01
302.0	132906	2773	467517	98.1	34.3	3233.7	-5.45	0.28	9.07
304.0	133092	2842	474002	87.2	34.9	3251.8	-5.45	0.29	9.12
306.0	133255	2913	480524	76.3	35.5	3270.1	-5.46	0.29	9.17
308.0	133397	2984	487083	65.4	36.1	3288.5	-5.46	0.29	9.21
310.0	133517	3057	493678	54.5	36.6	3307.0	-5.47	0.30	9.27
312.0	133615	3131	500311	43.5	37.2	3325.6	-5.48	0.30	9.33
314.0	133691	3206	506981	32.6	37.8	3344.3	-5.49	0.30	9.38
316.0	133745	3282	513688	21.6	38.4	3363.1	-5.50	0.30	9.43
318.0	133777	3360	520433	10.6	39.1	3382.0	-5.51	0.31	9.48
320.0	133787	3438	527216	-0.5	39.7	3401.1	-5.53	0.31	9.54
322.0	133775	3518	534038	-11.5	40.3	3420.2	-5.54	0.31	9.60
324.0	133741	3600	540897	-22.6	40.9	3439.5	-5.54	0.32	9.66
326.0	133685	3682	547795	-33.7	41.6	3458.8	-5.55	0.32	9.72
328.0	133606	3766	554733	-44.8	42.2	3478.3	-5.55	0.33	9.77
330.0	133505	3851	561709	-55.9	42.9	3497.9	-5.56	0.34	9.83
332.0	133382	3938	568724	-67.1	43.6	3517.6	-5.57	0.34	9.88
334.0	133237	4025	575779	-78.2	44.2	3537.5	-5.58	0.34	9.94
336.0	133069	4114	582874	-89.4	44.9	3557.4	-5.60	0.35	10.00
338.0	132879	4205	590009	-100.6	45.6	3577.5	-5.62	0.35	10.07
340.0	132667	4297	597184	-111.9	46.3	3597.7	-5.63	0.35	10.13
342.0	132432	4390	604400	-123.2	47.0	3618.0	-5.64	0.36	10.19

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	132174	4485	611656	-134.4	47.8	3638.4	-5.65	0.36	10.25
346.0	131894	4581	618954	-145.8	48.5	3659.0	-5.67	0.37	10.31
348.0	131591	4679	626292	-157.1	49.2	3679.7	-5.69	0.37	10.37
350.0	131266	4778	633673	-168.5	50.0	3700.5	-5.70	0.37	10.44
352.0	130917	4879	641094	-179.9	50.7	3721.4	-5.71	0.37	10.50
354.0	130546	4981	648558	-191.3	51.5	3742.5	-5.72	0.38	10.57
356.0	130152	5085	656065	-202.8	52.2	3763.7	-5.74	0.39	10.64
358.0	129735	5190	663613	-214.3	53.0	3785.0	-5.76	0.40	10.70
360.0	129295	5297	671205	-225.8	53.8	3806.5	-5.78	0.41	10.77
362.0	128831	5405	678839	-237.4	54.7	3828.1	-5.80	0.41	10.84
364.0	128345	5515	686517	-249.0	55.5	3849.9	-5.81	0.42	10.91
366.0	127835	5627	694239	-260.7	56.3	3871.7	-5.83	0.42	10.98
368.0	127302	5741	702005	-272.3	57.1	3893.8	-5.84	0.41	11.05
370.0	126746	5856	709814	-284.0	58.0	3915.9	-5.86	0.42	11.12
372.0	126166	5972	717668	-295.8	58.8	3938.3	-5.87	0.42	11.19
374.0	125563	6091	725567	-307.5	59.6	3960.7	-5.89	0.42	11.26
376.0	124936	6211	733511	-319.4	60.5	3983.3	-5.92	0.43	11.34
378.0	124285	6333	741501	-331.2	61.4	4006.1	-5.94	0.44	11.41
380.0	123611	6457	749536	-343.1	62.2	4028.9	-5.95	0.45	11.48
382.0	122913	6582	757617	-355.0	63.1	4052.0	-5.96	0.45	11.56
384.0	122191	6709	765744	-367.0	64.0	4075.2	-5.98	0.45	11.64
386.0	121445	6838	773917	-378.9	65.0	4098.6	-6.01	0.46	11.72
388.0	120675	6969	782138	-391.0	65.9	4122.1	-6.04	0.46	11.80
390.0	119881	7102	790406	-403.1	66.8	4145.8	-6.06	0.46	11.88
392.0	119063	7236	798721	-415.2	67.7	4169.6	-6.08	0.46	11.96
394.0	118220	7373	807084	-427.4	68.7	4193.6	-6.10	0.47	12.04
396.0	117353	7511	815496	-439.6	69.6	4217.8	-6.12	0.48	12.12
398.0	116461	7651	823956	-451.9	70.5	4242.1	-6.15	0.48	12.20
400.0	115545	7793	832464	-464.2	71.5	4266.6	-6.17	0.48	12.29
402.0	114605	7937	841022	-476.6	72.5	4291.3	-6.20	0.49	12.38
404.0	113639	8083	849629	-489.0	73.5	4316.1	-6.22	0.50	12.46
406.0	112648	8231	858287	-501.5	74.5	4341.1	-6.25	0.50	12.55
408.0	111633	8381	866994	-514.0	75.5	4366.3	-6.28	0.51	12.64
410.0	110592	8533	875752	-526.6	76.5	4391.7	-6.30	0.51	12.73
412.0	109527	8687	884561	-539.2	77.5	4417.3	-6.33	0.52	12.82
414.0	108435	8843	893421	-551.9	78.6	4443.0	-6.36	0.52	12.92
416.0	107319	9001	902333	-564.7	79.6	4468.9	-6.39	0.53	13.01
418.0	106177	9161	911297	-577.5	80.7	4495.0	-6.42	0.54	13.10
420.0	105009	9324	920313	-590.4	81.7	4521.3	-6.45	0.55	13.20
422.0	103815	9488	929382	-603.3	82.8	4547.8	-6.48	0.55	13.30
424.0	102596	9655	938505	-616.3	83.9	4574.5	-6.51	0.55	13.40
426.0	101350	9824	947681	-629.3	85.1	4601.4	-6.54	0.56	13.50
428.0	100079	9995	956911	-642.4	86.2	4628.5	-6.57	0.57	13.60

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
430.0	98781	10169	966195	-655.6	87.3	4655.8	-6.60	0.58	13.71
432.0	97456	10344	975534	-668.8	88.5	4683.4	-6.64	0.59	13.81
434.0	96105	10523	984928	-682.1	89.7	4711.1	-6.67	0.59	13.91
436.0	94728	10703	994379	-695.5	90.9	4739.0	-6.71	0.59	14.02
438.0	93323	10886	1003885	-709.0	92.0	4767.2	-6.75	0.60	14.13
440.0	91892	11071	1013447	-722.5	93.2	4795.5	-6.78	0.61	14.25
442.0	90433	11259	1023067	-736.1	94.5	4824.1	-6.81	0.62	14.36
444.0	88947	11449	1032744	-749.8	95.7	4853.0	-6.85	0.62	14.46
446.0	87434	11642	1042479	-763.5	97.0	4882.0	-6.89	0.63	14.57
448.0	85893	11837	1052272	-777.3	98.2	4911.3	-6.93	0.63	14.69
450.0	84325	12035	1062124	-791.2	99.5	4940.8	-6.97	0.64	14.81
452.0	82728	12235	1072035	-805.2	100.8	4970.5	-7.01	0.65	14.93
454.0	81104	12438	1082006	-819.3	102.1	5000.5	-7.05	0.66	15.05
456.0	79451	12643	1092038	-833.4	103.4	5030.7	-7.09	0.66	15.18
458.0	77770	12852	1102130	-847.6	104.8	5061.2	-7.13	0.67	15.30
460.0	76060	13062	1112283	-861.9	106.1	5092.0	-7.18	0.68	15.42
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
461.77	74523	13251	1121320	-874.7	107.3	5118.2	-7.23	0.63	15.53
462.0	74322	13276	1122497	-876.4	107.4	5121.3	-7.38	0.62	12.16
464.0	72555	13492	1132766	-891.3	108.6	5147.3	-7.53	0.58	12.22
466.0	70757	13711	1143085	-906.4	109.8	5171.8	-7.53	0.58	12.28
468.0	68929	13931	1153453	-921.4	110.9	5196.4	-7.48	0.56	12.33
470.0	67071	14154	1163871	-936.2	112.1	5221.1	-7.28	0.59	12.39
472.0	65185	14380	1174338	-950.4	113.3	5245.9	-6.99	0.60	12.46
474.0	63270	14608	1184855	-964.1	114.5	5271.0	-6.70	0.60	12.51
476.0	61329	14838	1195422	-977.3	115.7	5296.1	-6.54	0.59	12.58
478.0	59361	15070	1206039	-990.4	116.9	5321.3	-6.49	0.59	12.65
480.0	57367	15305	1216707	-1003.3	118.1	5346.7	-6.51	0.59	12.74
482.0	55347	15543	1227426	-1016.4	119.3	5372.3	-6.55	0.60	12.84
484.0	53302	15782	1238196	-1029.5	120.5	5398.0	-6.61	0.62	12.94
486.0	51229	16025	1249018	-1042.9	121.7	5424.0	-6.71	0.64	13.04
488.0	49130	16269	1259893	-1056.4	123.0	5450.2	-6.82	0.65	13.14
490.0	47004	16517	1270819	-1070.1	124.3	5476.6	-6.93	0.66	13.25
492.0	44849	16767	1281799	-1084.0	125.7	5503.2	-7.02	0.67	13.35
494.0	42667	17019	1292832	-1098.2	127.0	5529.9	-7.14	0.68	13.45
496.0	40457	17275	1303917	-1112.6	128.4	5554.5	-7.29	0.67	11.54
498.0	38217	17533	1315049	-1127.3	129.7	5577.5	-7.42	0.67	11.56
500.0	35947	17794	1326228	-1142.2	131.1	5600.7	-7.50	0.68	11.57
502.0	33648	18057	1337452	-1157.2	132.4	5623.8	-7.56	0.69	11.59
504.0	31318	18323	1348723	-1172.4	133.8	5647.0	-7.62	0.70	11.64
506.0	28958	18592	1360041	-1187.7	135.2	5670.4	-7.67	0.70	11.71

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	26567	18864	1371405	-1203.1	136.7	5693.8	-7.72	0.71	11.77
510.0	24146	19139	1382816	-1218.6	138.1	5717.5	-7.77	0.72	11.85
512.0	21693	19417	1394275	-1234.2	139.6	5741.3	-7.82	0.73	11.92
514.0	19209	19697	1405781	-1249.9	141.0	5765.2	-7.86	0.74	11.99
516.0	16693	19981	1417336	-1265.6	142.5	5789.2	-7.90	0.75	12.07
518.0	14146	20267	1428939	-1281.5	144.0	5813.5	-7.96	0.76	12.15
520.0	11568	20557	1440590	-1297.5	145.5	5837.9	-8.03	0.76	12.24
522.0	8957	20850	1452290	-1313.6	147.1	5862.4	-8.10	0.77	12.32
524.0	6313	21145	1464040	-1329.8	148.6	5887.1	-8.17	0.77	12.40
526.0	3637	21444	1475839	-1346.3	150.1	5912.0	-8.24	0.77	12.48
528.0	928	21746	1487688	-1362.8	151.7	5937.1	-8.31	0.78	12.57
530.0	-1814	22051	1499587	-1379.5	153.2	5962.3	-8.36	0.78	12.65
532.0	-4590	22359	1511537	-1396.2	154.8	5987.7	-8.41	0.79	12.74
534.0	-7399	22670	1523538	-1413.1	156.4	6013.2	-8.47	0.81	12.82
536.0	-10242	22984	1535590	-1430.1	158.0	6038.9	-8.53	0.81	12.91
538.0	-13120	23302	1547694	-1447.2	159.7	6064.9	-8.59	0.82	13.00
540.0	-16032	23623	1559849	-1464.5	161.3	6090.9	-8.65	0.82	13.09
542.0	-18978	23947	1572058	-1481.8	163.0	6117.2	-8.71	0.83	13.18
544.0	-21959	24275	1584318	-1499.3	164.6	6143.6	-8.75	0.84	13.26
546.0	-24975	24606	1596632	-1516.9	166.3	6170.3	-8.80	0.85	13.35
548.0	-28026	24940	1609000	-1534.5	168.0	6197.1	-8.86	0.86	13.45
550.0	-31113	25278	1621421	-1552.3	169.8	6224.0	-8.92	0.87	13.54
552.0	-34236	25619	1633896	-1570.2	171.5	6251.2	-8.97	0.87	13.62
554.0	-37394	25964	1646426	-1588.2	173.2	6278.5	-9.01	0.87	13.70
556.0	-40589	26312	1659010	-1606.2	175.0	6306.0	-9.04	0.87	13.78
558.0	-43819	26664	1671650	-1624.3	176.7	6333.6	-9.08	0.81	13.86
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
559.54	-46332	26937	1681412	-1638.3	177.8	6355.0	-9.05	0.71	13.92
560.0	-47086	27019	1684333	-1642.4	178.2	6357.6	-8.57	0.71	-2.56
S-II/S-IVB SEPARATION COMMAND									
560.5	-47908	27108	1687507	-1646.6	178.5	6356.3	-8.37	0.68	-2.54
562.0	-50387	27376	1697038	-1659.0	179.3	6352.6	-8.18	0.48	-2.47
564.0	-53721	27736	1709738	-1675.4	180.3	6347.7	-8.22	0.48	-2.37
566.0	-57088	28097	1722433	-1692.1	181.3	6348.6	-8.46	0.56	2.31
568.0	-60489	28461	1735136	-1709.0	182.5	6354.0	-8.46	0.59	2.95
570.0	-63924	28827	1747850	-1725.9	183.7	6360.0	-8.47	0.60	3.03
572.0	-67393	29196	1760577	-1743.0	184.8	6366.2	-8.66	0.57	3.09
574.0	-70896	29567	1773315	-1760.5	186.0	6372.3	-8.82	0.56	3.05
576.0	-74435	29940	1786066	-1778.2	187.1	6378.5	-8.89	0.57	3.07

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	-78009	30315	1798829	-1796.0	188.3	6384.6	-8.87	0.58	3.09
580.0	-81619	30693	1811605	-1813.7	189.4	6390.8	-8.85	0.59	3.10
582.0	-85264	31073	1824393	-1831.4	190.6	6397.0	-8.87	0.60	3.10
584.0	-88944	31455	1837193	-1849.2	191.8	6403.2	-8.89	0.62	3.09
586.0	-92660	31840	1850005	-1867.0	193.1	6409.4	-8.91	0.63	3.09
588.0	-96412	32228	1862830	-1884.8	194.3	6415.6	-8.94	0.64	3.08
590.0	-100200	32618	1875668	-1902.7	195.6	6421.7	-8.97	0.65	3.08
592.0	-104023	33010	1888517	-1920.7	197.0	6427.9	-9.00	0.66	3.08
594.0	-107882	33405	1901379	-1938.7	198.3	6434.0	-9.02	0.66	3.07
596.0	-111778	33803	1914253	-1956.7	199.6	6440.2	-9.04	0.66	3.07
598.0	-115709	34204	1927140	-1974.8	200.9	6446.3	-9.05	0.67	3.06
600.0	-119677	34607	1940039	-1992.9	202.3	6452.4	-9.06	0.67	3.05
602.0	-123681	35013	1952950	-2011.1	203.6	6458.5	-9.07	0.67	3.04
604.0	-127721	35421	1965873	-2029.2	205.0	6464.6	-9.08	0.68	3.04
606.0	-131798	35833	1978808	-2047.4	206.3	6470.7	-9.09	0.68	3.05
608.0	-135911	36247	1991756	-2065.6	207.7	6476.8	-9.10	0.69	3.05
610.0	-140060	36663	2004715	-2083.8	209.1	6482.9	-9.11	0.70	3.04
612.0	-144246	37083	2017687	-2102.0	210.5	6488.9	-9.12	0.69	3.02
614.0	-148468	37505	2030671	-2120.3	211.9	6495.0	-9.14	0.69	3.01
616.0	-152727	37930	2043667	-2138.6	213.2	6501.0	-9.14	0.69	3.01
618.0	-157023	38358	2056675	-2156.9	214.6	6507.0	-9.15	0.68	3.00
620.0	-161355	38789	2069695	-2175.2	216.0	6513.0	-9.16	0.69	3.00
622.0	-165723	39222	2082727	-2193.5	217.4	6519.0	-9.17	0.69	3.01
624.0	-170129	39658	2095771	-2211.8	218.7	6525.1	-9.18	0.70	3.02
626.0	-174571	40097	2108827	-2230.2	220.1	6531.1	-9.19	0.70	3.01
628.0	-179049	40539	2121896	-2248.6	221.6	6537.1	-9.20	0.70	3.00
630.0	-183565	40983	2134976	-2267.0	223.0	6543.1	-9.23	0.71	2.99
632.0	-188118	41431	2148068	-2285.5	224.4	6549.0	-9.24	0.71	2.98
634.0	-192707	41881	2161172	-2304.0	225.8	6555.0	-9.25	0.70	2.98
636.0	-197334	42334	2174288	-2322.5	227.2	6561.0	-9.25	0.70	2.98
638.0	-201997	42790	2187416	-2341.0	228.6	6566.9	-9.25	0.71	2.98
640.0	-206698	43248	2200556	-2359.5	230.0	6572.9	-9.26	0.71	2.97
642.0	-211435	43710	2213707	-2378.0	231.4	6578.8	-9.27	0.71	2.97
644.0	-216210	44174	2226871	-2396.6	232.8	6584.7	-9.28	0.70	2.97
646.0	-221022	44641	2240046	-2415.2	234.2	6590.7	-9.30	0.71	2.97
648.0	-225870	45111	2253234	-2433.8	235.7	6596.6	-9.31	0.71	2.98
650.0	-230757	45584	2266433	-2452.4	237.1	6602.6	-9.33	0.71	2.98
652.0	-235680	46059	2279644	-2471.1	238.5	6608.5	-9.34	0.71	2.97
654.0	-240641	46538	2292867	-2489.8	239.9	6614.5	-9.35	0.71	2.96
656.0	-245639	47019	2306102	-2508.5	241.3	6620.4	-9.35	0.71	2.95
658.0	-250675	47503	2319348	-2527.2	242.8	6626.3	-9.35	0.70	2.95
660.0	-255748	47990	2332607	-2545.9	244.2	6632.2	-9.36	0.70	2.95
662.0	-260859	48480	2345877	-2564.6	245.6	6638.1	-9.37	0.71	2.95

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	-266007	48972	2359159	-2583.4	247.0	6644.0	-9.38	0.71	2.95
666.0	-271192	49468	2372453	-2602.2	248.4	6649.9	-9.40	0.71	2.94
668.0	-276415	49966	2385759	-2621.0	249.8	6655.8	-9.40	0.71	2.93
670.0	-281676	50467	2399076	-2639.8	251.3	6661.6	-9.40	0.72	2.94
672.0	-286974	50971	2412405	-2658.6	252.7	6667.5	-9.41	0.72	2.93
674.0	-292310	51478	2425746	-2677.4	254.1	6673.4	-9.43	0.71	2.93
676.0	-297684	51988	2439099	-2696.3	255.6	6679.2	-9.47	0.71	2.92
678.0	-303096	52500	2452463	-2715.3	257.0	6685.0	-9.51	0.72	2.91
680.0	-308545	53016	2465839	-2734.3	258.4	6690.9	-9.53	0.72	2.91
682.0	-314033	53534	2479226	-2753.4	259.9	6696.7	-9.52	0.72	2.91
684.0	-319559	54055	2492626	-2772.4	261.3	6702.5	-9.49	0.72	2.91
686.0	-325122	54579	2506036	-2791.3	262.8	6708.3	-9.48	0.71	2.91
688.0	-330724	55106	2519459	-2810.3	264.2	6714.1	-9.48	0.72	2.90
690.0	-336363	55636	2532893	-2829.3	265.6	6719.9	-9.49	0.72	2.91
692.0	-342041	56169	2546339	-2848.2	267.1	6725.7	-9.49	0.72	2.91
694.0	-347756	56704	2559796	-2867.2	268.5	6731.6	-9.48	0.73	2.92
696.0	-353510	57243	2573265	-2886.1	270.0	6737.4	-9.47	0.73	2.93
698.0	-359301	57784	2586746	-2905.1	271.4	6743.3	-9.46	0.73	2.93
700.0	-365130	58329	2600238	-2924.0	272.9	6749.1	-9.45	0.71	2.94
702.0	-370997	58876	2613742	-2942.9	274.3	6755.0	-9.44	0.72	2.94
704.0	-376901	59426	2627258	-2961.8	275.8	6760.9	-9.43	0.71	2.95
706.0	-382844	59979	2640786	-2980.6	277.3	6766.8	-9.43	0.65	2.95
	S-IVB FIRST GUIDANCE CUTOFF								
706.21	-383470	60037	2642206	-2982.3	277.4	6767.4	-9.42	0.61	2.95
708.0	-388821	60535	2654316	-2996.7	278.4	6762.8	-7.65	0.53	-3.42
710.0	-394830	61093	2667834	-3012.1	279.4	6756.0	-7.64	0.51	-3.43
712.0	-400870	61653	2681339	-3027.4	280.5	6749.1	-7.64	0.51	-3.45
714.0	-406940	62215	2694831	-3042.7	281.5	6742.2	-7.63	0.51	-3.46
716.0	-413040	62778	2708308	-3057.9	282.5	6735.2	-7.62	0.51	-3.48
	PARKING ORBIT INSERTION								
716.21	-413683	62838	2709723	-3059.5	282.6	6734.6	-7.62	0.51	-3.48

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									
-16.963	6373.382	17.084	-5.540	-0.0	126.0	388.7	-0.02	-0.01	0.00
-16.0	6373.382	17.206	-5.165	-0.0	126.0	388.7	-0.02	-0.01	0.00
-15.0	6373.382	17.332	-4.777	-0.1	126.0	388.7	-0.02	-0.01	0.00
-14.0	6373.382	17.458	-4.388	-0.1	126.0	388.7	-0.02	-0.01	0.00
-13.0	6373.382	17.584	-3.999	-0.1	126.0	388.7	-0.02	-0.01	0.00
-12.0	6373.381	17.710	-3.610	-0.1	126.0	388.7	-0.02	-0.01	0.00
-11.0	6373.381	17.836	-3.222	-0.2	126.0	388.7	-0.02	-0.01	0.00
-10.0	6373.381	17.962	-2.833	-0.2	125.9	388.7	-0.02	-0.01	0.00
-9.0	6373.381	18.088	-2.444	-0.2	125.9	388.8	-0.02	-0.01	0.00
-8.0	6373.381	18.214	-2.055	-0.2	125.9	388.8	-0.02	-0.01	0.00
-7.0	6373.380	18.339	-1.667	-0.3	125.9	388.8	-0.02	-0.01	0.00
-6.0	6373.380	18.465	-1.278	-0.3	125.9	388.8	-0.02	-0.01	0.00
-5.0	6373.380	18.591	-0.889	-0.3	125.9	388.8	-0.02	-0.01	0.00
-4.0	6373.380	18.717	-0.500	-0.3	125.9	388.8	-0.02	-0.01	0.00
-3.0	6373.379	18.843	-0.112	-0.4	125.9	388.8	-0.02	-0.01	0.00
-2.0	6373.379	18.969	0.277	-0.4	125.8	388.8	-0.02	-0.01	0.00
-1.0	6373.378	19.095	0.666	-0.4	125.8	388.8	-0.02	-0.01	0.00
0.0	6373.378	19.220	1.055	-0.4	125.8	388.8	-0.02	-0.01	0.00
ALL HOLDDOWN ARMS RELEASED									
0.3	6373.378	19.258	1.171	-0.4	125.8	388.8	0.77	-0.01	-0.01
LIFTOFF - START OF TIME BASE 1									
0.6	6373.378	19.296	1.288	-0.1	125.8	388.8	0.94	-0.01	-0.01
1.0	6373.378	19.346	1.444	0.5	125.8	388.8	2.00	-0.02	-0.01
2.0	6373.379	19.472	1.832	2.6	125.8	388.8	2.16	-0.01	-0.00
3.0	6373.383	19.598	2.221	4.7	125.8	388.8	2.21	0.11	0.00
4.0	6373.389	19.724	2.610	7.0	126.0	388.8	2.26	0.24	0.01
5.0	6373.397	19.850	2.999	9.2	126.3	388.8	2.32	0.26	0.02
6.0	6373.407	19.976	3.387	11.6	126.5	388.8	2.38	0.16	0.03
7.0	6373.420	20.103	3.776	14.0	126.6	388.9	2.44	0.14	0.03
8.0	6373.435	20.229	4.165	16.5	126.8	388.9	2.49	0.25	0.04
9.0	6373.453	20.356	4.554	19.0	127.1	388.9	2.55	0.31	0.04
10.0	6373.473	20.484	4.943	21.6	127.4	389.0	2.61	0.33	0.05
11.0	6373.496	20.611	5.332	24.2	127.7	389.0	2.66	0.20	0.06
12.0	6373.522	20.739	5.721	26.9	127.8	389.1	2.71	0.02	0.05
13.0	6373.550	20.867	6.110	29.6	127.8	389.2	2.76	-0.02	0.12
14.0	6373.581	20.994	6.500	32.4	127.8	389.3	2.81	0.01	0.13

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	6373.615	21.122	6.889	35.2	127.8	389.4	2.86	0.01	0.15
16.0	6373.651	21.250	7.278	38.1	127.8	389.6	2.91	-0.03	0.16
17.0	6373.691	21.378	7.668	41.0	127.7	389.8	2.98	-0.07	0.18
18.0	6373.733	21.505	8.058	44.0	127.6	389.9	3.06	-0.12	0.20
19.0	6373.779	21.633	8.448	47.1	127.5	390.2	3.10	-0.12	0.29
20.0	6373.828	21.760	8.838	50.2	127.4	390.5	3.18	-0.11	0.36
21.0	6373.879	21.888	9.229	53.4	127.3	390.9	3.25	-0.10	0.43
22.0	6373.935	22.015	9.620	56.7	127.2	391.4	3.32	-0.09	0.51
23.0	6373.993	22.142	10.012	60.1	127.1	391.9	3.39	-0.08	0.59
24.0	6374.055	22.269	10.404	63.5	127.0	392.6	3.46	-0.07	0.67
25.0	6374.120	22.396	10.797	67.0	126.9	393.3	3.54	-0.07	0.76
26.0	6374.189	22.523	11.191	70.6	126.8	394.1	3.62	-0.08	0.86
27.0	6374.261	22.650	11.585	74.2	126.8	395.0	3.69	-0.08	0.97
28.0	6374.337	22.776	11.981	77.9	126.7	396.0	3.76	-0.08	1.08
29.0	6374.417	22.903	12.377	81.7	126.6	397.2	3.83	-0.07	1.19
30.0	6374.501	23.030	12.775	85.6	126.5	398.4	3.90	-0.07	1.29
31.0	6374.588	23.156	13.174	89.5	126.5	399.8	3.97	-0.06	1.40
32.0	6374.680	23.283	13.575	93.5	126.4	401.2	4.05	-0.06	1.51
33.0	6374.775	23.409	13.977	97.6	126.4	402.8	4.13	-0.05	1.62
34.0	6374.875	23.535	14.380	101.8	126.3	404.5	4.20	-0.04	1.74
35.0	6374.979	23.662	14.786	106.0	126.3	406.3	4.28	-0.03	1.87
36.0	6375.087	23.788	15.193	110.3	126.3	408.2	4.35	-0.02	1.99
37.0	6375.199	23.914	15.602	114.7	126.2	410.2	4.42	-0.01	2.12
38.0	6375.316	24.040	16.013	119.1	126.2	412.4	4.49	-0.01	2.24
39.0	6375.438	24.167	16.427	123.7	126.2	414.7	4.57	-0.02	2.37
40.0	6375.564	24.293	16.843	128.3	126.2	417.2	4.64	-0.03	2.50
41.0	6375.694	24.419	17.261	132.9	126.1	419.7	4.71	-0.05	2.64
42.0	6375.830	24.545	17.682	137.7	126.1	422.5	4.79	-0.06	2.79
43.0	6375.970	24.671	18.106	142.5	126.0	425.3	4.87	-0.07	2.96
44.0	6376.115	24.797	18.533	147.4	126.0	428.4	4.94	-0.07	3.13
45.0	6376.265	24.923	18.963	152.4	125.9	431.6	5.01	-0.07	3.30
46.0	6376.419	25.049	19.396	157.4	125.8	435.0	5.08	-0.06	3.49
47.0	6376.579	25.175	19.833	162.5	125.7	438.6	5.15	-0.06	3.68
48.0	6376.745	25.300	20.274	167.7	125.7	442.4	5.22	-0.07	3.87
49.0	6376.915	25.426	20.718	173.0	125.6	446.3	5.30	-0.09	4.05
50.0	6377.091	25.551	21.166	178.3	125.5	450.5	5.38	-0.13	4.23
51.0	6377.272	25.677	21.619	183.7	125.3	454.8	5.45	-0.17	4.40
52.0	6377.458	25.802	22.076	189.2	125.1	459.3	5.53	-0.21	4.57
53.0	6377.650	25.927	22.537	194.8	124.9	463.9	5.59	-0.26	4.74
54.0	6377.848	26.052	23.004	200.4	124.6	468.7	5.66	-0.30	4.91
55.0	6378.051	26.176	23.475	206.1	124.3	473.8	5.72	-0.33	5.09
56.0	6378.260	26.300	23.951	211.8	124.0	478.9	5.79	-0.34	5.28
57.0	6378.474	26.424	24.433	217.6	123.6	484.3	5.86	-0.34	5.47

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	6378.695	26.548	24.920	223.5	123.3	489.9	5.93	-0.32	5.66
59.0	6378.922	26.671	25.413	229.5	123.0	495.6	6.00	-0.30	5.86
60.0	6379.154	26.794	25.911	235.5	122.7	501.6	6.06	-0.28	6.07
61.0	6379.393	26.916	26.416	241.6	122.4	507.8	6.12	-0.26	6.28
62.0	6379.637	27.039	26.927	247.7	122.2	514.2	6.16	-0.23	6.50
63.0	6379.888	27.161	27.444	253.9	122.0	520.8	6.20	-0.19	6.72
64.0	6380.145	27.282	27.969	260.1	121.8	527.6	6.23	-0.15	6.92
65.0	6380.408	27.404	28.500	266.3	121.7	534.6	6.24	-0.11	7.13
66.0	6380.678	27.526	29.038	272.6	121.6	541.9	6.26	-0.06	7.33
67.0	6380.954	27.647	29.584	278.9	121.5	549.3	6.29	-0.02	7.53
MACH 1									
67.5	6381.094	27.708	29.859	282.0	121.5	553.1	6.31	-0.01	7.64
68.0	6381.236	27.769	30.137	285.2	121.5	556.9	6.32	0.00	7.74
69.0	6381.524	27.890	30.698	291.5	121.5	564.8	6.36	0.02	7.95
70.0	6381.819	28.012	31.266	297.9	121.6	572.9	6.40	0.04	8.17
71.0	6382.120	28.133	31.843	304.3	121.6	581.1	6.46	0.05	8.38
72.0	6382.427	28.255	32.429	310.8	121.7	589.6	6.53	0.06	8.60
73.0	6382.741	28.377	33.023	317.4	121.7	598.3	6.60	0.06	8.81
74.0	6383.062	28.499	33.625	324.0	121.8	607.2	6.67	0.06	9.03
75.0	6383.389	28.620	34.237	330.7	121.8	616.4	6.73	0.04	9.25
76.0	6383.723	28.742	34.858	337.4	121.8	625.8	6.80	0.02	9.49
77.0	6384.064	28.864	35.489	344.3	121.8	635.4	6.85	0.00	9.74
78.0	6384.412	28.986	36.129	351.1	121.9	645.3	6.90	0.00	10.01
79.0	6384.767	29.108	36.779	358.1	121.9	655.4	6.95	0.01	10.30
80.0	6385.128	29.230	37.440	365.0	121.9	665.9	6.99	0.04	10.59
81.0	6385.497	29.352	38.111	372.0	122.0	676.6	7.04	0.09	10.88
82.0	6385.872	29.474	38.793	379.1	122.1	687.6	7.10	0.13	11.16
83.0	6386.255	29.596	39.486	386.2	122.2	698.9	7.16	0.15	11.45
84.0	6386.645	29.718	40.191	393.4	122.3	710.5	7.20	0.16	11.74
85.0	6387.042	29.840	40.907	400.6	122.5	722.4	7.22	0.16	12.05
MAXIMUM DYNAMIC PRESSURE									
86.0	6387.446	29.963	41.636	407.8	122.6	734.6	7.22	0.16	12.40
87.0	6387.857	30.086	42.377	415.0	122.8	747.2	7.21	0.17	12.78
88.0	6388.276	30.209	43.131	422.2	123.0	760.2	7.17	0.19	13.18
89.0	6388.702	30.332	43.897	429.4	123.2	773.6	7.11	0.20	13.61
90.0	6389.135	30.455	44.678	436.4	123.4	787.4	7.05	0.22	14.05
91.0	6389.575	30.578	45.472	443.4	123.6	801.7	6.98	0.23	14.48
92.0	6390.022	30.702	46.281	450.4	123.9	816.4	6.92	0.23	14.89
93.0	6390.475	30.826	47.105	457.3	124.1	831.5	6.86	0.20	15.30

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
94.0	6390.936	30.950	47.944	464.1	124.2	847.0	6.81	0.15	15.70
95.0	6391.404	31.075	48.799	470.9	124.4	862.8	6.76	0.09	16.09
96.0	6391.878	31.199	49.670	477.6	124.4	879.1	6.70	0.02	16.48
97.0	6392.359	31.323	50.558	484.3	124.4	895.8	6.66	-0.04	16.85
98.0	6392.847	31.448	51.462	490.9	124.3	912.8	6.62	-0.09	17.22
99.0	6393.341	31.572	52.383	497.5	124.3	930.2	6.59	-0.12	17.58
100.0	6393.842	31.696	53.323	504.1	124.1	948.0	6.58	-0.14	17.92
101.0	6394.349	31.820	54.280	510.7	124.0	966.1	6.58	-0.14	18.26
102.0	6394.863	31.944	55.255	517.3	123.9	984.5	6.60	-0.13	18.58
103.0	6395.384	32.068	56.249	523.9	123.7	1003.2	6.62	-0.13	18.90
104.0	6395.911	32.192	57.261	530.5	123.6	1022.3	6.64	-0.14	19.22
105.0	6396.445	32.315	58.293	537.1	123.4	1041.7	6.64	-0.15	19.54
106.0	6396.985	32.439	59.345	543.8	123.3	1061.4	6.64	-0.15	19.87
107.0	6397.532	32.562	60.416	550.4	123.1	1081.4	6.62	-0.15	20.21
108.0	6398.086	32.685	61.508	557.0	123.0	1101.8	6.60	-0.15	20.56
109.0	6398.646	32.808	62.620	563.6	122.8	1122.6	6.57	-0.13	20.91
110.0	6399.213	32.930	63.753	570.1	122.7	1143.7	6.55	-0.11	21.27
111.0	6399.786	33.053	64.907	576.7	122.6	1165.1	6.54	-0.09	21.62
112.0	6400.366	33.176	66.083	583.2	122.5	1186.9	6.55	-0.08	21.96
113.0	6400.953	33.298	67.281	589.8	122.4	1209.0	6.58	-0.07	22.29
114.0	6401.546	33.421	68.502	596.4	122.4	1231.4	6.63	-0.08	22.61
115.0	6402.145	33.543	69.744	603.0	122.3	1254.2	6.69	-0.08	22.91
116.0	6402.752	33.665	71.010	609.8	122.2	1277.3	6.78	-0.09	23.21
117.0	6403.365	33.787	72.299	616.6	122.1	1300.6	6.86	-0.10	23.52
118.0	6403.985	33.909	73.611	623.5	122.0	1324.3	6.94	-0.10	23.83
119.0	6404.612	34.031	74.948	630.4	121.9	1348.3	7.00	-0.08	24.16
120.0	6405.246	34.153	76.308	637.4	121.8	1372.7	7.04	-0.07	24.52
121.0	6405.887	34.275	77.693	644.5	121.8	1397.4	7.05	-0.05	24.89
122.0	6406.535	34.397	79.103	651.5	121.7	1422.5	7.03	-0.04	25.29
123.0	6407.190	34.518	80.538	658.5	121.7	1448.0	7.01	-0.03	25.70
124.0	6407.852	34.640	81.999	665.5	121.6	1473.9	6.99	-0.03	26.11
125.0	6408.521	34.762	83.486	672.5	121.6	1500.2	6.99	-0.04	26.52
126.0	6409.197	34.883	85.000	679.5	121.6	1526.9	7.01	-0.06	26.92
127.0	6409.880	35.005	86.540	686.5	121.5	1554.0	7.05	-0.08	27.32
128.0	6410.570	35.126	88.108	693.6	121.4	1581.6	7.10	-0.10	27.73
129.0	6411.267	35.248	89.703	700.7	121.3	1609.5	7.13	-0.12	28.14
130.0	6411.972	35.369	91.327	707.9	121.2	1637.8	7.17	-0.14	28.58
131.0	6412.683	35.490	92.979	715.0	121.0	1666.6	7.20	-0.14	29.03
132.0	6413.402	35.611	94.660	722.3	120.9	1695.9	7.24	-0.14	29.47
133.0	6414.128	35.732	96.371	729.5	120.7	1725.6	7.27	-0.10	29.92
134.0	6414.861	35.852	98.111	736.8	120.6	1755.7	7.31	-0.12	30.37
135.0	6415.602	35.973	99.882	744.1	120.5	1786.3	7.34	-0.14	30.82
136.0	6416.349	36.093	101.684	751.5	120.3	1817.4	7.37	-0.19	31.27

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
137.0	6417.105	36.214	103.517	758.8	120.1	1848.9	7.41	-0.19	31.72
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
137.85	6417.752	36.316	105.100	765.2	120.0	1876.0	7.44	-0.18	32.10
138.0	6417.867	36.334	105.381	766.1	120.0	1880.7	4.99	-0.18	30.79
139.0	6418.635	36.453	107.273	770.5	119.8	1907.5	4.17	-0.14	25.74
140.0	6419.408	36.573	109.194	774.6	119.7	1933.3	4.17	-0.14	26.07
141.0	6420.185	36.693	111.141	778.8	119.5	1959.4	4.16	-0.10	26.40
142.0	6420.966	36.812	113.113	782.9	119.4	1985.8	4.15	-0.09	26.72
143.0	6421.751	36.932	115.112	787.1	119.4	2012.6	4.14	-0.09	27.05
144.0	6422.540	37.051	117.138	791.2	119.3	2039.8	4.13	-0.08	27.37
145.0	6423.333	37.170	119.192	795.3	119.2	2067.3	4.13	-0.07	27.69
146.0	6424.131	37.289	121.273	799.5	119.1	2095.1	4.13	-0.07	28.01
147.0	6424.932	37.409	123.382	803.6	119.1	2123.3	4.15	-0.08	28.37
148.0	6425.738	37.528	125.519	807.8	119.0	2151.9	4.17	-0.08	28.75
149.0	6426.547	37.646	127.685	811.9	118.9	2180.8	4.19	-0.09	29.12
150.0	6427.361	37.765	129.880	816.1	118.8	2210.1	4.20	-0.10	29.50
151.0	6428.180	37.884	132.105	820.3	118.7	2239.6	4.23	-0.10	29.90
152.0	6429.002	38.003	134.360	824.5	118.6	2269.7	4.25	-0.10	30.32
153.0	6429.829	38.121	136.645	828.8	118.5	2300.3	4.26	-0.10	30.76
154.0	6430.659	38.240	138.960	833.0	118.4	2331.2	4.27	-0.10	31.20
155.0	6431.495	38.358	141.307	837.3	118.3	2362.7	4.28	-0.08	31.68
156.0	6432.334	38.476	143.686	841.6	118.2	2394.6	4.28	-0.09	32.14
157.0	6433.178	38.594	146.097	845.8	118.1	2426.9	4.29	-0.09	32.59
158.0	6434.026	38.712	148.540	850.1	118.0	2459.7	4.30	-0.09	33.07
159.0	6434.878	38.830	151.016	854.4	117.9	2493.1	4.31	-0.09	33.54
160.0	6435.735	38.948	153.526	858.7	117.8	2526.8	4.31	-0.09	33.99
161.0	6436.595	39.066	156.070	863.1	117.7	2561.0	4.32	-0.09	34.26
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.78	6437.269	39.158	158.077	866.4	117.6	2587.8	4.33	-0.15	34.53
162.0	6437.459	39.184	158.645	866.6	117.6	2593.4	-3.12	-0.09	16.89
163.0	6438.320	39.301	161.237	858.7	117.6	2597.6	-9.52	-0.04	-0.07
S-IC/S-II SEPARATION COMMAND									
163.5	6438.750	39.360	162.539	854.0	117.5	2597.6	-9.52	-0.04	-0.06
164.0	6439.176	39.419	163.838	849.2	117.5	2597.5	-9.52	-0.04	-0.05
166.0	6440.855	39.654	169.032	830.3	117.4	2597.6	-9.29	-0.04	0.52
168.0	6442.498	39.888	174.233	813.8	117.3	2604.3	-7.28	-0.06	5.31
170.0	6444.111	40.123	179.452	799.4	117.2	2615.3	-7.13	-0.04	5.78

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	6445.696	40.357	184.695	785.7	117.1	2628.1	-6.70	-0.05	6.65
174.0	6447.254	40.591	189.965	772.3	117.0	2641.4	-6.66	-0.05	6.81
176.0	6448.786	40.825	195.262	759.0	116.9	2655.1	-6.64	-0.05	6.87
178.0	6450.290	41.059	200.586	745.8	116.8	2668.9	-6.62	-0.04	6.89
180.0	6451.768	41.292	205.937	732.5	116.7	2682.7	-6.60	-0.05	6.92
182.0	6453.220	41.525	211.316	719.3	116.6	2696.6	-6.58	-0.05	6.95
184.0	6454.646	41.759	216.724	706.1	116.5	2710.5	-6.56	-0.05	6.98
186.0	6456.045	41.991	222.159	693.0	116.4	2724.5	-6.54	-0.05	7.00
188.0	6457.418	42.224	227.622	679.9	116.3	2738.5	-6.52	-0.05	7.03
190.0	6458.764	42.456	233.113	666.9	116.2	2752.6	-6.50	-0.05	7.06
192.0	6460.085	42.689	238.632	653.9	116.1	2766.8	-6.48	-0.05	7.09
194.0	6461.380	42.921	244.180	641.0	116.0	2781.0	-6.45	-0.05	7.12
196.0	6462.649	43.153	249.756	628.1	115.9	2795.3	-6.43	-0.05	7.15
198.0	6463.892	43.384	255.361	615.2	115.8	2809.6	-6.42	-0.05	7.19
200.0	6465.110	43.616	260.995	602.4	115.7	2824.1	-6.40	-0.05	7.23
202.0	6466.302	43.847	266.657	589.6	115.6	2838.6	-6.37	-0.05	7.27
204.0	6467.469	44.078	272.349	576.9	115.5	2853.1	-6.32	-0.06	7.29
206.0	6468.610	44.309	278.070	564.3	115.3	2867.7	-6.23	-0.06	7.28
208.0	6469.726	44.539	283.820	552.0	115.2	2882.2	-6.09	-0.07	7.24
210.0	6470.818	44.770	289.599	540.0	115.0	2896.7	-5.93	-0.09	7.20
212.0	6471.886	44.999	295.407	528.2	114.8	2911.1	-5.83	-0.10	7.19
214.0	6472.931	45.229	301.243	516.6	114.6	2925.5	-5.78	-0.10	7.21
216.0	6473.953	45.458	307.108	505.0	114.4	2939.9	-5.79	-0.10	7.24
218.0	6474.951	45.687	313.003	493.4	114.2	2954.4	-5.80	-0.10	7.27
220.0	6475.926	45.915	318.926	481.8	114.0	2969.0	-5.80	-0.09	7.31
222.0	6476.878	46.143	324.879	470.2	113.8	2983.7	-5.80	-0.10	7.35
224.0	6477.807	46.370	330.861	458.6	113.6	2998.4	-5.81	-0.10	7.39
226.0	6478.713	46.597	336.872	447.0	113.4	3013.2	-5.82	-0.09	7.42
228.0	6479.595	46.824	342.914	435.3	113.3	3028.1	-5.82	-0.09	7.46
230.0	6480.454	47.050	348.985	423.7	113.1	3043.0	-5.82	-0.09	7.49
232.0	6481.289	47.276	355.086	412.0	112.9	3058.1	-5.82	-0.09	7.53
234.0	6482.102	47.502	361.217	400.3	112.7	3073.2	-5.83	-0.09	7.56
236.0	6482.891	47.727	367.379	388.7	112.5	3088.3	-5.83	-0.09	7.59
238.0	6483.657	47.952	373.570	377.0	112.4	3103.5	-5.83	-0.09	7.63
240.0	6484.399	48.177	379.793	365.3	112.2	3118.8	-5.82	-0.09	7.67
242.0	6485.118	48.401	386.046	353.7	112.0	3134.2	-5.83	-0.09	7.70
244.0	6485.813	48.625	392.330	342.0	111.8	3149.7	-5.84	-0.09	7.74
246.0	6486.486	48.848	398.645	330.3	111.6	3165.2	-5.85	-0.08	7.78
248.0	6487.135	49.071	404.991	318.6	111.5	3180.8	-5.85	-0.09	7.82
250.0	6487.760	49.294	411.368	306.8	111.3	3196.5	-5.85	-0.09	7.85
252.0	6488.362	49.516	417.777	295.1	111.1	3212.2	-5.85	-0.09	7.89
254.0	6488.941	49.738	424.217	283.4	110.9	3228.0	-5.85	-0.09	7.93
256.0	6489.496	49.960	430.689	271.7	110.7	3243.9	-5.85	-0.09	7.96

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	6490.027	50.181	437.193	260.0	110.5	3259.9	-5.87	-0.10	8.00
260.0	6490.536	50.402	443.728	248.2	110.3	3275.9	-5.88	-0.09	8.04
262.0	6491.020	50.622	450.296	236.4	110.1	3292.1	-5.88	-0.09	8.09
264.0	6491.481	50.842	456.897	224.7	109.9	3308.3	-5.88	-0.09	8.13
266.0	6491.919	51.062	463.530	212.9	109.8	3324.6	-5.88	-0.09	8.17
268.0	6492.333	51.281	470.195	201.1	109.6	3341.0	-5.89	-0.09	8.20
270.0	6492.723	51.500	476.894	189.3	109.4	3357.4	-5.90	-0.09	8.25
272.0	6493.090	51.719	483.625	177.5	109.2	3374.0	-5.91	-0.09	8.29
274.0	6493.433	51.937	490.390	165.7	109.0	3390.6	-5.91	-0.09	8.33
276.0	6493.753	52.155	497.187	153.8	108.8	3407.3	-5.92	-0.09	8.37
278.0	6494.048	52.373	504.019	142.0	108.7	3424.1	-5.93	-0.08	8.42
280.0	6494.320	52.590	510.884	130.1	108.5	3441.0	-5.93	-0.09	8.46
282.0	6494.569	52.807	517.783	118.2	108.3	3457.9	-5.95	-0.09	8.51
284.0	6494.793	53.023	524.716	106.3	108.1	3475.0	-5.96	-0.09	8.55
286.0	6494.994	53.239	531.683	94.3	107.9	3492.2	-5.97	-0.09	8.59
288.0	6495.170	53.455	538.684	82.4	107.7	3509.4	-5.97	-0.08	8.63
290.0	6495.323	53.670	545.721	70.4	107.6	3526.7	-5.98	-0.09	8.68
292.0	6495.452	53.885	552.791	58.5	107.4	3544.1	-5.99	-0.10	8.73
294.0	6495.557	54.099	559.897	46.5	107.2	3561.6	-6.00	-0.10	8.78
296.0	6495.638	54.313	567.038	34.4	107.0	3579.3	-6.00	-0.09	8.83
298.0	6495.695	54.527	574.214	22.4	106.8	3597.0	-6.02	-0.09	8.87
300.0	6495.728	54.741	581.426	10.4	106.6	3614.7	-6.03	-0.09	8.91
302.0	6495.736	54.954	588.673	-1.7	106.4	3632.6	-6.04	-0.09	8.96
304.0	6495.721	55.166	595.956	-13.8	106.3	3650.6	-6.05	-0.09	9.02
306.0	6495.681	55.379	603.276	-25.9	106.1	3668.7	-6.06	-0.09	9.06
308.0	6495.617	55.591	610.631	-38.1	105.9	3686.9	-6.06	-0.09	9.11
310.0	6495.529	55.802	618.023	-50.2	105.7	3705.1	-6.07	-0.09	9.16
312.0	6495.416	56.013	625.452	-62.4	105.5	3723.5	-6.09	-0.09	9.22
314.0	6495.279	56.224	632.917	-74.6	105.3	3742.0	-6.11	-0.09	9.27
316.0	6495.118	56.435	640.420	-86.9	105.2	3760.6	-6.12	-0.09	9.31
318.0	6494.932	56.645	647.960	-99.1	105.0	3779.3	-6.14	-0.09	9.36
320.0	6494.721	56.855	655.537	-111.4	104.8	3798.1	-6.16	-0.09	9.42
322.0	6494.486	57.064	663.152	-123.8	104.6	3817.0	-6.18	-0.09	9.48
324.0	6494.226	57.273	670.805	-136.2	104.4	3836.0	-6.18	-0.09	9.53
326.0	6493.941	57.482	678.496	-148.5	104.2	3855.1	-6.19	-0.09	9.59
328.0	6493.632	57.690	686.225	-160.9	104.0	3874.3	-6.20	-0.09	9.64
330.0	6493.297	57.898	693.993	-173.4	103.9	3893.7	-6.22	-0.08	9.70
332.0	6492.938	58.105	701.800	-185.8	103.7	3913.1	-6.23	-0.08	9.75
334.0	6492.554	58.313	709.646	-198.3	103.5	3932.7	-6.25	-0.08	9.80
336.0	6492.145	58.519	717.531	-210.9	103.3	3952.3	-6.27	-0.08	9.86
338.0	6491.711	58.726	725.455	-223.4	103.2	3972.1	-6.29	-0.08	9.92
340.0	6491.251	58.932	733.419	-236.1	103.0	3992.0	-6.31	-0.08	9.98
342.0	6490.766	59.138	741.423	-248.7	102.8	4012.1	-6.32	-0.08	10.04

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	6490.256	59.344	749.468	-261.4	102.7	4032.2	-6.34	-0.08	10.10
346.0	6489.721	59.549	757.552	-274.1	102.5	4052.5	-6.36	-0.08	10.16
348.0	6489.160	59.753	765.678	-286.8	102.3	4072.9	-6.38	-0.08	10.22
350.0	6488.573	59.958	773.844	-299.6	102.2	4093.4	-6.40	-0.09	10.28
352.0	6487.961	60.162	782.051	-312.5	102.0	4114.0	-6.42	-0.08	10.34
354.0	6487.323	60.366	790.300	-325.4	101.8	4134.7	-6.44	-0.08	10.41
356.0	6486.660	60.569	798.590	-338.3	101.6	4155.6	-6.46	-0.07	10.47
358.0	6485.970	60.772	806.922	-351.2	101.5	4176.6	-6.48	-0.07	10.53
360.0	6485.255	60.975	815.297	-364.2	101.4	4197.7	-6.51	-0.07	10.60
362.0	6484.513	61.178	823.714	-377.3	101.2	4219.0	-6.53	-0.07	10.66
364.0	6483.746	61.380	832.173	-390.4	101.1	4240.4	-6.56	-0.07	10.73
366.0	6482.952	61.582	840.675	-403.5	100.9	4261.9	-6.58	-0.07	10.80
368.0	6482.132	61.784	849.221	-416.7	100.8	4283.6	-6.60	-0.08	10.87
370.0	6481.285	61.985	857.810	-429.9	100.6	4305.4	-6.62	-0.08	10.93
372.0	6480.412	62.186	866.443	-443.2	100.4	4327.4	-6.64	-0.08	11.00
374.0	6479.512	62.387	875.119	-456.5	100.3	4349.5	-6.66	-0.08	11.07
376.0	6478.586	62.587	883.840	-469.9	100.1	4371.7	-6.69	-0.08	11.14
378.0	6477.633	62.787	892.606	-483.3	100.0	4394.0	-6.72	-0.07	11.21
380.0	6476.653	62.987	901.417	-496.8	99.8	4416.5	-6.74	-0.07	11.29
382.0	6475.645	63.187	910.272	-510.3	99.7	4439.2	-6.76	-0.07	11.36
384.0	6474.611	63.386	919.174	-523.9	99.5	4462.0	-6.78	-0.07	11.44
386.0	6473.550	63.585	928.120	-537.5	99.4	4485.0	-6.81	-0.07	11.51
388.0	6472.461	63.783	937.113	-551.1	99.2	4508.1	-6.85	-0.07	11.59
390.0	6471.345	63.982	946.153	-564.9	99.1	4531.3	-6.88	-0.08	11.66
392.0	6470.202	64.180	955.239	-578.7	98.9	4554.7	-6.90	-0.08	11.75
394.0	6469.031	64.377	964.372	-592.5	98.7	4578.3	-6.93	-0.08	11.83
396.0	6467.832	64.574	973.552	-606.4	98.6	4602.0	-6.96	-0.08	11.90
398.0	6466.605	64.771	982.780	-620.4	98.4	4625.9	-6.99	-0.08	11.98
400.0	6465.350	64.968	992.056	-634.4	98.2	4650.0	-7.02	-0.08	12.06
402.0	6464.067	65.164	1001.380	-648.5	98.1	4674.2	-7.05	-0.08	12.15
404.0	6462.756	65.360	1010.753	-662.7	97.9	4698.6	-7.09	-0.07	12.23
406.0	6461.417	65.556	1020.175	-676.9	97.8	4723.1	-7.12	-0.07	12.32
408.0	6460.049	65.751	1029.646	-691.2	97.6	4747.8	-7.15	-0.07	12.40
410.0	6458.652	65.946	1039.166	-705.5	97.4	4772.7	-7.18	-0.07	12.49
412.0	6457.226	66.141	1048.737	-720.0	97.3	4797.8	-7.22	-0.07	12.58
414.0	6455.772	66.336	1058.357	-734.4	97.1	4823.1	-7.26	-0.08	12.67
416.0	6454.289	66.530	1068.029	-749.0	97.0	4848.5	-7.30	-0.07	12.76
418.0	6452.776	66.723	1077.752	-763.7	96.8	4874.1	-7.33	-0.07	12.84
420.0	6451.234	66.917	1087.526	-778.4	96.7	4899.9	-7.37	-0.06	12.94
422.0	6449.662	67.110	1097.351	-793.2	96.5	4925.9	-7.40	-0.07	13.04
424.0	6448.061	67.303	1107.229	-808.0	96.4	4952.0	-7.44	-0.07	13.13
426.0	6446.430	67.496	1117.160	-823.0	96.3	4978.4	-7.48	-0.07	13.23
428.0	6444.769	67.688	1127.143	-838.0	96.1	5005.0	-7.52	-0.06	13.33

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	6443.078	67.880	1137.180	-853.1	96.0	5031.7	-7.56	-0.06	13.43
432.0	6441.357	68.072	1147.270	-868.3	95.9	5058.7	-7.60	-0.06	13.53
434.0	6439.605	68.264	1157.415	-883.5	95.7	5085.9	-7.65	-0.06	13.63
436.0	6437.823	68.455	1167.614	-898.9	95.6	5113.2	-7.69	-0.06	13.73
438.0	6436.009	68.646	1177.868	-914.3	95.5	5140.8	-7.74	-0.06	13.84
440.0	6434.165	68.837	1188.177	-929.9	95.3	5168.6	-7.78	-0.06	13.95
442.0	6432.290	69.027	1198.542	-945.5	95.2	5196.6	-7.82	-0.05	14.06
444.0	6430.383	69.218	1208.964	-961.2	95.1	5224.9	-7.86	-0.06	14.16
446.0	6428.445	69.408	1219.442	-977.0	95.0	5253.3	-7.91	-0.06	14.27
448.0	6426.475	69.598	1229.977	-992.8	94.8	5282.0	-7.96	-0.06	14.38
450.0	6424.474	69.787	1240.570	-1008.8	94.7	5310.8	-8.01	-0.06	14.50
452.0	6422.440	69.976	1251.221	-1024.9	94.6	5339.9	-8.06	-0.05	14.62
454.0	6420.374	70.166	1261.930	-1041.1	94.5	5369.3	-8.11	-0.05	14.73
456.0	6418.276	70.354	1272.698	-1057.4	94.4	5398.9	-8.15	-0.05	14.85
458.0	6416.144	70.543	1283.526	-1073.8	94.3	5428.7	-8.20	-0.05	14.97
460.0	6413.980	70.732	1294.413	-1090.2	94.2	5458.8	-8.27	-0.05	15.09
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
461.77	6412.037	70.898	1304.099	-1105.0	94.0	5484.4	-8.32	-0.11	15.19
462.0	6411.783	70.920	1305.361	-1106.9	94.0	5487.5	-8.38	-0.06	11.82
464.0	6409.553	71.108	1316.362	-1123.8	93.8	5512.8	-8.53	-0.11	11.87
466.0	6407.288	71.295	1327.411	-1140.9	93.6	5536.6	-8.54	-0.11	11.92
468.0	6404.989	71.482	1338.508	-1158.0	93.4	5560.5	-8.49	-0.13	11.98
470.0	6402.656	71.668	1349.653	-1174.8	93.1	5584.5	-8.30	-0.10	12.04
472.0	6400.290	71.855	1360.846	-1191.1	92.9	5608.6	-8.01	-0.10	12.12
474.0	6397.892	72.040	1372.088	-1206.9	92.7	5633.0	-7.73	-0.11	12.17
476.0	6395.463	72.225	1383.378	-1222.2	92.5	5657.4	-7.57	-0.11	12.24
478.0	6393.003	72.410	1394.718	-1237.3	92.2	5682.0	-7.54	-0.12	12.31
480.0	6390.514	72.594	1406.106	-1252.4	92.0	5706.7	-7.56	-0.12	12.40
482.0	6387.994	72.778	1417.545	-1267.6	91.8	5731.6	-7.61	-0.12	12.50
484.0	6385.443	72.961	1429.033	-1282.9	91.5	5756.7	-7.68	-0.11	12.59
486.0	6382.862	73.144	1440.572	-1298.4	91.3	5782.0	-7.78	-0.10	12.69
488.0	6380.250	73.327	1452.161	-1314.0	91.1	5807.5	-7.90	-0.08	12.78
490.0	6377.606	73.509	1463.802	-1330.0	91.0	5833.1	-8.02	-0.08	12.88
492.0	6374.930	73.690	1475.494	-1346.1	90.8	5859.0	-8.11	-0.08	12.97
494.0	6372.221	73.872	1487.238	-1362.4	90.6	5885.0	-8.24	-0.08	13.07
496.0	6369.480	74.053	1499.032	-1379.0	90.5	5908.8	-8.34	-0.05	11.15
498.0	6366.705	74.234	1510.872	-1395.9	90.4	5931.1	-8.48	-0.06	11.16
500.0	6363.896	74.414	1522.757	-1412.9	90.2	5953.4	-8.56	-0.06	11.17
502.0	6361.053	74.595	1534.686	-1430.1	90.1	5975.8	-8.62	-0.05	11.19
504.0	6358.176	74.775	1546.660	-1447.4	90.0	5998.2	-8.69	-0.05	11.23
506.0	6355.263	74.955	1558.679	-1464.9	89.9	6020.7	-8.75	-0.05	11.29

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	6352.316	75.135	1570.743	-1482.4	89.8	6043.4	-8.80	-0.04	11.36
510.0	6349.334	75.314	1582.852	-1500.1	89.7	6066.1	-8.86	-0.04	11.43
512.0	6346.316	75.494	1595.008	-1517.9	89.6	6089.1	-8.92	-0.04	11.49
514.0	6343.262	75.673	1607.209	-1535.8	89.6	6112.2	-8.96	-0.03	11.56
516.0	6340.172	75.852	1619.457	-1553.8	89.5	6135.4	-9.01	-0.03	11.63
518.0	6337.047	76.031	1631.751	-1571.9	89.4	6158.7	-9.07	-0.03	11.71
520.0	6333.884	76.210	1644.092	-1590.2	89.4	6182.2	-9.15	-0.02	11.79
522.0	6330.686	76.388	1656.480	-1608.6	89.3	6205.9	-9.23	-0.03	11.87
524.0	6327.450	76.567	1668.915	-1627.1	89.2	6229.7	-9.31	-0.03	11.94
526.0	6324.177	76.745	1681.399	-1645.8	89.2	6253.7	-9.39	-0.04	12.02
528.0	6320.867	76.923	1693.930	-1664.7	89.1	6277.8	-9.46	-0.04	12.10
530.0	6317.518	77.101	1706.510	-1683.7	89.0	6302.1	-9.52	-0.04	12.18
532.0	6314.132	77.279	1719.139	-1702.8	88.9	6326.5	-9.58	-0.03	12.26
534.0	6310.707	77.457	1731.816	-1722.1	88.9	6351.2	-9.64	-0.02	12.34
536.0	6307.244	77.635	1744.543	-1741.4	88.8	6375.9	-9.71	-0.02	12.42
538.0	6303.741	77.812	1757.320	-1760.9	88.7	6400.9	-9.78	-0.02	12.51
540.0	6300.200	77.990	1770.147	-1780.6	88.7	6426.0	-9.85	-0.02	12.59
542.0	6296.619	78.167	1783.024	-1800.4	88.6	6451.2	-9.91	-0.02	12.67
544.0	6292.998	78.344	1795.952	-1820.3	88.6	6476.7	-9.96	-0.02	12.75
546.0	6289.337	78.521	1808.931	-1840.3	88.5	6502.3	-10.02	-0.02	12.84
548.0	6285.637	78.698	1821.961	-1860.4	88.5	6528.0	-10.09	-0.01	12.93
550.0	6281.896	78.875	1835.043	-1880.7	88.5	6554.0	-10.15	-0.01	13.01
552.0	6278.114	79.052	1848.177	-1901.1	88.4	6580.1	-10.22	-0.01	13.09
554.0	6274.291	79.229	1861.364	-1921.6	88.4	6606.4	-10.26	-0.02	13.16
556.0	6270.428	79.406	1874.603	-1942.2	88.3	6632.8	-10.30	-0.03	13.24
558.0	6266.522	79.582	1887.895	-1962.8	88.3	6659.3	-10.34	-0.10	13.31
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
559.54	6263.488	79.718	1898.158	-1978.8	88.0	6679.8	-10.33	-0.20	13.37
560.0	6262.577	79.759	1901.229	-1983.3	88.0	6682.2	-9.26	0.14	-3.08
S-II/S-IVB SEPARATION COMMAND									
560.5	6261.584	79.803	1904.565	-1987.9	88.0	6680.7	-9.06	0.11	-3.05
562.0	6258.592	79.935	1914.582	-2001.3	88.0	6676.2	-8.87	-0.09	-2.98
564.0	6254.572	80.111	1927.928	-2019.1	87.8	6670.3	-8.92	-0.09	-2.89
566.0	6250.516	80.286	1941.267	-2037.4	87.6	6670.1	-9.32	-0.10	1.78
568.0	6246.423	80.461	1954.612	-2056.1	87.4	6674.5	-9.35	-0.09	2.42
570.0	6242.292	80.636	1967.966	-2074.8	87.2	6679.4	-9.36	-0.08	2.49
572.0	6238.123	80.810	1981.331	-2093.8	87.0	6684.5	-9.55	-0.12	2.54
574.0	6233.917	80.983	1994.705	-2113.0	86.7	6689.6	-9.71	-0.13	2.49
576.0	6229.671	81.156	2008.089	-2132.6	86.4	6694.6	-9.78	-0.12	2.50

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
578.0	6225.387	81.329	2021.483	-2152.2	86.2	6699.6	-9.77	-0.11	2.52
580.0	6221.063	81.501	2034.887	-2171.7	85.9	6704.6	-9.75	-0.11	2.53
582.0	6216.700	81.673	2048.302	-2191.2	85.7	6709.7	-9.76	-0.10	2.53
584.0	6212.298	81.844	2061.726	-2210.8	85.5	6714.8	-9.79	-0.09	2.52
586.0	6207.857	82.015	2075.161	-2230.4	85.3	6719.8	-9.81	-0.07	2.51
588.0	6203.376	82.186	2088.606	-2250.1	85.2	6724.8	-9.84	-0.06	2.50
590.0	6198.856	82.356	2102.060	-2269.8	85.1	6729.8	-9.87	-0.06	2.49
592.0	6194.297	82.526	2115.525	-2289.6	85.0	6734.8	-9.90	-0.05	2.48
594.0	6189.698	82.696	2128.999	-2309.4	84.8	6739.8	-9.92	-0.05	2.48
596.0	6185.059	82.865	2142.484	-2329.3	84.7	6744.7	-9.94	-0.05	2.47
598.0	6180.381	83.034	2155.978	-2349.2	84.6	6749.7	-9.95	-0.05	2.46
600.0	6175.662	83.204	2169.483	-2369.2	84.5	6754.6	-9.96	-0.04	2.44
602.0	6170.904	83.372	2182.997	-2389.1	84.4	6759.4	-9.97	-0.04	2.43
604.0	6166.106	83.541	2196.520	-2409.1	84.3	6764.3	-9.99	-0.04	2.43
606.0	6161.267	83.710	2210.054	-2429.1	84.2	6769.2	-10.00	-0.04	2.43
608.0	6156.389	83.878	2223.597	-2449.2	84.1	6774.0	-10.01	-0.03	2.42
610.0	6151.471	84.046	2237.150	-2469.2	84.1	6778.9	-10.02	-0.03	2.41
612.0	6146.512	84.214	2250.712	-2489.3	84.0	6783.7	-10.04	-0.03	2.39
614.0	6141.514	84.382	2264.284	-2509.4	83.9	6788.4	-10.05	-0.04	2.37
616.0	6136.475	84.550	2277.866	-2529.5	83.8	6793.2	-10.06	-0.04	2.36
618.0	6131.395	84.717	2291.457	-2549.7	83.7	6797.9	-10.06	-0.05	2.36
620.0	6126.276	84.885	2305.058	-2569.8	83.6	6802.6	-10.08	-0.05	2.35
622.0	6121.116	85.052	2318.668	-2590.0	83.5	6807.4	-10.08	-0.04	2.36
624.0	6115.916	85.219	2332.287	-2610.2	83.4	6812.1	-10.09	-0.04	2.36
626.0	6110.675	85.385	2345.916	-2630.4	83.3	6816.8	-10.10	-0.04	2.35
628.0	6105.394	85.552	2359.554	-2650.7	83.2	6821.5	-10.12	-0.04	2.33
630.0	6100.072	85.718	2373.202	-2671.0	83.1	6826.2	-10.15	-0.04	2.32
632.0	6094.710	85.884	2386.859	-2691.3	83.1	6830.8	-10.16	-0.04	2.31
634.0	6089.307	86.050	2400.525	-2711.7	83.0	6835.4	-10.17	-0.04	2.30
636.0	6083.863	86.216	2414.201	-2732.0	82.9	6840.0	-10.17	-0.04	2.30
638.0	6078.379	86.382	2427.885	-2752.4	82.8	6844.6	-10.17	-0.04	2.29
640.0	6072.854	86.547	2441.579	-2772.8	82.7	6849.2	-10.18	-0.04	2.29
642.0	6067.288	86.712	2455.282	-2793.2	82.6	6853.8	-10.19	-0.05	2.28
644.0	6061.681	86.877	2468.994	-2813.6	82.5	6858.4	-10.21	-0.05	2.27
646.0	6056.033	87.042	2482.716	-2834.1	82.3	6862.9	-10.22	-0.05	2.27
648.0	6050.345	87.207	2496.446	-2854.6	82.2	6867.5	-10.24	-0.05	2.27
650.0	6044.615	87.371	2510.186	-2875.1	82.1	6872.0	-10.25	-0.05	2.27
652.0	6038.844	87.535	2523.934	-2895.6	82.0	6876.6	-10.27	-0.05	2.26
654.0	6033.032	87.699	2537.692	-2916.2	81.9	6881.1	-10.27	-0.05	2.24
656.0	6027.179	87.863	2551.458	-2936.8	81.8	6885.6	-10.28	-0.06	2.23
658.0	6021.285	88.026	2565.234	-2957.3	81.6	6890.0	-10.28	-0.06	2.23
660.0	6015.350	88.189	2579.019	-2977.9	81.5	6894.5	-10.29	-0.07	2.23
662.0	6009.374	88.352	2592.812	-2998.5	81.4	6898.9	-10.30	-0.06	2.22

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	6003.356	88.515	2606.614	-3019.2	81.2	6903.4	-10.31	-0.06	2.21
666.0	5997.297	88.677	2620.426	-3039.9	81.1	6907.8	-10.33	-0.06	2.20
668.0	5991.196	88.839	2634.246	-3060.5	81.0	6912.2	-10.33	-0.06	2.19
670.0	5985.055	89.001	2648.074	-3081.2	80.8	6916.6	-10.34	-0.06	2.19
672.0	5978.871	89.163	2661.912	-3101.9	80.7	6921.0	-10.34	-0.06	2.18
674.0	5972.647	89.324	2675.758	-3122.7	80.5	6925.4	-10.36	-0.07	2.18
676.0	5966.381	89.485	2689.613	-3143.5	80.4	6929.7	-10.40	-0.07	2.16
678.0	5960.073	89.645	2703.477	-3164.3	80.3	6934.0	-10.45	-0.06	2.14
680.0	5953.723	89.806	2717.349	-3185.3	80.1	6938.3	-10.47	-0.07	2.14
682.0	5947.332	89.966	2731.230	-3206.2	80.0	6942.6	-10.45	-0.07	2.14
684.0	5940.899	90.126	2745.120	-3227.1	79.8	6946.9	-10.42	-0.07	2.14
686.0	5934.423	90.285	2759.018	-3248.0	79.7	6951.1	-10.41	-0.08	2.13
688.0	5927.907	90.444	2772.924	-3268.9	79.5	6955.4	-10.42	-0.08	2.12
690.0	5921.348	90.603	2786.839	-3289.7	79.3	6959.6	-10.43	-0.07	2.12
692.0	5914.748	90.762	2800.763	-3310.6	79.2	6963.9	-10.43	-0.07	2.12
694.0	5908.106	90.920	2814.695	-3331.5	79.0	6968.1	-10.42	-0.07	2.13
696.0	5901.422	91.078	2828.635	-3352.3	78.9	6972.4	-10.41	-0.07	2.13
698.0	5894.696	91.235	2842.585	-3373.2	78.7	6976.7	-10.40	-0.07	2.13
700.0	5887.929	91.393	2856.542	-3394.0	78.6	6980.9	-10.39	-0.09	2.13
702.0	5881.120	91.550	2870.508	-3414.8	78.4	6985.2	-10.39	-0.09	2.14
704.0	5874.270	91.706	2884.483	-3435.6	78.3	6989.5	-10.38	-0.10	2.14
706.0	5867.378	91.863	2898.466	-3456.4	78.1	6993.8	-10.37	-0.15	2.14
S-IVB FIRST GUIDANCE CUTOFF									
706.21	5866.651	91.879	2899.935	-3458.3	78.1	6994.2	-10.37	-0.20	2.14
708.0	5860.447	92.019	2912.449	-3474.0	77.9	6988.4	-8.32	-0.09	-4.16
710.0	5853.482	92.174	2926.417	-3490.7	77.7	6980.0	-8.31	-0.11	-4.17
712.0	5846.484	92.329	2940.369	-3507.4	77.4	6971.7	-8.30	-0.11	-4.19
714.0	5839.453	92.484	2954.304	-3524.0	77.2	6963.3	-8.29	-0.11	-4.21
716.0	5832.388	92.638	2968.222	-3540.6	76.9	6954.9	-8.28	-0.11	-4.23
PARKING ORBIT INSERTION									
716.21	5831.644	92.654	2969.683	-3542.4	76.9	6954.1	-8.28	-0.11	-4.23

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											
-16.963	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-16.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-15.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-14.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-13.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-12.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-11.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-10.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-9.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-8.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-7.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-6.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-5.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-4.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-3.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-2.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
-1.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
0.0	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	112
ALL HOLDDOWN ARMS RELEASED											
0.3	6373.407	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.00	408.6	0	112
LIFTOFF - START OF TIME BASE 1											
0.6	6373.407	-80.6041	28.4470	247.35	89.13	0.3	90.00	0.05	408.6	0	112
1.0	6373.407	-80.6041	28.4470	268.62	89.42	0.9	90.00	0.13	408.6	0	112
2.0	6373.409	-80.6041	28.4470	292.36	89.61	3.0	90.00	0.43	408.6	0	114
3.0	6373.413	-80.6041	28.4470	184.70	89.48	5.3	90.01	0.74	408.7	0	118
4.0	6373.420	-80.6041	28.4470	165.91	88.29	7.5	90.03	1.05	408.8	0	124
5.0	6373.429	-80.6041	28.4470	162.76	87.20	9.8	90.06	1.38	408.9	0	133
6.0	6373.440	-80.6041	28.4470	161.19	86.77	12.2	90.09	1.71	409.0	0	144
7.0	6373.453	-80.6041	28.4469	159.83	86.70	14.7	90.11	2.05	409.2	1	158
8.0	6373.469	-80.6041	28.4469	158.66	86.60	17.1	90.13	2.40	409.4	2	173
9.0	6373.487	-80.6041	28.4469	158.01	86.18	19.7	90.17	2.75	409.6	3	192
10.0	6373.508	-80.6041	28.4469	157.54	85.78	22.3	90.21	3.11	409.9	5	213
11.0	6373.532	-80.6041	28.4469	156.94	85.53	25.0	90.25	3.48	410.2	7	236
12.0	6373.558	-80.6041	28.4469	155.97	85.75	27.7	90.26	3.86	410.4	9	263
13.0	6373.587	-80.6041	28.4469	154.42	86.15	30.5	90.26	4.24	410.7	11	292
14.0	6373.619	-80.6041	28.4469	151.17	86.46	33.3	90.25	4.63	411.0	13	323

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	6373.653	-80.6041	28.4468	147.74	86.67	36.1	90.25	5.03	411.4	15	358
16.0	6373.691	-80.6041	28.4468	143.99	86.87	39.0	90.24	5.43	411.8	17	395
17.0	6373.731	-80.6040	28.4468	139.55	87.08	42.0	90.23	5.84	412.2	19	436
18.0	6373.775	-80.6040	28.4468	134.27	87.29	45.0	90.21	6.25	412.6	21	479
19.0	6373.821	-80.6040	28.4468	127.44	87.44	48.1	90.18	6.68	413.2	23	526
20.0	6373.871	-80.6040	28.4468	119.14	87.48	51.3	90.15	7.11	413.8	25	575
21.0	6373.924	-80.6040	28.4468	110.98	87.41	54.5	90.12	7.55	414.6	27	628
22.0	6373.980	-80.6039	28.4468	103.46	87.25	57.8	90.09	7.99	415.4	29	684
23.0	6374.039	-80.6039	28.4467	97.13	87.01	61.2	90.06	8.44	416.4	31	744
24.0	6374.102	-80.6039	28.4467	92.05	86.69	64.7	90.02	8.90	417.4	34	807
25.0	6374.168	-80.6038	28.4467	87.97	86.33	68.2	89.98	9.36	418.6	37	873
26.0	6374.238	-80.6038	28.4468	84.72	85.91	71.9	89.93	9.83	420.0	41	943
27.0	6374.312	-80.6037	28.4468	82.10	85.45	75.6	89.89	10.30	421.4	45	1016
28.0	6374.389	-80.6037	28.4468	80.02	84.96	79.4	89.83	10.78	423.0	50	1094
29.0	6374.470	-80.6036	28.4468	78.38	84.44	83.3	89.78	11.26	424.8	56	1175
30.0	6374.555	-80.6035	28.4468	77.10	83.90	87.3	89.72	11.74	426.7	64	1260
31.0	6374.644	-80.6034	28.4468	76.09	83.35	91.4	89.65	12.23	428.7	72	1348
32.0	6374.737	-80.6033	28.4468	75.29	82.78	95.6	89.58	12.71	430.9	82	1441
33.0	6374.834	-80.6032	28.4469	74.67	82.20	99.9	89.51	13.20	433.3	94	1538
34.0	6374.935	-80.6030	28.4469	74.19	81.61	104.3	89.44	13.69	435.8	108	1639
35.0	6375.040	-80.6029	28.4469	73.85	81.01	108.8	89.36	14.18	438.5	123	1744
36.0	6375.149	-80.6027	28.4470	73.60	80.41	113.3	89.28	14.67	441.3	140	1854
37.0	6375.263	-80.6025	28.4470	73.40	79.80	118.0	89.20	15.16	444.3	160	1968
38.0	6375.382	-80.6023	28.4471	73.23	79.18	122.8	89.12	15.64	447.5	181	2086
39.0	6375.505	-80.6021	28.4472	73.07	78.57	127.7	89.02	16.13	450.8	205	2209
40.0	6375.632	-80.6018	28.4472	72.92	77.95	132.8	88.93	16.61	454.3	231	2337
41.0	6375.764	-80.6015	28.4473	72.77	77.32	137.9	88.83	17.09	458.0	259	2469
42.0	6375.901	-80.6012	28.4474	72.62	76.70	143.2	88.72	17.56	461.9	291	2606
43.0	6376.043	-80.6009	28.4475	72.47	76.06	148.6	88.61	18.03	465.9	325	2748
44.0	6376.190	-80.6005	28.4476	72.33	75.42	154.1	88.49	18.49	470.2	362	2895
45.0	6376.341	-80.6001	28.4477	72.20	74.77	159.8	88.36	18.95	474.7	402	3046
46.0	6376.498	-80.5997	28.4478	72.10	74.11	165.6	88.23	19.40	479.4	445	3203
47.0	6376.660	-80.5992	28.4479	72.02	73.44	171.5	88.10	19.84	484.3	492	3365
48.0	6376.827	-80.5987	28.4481	71.94	72.77	177.6	87.96	20.27	489.5	542	3532
49.0	6376.999	-80.5982	28.4482	71.86	72.09	183.8	87.82	20.70	494.9	597	3704
50.0	6377.177	-80.5976	28.4484	71.76	71.42	190.2	87.67	21.12	500.5	655	3882
51.0	6377.360	-80.5970	28.4486	71.65	70.75	196.8	87.51	21.53	506.2	718	4065
52.0	6377.548	-80.5964	28.4488	71.51	70.08	203.5	87.35	21.93	512.2	785	4254
53.0	6377.743	-80.5957	28.4490	71.36	69.42	210.3	87.18	22.32	518.4	856	4448
54.0	6377.942	-80.5949	28.4492	71.20	68.76	217.3	87.00	22.71	524.8	932	4648
55.0	6378.148	-80.5942	28.4494	71.03	68.11	224.5	86.81	23.08	531.4	1013	4853
56.0	6378.359	-80.5933	28.4497	70.88	67.47	231.8	86.62	23.45	538.2	1099	5064
57.0	6378.576	-80.5924	28.4500	70.74	66.83	239.3	86.43	23.80	545.2	1191	5282

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	6378.799	-80.5915	28.4502	70.62	66.20	247.0	86.24	24.14	552.4	1287	5505
59.0	6379.028	-80.5905	28.4505	70.53	65.57	254.8	86.05	24.48	559.9	1390	5734
60.0	6379.263	-80.5895	28.4509	70.46	64.94	262.8	85.86	24.80	567.6	1498	5969
61.0	6379.504	-80.5884	28.4512	70.41	64.32	271.0	85.67	25.11	575.5	1612	6210
62.0	6379.751	-80.5872	28.4516	70.38	63.70	279.3	85.48	25.41	583.7	1732	6457
63.0	6380.005	-80.5860	28.4520	70.38	63.09	287.8	85.30	25.69	592.1	1859	6711
64.0	6380.265	-80.5847	28.4524	70.39	62.47	296.5	85.12	25.96	600.7	1992	6971
65.0	6380.531	-80.5834	28.4528	70.42	61.86	305.3	84.94	26.21	609.6	2132	7237
66.0	6380.803	-80.5819	28.4532	70.47	61.26	314.3	84.77	26.45	618.6	2280	7510
67.0	6381.082	-80.5804	28.4537	70.53	60.65	323.4	84.60	26.68	627.9	2434	7789
	MACH 1										
67.5	6381.224	-80.5797	28.4539	70.56	60.36	328.1	84.51	26.79	632.6	2514	7931
68.0	6381.367	-80.5789	28.4542	70.60	60.06	332.7	84.43	26.90	637.4	2596	8074
69.0	6381.659	-80.5772	28.4547	70.67	59.47	342.2	84.27	27.10	647.1	2766	8366
70.0	6381.957	-80.5755	28.4552	70.74	58.88	351.9	84.10	27.29	657.0	2944	8664
71.0	6382.261	-80.5737	28.4558	70.82	58.31	361.7	83.95	27.47	667.2	3129	8969
72.0	6382.572	-80.5719	28.4563	70.89	57.74	371.7	83.79	27.64	677.5	3323	9280
73.0	6382.890	-80.5699	28.4569	70.96	57.18	382.0	83.63	27.81	688.1	3526	9598
74.0	6383.214	-80.5679	28.4576	71.02	56.63	392.4	83.47	27.96	699.0	3737	9922
75.0	6383.545	-80.5657	28.4582	71.08	56.09	403.1	83.31	28.11	710.0	3957	10253
76.0	6383.883	-80.5635	28.4589	71.13	55.55	414.0	83.15	28.25	721.3	4186	10592
77.0	6384.228	-80.5612	28.4596	71.17	55.02	425.1	82.99	28.38	732.8	4424	10937
78.0	6384.580	-80.5588	28.4603	71.21	54.50	436.5	82.83	28.50	744.6	4672	11289
79.0	6384.939	-80.5563	28.4610	71.25	53.97	448.1	82.68	28.61	756.7	4930	11648
80.0	6385.305	-80.5537	28.4618	71.30	53.45	459.9	82.52	28.71	769.1	5199	12014
81.0	6385.678	-80.5510	28.4626	71.34	52.93	472.0	82.37	28.80	781.7	5477	12387
82.0	6386.058	-80.5482	28.4634	71.40	52.42	484.4	82.22	28.89	794.6	5767	12768
83.0	6386.446	-80.5453	28.4643	71.45	51.91	496.9	82.07	28.96	807.8	6067	13156
84.0	6386.840	-80.5423	28.4652	71.50	51.40	509.8	81.92	29.02	821.3	6379	13551
85.0	6387.242	-80.5391	28.4661	71.56	50.90	522.9	81.78	29.08	835.1	6702	13953
	MAXIMUM DYNAMIC PRESSURE										
86.0	6387.652	-80.5359	28.4670	71.61	50.39	536.3	81.64	29.12	849.1	7037	14363
87.0	6388.069	-80.5325	28.4680	71.66	49.88	550.0	81.50	29.15	863.5	7384	14780
88.0	6388.493	-80.5290	28.4690	71.71	49.36	563.9	81.36	29.16	878.2	7744	15205
89.0	6388.925	-80.5254	28.4701	71.76	48.84	578.1	81.22	29.16	893.3	8117	15636
90.0	6389.363	-80.5217	28.4712	71.81	48.30	592.6	81.08	29.14	908.7	8503	16076
91.0	6389.810	-80.5178	28.4723	71.86	47.76	607.4	80.94	29.11	924.5	8904	16522
92.0	6390.263	-80.5137	28.4735	71.90	47.21	622.5	80.81	29.06	940.6	9318	16976
93.0	6390.723	-80.5096	28.4747	71.94	46.66	638.0	80.67	29.00	957.0	9747	17437

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
94.0	6391.191	-80.5052	28.4759	71.98	46.11	653.7	80.53	28.93	973.7	10192	17905
95.0	6391.665	-80.5008	28.4772	72.01	45.55	669.7	80.39	28.85	990.8	10651	18380
96.0	6392.147	-80.4961	28.4785	72.02	45.00	686.0	80.25	28.76	1008.2	11127	18862
97.0	6392.636	-80.4914	28.4799	72.03	44.45	702.6	80.10	28.66	1025.9	11619	19350
98.0	6393.131	-80.4864	28.4813	72.04	43.90	719.5	79.96	28.55	1043.9	12127	19846
99.0	6393.633	-80.4813	28.4827	72.04	43.35	736.7	79.82	28.43	1062.2	12652	20349
100.0	6394.142	-80.4760	28.4842	72.04	42.82	754.2	79.67	28.31	1080.8	13195	20859
101.0	6394.659	-80.4706	28.4858	72.04	42.29	772.1	79.53	28.19	1099.8	13755	21375
102.0	6395.181	-80.4649	28.4874	72.04	41.77	790.3	79.39	28.06	1119.0	14334	21899
103.0	6395.711	-80.4591	28.4890	72.03	41.26	808.7	79.26	27.93	1138.5	14930	22429
104.0	6396.248	-80.4532	28.4907	72.03	40.75	827.6	79.12	27.80	1158.4	15545	22966
105.0	6396.792	-80.4470	28.4925	72.03	40.26	846.7	78.99	27.67	1178.5	16180	23511
106.0	6397.342	-80.4406	28.4943	72.03	39.78	866.1	78.87	27.53	1198.9	16833	24062
107.0	6397.900	-80.4341	28.4962	72.03	39.31	885.9	78.74	27.39	1219.7	17506	24620
108.0	6398.465	-80.4273	28.4981	72.04	38.84	906.0	78.62	27.25	1240.7	18199	25186
109.0	6399.037	-80.4204	28.5001	72.04	38.38	926.4	78.50	27.11	1262.1	18912	25758
110.0	6399.615	-80.4133	28.5021	72.04	37.93	947.1	78.39	26.96	1283.8	19645	26337
111.0	6400.201	-80.4059	28.5042	72.05	37.48	968.1	78.28	26.82	1305.8	20400	26923
112.0	6400.793	-80.3984	28.5064	72.05	37.04	989.5	78.17	26.67	1328.1	21176	27517
113.0	6401.393	-80.3906	28.5086	72.06	36.61	1011.3	78.06	26.52	1350.7	21973	28117
114.0	6402.000	-80.3826	28.5108	72.07	36.19	1033.3	77.96	26.37	1373.7	22792	28724
115.0	6402.613	-80.3744	28.5132	72.08	35.78	1055.8	77.86	26.22	1397.0	23633	29339
116.0	6403.234	-80.3660	28.5155	72.09	35.38	1078.5	77.76	26.08	1420.6	24497	29960
117.0	6403.862	-80.3574	28.5180	72.09	35.00	1101.7	77.67	25.94	1444.6	25384	30589
118.0	6404.498	-80.3485	28.5205	72.10	34.62	1125.1	77.57	25.80	1468.8	26294	31226
119.0	6405.141	-80.3395	28.5231	72.11	34.26	1149.0	77.48	25.67	1493.4	27227	31869
120.0	6405.792	-80.3301	28.5257	72.12	33.90	1173.2	77.40	25.53	1518.4	28184	32521
121.0	6406.450	-80.3206	28.5284	72.13	33.55	1197.7	77.31	25.40	1543.6	29164	33180
122.0	6407.116	-80.3108	28.5312	72.14	33.21	1222.7	77.23	25.26	1569.3	30170	33847
123.0	6407.789	-80.3008	28.5341	72.15	32.87	1248.0	77.15	25.12	1595.3	31200	34521
124.0	6408.470	-80.2905	28.5370	72.16	32.53	1273.6	77.07	24.98	1621.7	32255	35203
125.0	6409.159	-80.2800	28.5399	72.17	32.20	1299.7	76.99	24.84	1648.5	33336	35893
126.0	6409.856	-80.2692	28.5430	72.18	31.88	1326.2	76.92	24.70	1675.7	34442	36590
127.0	6410.560	-80.2581	28.5461	72.19	31.56	1353.1	76.84	24.57	1703.3	35575	37295
128.0	6411.272	-80.2468	28.5493	72.20	31.24	1380.4	76.77	24.43	1731.2	36735	38008
129.0	6411.992	-80.2353	28.5525	72.21	30.93	1408.1	76.70	24.29	1759.6	37922	38729
130.0	6412.719	-80.2234	28.5559	72.22	30.63	1436.3	76.63	24.15	1788.4	39136	39458
131.0	6413.455	-80.2113	28.5593	72.23	30.33	1464.8	76.56	24.02	1817.6	40378	40195
132.0	6414.199	-80.1989	28.5628	72.24	30.04	1493.9	76.49	23.88	1847.2	41649	40940
133.0	6414.951	-80.1863	28.5663	72.24	29.75	1523.4	76.42	23.75	1877.3	42948	41693
134.0	6415.711	-80.1733	28.5700	72.25	29.47	1553.3	76.36	23.61	1907.9	44277	42455
135.0	6416.480	-80.1601	28.5737	72.26	29.19	1583.7	76.30	23.48	1938.9	45635	43224
136.0	6417.257	-80.1466	28.5775	72.27	28.92	1614.6	76.24	23.35	1970.3	47023	44002

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
137.0	6418.042	-80.1327	28.5814	72.28	28.65	1645.9	76.18	23.22	2002.2	48442	44788
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
137.85	6418.716	-80.1207	28.5847	72.28	28.43	1672.8	76.12	23.10	2029.6	49672	45463
138.0	6418.835	-80.1186	28.5853	72.28	28.39	1677.5	76.12	23.08	2034.3	49891	45583
139.0	6419.635	-80.1042	28.5894	72.29	28.12	1703.3	76.07	22.93	2060.7	51368	46384
140.0	6420.441	-80.0895	28.5935	72.30	27.88	1728.1	76.03	22.79	2086.1	52872	47191
141.0	6421.252	-80.0746	28.5977	72.31	27.63	1753.3	75.99	22.65	2111.9	54401	48004
142.0	6422.068	-80.0594	28.6019	72.32	27.39	1778.9	75.95	22.51	2137.9	55955	48821
143.0	6422.889	-80.0440	28.6062	72.33	27.16	1804.7	75.91	22.37	2164.4	57536	49643
144.0	6423.715	-80.0283	28.6106	72.35	26.92	1831.0	75.87	22.23	2191.1	59142	50471
145.0	6424.546	-80.0124	28.6151	72.36	26.69	1857.5	75.83	22.09	2218.2	60775	51304
146.0	6425.383	-79.9962	28.6196	72.37	26.46	1884.4	75.80	21.95	2245.6	62434	52142
147.0	6426.225	-79.9797	28.6242	72.38	26.23	1911.7	75.76	21.82	2273.4	64121	52986
148.0	6427.073	-79.9630	28.6288	72.40	26.00	1939.4	75.73	21.68	2301.6	65836	53835
149.0	6427.926	-79.9460	28.6336	72.41	25.78	1967.4	75.70	21.55	2330.1	67578	54689
150.0	6428.784	-79.9287	28.6384	72.42	25.57	1995.8	75.66	21.41	2359.0	69348	55549
151.0	6429.648	-79.9111	28.6433	72.43	25.35	2024.4	75.63	21.28	2388.1	71147	56415
152.0	6430.518	-79.8933	28.6482	72.44	25.14	2053.6	75.60	21.15	2417.8	72975	57286
153.0	6431.393	-79.8752	28.6533	72.46	24.93	2083.3	75.57	21.02	2447.9	74832	58163
154.0	6432.274	-79.8567	28.6584	72.47	24.72	2113.4	75.54	20.89	2478.4	76719	59045
155.0	6433.161	-79.8380	28.6636	72.48	24.52	2144.0	75.51	20.76	2509.5	78637	59934
156.0	6434.054	-79.8190	28.6688	72.50	24.31	2175.0	75.48	20.64	2540.9	80584	60828
157.0	6434.952	-79.7996	28.6742	72.51	24.11	2206.4	75.45	20.51	2572.8	82563	61728
158.0	6435.857	-79.7800	28.6796	72.52	23.91	2238.3	75.43	20.38	2605.2	84574	62634
159.0	6436.767	-79.7600	28.6851	72.54	23.72	2270.8	75.40	20.26	2638.1	86616	63546
160.0	6437.683	-79.7397	28.6907	72.55	23.52	2303.7	75.37	20.13	2671.3	88691	64464
161.0	6438.606	-79.7191	28.6964	72.56	23.33	2336.9	75.35	20.01	2705.0	90798	65389
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
161.78	6439.329	-79.7028	28.7009	72.58	23.19	2363.1	75.33	19.91	2731.5	92464	66113
162.0	6439.533	-79.6982	28.7021	72.58	23.14	2368.4	75.32	19.88	2736.9	92936	66318
163.0	6440.459	-79.6771	28.7079	72.59	22.96	2369.4	75.33	19.72	2738.4	95089	67246
S-IC/S-II SEPARATION COMMAND											
163.5	6440.921	-79.6666	28.7109	72.60	22.86	2367.6	75.34	19.64	2736.9	96172	67709
164.0	6441.380	-79.6560	28.7138	72.61	22.77	2365.9	75.34	19.56	2735.4	97252	68169
166.0	6443.195	-79.6138	28.7253	72.63	22.40	2359.2	75.37	19.23	2729.6	101567	69987
168.0	6444.977	-79.5715	28.7369	72.66	22.02	2359.5	75.39	18.90	2731.0	105886	71773
170.0	6446.734	-79.5291	28.7485	72.69	21.65	2365.0	75.40	18.59	2737.3	110221	73534

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	6448.468	-79.4864	28.7602	72.72	21.29	2372.3	75.41	18.28	2745.5	114579	75271
174.0	6450.180	-79.4435	28.7719	72.75	20.93	2380.4	75.42	17.99	2754.5	118961	76987
176.0	6451.870	-79.4003	28.7836	72.78	20.58	2389.1	75.43	17.69	2764.0	123367	78681
178.0	6453.539	-79.3569	28.7954	72.80	20.23	2397.9	75.44	17.39	2773.6	127798	80353
180.0	6455.186	-79.3132	28.8072	72.83	19.88	2406.9	75.46	17.10	2783.4	132255	82004
182.0	6456.813	-79.2693	28.8191	72.86	19.53	2416.0	75.47	16.81	2793.3	136737	83634
184.0	6458.418	-79.2251	28.8310	72.89	19.19	2425.4	75.48	16.53	2803.4	141244	85243
186.0	6460.002	-79.1806	28.8430	72.92	18.86	2434.9	75.49	16.24	2813.7	145778	86832
188.0	6461.566	-79.1359	28.8551	72.95	18.53	2444.6	75.51	15.96	2824.1	150337	88399
190.0	6463.109	-79.0909	28.8671	72.98	18.20	2454.5	75.52	15.69	2834.7	154923	89946
192.0	6464.632	-79.0456	28.8793	73.01	17.87	2464.5	75.53	15.42	2845.4	159534	91473
194.0	6466.135	-79.0001	28.8914	73.04	17.55	2474.8	75.55	15.15	2856.3	164172	92979
196.0	6467.617	-78.9542	28.9036	73.07	17.23	2485.2	75.56	14.88	2867.3	168837	94466
198.0	6469.080	-78.9081	28.9159	73.10	16.92	2495.7	75.57	14.62	2878.5	173528	95932
200.0	6470.523	-78.8618	28.9282	73.13	16.61	2506.5	75.59	14.36	2889.9	178246	97379
202.0	6471.946	-78.8151	28.9406	73.16	16.31	2517.5	75.60	14.10	2901.5	182991	98807
204.0	6473.350	-78.7682	28.9530	73.19	16.01	2528.6	75.61	13.85	2913.2	187763	100215
206.0	6474.735	-78.7210	28.9655	73.23	15.71	2539.9	75.63	13.60	2925.0	192563	101603
208.0	6476.102	-78.6735	28.9780	73.26	15.43	2551.2	75.64	13.36	2936.9	197390	102974
210.0	6477.450	-78.6257	28.9906	73.29	15.15	2562.7	75.66	13.13	2948.8	202243	104326
212.0	6478.781	-78.5776	29.0032	73.31	14.88	2574.2	75.67	12.90	2960.8	207124	105661
214.0	6480.095	-78.5293	29.0158	73.34	14.62	2585.8	75.68	12.68	2972.9	212032	106979
216.0	6481.392	-78.4807	29.0285	73.37	14.37	2597.6	75.70	12.47	2985.2	216967	108280
218.0	6482.673	-78.4318	29.0413	73.40	14.11	2609.5	75.71	12.26	2997.5	221930	109565
220.0	6483.937	-78.3826	29.0541	73.43	13.86	2621.6	75.73	12.04	3010.0	226919	110833
222.0	6485.185	-78.3332	29.0669	73.46	13.61	2633.8	75.74	11.83	3022.6	231937	112085
224.0	6486.417	-78.2834	29.0798	73.49	13.37	2646.1	75.76	11.63	3035.4	236982	113321
226.0	6487.632	-78.2334	29.0928	73.52	13.12	2658.6	75.77	11.42	3048.3	242055	114541
228.0	6488.831	-78.1830	29.1058	73.55	12.88	2671.3	75.79	11.22	3061.3	247156	115744
230.0	6490.014	-78.1324	29.1188	73.59	12.64	2684.1	75.80	11.02	3074.5	252285	116931
232.0	6491.181	-78.0815	29.1319	73.62	12.41	2697.0	75.82	10.82	3087.8	257443	118102
234.0	6492.332	-78.0303	29.1450	73.65	12.17	2710.0	75.84	10.62	3101.2	262629	119257
236.0	6493.467	-77.9787	29.1582	73.68	11.94	2723.2	75.85	10.42	3114.7	267844	120397
238.0	6494.587	-77.9269	29.1715	73.71	11.72	2736.5	75.87	10.23	3128.4	273088	121520
240.0	6495.690	-77.8748	29.1848	73.74	11.49	2750.0	75.89	10.04	3142.2	278362	122628
242.0	6496.778	-77.8224	29.1981	73.78	11.27	2763.6	75.90	9.85	3156.1	283664	123720
244.0	6497.851	-77.7696	29.2115	73.81	11.05	2777.3	75.92	9.67	3170.2	288997	124797
246.0	6498.908	-77.7166	29.2249	73.84	10.83	2791.2	75.94	9.48	3184.3	294358	125858
248.0	6499.949	-77.6632	29.2384	73.87	10.62	2805.2	75.96	9.30	3198.7	299750	126904
250.0	6500.976	-77.6096	29.2519	73.91	10.41	2819.4	75.98	9.12	3213.1	305172	127935
252.0	6501.987	-77.5556	29.2655	73.94	10.20	2833.7	76.00	8.94	3227.7	310624	128950
254.0	6502.983	-77.5013	29.2791	73.97	9.99	2848.1	76.01	8.77	3242.3	316106	129950
256.0	6503.964	-77.4467	29.2928	74.01	9.79	2862.6	76.03	8.59	3257.2	321619	130936

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	SF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
258.0	6504.930	-77.3917	29.3065	74.04	9.59	2877.3	76.05	8.42	3272.1	327163	131906
260.0	6505.881	-77.3364	29.3203	74.07	9.39	2892.2	76.07	8.25	3287.2	332737	132862
262.0	6506.817	-77.2808	29.3341	74.11	9.20	2907.1	76.09	8.09	3302.4	338343	133803
264.0	6507.739	-77.2249	29.3479	74.14	9.00	2922.2	76.11	7.92	3317.7	343980	134729
266.0	6508.646	-77.1687	29.3619	74.18	8.81	2937.5	76.13	7.76	3333.2	349649	135641
268.0	6509.539	-77.1121	29.3758	74.21	8.62	2952.9	76.15	7.60	3348.8	355350	136538
270.0	6510.417	-77.0552	29.3898	74.24	8.44	2968.4	76.17	7.44	3364.5	361082	137421
272.0	6511.281	-76.9979	29.4039	74.28	8.26	2984.0	76.19	7.28	3380.4	366847	138289
274.0	6512.131	-76.9403	29.4180	74.31	8.07	2999.8	76.22	7.13	3396.4	372643	139144
276.0	6512.967	-76.8824	29.4321	74.35	7.90	3015.7	76.24	6.97	3412.5	378473	139984
278.0	6513.789	-76.8241	29.4463	74.39	7.72	3031.8	76.26	6.82	3428.8	384335	140810
280.0	6514.596	-76.7655	29.4606	74.42	7.55	3048.0	76.28	6.67	3445.1	390230	141622
282.0	6515.390	-76.7065	29.4749	74.46	7.38	3064.3	76.30	6.53	3461.7	396158	142421
284.0	6516.170	-76.6472	29.4892	74.49	7.21	3080.8	76.33	6.38	3478.3	402120	143205
286.0	6516.937	-76.5875	29.5036	74.53	7.04	3097.4	76.35	6.24	3495.1	408115	143976
288.0	6517.690	-76.5275	29.5181	74.57	6.88	3114.2	76.37	6.10	3512.0	414145	144734
290.0	6518.429	-76.4671	29.5326	74.60	6.72	3131.0	76.40	5.96	3529.1	420208	145478
292.0	6519.155	-76.4063	29.5471	74.64	6.56	3148.1	76.42	5.82	3546.2	426305	146209
294.0	6519.868	-76.3452	29.5617	74.68	6.40	3165.2	76.44	5.69	3563.6	432437	146926
296.0	6520.567	-76.2837	29.5763	74.71	6.25	3182.6	76.47	5.55	3581.0	438603	147630
298.0	6521.253	-76.2219	29.5910	74.75	6.10	3200.0	76.49	5.42	3598.6	444805	148321
300.0	6521.927	-76.1597	29.6057	74.79	5.95	3217.6	76.52	5.29	3616.3	451042	148999
302.0	6522.587	-76.0971	29.6205	74.83	5.80	3235.3	76.54	5.16	3634.2	457314	149665
304.0	6523.235	-76.0341	29.6353	74.87	5.66	3253.2	76.57	5.04	3652.2	463621	150317
306.0	6523.870	-75.9707	29.6502	74.90	5.51	3271.2	76.59	4.91	3670.3	469964	150957
308.0	6524.492	-75.9070	29.6651	74.94	5.37	3289.3	76.62	4.79	3688.6	476344	151584
310.0	6525.102	-75.8429	29.6801	74.98	5.24	3307.6	76.64	4.67	3707.0	482760	152199
312.0	6525.700	-75.7784	29.6951	75.02	5.10	3326.1	76.67	4.55	3725.5	489212	152801
314.0	6526.285	-75.7135	29.7102	75.06	4.97	3344.7	76.70	4.44	3744.2	495701	153391
316.0	6526.858	-75.6482	29.7253	75.10	4.83	3363.4	76.72	4.32	3763.1	502227	153969
318.0	6527.419	-75.5826	29.7404	75.14	4.70	3382.3	76.75	4.21	3782.0	508790	154535
320.0	6527.968	-75.5165	29.7556	75.18	4.58	3401.3	76.78	4.10	3801.1	515391	155088
322.0	6528.505	-75.4500	29.7709	75.22	4.45	3420.5	76.80	3.98	3820.4	522030	155630
324.0	6529.030	-75.3831	29.7862	75.26	4.33	3439.8	76.83	3.88	3839.8	528706	156160
326.0	6529.543	-75.3158	29.8015	75.30	4.21	3459.3	76.86	3.77	3859.4	535421	156679
328.0	6530.045	-75.2481	29.8169	75.34	4.09	3478.9	76.89	3.67	3879.1	542175	157185
330.0	6530.535	-75.1800	29.8323	75.38	3.97	3498.6	76.92	3.56	3898.9	548967	157681
332.0	6531.014	-75.1115	29.8478	75.42	3.86	3518.5	76.95	3.46	3918.9	555799	158165
334.0	6531.482	-75.0426	29.8633	75.47	3.74	3538.6	76.98	3.36	3939.0	562669	158637
336.0	6531.938	-74.9732	29.8789	75.51	3.63	3558.8	77.01	3.27	3959.3	569580	159099
338.0	6532.384	-74.9034	29.8945	75.55	3.52	3579.2	77.04	3.17	3979.7	576530	159549
340.0	6532.818	-74.8332	29.9102	75.59	3.42	3599.7	77.07	3.07	4000.3	583520	159989
342.0	6533.242	-74.7626	29.9259	75.64	3.31	3620.4	77.10	2.98	4021.1	590551	160418

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	6533.655	-74.6915	29.9416	75.68	3.21	3641.2	77.13	2.89	4042.0	597622	160836
346.0	6534.057	-74.6200	29.9574	75.72	3.11	3662.2	77.16	2.80	4063.0	604735	161243
348.0	6534.449	-74.5480	29.9732	75.77	3.01	3683.4	77.19	2.71	4084.2	611889	161640
350.0	6534.831	-74.4756	29.9891	75.81	2.91	3704.7	77.22	2.63	4105.6	619084	162027
352.0	6535.202	-74.4028	30.0051	75.85	2.82	3726.1	77.25	2.54	4127.1	626321	162403
354.0	6535.563	-74.3295	30.0210	75.90	2.72	3747.7	77.29	2.46	4148.8	633600	162769
356.0	6535.914	-74.2557	30.0370	75.94	2.63	3769.5	77.32	2.38	4170.6	640922	163126
358.0	6536.255	-74.1815	30.0531	75.99	2.54	3791.5	77.35	2.30	4192.6	648286	163472
360.0	6536.586	-74.1069	30.0692	76.03	2.45	3813.6	77.39	2.22	4214.7	655694	163808
362.0	6536.908	-74.0317	30.0853	76.08	2.37	3835.9	77.42	2.14	4237.1	663145	164135
364.0	6537.220	-73.9561	30.1015	76.12	2.28	3858.3	77.45	2.07	4259.5	670639	164452
366.0	6537.522	-73.8801	30.1178	76.17	2.20	3880.9	77.49	1.99	4282.2	678178	164760
368.0	6537.815	-73.8035	30.1340	76.22	2.12	3903.7	77.52	1.92	4305.0	685760	165058
370.0	6538.099	-73.7265	30.1503	76.26	2.04	3926.7	77.56	1.85	4328.0	693388	165347
372.0	6538.374	-73.6490	30.1667	76.31	1.96	3949.8	77.59	1.78	4351.2	701060	165627
374.0	6538.639	-73.5710	30.1831	76.36	1.89	3973.1	77.63	1.71	4374.5	708777	165899
376.0	6538.896	-73.4925	30.1995	76.40	1.81	3996.6	77.67	1.65	4398.0	716540	166161
378.0	6539.145	-73.4135	30.2160	76.45	1.74	4020.2	77.70	1.58	4421.7	724349	166415
380.0	6539.384	-73.3341	30.2325	76.50	1.67	4044.0	77.74	1.52	4445.5	732204	166660
382.0	6539.616	-73.2541	30.2491	76.55	1.60	4068.0	77.77	1.46	4469.5	740106	166896
384.0	6539.839	-73.1736	30.2657	76.59	1.53	4092.2	77.81	1.40	4493.7	748055	167125
386.0	6540.054	-73.0926	30.2823	76.64	1.47	4116.6	77.85	1.34	4518.1	756051	167345
388.0	6540.260	-73.0111	30.2990	76.69	1.40	4141.1	77.89	1.28	4542.7	764094	167557
390.0	6540.460	-72.9291	30.3157	76.74	1.34	4165.8	77.93	1.22	4567.5	772186	167762
392.0	6540.651	-72.8466	30.3325	76.79	1.28	4190.8	77.96	1.17	4592.4	780325	167959
394.0	6540.835	-72.7635	30.3493	76.84	1.22	4215.9	78.00	1.12	4617.6	788514	168148
396.0	6541.011	-72.6800	30.3661	76.89	1.17	4241.2	78.04	1.06	4642.9	796751	168330
398.0	6541.180	-72.5958	30.3830	76.94	1.11	4266.7	78.08	1.01	4668.4	805038	168504
400.0	6541.342	-72.5112	30.3999	76.99	1.06	4292.4	78.12	0.97	4694.1	813375	168671
402.0	6541.496	-72.4260	30.4168	77.04	1.00	4318.3	78.16	0.92	4720.0	821762	168832
404.0	6541.644	-72.3402	30.4338	77.09	0.95	4344.3	78.20	0.87	4746.1	830199	168985
406.0	6541.786	-72.2539	30.4508	77.14	0.90	4370.6	78.24	0.83	4772.4	838688	169132
408.0	6541.920	-72.1671	30.4679	77.20	0.86	4397.1	78.28	0.78	4798.9	847227	169272
410.0	6542.048	-72.0797	30.4849	77.25	0.81	4423.8	78.32	0.74	4825.6	855819	169406
412.0	6542.171	-71.9917	30.5021	77.30	0.77	4450.7	78.37	0.70	4852.5	864462	169534
414.0	6542.287	-71.9032	30.5192	77.35	0.72	4477.8	78.41	0.66	4879.6	873159	169655
416.0	6542.397	-71.8140	30.5364	77.41	0.68	4505.2	78.45	0.63	4907.0	881908	169771
418.0	6542.501	-71.7243	30.5536	77.46	0.64	4532.7	78.49	0.59	4934.5	890710	169881
420.0	6542.599	-71.6341	30.5709	77.51	0.60	4560.4	78.54	0.55	4962.3	899566	169985
422.0	6542.693	-71.5432	30.5882	77.57	0.57	4588.4	78.58	0.52	4990.3	908476	170084
424.0	6542.781	-71.4518	30.6055	77.62	0.53	4616.6	78.63	0.49	5018.5	917441	170178
426.0	6542.863	-71.3597	30.6228	77.68	0.50	4645.0	78.67	0.46	5046.9	926461	170266
428.0	6542.941	-71.2670	30.6402	77.73	0.46	4673.7	78.72	0.43	5075.6	935537	170350

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	6543.015	-71.1738	30.6576	77.79	0.43	4702.6	78.76	0.40	5104.5	944668	170429
432.0	6543.083	-71.0799	30.6751	77.84	0.40	4731.7	78.81	0.37	5133.6	953856	170503
434.0	6543.148	-70.9854	30.6925	77.90	0.37	4761.0	78.85	0.35	5162.9	963101	170573
436.0	6543.208	-70.8903	30.7100	77.95	0.35	4790.6	78.90	0.32	5192.5	972403	170639
438.0	6543.264	-70.7945	30.7276	78.01	0.32	4820.5	78.95	0.30	5222.4	981763	170701
440.0	6543.316	-70.6981	30.7451	78.07	0.30	4850.6	78.99	0.28	5252.5	991182	170759
442.0	6543.365	-70.6011	30.7627	78.13	0.28	4880.9	79.04	0.25	5282.8	1000659	170813
444.0	6543.410	-70.5035	30.7803	78.18	0.25	4911.5	79.09	0.23	5313.4	1010195	170864
446.0	6543.452	-70.4051	30.7979	78.24	0.23	4942.3	79.14	0.22	5344.2	1019791	170912
448.0	6543.491	-70.3062	30.8155	78.30	0.22	4973.4	79.19	0.20	5375.3	1029447	170957
450.0	6543.527	-70.2065	30.8332	78.36	0.20	5004.7	79.24	0.18	5406.6	1039164	170999
452.0	6543.561	-70.1062	30.8509	78.42	0.18	5036.3	79.29	0.17	5438.2	1048942	171038
454.0	6543.592	-70.0052	30.8686	78.48	0.17	5068.2	79.34	0.16	5470.1	1058782	171075
456.0	6543.621	-69.9036	30.8864	78.54	0.16	5100.3	79.39	0.15	5502.3	1068684	171110
458.0	6543.648	-69.8012	30.9041	78.60	0.15	5132.8	79.44	0.13	5534.7	1078649	171143
460.0	6543.673	-69.6982	30.9219	78.66	0.14	5165.5	79.49	0.13	5567.4	1088678	171174
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
461.77	6543.694	-69.6064	30.9376	78.72	0.12	5193.5	79.54	0.12	5595.4	1097607	171200
462.0	6543.696	-69.5945	30.9397	78.72	0.12	5196.8	79.54	0.11	5598.8	1098770	171203
464.0	6543.717	-69.4901	30.9575	78.78	0.10	5225.0	79.59	0.09	5627.0	1108919	171230
466.0	6543.733	-69.3852	30.9753	78.84	0.08	5251.7	79.65	0.07	5653.7	1119121	171252
468.0	6543.745	-69.2796	30.9931	78.91	0.05	5278.6	79.70	0.05	5680.5	1129376	171270
470.0	6543.753	-69.1735	31.0109	78.97	0.04	5305.5	79.75	0.03	5707.5	1139683	171284
472.0	6543.759	-69.0668	31.0286	79.03	0.03	5332.5	79.81	0.02	5734.5	1150042	171295
474.0	6543.763	-68.9596	31.0464	79.09	0.02	5359.6	79.86	0.02	5761.6	1160454	171305
476.0	6543.768	-68.8517	31.0642	79.15	0.03	5386.7	79.92	0.03	5788.7	1170919	171316
478.0	6543.774	-68.7432	31.0819	79.22	0.03	5413.9	79.97	0.03	5815.9	1181436	171328
480.0	6543.781	-68.6342	31.0996	79.28	0.04	5441.3	80.03	0.04	5843.2	1192007	171341
482.0	6543.791	-68.5246	31.1173	79.34	0.05	5468.9	80.08	0.05	5870.8	1202631	171356
484.0	6543.802	-68.4143	31.1351	79.41	0.07	5496.7	80.14	0.06	5898.6	1213309	171374
486.0	6543.816	-68.3035	31.1527	79.47	0.08	5524.7	80.19	0.07	5926.7	1224041	171393
488.0	6543.832	-68.1920	31.1704	79.54	0.09	5553.0	80.25	0.08	5955.0	1234828	171415
490.0	6543.850	-68.0800	31.1881	79.60	0.10	5581.5	80.31	0.09	5983.5	1245671	171439
492.0	6543.871	-67.9673	31.2057	79.67	0.11	5610.3	80.37	0.10	6012.3	1256569	171466
494.0	6543.893	-67.8540	31.2233	79.73	0.12	5639.4	80.42	0.11	6041.3	1267523	171494
496.0	6543.917	-67.7400	31.2409	79.80	0.12	5666.2	80.48	0.12	6068.2	1278533	171524
498.0	6543.942	-67.6255	31.2584	79.87	0.12	5691.8	80.54	0.12	6093.8	1289593	171555
500.0	6543.967	-67.5105	31.2759	79.94	0.12	5717.5	80.60	0.12	6119.4	1300703	171585
502.0	6543.991	-67.3949	31.2934	80.01	0.12	5743.2	80.67	0.12	6145.2	1311862	171615
504.0	6544.016	-67.2787	31.3109	80.07	0.12	5769.0	80.73	0.11	6171.0	1323072	171646
506.0	6544.041	-67.1619	31.3282	80.14	0.12	5795.0	80.79	0.12	6197.0	1334332	171677

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	6544.066	-67.0446	31.3456	80.21	0.12	5821.2	80.85	0.12	6223.2	1345643	171707
510.0	6544.091	-66.9267	31.3629	80.28	0.13	5847.5	80.91	0.12	6249.5	1357006	171738
512.0	6544.117	-66.8082	31.3802	80.35	0.13	5874.1	80.98	0.12	6276.1	1368419	171770
514.0	6544.144	-66.6891	31.3974	80.42	0.13	5900.8	81.04	0.12	6302.8	1379884	171802
516.0	6544.171	-66.5695	31.4145	80.49	0.13	5927.7	81.10	0.13	6329.7	1391402	171836
518.0	6544.200	-66.4492	31.4316	80.57	0.14	5954.8	81.17	0.13	6356.8	1402972	171870
520.0	6544.229	-66.3284	31.4487	80.64	0.15	5982.1	81.23	0.14	6384.1	1414595	171905
522.0	6544.260	-66.2069	31.4657	80.71	0.15	6009.6	81.30	0.14	6411.6	1426271	171942
524.0	6544.293	-66.0849	31.4827	80.78	0.16	6037.3	81.36	0.15	6439.3	1438000	171980
526.0	6544.326	-65.9622	31.4996	80.86	0.16	6065.2	81.43	0.15	6467.3	1449784	172019
528.0	6544.362	-65.8389	31.5164	80.93	0.17	6093.3	81.49	0.16	6495.4	1461623	172060
530.0	6544.399	-65.7150	31.5332	81.00	0.18	6121.7	81.56	0.17	6523.7	1473516	172103
532.0	6544.438	-65.5905	31.5500	81.08	0.19	6150.2	81.63	0.18	6552.3	1485465	172148
534.0	6544.479	-65.4653	31.5666	81.15	0.20	6179.0	81.69	0.18	6581.1	1497469	172194
536.0	6544.523	-65.3396	31.5833	81.22	0.21	6208.0	81.76	0.19	6610.1	1509529	172243
538.0	6544.569	-65.2131	31.5998	81.30	0.22	6237.2	81.83	0.20	6639.3	1521646	172295
540.0	6544.617	-65.0861	31.6163	81.37	0.23	6266.6	81.90	0.21	6668.7	1533820	172349
542.0	6544.669	-64.9583	31.6327	81.45	0.24	6296.2	81.97	0.23	6698.3	1546052	172406
544.0	6544.724	-64.8300	31.6491	81.53	0.25	6326.1	82.04	0.24	6728.2	1558341	172466
546.0	6544.781	-64.7010	31.6654	81.60	0.27	6356.1	82.11	0.25	6758.3	1570688	172529
548.0	6544.843	-64.5713	31.6816	81.68	0.28	6386.4	82.18	0.27	6788.5	1583094	172596
550.0	6544.908	-64.4409	31.6977	81.76	0.30	6416.9	82.25	0.28	6819.1	1595559	172667
552.0	6544.977	-64.3099	31.7138	81.84	0.32	6447.7	82.32	0.30	6849.8	1608083	172741
554.0	6545.050	-64.1782	31.7298	81.91	0.33	6478.6	82.39	0.31	6880.7	1620667	172820
556.0	6545.128	-64.0458	31.7457	81.99	0.35	6509.7	82.46	0.33	6911.8	1633312	172903
558.0	6545.211	-63.9128	31.7615	82.07	0.37	6541.0	82.53	0.35	6943.1	1646017	172991
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
559.54	6545.276	-63.8100	31.7737	82.13	0.39	6565.2	82.59	0.37	6967.3	1655833	173060
560.0	6545.296	-63.7792	31.7773	82.15	0.39	6568.7	82.60	0.37	6970.9	1658772	173081
S-II/S-IVB SEPARATION COMMAND											
560.5	6545.317	-63.7457	31.7812	82.17	0.38	6568.6	82.62	0.36	6970.7	1661965	173104
562.0	6545.379	-63.6452	31.7929	82.23	0.35	6568.1	82.68	0.33	6970.2	1671555	173170
564.0	6545.456	-63.5111	31.8084	82.31	0.32	6567.6	82.76	0.30	6969.7	1684342	173252
566.0	6545.526	-63.3770	31.8237	82.39	0.29	6572.7	82.83	0.28	6974.9	1697133	173327
568.0	6545.592	-63.2426	31.8389	82.47	0.28	6582.4	82.90	0.26	6984.6	1709939	173398
570.0	6545.655	-63.1080	31.8539	82.55	0.27	6592.6	82.98	0.25	6994.8	1722764	173466
572.0	6545.715	-62.9732	31.8688	82.63	0.25	6603.1	83.05	0.24	7005.3	1735610	173531
574.0	6545.771	-62.8381	31.8836	82.71	0.24	6613.7	83.13	0.22	7015.9	1748475	173592
576.0	6545.824	-62.7027	31.8982	82.79	0.22	6624.3	83.20	0.21	7026.6	1761362	173650

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	6545.872	-62.5670	31.9127	82.87	0.20	6635.1	83.28	0.19	7037.3	1774269	173703
580.0	6545.917	-62.4311	31.9271	82.95	0.18	6645.9	83.35	0.17	7048.1	1787196	173753
582.0	6545.958	-62.2950	31.9413	83.03	0.17	6656.7	83.43	0.16	7059.0	1800145	173799
584.0	6545.996	-62.1585	31.9553	83.11	0.15	6667.6	83.50	0.14	7069.9	1813115	173841
586.0	6546.030	-62.0218	31.9693	83.19	0.14	6678.6	83.58	0.13	7080.8	1826106	173880
588.0	6546.060	-61.8848	31.9831	83.27	0.12	6689.5	83.65	0.12	7091.8	1839118	173915
590.0	6546.087	-61.7476	31.9967	83.35	0.11	6700.5	83.73	0.10	7102.8	1852152	173947
592.0	6546.111	-61.6101	32.0102	83.44	0.09	6711.6	83.81	0.09	7113.9	1865207	173975
594.0	6546.132	-61.4723	32.0236	83.52	0.08	6722.7	83.89	0.08	7125.0	1878284	174000
596.0	6546.149	-61.3342	32.0368	83.60	0.07	6733.8	83.96	0.06	7136.1	1891382	174021
598.0	6546.163	-61.1959	32.0499	83.68	0.05	6745.0	84.04	0.05	7147.3	1904502	174039
600.0	6546.173	-61.0573	32.0628	83.77	0.04	6756.2	84.12	0.04	7158.5	1917643	174054
602.0	6546.181	-60.9185	32.0755	83.85	0.03	6767.5	84.20	0.02	7169.7	1930807	174066
604.0	6546.185	-60.7793	32.0882	83.93	0.01	6778.7	84.27	0.01	7181.0	1943992	174075
606.0	6546.187	-60.6399	32.1006	84.02	0.00	6790.0	84.35	0.00	7192.3	1957199	174081
608.0	6546.186	-60.5002	32.1129	84.10	-0.01	6801.4	84.43	-0.01	7203.7	1970429	174084
610.0	6546.182	-60.3603	32.1251	84.19	-0.02	6812.8	84.51	-0.02	7215.1	1983680	174084
612.0	6546.175	-60.2200	32.1371	84.27	-0.03	6824.2	84.59	-0.03	7226.5	1996954	174082
614.0	6546.166	-60.0795	32.1489	84.35	-0.04	6835.6	84.67	-0.04	7237.9	2010250	174077
616.0	6546.155	-59.9388	32.1606	84.44	-0.05	6847.0	84.75	-0.05	7249.3	2023568	174069
618.0	6546.141	-59.7977	32.1722	84.52	-0.06	6858.5	84.83	-0.06	7260.8	2036908	174059
620.0	6546.125	-59.6564	32.1836	84.61	-0.07	6870.0	84.91	-0.07	7272.3	2050271	174047
622.0	6546.107	-59.5148	32.1948	84.69	-0.08	6881.6	84.99	-0.08	7283.9	2063656	174033
624.0	6546.087	-59.3729	32.2058	84.78	-0.09	6893.2	85.07	-0.08	7295.5	2077064	174016
626.0	6546.065	-59.2307	32.2167	84.86	-0.10	6904.9	85.15	-0.09	7307.2	2090494	173998
628.0	6546.041	-59.0883	32.2275	84.95	-0.10	6916.6	85.23	-0.10	7318.9	2103948	173978
630.0	6546.015	-58.9456	32.2381	85.04	-0.11	6928.3	85.31	-0.10	7330.6	2117424	173956
632.0	6545.988	-58.8026	32.2485	85.12	-0.12	6940.0	85.39	-0.11	7342.3	2130923	173932
634.0	6545.960	-58.6593	32.2587	85.21	-0.12	6951.8	85.47	-0.11	7354.1	2144445	173907
636.0	6545.929	-58.5158	32.2688	85.29	-0.13	6963.6	85.55	-0.12	7365.9	2157990	173880
638.0	6545.898	-58.3720	32.2787	85.38	-0.13	6975.5	85.63	-0.12	7377.8	2171558	173852
640.0	6545.865	-58.2279	32.2885	85.47	-0.14	6987.3	85.71	-0.13	7389.7	2185149	173823
642.0	6545.831	-58.0835	32.2981	85.55	-0.14	6999.2	85.80	-0.13	7401.6	2198763	173792
644.0	6545.797	-57.9388	32.3075	85.64	-0.14	7011.2	85.88	-0.14	7413.5	2212401	173761
646.0	6545.761	-57.7939	32.3167	85.73	-0.15	7023.2	85.96	-0.14	7425.5	2226062	173728
648.0	6545.725	-57.6487	32.3258	85.81	-0.15	7035.2	86.04	-0.14	7437.6	2239747	173695
650.0	6545.688	-57.5032	32.3347	85.90	-0.15	7047.3	86.12	-0.14	7449.7	2253455	173661
652.0	6545.651	-57.3574	32.3434	85.99	-0.15	7059.5	86.21	-0.14	7461.8	2267186	173627
654.0	6545.613	-57.2113	32.3520	86.08	-0.15	7071.6	86.29	-0.15	7473.9	2280942	173592
656.0	6545.575	-57.0650	32.3604	86.16	-0.15	7083.8	86.37	-0.15	7486.1	2294721	173557
658.0	6545.537	-56.9183	32.3686	86.25	-0.15	7096.0	86.45	-0.15	7498.3	2308524	173521
660.0	6545.499	-56.7714	32.3766	86.34	-0.15	7108.2	86.54	-0.15	7510.6	2322351	173486
662.0	6545.460	-56.6242	32.3845	86.43	-0.15	7120.5	86.62	-0.14	7522.9	2336202	173450

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	6545.422	-56.4768	32.3921	86.52	-0.15	7132.8	86.70	-0.14	7535.2	2350076	173415
666.0	6545.385	-56.3290	32.3996	86.60	-0.15	7145.2	86.79	-0.14	7547.5	2363975	173380
668.0	6545.348	-56.1810	32.4070	86.69	-0.15	7157.6	86.87	-0.14	7559.9	2377898	173345
670.0	6545.311	-56.0327	32.4141	86.78	-0.14	7170.0	86.95	-0.14	7572.3	2391846	173311
672.0	6545.275	-55.8841	32.4210	86.87	-0.14	7182.4	87.04	-0.13	7584.8	2405817	173278
674.0	6545.240	-55.7352	32.4278	86.96	-0.14	7194.9	87.12	-0.13	7597.2	2419813	173245
676.0	6545.206	-55.5860	32.4344	87.05	-0.13	7207.4	87.21	-0.13	7609.8	2433833	173213
678.0	6545.173	-55.4366	32.4408	87.14	-0.13	7220.0	87.29	-0.12	7622.3	2447878	173182
680.0	6545.141	-55.2868	32.4470	87.23	-0.12	7232.6	87.37	-0.12	7634.9	2461947	173152
682.0	6545.110	-55.1368	32.4531	87.32	-0.12	7245.3	87.46	-0.11	7647.6	2476041	173123
684.0	6545.081	-54.9865	32.4589	87.41	-0.11	7257.9	87.54	-0.11	7660.3	2490160	173096
686.0	6545.053	-54.8359	32.4646	87.50	-0.11	7270.6	87.63	-0.10	7672.9	2504303	173069
688.0	6545.026	-54.6850	32.4700	87.59	-0.10	7283.3	87.71	-0.10	7685.7	2518472	173045
690.0	6545.002	-54.5339	32.4753	87.68	-0.09	7296.1	87.80	-0.09	7698.4	2532665	173022
692.0	6544.979	-54.3825	32.4804	87.77	-0.08	7308.9	87.88	-0.08	7711.2	2546883	173001
694.0	6544.959	-54.2307	32.4853	87.86	-0.07	7321.7	87.97	-0.07	7724.0	2561125	172983
696.0	6544.941	-54.0787	32.4900	87.95	-0.06	7334.5	88.06	-0.06	7736.9	2575393	172967
698.0	6544.926	-53.9264	32.4945	88.04	-0.05	7347.4	88.14	-0.05	7749.7	2589686	172953
700.0	6544.914	-53.7739	32.4988	88.13	-0.04	7360.3	88.23	-0.04	7762.7	2604005	172942
702.0	6544.904	-53.6210	32.5029	88.22	-0.03	7373.3	88.31	-0.03	7775.6	2618348	172934
704.0	6544.899	-53.4679	32.5068	88.31	-0.02	7386.3	88.40	-0.02	7788.6	2632717	172930
706.0	6544.896	-53.3144	32.5105	88.40	-0.00	7399.3	88.49	-0.00	7801.6	2647111	172929
	S-IVB FIRST GUIDANCE CUTOFF										
706.21	6544.896	-53.2983	32.5109	88.41	0.00	7400.6	88.50	0.00	7802.9	2648623	172928
708.0	6544.896	-53.1608	32.5140	88.50	0.00	7402.3	88.57	0.00	7804.6	2661521	172930
710.0	6544.896	-53.0072	32.5173	88.59	0.00	7402.3	88.66	0.00	7804.6	2675933	172931
712.0	6544.897	-52.8535	32.5204	88.68	0.00	7402.3	88.75	0.00	7804.6	2690346	172932
714.0	6544.897	-52.6999	32.5232	88.77	0.00	7402.3	88.84	0.00	7804.6	2704758	172934
716.0	6544.897	-52.5462	32.5259	88.86	0.00	7402.3	88.92	0.00	7804.6	2719171	172935
	PARKING ORBIT INSERTION										
716.21	6544.897	-52.5300	32.5262	88.87	0.00	7402.4	88.93	0.00	7804.7	2720684	172935

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								
716.21	6544.897	-52.5300	32.5262	32.6963	88.93	0.00	7804.7	172.935
750.0	6544.948	-49.9329	32.5390	32.7091	90.41	-0.00	7804.8	172.990
800.0	6544.944	-46.0926	32.4496	32.6194	92.59	-0.00	7805.0	172.956
850.0	6544.943	-42.2660	32.2307	32.4000	94.75	-0.00	7805.1	172.881
900.0	6544.944	-38.4643	31.8841	32.0523	96.89	0.00	7805.3	172.765
950.0	6544.947	-34.6981	31.4123	31.5792	98.98	0.00	7805.4	172.610
1000.0	6544.952	-30.9767	30.8190	30.9841	101.01	0.00	7805.6	172.419
1050.0	6544.960	-27.3083	30.1083	30.2712	102.99	0.00	7805.7	172.195
1100.0	6544.969	-23.6995	29.2852	29.4454	104.88	0.00	7805.9	171.939
1150.0	6544.981	-20.1556	28.3552	28.5121	106.70	0.00	7806.1	171.656
1200.0	6544.993	-16.6804	27.3240	27.4771	108.42	0.00	7806.4	171.350
1250.0	6545.007	-13.2761	26.1978	26.3465	110.05	0.00	7806.6	171.025
1300.0	6545.021	-9.9436	24.9828	25.1266	111.59	0.00	7806.8	170.685
1350.0	6545.036	-6.6828	23.6855	23.8237	113.02	0.00	7807.1	170.335
1400.0	6545.051	-3.4921	22.3123	22.4442	114.35	0.00	7807.3	169.981
1450.0	6545.066	-0.3693	20.8694	20.9944	115.58	0.00	7807.6	169.625
1500.0	6545.080	2.6888	19.3630	19.4806	116.71	0.00	7807.8	169.275
1550.0	6545.093	5.6860	17.7993	17.9087	117.73	0.00	7808.0	168.934
1600.0	6545.104	8.6266	16.1840	16.2847	118.66	0.00	7808.3	168.607
1650.0	6545.115	11.5154	14.5231	14.6143	119.48	0.00	7808.5	168.300
1700.0	6545.123	14.3574	12.8219	12.9033	120.20	0.00	7808.7	168.015
1750.0	6545.129	17.1582	11.0859	11.1569	120.83	0.00	7808.9	167.757
1800.0	6545.133	19.9231	9.3203	9.3804	121.36	0.00	7809.1	167.531
1850.0	6545.135	22.6579	7.5302	7.5791	121.79	0.00	7809.2	167.338
1900.0	6545.135	25.3683	5.7205	5.7578	122.13	-0.00	7809.4	167.182
1950.0	6545.133	28.0603	3.8961	3.9216	122.37	-0.00	7809.5	167.066
2000.0	6545.128	30.7398	2.0617	2.0752	122.52	-0.00	7809.6	166.990
2050.0	6545.123	33.4126	0.2220	0.2235	122.58	-0.00	7809.7	166.957
2100.0	6545.115	36.0847	-1.6182	-1.6289	122.55	-0.00	7809.7	166.966
2150.0	6545.107	38.7620	-3.4544	-3.4770	122.42	-0.00	7809.8	167.019
2200.0	6545.098	41.4506	-5.2817	-5.3162	122.20	-0.00	7809.8	167.114
2250.0	6545.089	44.1562	-7.0956	-7.1417	121.88	-0.00	7809.7	167.251
2300.0	6545.080	46.8848	-8.8910	-8.9484	121.47	-0.00	7809.7	167.428
2350.0	6545.073	49.6422	-10.6631	-10.7315	120.97	-0.00	7809.6	167.643
2400.0	6545.068	52.4341	-12.4069	-12.4858	120.36	-0.00	7809.5	167.893
2450.0	6545.065	55.2660	-14.1172	-14.2061	119.66	-0.00	7809.4	168.177
2500.0	6545.065	58.1434	-15.7886	-15.8870	118.87	0.00	7809.3	168.490
2550.0	6545.070	61.0715	-17.4156	-17.5229	117.97	0.00	7809.1	168.828
2600.0	6545.080	64.0551	-18.9925	-19.1082	116.97	0.00	7809.0	169.188
2650.0	6545.095	67.0986	-20.5135	-20.6368	115.86	0.00	7808.8	169.566

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
2700.0	6545.117	70.2060	-21.9725	-22.1028	114.66	0.00	7808.6	169.957
2750.0	6545.146	73.3807	-23.3633	-23.5000	113.35	0.00	7808.4	170.357
2800.0	6545.183	76.6250	-24.6796	-24.8221	111.94	0.01	7808.2	170.761
2850.0	6545.230	79.9407	-25.9151	-26.0627	110.43	0.01	7808.0	171.164
2900.0	6545.285	83.3283	-27.0634	-27.2155	108.82	0.01	7807.7	171.563
2950.0	6545.351	86.7871	-28.1181	-28.2741	107.12	0.01	7807.5	171.953
3000.0	6545.427	90.3152	-29.0731	-29.2325	105.33	0.01	7807.3	172.329
3050.0	6545.514	93.9093	-29.9224	-30.0847	103.45	0.01	7807.1	172.689
3100.0	6545.613	97.5643	-30.6606	-30.8252	101.49	0.02	7806.8	173.028
3150.0	6545.723	101.2739	-31.2825	-31.4490	99.47	0.02	7806.6	173.344
3200.0	6545.845	105.0303	-31.7838	-31.9517	97.39	0.02	7806.4	173.633
3250.0	6545.979	108.8244	-32.1607	-32.3297	95.27	0.02	7806.2	173.893
3300.0	6546.124	112.6459	-32.4103	-32.5800	93.11	0.02	7806.0	174.123
3350.0	6546.281	116.4838	-32.5309	-32.7009	90.93	0.02	7805.8	174.321
3400.0	6546.449	120.3265	-32.5213	-32.6913	88.75	0.03	7805.7	174.485
3450.0	6546.628	124.1623	-32.3818	-32.5514	86.57	0.03	7805.5	174.617
3500.0	6546.817	127.9797	-32.1134	-32.2823	84.42	0.03	7805.4	174.715
3550.0	6547.015	131.7678	-31.7183	-31.8860	82.30	0.03	7805.2	174.781
3600.0	6547.222	135.5164	-31.1994	-31.3656	80.23	0.03	7805.1	174.815
3650.0	6547.437	139.2167	-30.5606	-30.7248	78.22	0.03	7805.0	174.819
3700.0	6547.658	142.8610	-29.8065	-29.9683	76.28	0.03	7804.9	174.795
3750.0	6547.886	146.4434	-28.9421	-29.1010	74.41	0.03	7804.8	174.746
3800.0	6548.118	149.9590	-27.9731	-28.1286	72.63	0.03	7804.7	174.675
3850.0	6548.353	153.4047	-26.9056	-27.0570	70.94	0.03	7804.7	174.583
3900.0	6548.591	156.7788	-25.7456	-25.8924	69.35	0.03	7804.6	174.476
3950.0	6548.829	160.0809	-24.4996	-24.6412	67.86	0.04	7804.5	174.356
4000.0	6549.068	163.3117	-23.1738	-23.3097	66.46	0.03	7804.5	174.227
4050.0	6549.304	166.4730	-21.7748	-21.9041	65.17	0.03	7804.4	174.093
4100.0	6549.538	169.5674	-20.3087	-20.4309	63.98	0.03	7804.4	173.959
4150.0	6549.767	172.5984	-18.7817	-18.8962	62.89	0.03	7804.3	173.827
4200.0	6549.990	175.5699	-17.1998	-17.3059	61.91	0.03	7804.3	173.702
4250.0	6550.206	178.4866	-15.5688	-15.6660	61.02	0.03	7804.2	173.588
4300.0	6550.415	-178.6468	-13.8944	-13.9820	60.24	0.03	7804.2	173.488
4350.0	6550.614	-175.8250	-12.1821	-12.2596	59.55	0.03	7804.1	173.405
4400.0	6550.803	-173.0426	-10.4371	-10.5040	58.96	0.03	7804.1	173.342
4450.0	6550.981	-170.2940	-8.6645	-8.7205	58.47	0.03	7804.0	173.302
4500.0	6551.146	-167.5735	-6.8695	-6.9141	58.07	0.02	7803.9	173.288
4550.0	6551.299	-164.8752	-5.0568	-5.0898	57.77	0.02	7803.9	173.300
4600.0	6551.438	-162.1933	-3.2312	-3.2524	57.56	0.02	7803.8	173.340
4650.0	6551.563	-159.5220	-1.3975	-1.4067	57.44	0.02	7803.7	173.410
4700.0	6551.674	-156.8552	0.4396	0.4425	57.42	0.02	7803.6	173.510
4750.0	6551.771	-154.1871	2.2756	2.2905	57.49	0.01	7803.5	173.638
4800.0	6551.852	-151.5117	4.1058	4.1327	57.65	0.01	7803.3	173.796

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	6551.919	-148.8232	5.9255	5.9641	57.90	0.01	7803.2	173.982
4900.0	6551.971	-146.1156	7.7300	7.7800	58.25	0.01	7803.1	174.193
4950.0	6552.008	-143.3832	9.5144	9.5756	58.69	0.00	7803.0	174.429
5000.0	6552.032	-140.6201	11.2738	11.3458	59.23	0.00	7802.8	174.687
5050.0	6552.042	-137.8208	13.0031	13.0855	59.87	0.00	7802.7	174.963
5100.0	6552.039	-134.9796	14.6973	14.7895	60.60	-0.00	7802.6	175.256
5150.0	6552.023	-132.0914	16.3508	16.4523	61.43	-0.00	7802.4	175.560
5200.0	6551.996	-129.1509	17.9582	18.0683	62.36	-0.00	7802.3	175.872
5250.0	6551.958	-126.1536	19.5138	19.6320	63.40	-0.01	7802.2	176.189
5300.0	6551.911	-123.0951	21.0116	21.1372	64.53	-0.01	7802.0	176.506
5350.0	6551.854	-119.9717	22.4456	22.5781	65.77	-0.01	7801.9	176.819
5400.0	6551.790	-116.7804	23.8097	23.9483	67.11	-0.01	7801.8	177.123
5450.0	6551.718	-113.5188	25.0975	25.2416	68.55	-0.01	7801.7	177.415
5500.0	6551.641	-110.1858	26.3026	26.4516	70.09	-0.01	7801.7	177.690
5550.0	6551.559	-106.7810	27.4189	27.5722	71.73	-0.01	7801.6	177.945
5600.0	6551.473	-103.3055	28.4398	28.5969	73.46	-0.01	7801.5	178.176
5650.0	6551.385	-99.7617	29.3595	29.5197	75.28	-0.01	7801.5	178.378
5700.0	6551.294	-96.1535	30.1721	30.3350	77.18	-0.01	7801.5	178.550
5750.0	6551.203	-92.4862	30.8722	31.0373	79.15	-0.01	7801.5	178.688
5800.0	6551.112	-88.7666	31.4550	31.6219	81.19	-0.01	7801.5	178.790
5850.0	6551.021	-85.0028	31.9162	32.0844	83.28	-0.01	7801.6	178.854
5900.0	6550.933	-81.2043	32.2525	32.4216	85.41	-0.01	7801.7	178.878
5950.0	6550.846	-77.3817	32.4611	32.6308	87.58	-0.01	7801.8	178.862
6000.0	6550.763	-73.5460	32.5406	32.7105	89.76	-0.01	7801.9	178.805
6050.0	6550.682	-69.7088	32.4902	32.6600	91.94	-0.01	7802.0	178.708
6100.0	6550.606	-65.8819	32.3104	32.4797	94.10	-0.01	7802.1	178.571
6150.0	6550.534	-62.0766	32.0025	32.1709	96.25	-0.01	7802.3	178.395
6200.0	6550.466	-58.3034	31.5688	31.7361	98.35	-0.01	7802.5	178.182
6250.0	6550.402	-54.5722	31.0128	31.1783	100.40	-0.01	7802.7	177.934
6300.0	6550.344	-50.8914	30.3382	30.5017	102.39	-0.01	7802.9	177.653
6350.0	6550.289	-47.2681	29.5500	29.7109	104.31	-0.01	7803.2	177.344
6400.0	6550.240	-43.7082	28.6533	28.8111	106.15	-0.01	7803.4	177.009
6450.0	6550.194	-40.2156	27.6539	27.8081	107.90	-0.01	7803.7	176.652
6500.0	6550.153	-36.7932	26.5577	26.7077	109.56	-0.01	7803.9	176.278
6550.0	6550.115	-33.4423	25.3710	25.5163	111.12	-0.01	7804.2	175.891
6600.0	6550.082	-30.1631	24.1002	24.2400	112.58	-0.00	7804.5	175.496
6650.0	6550.051	-26.9543	22.7515	22.8854	113.95	-0.00	7804.7	175.097
6700.0	6550.023	-23.8141	21.3314	21.4586	115.21	-0.00	7805.0	174.699
6750.0	6549.997	-20.7395	19.8459	19.9659	116.36	-0.00	7805.3	174.307
6800.0	6549.974	-17.7269	18.3014	18.4133	117.42	-0.00	7805.5	173.926
6850.0	6549.952	-14.7721	16.7036	16.8070	118.37	-0.00	7805.8	173.561
6900.0	6549.932	-11.8707	15.0583	15.1525	119.23	-0.00	7806.0	173.216
6950.0	6549.912	-9.0174	13.3711	13.4557	119.98	-0.00	7806.2	172.895

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
7000.0	6549.893	-6.2072	11.6475	11.7218	120.64	-0.00	7806.4	172.603
7050.0	6549.875	-3.4345	9.8927	9.9563	121.20	-0.00	7806.6	172.343
7100.0	6549.857	-0.6936	8.1118	8.1643	121.66	-0.00	7806.8	172.119
7150.0	6549.839	2.0211	6.3098	6.3508	122.03	-0.00	7806.9	171.932
7200.0	6549.821	4.7154	4.4915	4.5208	122.30	-0.00	7807.0	171.787
7250.0	6549.803	7.3953	2.6617	2.6791	122.48	-0.00	7807.1	171.683
7300.0	6549.785	10.0667	0.8251	0.8305	122.57	-0.00	7807.2	171.623
7350.0	6549.767	12.7354	-1.0136	-1.0203	122.57	-0.00	7807.2	171.608
7400.0	6549.750	15.4074	-2.8498	-2.8684	122.47	-0.00	7807.3	171.638
7450.0	6549.734	18.0886	-4.6787	-4.7092	122.28	-0.00	7807.3	171.711
7500.0	6549.720	20.7849	-6.4957	-6.5379	122.00	-0.00	7807.2	171.829
7550.0	6549.706	23.5022	-8.2959	-8.3496	121.62	-0.00	7807.2	171.988
7600.0	6549.695	26.2463	-10.0746	-10.1393	121.15	-0.00	7807.1	172.187
7650.0	6549.687	29.0229	-11.8266	-11.9020	120.58	-0.00	7807.0	172.424
7700.0	6549.683	31.8377	-13.5470	-13.6325	119.91	-0.00	7806.9	172.695
7750.0	6549.682	34.6960	-15.2303	-15.3256	119.15	0.00	7806.8	172.998
7800.0	6549.686	37.6032	-16.8713	-16.9756	118.28	0.00	7806.6	173.329
7850.0	6549.696	40.5642	-18.4641	-18.5770	117.32	0.00	7806.4	173.684
7900.0	6549.712	43.5835	-20.0032	-20.1239	116.25	0.00	7806.2	174.059
7950.0	6549.734	46.6653	-21.4825	-21.6104	115.08	0.00	7806.0	174.448
8000.0	6549.765	49.8132	-22.8958	-23.0303	113.81	0.01	7805.8	174.849
8050.0	6549.803	53.0298	-24.2370	-24.3775	112.44	0.01	7805.6	175.255
8100.0	6549.850	56.3171	-25.4997	-25.6455	110.96	0.01	7805.3	175.663
8150.0	6549.907	59.6762	-26.6775	-26.8280	109.39	0.01	7805.1	176.068
8200.0	6549.973	63.1067	-27.7642	-27.9188	107.72	0.01	7804.8	176.465
8250.0	6550.049	66.6071	-28.7534	-28.9116	105.96	0.01	7804.6	176.850
8300.0	6550.136	70.1747	-29.6392	-29.8004	104.11	0.01	7804.3	177.219
8350.0	6550.233	73.8049	-30.4160	-30.5797	102.19	0.02	7804.1	177.568
8400.0	6550.340	77.4921	-31.0785	-31.2442	100.19	0.02	7803.8	177.893
8450.0	6550.458	81.2288	-31.6220	-31.7894	98.13	0.02	7803.6	178.191
8500.0	6550.586	85.0064	-32.0426	-32.2112	96.02	0.02	7803.4	178.460
8550.0	6550.723	88.8151	-32.3372	-32.5066	93.88	0.02	7803.1	178.696
8600.0	6550.869	92.6441	-32.5035	-32.6733	91.71	0.02	7802.9	178.899
BEGIN S-IVB RESTART PREPARATIONS - START OF TIMEBASE 6								
8638.6	6550.983	95.6068	-32.5433	-32.7132	90.02	0.02	7802.8	179.027

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

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 PREPARATIONS - START OF TIMEBASE 6								
8638.6	-12898214	528600	212238	-432.2	-2497.0	-6952.6	8.28	-1.27	-0.06
8640.0	-12898814	525104	202505	-420.6	-2498.8	-6952.7	8.28	-1.26	-0.04
8650.0	-12902606	500053	132976	-337.8	-2511.3	-6952.7	8.29	-1.23	0.04
8660.0	-12905569	474879	63453	-254.9	-2523.4	-6951.8	8.29	-1.20	0.13
8670.0	-12907704	449586	-6055	-172.0	-2535.3	-6950.0	8.29	-1.17	0.22
8680.0	-12909008	424176	-75543	-89.0	-2546.7	-6947.4	8.29	-1.13	0.31
8690.0	-12909483	398651	-145002	-6.1	-2557.9	-6943.8	8.29	-1.10	0.40
8700.0	-12909130	373018	-214419	76.9	-2568.7	-6939.4	8.29	-1.07	0.49
8710.0	-12907946	347278	-283786	159.8	-2579.2	-6934.0	8.29	-1.03	0.58
8720.0	-12905934	321435	-353094	242.7	-2589.4	-6927.8	8.29	-1.00	0.67
8730.0	-12903092	295491	-422338	325.6	-2599.2	-6920.7	8.29	-0.97	0.75
8740.0	-12899421	269451	-491506	408.5	-2608.7	-6912.7	8.28	-0.93	0.84
8750.0	-12894923	243317	-560590	491.2	-2617.9	-6903.8	8.28	-0.90	0.93
8760.0	-12889597	217095	-629580	574.0	-2626.7	-6894.1	8.27	-0.86	1.02
8770.0	-12883444	190785	-698468	656.6	-2635.1	-6883.5	8.26	-0.83	1.11
8780.0	-12876465	164393	-767247	739.2	-2643.2	-6872.0	8.25	-0.79	1.19
8790.0	-12868660	137922	-835905	821.7	-2651.0	-6859.6	8.24	-0.76	1.28
8800.0	-12860032	111375	-904436	904.0	-2658.4	-6846.3	8.23	-0.72	1.37
8810.0	-12850580	84755	-972829	986.3	-2665.4	-6832.2	8.22	-0.69	1.46
8820.0	-12840306	58067	-1041077	1068.4	-2672.1	-6817.2	8.21	-0.65	1.54
8830.0	-12829211	31314	-1109171	1150.4	-2678.5	-6801.4	8.19	-0.62	1.63
8840.0	-12817298	4498	-1177102	1232.3	-2684.5	-6784.7	8.18	-0.58	1.71
8850.0	-12804566	-22375	-1244861	1314.0	-2690.1	-6767.1	8.16	-0.54	1.80
8860.0	-12791018	-49302	-1312441	1395.5	-2695.4	-6748.6	8.14	-0.51	1.89
8870.0	-12776656	-76281	-1379832	1476.9	-2700.3	-6729.4	8.13	-0.47	1.97
8880.0	-12761481	-103307	-1447025	1558.1	-2704.8	-6709.2	8.11	-0.44	2.06
8890.0	-12745496	-130376	-1514013	1639.0	-2709.0	-6688.2	8.09	-0.40	2.14
8900.0	-12728701	-157485	-1580786	1719.8	-2712.8	-6666.4	8.07	-0.36	2.23
8910.0	-12711100	-184631	-1647337	1800.3	-2716.2	-6643.7	8.04	-0.33	2.31
8920.0	-12692695	-211809	-1713657	1880.7	-2719.3	-6620.1	8.02	-0.29	2.40
8930.0	-12673488	-239016	-1779737	1960.7	-2722.0	-6595.8	8.00	-0.25	2.48
8940.0	-12653481	-266248	-1845570	2040.6	-2724.3	-6570.6	7.97	-0.21	2.56
8950.0	-12632677	-293501	-1911146	2120.2	-2726.3	-6544.5	7.94	-0.18	2.65
8960.0	-12611079	-320773	-1976457	2199.5	-2727.9	-6517.7	7.92	-0.14	2.73
8970.0	-12588689	-348058	-2041496	2278.5	-2729.1	-6490.0	7.89	-0.10	2.81
8980.0	-12565510	-375353	-2106254	2357.2	-2729.9	-6461.5	7.86	-0.07	2.89
8990.0	-12541546	-402655	-2170723	2435.7	-2730.4	-6432.1	7.83	-0.03	2.97
9000.0	-12516798	-429960	-2234894	2513.8	-2730.5	-6402.0	7.80	0.01	3.05
9010.0	-12491271	-457264	-2298761	2591.6	-2730.2	-6371.1	7.77	0.05	3.13
9020.0	-12464967	-484563	-2362313	2669.1	-2729.5	-6339.3	7.73	0.09	3.21

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	-12437890	-511853	-2425544	2746.2	-2728.5	-6306.8	7.70	0.12	3.29
9040.0	-12410043	-539131	-2488446	2823.0	-2727.1	-6273.4	7.66	0.16	3.37
9050.0	-12381431	-566393	-2551011	2899.5	-2725.2	-6239.3	7.63	0.20	3.45
9060.0	-12352055	-593635	-2613230	2975.6	-2723.1	-6204.4	7.59	0.24	3.53
9070.0	-12321921	-620853	-2675096	3051.2	-2720.5	-6168.7	7.55	0.28	3.61
9080.0	-12291031	-648044	-2736601	3126.6	-2717.5	-6132.2	7.51	0.31	3.69
9090.0	-12259391	-675203	-2797738	3201.5	-2714.2	-6095.0	7.47	0.35	3.76
9100.0	-12227003	-702327	-2858498	3276.0	-2710.5	-6057.0	7.43	0.39	3.84
9110.0	-12193872	-729412	-2918875	3350.1	-2706.4	-6018.2	7.39	0.43	3.91
9120.0	-12160003	-756454	-2978860	3423.8	-2701.9	-5978.7	7.35	0.47	3.99
9130.0	-12125398	-783449	-3038446	3497.0	-2697.1	-5938.4	7.30	0.50	4.06
9140.0	-12090064	-810394	-3097626	3569.8	-2691.9	-5897.4	7.26	0.54	4.14
9150.0	-12054003	-837285	-3156392	3642.2	-2686.2	-5855.7	7.21	0.58	4.21
9160.0	-12017173	-864144	-3214798	3714.2	-2680.3	-5813.2	7.17	0.62	4.28
9170.0	-11979673	-890915	-3272714	3785.6	-2673.9	-5770.0	7.11	0.65	4.35
9180.0	-11941462	-917621	-3330195	3856.6	-2667.1	-5726.1	7.07	0.70	4.43
9190.0	-11902543	-944257	-3387232	3927.1	-2660.0	-5681.4	7.02	0.73	4.50
9200.0	-11862922	-970820	-3443820	3997.0	-2652.5	-5636.0	6.98	0.77	4.57
9210.0	-11822604	-997305	-3499951	4066.5	-2644.6	-5590.0	6.93	0.81	4.64
	S-IVB SECOND IGNITION (STDV OPEN)								
9216.5	-11796026	-1014478	-3536188	4111.5	-2639.3	-5559.6	6.92	0.84	4.69
9218.0	-11789851	-1018436	-3544523	4122.7	-2638.6	-5553.8	8.65	-0.23	2.34
9220.0	-11781586	-1023715	-3555628	4142.0	-2640.1	-5551.6	9.97	-1.04	0.43
9222.0	-11773282	-1028997	-3566731	4162.1	-2642.3	-5550.9	10.03	-1.14	0.30
9224.0	-11764938	-1034284	-3577833	4182.2	-2644.6	-5550.3	10.09	-1.17	0.27
9226.0	-11756554	-1039575	-3588933	4202.4	-2646.9	-5549.7	10.16	-1.11	0.31
9228.0	-11748129	-1044871	-3600032	4222.8	-2649.0	-5549.1	10.27	-1.04	0.36
9230.0	-11739662	-1050171	-3611129	4243.5	-2651.0	-5548.3	10.41	-0.96	0.43
9232.0	-11731154	-1055475	-3622225	4264.4	-2652.8	-5547.3	10.52	-0.93	0.49
9234.0	-11722605	-1060782	-3633319	4285.5	-2654.7	-5546.3	10.55	-0.95	0.52
9236.0	-11714012	-1066094	-3644411	4306.6	-2656.6	-5545.4	10.53	-0.96	0.50
9238.0	-11705378	-1071409	-3655501	4327.7	-2658.5	-5544.4	10.53	-0.95	0.49
9240.0	-11696702	-1076728	-3666589	4348.7	-2660.4	-5543.4	10.56	-0.93	0.50
9242.0	-11687983	-1082050	-3677675	4369.9	-2662.3	-5542.4	10.58	-0.93	0.52
9244.0	-11679222	-1087377	-3688758	4391.0	-2664.1	-5541.4	10.57	-0.93	0.53
9246.0	-11670419	-1092707	-3699840	4412.2	-2666.0	-5540.3	10.58	-0.92	0.52
9248.0	-11661574	-1098041	-3710920	4433.3	-2667.8	-5539.3	10.59	-0.90	0.53
9250.0	-11652686	-1103378	-3721997	4454.5	-2669.6	-5538.2	10.60	-0.89	0.54
9252.0	-11643756	-1108719	-3733073	4475.7	-2671.4	-5537.1	10.60	-0.89	0.54
9254.0	-11634783	-1114064	-3744146	4496.9	-2673.2	-5536.0	10.61	-0.89	0.55
9256.0	-11625768	-1119412	-3755217	4518.2	-2674.9	-5534.9	10.62	-0.89	0.56

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	-11616710	-1124763	-3766285	4539.4	-2676.7	-5533.8	10.64	-0.89	0.56
9260.0	-11607610	-1130119	-3777352	4560.7	-2678.5	-5532.7	10.65	-0.87	0.58
9262.0	-11598467	-1135477	-3788416	4582.0	-2680.2	-5531.5	10.63	-0.87	0.58
9264.0	-11589282	-1140839	-3799478	4603.3	-2682.0	-5530.4	10.76	-0.93	0.46
9266.0	-11580054	-1146205	-3810538	4625.0	-2683.9	-5529.6	11.00	-1.03	0.22
9268.0	-11570782	-1151575	-3821597	4647.3	-2686.1	-5529.5	11.17	-1.11	0.04
9270.0	-11561465	-1156950	-3832656	4669.6	-2688.4	-5529.4	11.20	-1.12	0.02
9272.0	-11552103	-1162329	-3843715	4692.1	-2690.6	-5529.4	11.23	-1.13	0.00
9274.0	-11542697	-1167712	-3854774	4714.5	-2692.9	-5529.4	11.24	-1.12	0.01
9276.0	-11533245	-1173100	-3865832	4737.0	-2695.1	-5529.4	11.25	-1.12	0.02
9278.0	-11523748	-1178493	-3876891	4759.5	-2697.3	-5529.3	11.26	-1.11	0.02
9280.0	-11514207	-1183890	-3887950	4782.0	-2699.6	-5529.3	11.26	-1.11	0.02
9282.0	-11504620	-1189291	-3899008	4804.6	-2701.8	-5529.2	11.27	-1.11	0.02
9284.0	-11494989	-1194697	-3910067	4827.1	-2704.0	-5529.2	11.29	-1.11	0.02
9286.0	-11485312	-1200107	-3921125	4849.8	-2706.2	-5529.1	11.31	-1.11	0.03
9288.0	-11475589	-1205522	-3932183	4872.4	-2708.4	-5529.1	11.33	-1.11	0.03
9290.0	-11465822	-1210941	-3943241	4895.1	-2710.7	-5529.0	11.33	-1.11	0.03
9292.0	-11456009	-1216364	-3954299	4917.7	-2712.9	-5529.0	11.33	-1.10	0.03
9294.0	-11446151	-1221792	-3965357	4940.4	-2715.1	-5528.9	11.33	-1.11	0.03
9296.0	-11436248	-1227225	-3976415	4963.1	-2717.3	-5528.8	11.35	-1.11	0.03
9298.0	-11426299	-1232661	-3987472	4985.8	-2719.5	-5528.8	11.36	-1.12	0.03
9300.0	-11416305	-1238103	-3998530	5008.5	-2721.8	-5528.7	11.36	-1.12	0.03
9302.0	-11406265	-1243549	-4009587	5031.2	-2724.0	-5528.7	11.37	-1.11	0.03
9304.0	-11396180	-1248999	-4020645	5054.0	-2726.2	-5528.6	11.38	-1.11	0.03
9306.0	-11386049	-1254454	-4031702	5076.8	-2728.5	-5528.5	11.40	-1.11	0.03
9308.0	-11375873	-1259913	-4042759	5099.6	-2730.7	-5528.5	11.41	-1.11	0.03
9310.0	-11365651	-1265376	-4053816	5122.4	-2732.9	-5528.4	11.42	-1.11	0.04
9312.0	-11355383	-1270844	-4064872	5145.3	-2735.1	-5528.3	11.43	-1.12	0.03
9314.0	-11345070	-1276317	-4075929	5168.1	-2737.4	-5528.3	11.44	-1.12	0.03
9316.0	-11334711	-1281794	-4086985	5191.0	-2739.6	-5528.2	11.45	-1.12	0.04
9318.0	-11324306	-1287275	-4098042	5213.9	-2741.8	-5528.1	11.46	-1.12	0.04
9320.0	-11313855	-1292761	-4109098	5236.8	-2744.1	-5528.1	11.47	-1.12	0.04
9322.0	-11303358	-1298251	-4120154	5259.8	-2746.3	-5528.0	11.48	-1.13	0.04
9324.0	-11292816	-1303746	-4131210	5282.8	-2748.6	-5527.9	11.50	-1.13	0.04
9326.0	-11282227	-1309246	-4142266	5305.8	-2750.8	-5527.8	11.52	-1.13	0.04
9328.0	-11271593	-1314750	-4153321	5328.8	-2753.1	-5527.8	11.52	-1.13	0.03
9330.0	-11260912	-1320258	-4164377	5351.9	-2755.4	-5527.7	11.53	-1.13	0.03
9332.0	-11250185	-1325771	-4175432	5374.9	-2757.6	-5527.6	11.54	-1.14	0.03
9334.0	-11239412	-1331289	-4186487	5398.0	-2759.9	-5527.6	11.55	-1.15	0.03
9336.0	-11228593	-1336811	-4197542	5421.2	-2762.2	-5527.5	11.57	-1.15	0.03
9338.0	-11217727	-1342338	-4208597	5444.3	-2764.5	-5527.5	11.58	-1.15	0.03
9340.0	-11206816	-1347869	-4219652	5467.5	-2766.8	-5527.4	11.59	-1.15	0.03
9342.0	-11195858	-1353405	-4230707	5490.7	-2769.1	-5527.3	11.61	-1.15	0.03

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	-11184853	-1358945	-4241761	5513.9	-2771.4	-5527.3	11.63	-1.15	0.03
9346.0	-11173802	-1364491	-4252816	5537.2	-2773.7	-5527.2	11.63	-1.15	0.02
9348.0	-11162704	-1370040	-4263870	5560.4	-2776.0	-5527.2	11.63	-1.16	0.02
9350.0	-11151560	-1375595	-4274925	5583.7	-2778.4	-5527.2	11.65	-1.16	0.01
9352.0	-11140369	-1381154	-4285979	5607.0	-2780.7	-5527.1	11.66	-1.17	0.01
9354.0	-11129132	-1386717	-4297033	5630.4	-2783.0	-5527.1	11.68	-1.17	0.01
9356.0	-11117848	-1392286	-4308087	5653.8	-2785.4	-5527.1	11.71	-1.18	0.01
9358.0	-11106517	-1397859	-4319142	5677.2	-2787.7	-5527.1	11.74	-1.19	0.01
9360.0	-11095139	-1403437	-4330196	5700.7	-2790.1	-5527.1	11.76	-1.19	-0.00
9362.0	-11083714	-1409019	-4341250	5724.2	-2792.5	-5527.1	11.76	-1.19	-0.01
9364.0	-11072242	-1414607	-4352304	5747.8	-2794.9	-5527.1	11.76	-1.20	-0.01
9366.0	-11060723	-1420199	-4363358	5771.3	-2797.3	-5527.1	11.76	-1.20	-0.01
9368.0	-11049157	-1425796	-4374413	5794.8	-2799.7	-5527.2	11.76	-1.20	-0.02
9370.0	-11037544	-1431398	-4385467	5818.3	-2802.1	-5527.2	11.76	-1.20	-0.02
9372.0	-11025884	-1437004	-4396521	5841.9	-2804.5	-5527.2	11.76	-1.20	-0.03
9374.0	-11014176	-1442616	-4407576	5865.4	-2806.9	-5527.3	11.76	-1.20	-0.03
9376.0	-11002422	-1448232	-4418631	5888.9	-2809.3	-5527.4	11.77	-1.21	-0.03
9378.0	-10990621	-1453853	-4429685	5912.5	-2811.7	-5527.4	11.79	-1.22	-0.04
9380.0	-10978772	-1459479	-4440740	5936.1	-2814.2	-5527.5	11.83	-1.23	-0.04
9382.0	-10966876	-1465110	-4451796	5959.8	-2816.6	-5527.6	11.85	-1.23	-0.05
9384.0	-10954933	-1470745	-4462851	5983.5	-2819.1	-5527.7	11.87	-1.23	-0.05
9386.0	-10942942	-1476386	-4473906	6007.3	-2821.5	-5527.8	11.89	-1.23	-0.05
9388.0	-10930904	-1482031	-4484962	6031.1	-2824.0	-5527.9	11.91	-1.24	-0.06
9390.0	-10918818	-1487682	-4496018	6054.9	-2826.5	-5528.0	11.93	-1.25	-0.07
9392.0	-10906684	-1493337	-4507074	6078.8	-2829.0	-5528.2	11.94	-1.26	-0.07
9394.0	-10894503	-1498998	-4518131	6102.7	-2831.5	-5528.3	11.96	-1.26	-0.08
9396.0	-10882274	-1504664	-4529188	6126.6	-2834.1	-5528.5	11.97	-1.26	-0.09
9398.0	-10869996	-1510334	-4540245	6150.5	-2836.6	-5528.7	11.98	-1.27	-0.09
9400.0	-10857671	-1516010	-4551302	6174.5	-2839.1	-5528.9	12.00	-1.28	-0.09
9402.0	-10845298	-1521691	-4562360	6198.6	-2841.7	-5529.0	12.02	-1.28	-0.10
9404.0	-10832877	-1527377	-4573419	6222.6	-2844.3	-5529.2	12.04	-1.29	-0.11
9406.0	-10820408	-1533068	-4584477	6246.7	-2846.9	-5529.5	12.06	-1.29	-0.12
9408.0	-10807890	-1538764	-4595536	6270.9	-2849.4	-5529.7	12.08	-1.30	-0.13
9410.0	-10795324	-1544466	-4606596	6295.1	-2852.1	-5530.0	12.10	-1.30	-0.14
9412.0	-10782710	-1550172	-4617656	6319.3	-2854.7	-5530.3	12.12	-1.31	-0.14
9414.0	-10770047	-1555884	-4628717	6343.5	-2857.3	-5530.6	12.12	-1.32	-0.14
9416.0	-10757336	-1561602	-4639779	6367.8	-2859.9	-5530.9	12.13	-1.33	-0.15
9418.0	-10744576	-1567324	-4650841	6392.1	-2862.6	-5531.1	12.16	-1.33	-0.15
9420.0	-10731767	-1573052	-4661903	6416.4	-2865.3	-5531.5	12.18	-1.34	-0.16
9422.0	-10718910	-1578785	-4672967	6440.8	-2868.0	-5531.8	12.21	-1.35	-0.17
9424.0	-10706004	-1584524	-4684030	6465.2	-2870.7	-5532.1	12.23	-1.36	-0.18
9426.0	-10693049	-1590268	-4695095	6489.7	-2873.4	-5532.5	12.25	-1.36	-0.19
9428.0	-10680045	-1596017	-4706161	6514.2	-2876.1	-5532.9	12.27	-1.37	-0.20

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	-10666992	-1601772	-4717227	6538.8	-2878.9	-5533.3	12.28	-1.38	-0.21
9432.0	-10653890	-1607533	-4728294	6563.4	-2881.6	-5533.7	12.30	-1.39	-0.21
9434.0	-10640739	-1613299	-4739362	6588.0	-2884.4	-5534.2	12.33	-1.39	-0.22
9436.0	-10627538	-1619071	-4750431	6612.7	-2887.2	-5534.6	12.35	-1.39	-0.23
9438.0	-10614288	-1624848	-4761500	6637.4	-2890.0	-5535.1	12.37	-1.40	-0.24
9440.0	-10600989	-1630631	-4772571	6662.1	-2892.8	-5535.6	12.38	-1.41	-0.25
9442.0	-10587640	-1636419	-4783643	6686.9	-2895.6	-5536.1	12.41	-1.42	-0.26
9444.0	-10574241	-1642213	-4794715	6711.8	-2898.5	-5536.6	12.44	-1.43	-0.27
9446.0	-10560792	-1648013	-4805789	6736.7	-2901.3	-5537.2	12.46	-1.44	-0.27
9448.0	-10547294	-1653818	-4816864	6761.6	-2904.2	-5537.7	12.49	-1.45	-0.28
9450.0	-10533746	-1659630	-4827940	6786.6	-2907.1	-5538.3	12.51	-1.46	-0.29
9452.0	-10520148	-1665447	-4839017	6811.7	-2910.1	-5538.9	12.55	-1.46	-0.31
9454.0	-10506499	-1671270	-4850096	6836.8	-2913.0	-5539.5	12.57	-1.47	-0.32
9456.0	-10492801	-1677099	-4861175	6861.9	-2915.9	-5540.2	12.58	-1.48	-0.33
9458.0	-10479051	-1682934	-4872256	6887.1	-2918.9	-5540.8	12.60	-1.49	-0.34
9460.0	-10465252	-1688775	-4883339	6912.3	-2921.9	-5541.5	12.63	-1.50	-0.34
9462.0	-10451402	-1694621	-4894422	6937.6	-2924.9	-5542.2	12.67	-1.50	-0.35
9464.0	-10437501	-1700474	-4905508	6963.0	-2927.9	-5542.9	12.71	-1.51	-0.36
9466.0	-10423550	-1706333	-4916594	6988.5	-2930.9	-5543.7	12.74	-1.52	-0.37
9468.0	-10409547	-1712198	-4927682	7014.0	-2934.0	-5544.4	12.76	-1.53	-0.38
9470.0	-10395494	-1718069	-4938772	7039.5	-2937.0	-5545.2	12.78	-1.54	-0.39
9472.0	-10381389	-1723946	-4949863	7065.1	-2940.1	-5546.0	12.81	-1.55	-0.41
9474.0	-10367234	-1729829	-4960956	7090.7	-2943.2	-5546.8	12.85	-1.56	-0.43
9476.0	-10353026	-1735719	-4972050	7116.5	-2946.4	-5547.7	12.89	-1.57	-0.44
9478.0	-10338768	-1741615	-4983146	7142.3	-2949.5	-5548.6	12.92	-1.58	-0.45
9480.0	-10324457	-1747517	-4994244	7168.2	-2952.7	-5549.5	12.96	-1.60	-0.46
9482.0	-10310095	-1753426	-5005344	7194.1	-2955.9	-5550.4	13.00	-1.61	-0.48
9484.0	-10295681	-1759341	-5016446	7220.2	-2959.1	-5551.4	13.03	-1.62	-0.49
9486.0	-10281214	-1765262	-5027550	7246.3	-2962.4	-5552.4	13.06	-1.63	-0.50
9488.0	-10266696	-1771190	-5038656	7272.4	-2965.7	-5553.4	13.10	-1.63	-0.50
9490.0	-10252125	-1777125	-5049763	7298.7	-2968.9	-5554.4	13.14	-1.63	-0.50
9492.0	-10237501	-1783066	-5060873	7325.0	-2972.2	-5555.4	13.18	-1.65	-0.50
9494.0	-10222825	-1789014	-5071985	7351.4	-2975.5	-5556.4	13.22	-1.66	-0.52
9496.0	-10208095	-1794968	-5083099	7377.8	-2978.9	-5557.5	13.25	-1.68	-0.54
9498.0	-10193313	-1800929	-5094215	7404.4	-2982.2	-5558.5	13.30	-1.70	-0.55
9500.0	-10178478	-1806897	-5105333	7431.1	-2985.6	-5559.6	13.35	-1.71	-0.55
9502.0	-10163589	-1812872	-5116453	7457.8	-2989.0	-5560.8	13.39	-1.71	-0.56
9504.0	-10148646	-1818853	-5127576	7484.6	-2992.5	-5561.9	13.42	-1.71	-0.57
9506.0	-10133650	-1824842	-5138701	7511.5	-2995.9	-5563.0	13.47	-1.72	-0.58
9508.0	-10118600	-1830837	-5149828	7538.5	-2999.4	-5564.2	13.53	-1.74	-0.59
9510.0	-10103496	-1836839	-5160957	7565.6	-3002.9	-5565.4	13.59	-1.75	-0.60
9512.0	-10088338	-1842848	-5172089	7592.8	-3006.4	-5566.6	13.64	-1.76	-0.61
9514.0	-10073125	-1848864	-5183224	7620.1	-3009.9	-5567.8	13.68	-1.76	-0.61

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	-10057857	-1854888	-5194361	7647.5	-3013.4	-5569.0	13.72	-1.78	-0.61
9518.0	-10042535	-1860918	-5205500	7675.0	-3017.0	-5570.3	13.78	-1.79	-0.61
9520.0	-10027157	-1866956	-5216642	7702.7	-3020.6	-5571.5	13.84	-1.80	-0.61
9522.0	-10011724	-1873001	-5227786	7730.4	-3024.2	-5572.7	13.90	-1.82	-0.62
9524.0	-9996235	-1879053	-5238933	7758.3	-3027.8	-5574.0	13.95	-1.82	-0.63
9526.0	-9980691	-1885112	-5250082	7786.2	-3031.5	-5575.2	14.00	-1.83	-0.62
9528.0	-9965090	-1891179	-5261234	7814.3	-3035.2	-5576.5	14.05	-1.84	-0.63
9530.0	-9949434	-1897253	-5272388	7842.4	-3038.8	-5577.7	14.13	-1.84	-0.60
9532.0	-9933721	-1903334	-5283544	7870.9	-3042.5	-5578.8	14.28	-1.82	-0.50
9534.0	-9917950	-1909422	-5294703	7899.6	-3046.1	-5579.7	14.44	-1.79	-0.37
9536.0	-9902122	-1915518	-5305863	7928.6	-3049.7	-5580.4	14.55	-1.78	-0.31
9538.0	-9886236	-1921621	-5317024	7957.7	-3053.2	-5581.0	14.60	-1.80	-0.34
9540.0	-9870291	-1927731	-5328187	7987.0	-3056.9	-5581.7	14.64	-1.83	-0.39
9542.0	-9854288	-1933849	-5339351	8016.3	-3060.6	-5582.5	14.67	-1.85	-0.42
9544.0	-9838226	-1939974	-5350517	8045.7	-3064.3	-5583.4	14.70	-1.87	-0.47
9546.0	-9822105	-1946106	-5361685	8075.1	-3068.0	-5584.4	14.74	-1.89	-0.52
9548.0	-9805925	-1952246	-5372855	8104.6	-3071.8	-5585.5	14.78	-1.93	-0.57
9550.0	-9789687	-1958393	-5384027	8134.2	-3075.7	-5586.7	14.81	-1.96	-0.61
9552.0	-9773388	-1964549	-5395201	8163.9	-3079.7	-5588.0	14.82	-1.98	-0.66
9554.0	-9757031	-1970712	-5406379	8193.6	-3083.7	-5589.3	14.85	-2.00	-0.72
9556.0	-9740614	-1976883	-5417559	8223.3	-3087.7	-5590.8	14.84	-2.02	-0.77
9558.0	-9724138	-1983062	-5428742	8253.2	-3091.7	-5592.4	14.84	-2.04	-0.82
S-IVB SECOND GUIDANCE CUTOFF									
9558.42	-9720670	-1984361	-5431091	8259.2	-3092.6	-5592.6	14.84	-2.04	-0.83
9560.0	-9707613	-1989246	-5439921	8268.3	-3090.6	-5584.5	3.70	1.91	6.45
9562.0	-9691068	-1995423	-5451078	8275.4	-3086.7	-5571.5	3.66	1.91	6.45
9564.0	-9674510	-2001593	-5462208	8282.7	-3082.9	-5558.5	3.62	1.91	6.46
9566.0	-9657938	-2007755	-5473312	8289.8	-3079.1	-5545.6	3.58	1.92	6.48
9568.0	-9641351	-2013909	-5484390.	8296.9	-3075.3	-5532.7	3.54	1.92	6.48
TRANSLUNAR INJECTION									
9568.42	-9637866	-2015201	-5486713	8298.4	-3074.4	-5529.9	3.54	1.92	6.48
9600.0	-9374106	-2111320	-5658106	8403.7	-3012.4	-5324.3	3.13	2.00	6.53
9650.0	-8950279	-2259397	-5916150	8544.1	-2909.9	-4997.4	2.49	2.10	6.53
9700.0	-8520228	-2402244	-6157887	8652.8	-2803.6	-4672.8	1.87	2.15	6.44
9750.0	-8085503	-2539720	-6383537	8731.3	-2695.3	-4354.5	1.28	2.17	6.28
9800.0	-7647564	-2671772	-6593501	8781.8	-2586.8	-4045.9	0.75	2.16	6.06
9850.0	-7207747	-2798421	-6788333	8806.9	-2479.4	-3749.7	0.27	2.13	5.79
9900.0	-6767252	-2919755	-6968705	8809.4	-2374.4	-3467.8	-0.16	2.07	5.49
9950.0	-6327136	-3035910	-7135369	8792.2	-2272.4	-3201.5	-0.52	2.00	5.16

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	-5888311	-3147063	-7289127	8758.2	-2174.4	-2951.6	-0.83	1.92	4.83
10050.0	-5451552	-3253420	-7430806	8710.0	-2080.6	-2718.3	-1.09	1.83	4.50
10100.0	-5017504	-3355204	-7561237	8650.1	-1991.5	-2501.6	-1.30	1.74	4.17
10150.0	-4586697	-3452648	-7681238	8580.8	-1907.1	-2301.1	-1.47	1.64	3.85
10200.0	-4159554	-3545992	-7791604	8503.8	-1827.5	-2116.1	-1.60	1.54	3.55
10250.0	-3736410	-3635474	-7893094	8421.1	-1752.6	-1945.9	-1.70	1.45	3.26
10300.0	-3317519	-3721326	-7986429	8333.9	-1682.3	-1789.8	-1.78	1.36	2.99
10350.0	-2903072	-3803776	-8072290	8243.6	-1616.4	-1646.8	-1.83	1.27	2.73
10400.0	-2493199	-3883040	-8151311	8151.1	-1554.8	-1516.1	-1.87	1.19	2.50
10450.0	-2087986	-3959325	-8224085	8057.3	-1497.2	-1396.8	-1.88	1.11	2.28
10500.0	-1687478	-4032828	-8291163	7963.0	-1443.5	-1288.0	-1.89	1.04	2.07
10550.0	-1291688	-4103734	-8353052	7868.6	-1393.3	-1189.1	-1.88	0.97	1.89
10600.0	-900606	-4172216	-8410223	7774.8	-1346.5	-1099.2	-1.87	0.90	1.71
10650.0	-514196	-4238438	-8463109	7681.8	-1302.9	-1017.6	-1.85	0.84	1.55
10700.0	-132410	-4302552	-8512108	7589.9	-1262.2	-943.6	-1.82	0.79	1.41
10750.0	244815	-4364702	-8557589	7499.4	-1224.2	-876.7	-1.80	0.73	1.27
10800.0	617554	-4425018	-8599888	7410.4	-1188.8	-816.3	-1.76	0.68	1.15
10850.0	985886	-4483626	-8639316	7323.1	-1155.9	-761.8	-1.73	0.64	1.03
10900.0	1349898	-4540642	-8676158	7237.6	-1125.1	-712.8	-1.69	0.59	0.93
10950.0	1709681	-4596172	-8710678	7154.0	-1096.4	-668.8	-1.65	0.55	0.83
11000.0	2065327	-4650317	-8743116	7072.2	-1069.7	-629.5	-1.62	0.52	0.74
11050.0	2416931	-4703171	-8773695	6992.3	-1044.7	-594.4	-1.58	0.48	0.66
	CSM SEPARATION								
11099.0	2757666	-4753796	-8802054	6915.8	-1021.9	-563.8	-1.54	0.45	0.59

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

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 TIMEBASE 6									
8638.6	-5781.969	-93.477	-3078.226	3665.1	-126.5	-6887.2	8.20	0.12	4.36
8640.0	-5776.833	-93.654	-3087.865	3676.6	-126.4	-6881.1	8.19	0.12	4.38
8650.0	-5739.658	-94.911	-3156.456	3758.3	-125.2	-6836.8	8.14	0.12	4.48
8660.0	-5701.669	-96.157	-3224.599	3839.4	-123.9	-6791.6	8.09	0.12	4.57
8670.0	-5662.872	-97.390	-3292.284	3920.0	-122.7	-6745.4	8.03	0.12	4.67
8680.0	-5623.271	-98.611	-3359.503	4000.1	-121.4	-6698.2	7.97	0.13	4.76
8690.0	-5582.871	-99.819	-3426.248	4079.5	-120.2	-6650.1	7.92	0.13	4.86
8700.0	-5541.681	-101.014	-3492.505	4158.4	-118.9	-6601.1	7.86	0.13	4.95
8710.0	-5499.705	-102.196	-3558.266	4236.7	-117.6	-6551.1	7.80	0.13	5.04
8720.0	-5456.951	-103.365	-3623.522	4314.4	-116.2	-6500.2	7.74	0.13	5.14
8730.0	-5413.421	-104.521	-3688.266	4391.4	-114.9	-6448.4	7.68	0.13	5.23
8740.0	-5369.123	-105.663	-3752.488	4467.9	-113.5	-6395.6	7.61	0.14	5.32
8750.0	-5324.064	-106.791	-3816.176	4543.7	-112.1	-6342.0	7.55	0.14	5.41
8760.0	-5278.251	-107.905	-3879.324	4618.9	-110.7	-6287.4	7.48	0.14	5.50
8770.0	-5231.689	-109.005	-3941.922	4693.4	-109.3	-6232.0	7.42	0.14	5.59
8780.0	-5184.385	-110.092	-4003.961	4767.3	-107.9	-6175.7	7.35	0.14	5.68
8790.0	-5136.346	-111.163	-4065.433	4840.4	-106.5	-6118.5	7.28	0.14	5.76
8800.0	-5087.579	-112.221	-4126.328	4912.9	-105.0	-6060.4	7.21	0.15	5.85
8810.0	-5038.090	-113.263	-4186.638	4984.7	-103.5	-6001.5	7.14	0.15	5.94
8820.0	-4987.887	-114.291	-4246.355	5055.8	-102.0	-5941.7	7.07	0.15	6.02
8830.0	-4936.976	-115.304	-4305.470	5126.2	-100.5	-5881.1	7.00	0.15	6.10
8840.0	-4885.365	-116.302	-4363.975	5195.8	-99.0	-5819.7	6.93	0.15	6.19
8850.0	-4833.062	-117.285	-4421.861	5264.7	-97.5	-5757.4	6.85	0.15	6.27
8860.0	-4780.073	-118.252	-4479.121	5332.9	-95.9	-5694.3	6.78	0.15	6.35
8870.0	-4726.406	-119.204	-4535.745	5400.3	-94.4	-5630.4	6.70	0.16	6.43
8880.0	-4672.069	-120.140	-4591.727	5467.0	-92.8	-5565.8	6.62	0.16	6.51
8890.0	-4617.070	-121.060	-4647.058	5532.8	-91.2	-5500.3	6.55	0.16	6.59
8900.0	-4561.415	-121.964	-4701.730	5597.9	-89.6	-5434.0	6.47	0.16	6.66
8910.0	-4505.114	-122.852	-4755.736	5662.2	-88.0	-5367.0	6.39	0.16	6.74
8920.0	-4448.174	-123.724	-4809.068	5725.7	-86.4	-5299.2	6.31	0.16	6.82
8930.0	-4390.603	-124.580	-4861.718	5788.4	-84.8	-5230.7	6.22	0.16	6.89
8940.0	-4332.409	-125.419	-4913.679	5850.2	-83.1	-5161.4	6.14	0.16	6.96
8950.0	-4273.601	-126.242	-4964.944	5911.3	-81.4	-5091.4	6.06	0.17	7.04
8960.0	-4214.186	-127.048	-5015.505	5971.5	-79.8	-5020.7	5.97	0.17	7.11
8970.0	-4154.174	-127.837	-5065.355	6030.8	-78.1	-4949.3	5.89	0.17	7.18
8980.0	-4093.573	-128.609	-5114.488	6089.3	-76.4	-4877.1	5.80	0.17	7.25
8990.0	-4032.391	-129.365	-5162.896	6146.9	-74.7	-4804.3	5.72	0.17	7.32
9000.0	-3970.638	-130.103	-5210.572	6203.7	-72.9	-4730.8	5.63	0.17	7.39
9010.0	-3908.321	-130.823	-5257.509	6259.6	-71.2	-4656.6	5.54	0.17	7.45
9020.0	-3845.450	-131.527	-5303.702	6314.5	-69.5	-4581.8	5.45	0.17	7.52

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	-3782.033	-132.213	-5349.143	6368.6	-67.7	-4506.3	5.36	0.17	7.58
9040.0	-3718.080	-132.881	-5393.826	6421.8	-65.9	-4430.2	5.27	0.18	7.64
9050.0	-3653.600	-133.531	-5437.744	6474.1	-64.2	-4353.4	5.18	0.18	7.71
9060.0	-3588.601	-134.164	-5480.892	6525.5	-62.4	-4276.1	5.09	0.18	7.77
9070.0	-3523.093	-134.779	-5523.263	6575.9	-60.6	-4198.1	5.00	0.18	7.83
9080.0	-3457.085	-135.376	-5564.852	6625.4	-58.8	-4119.5	4.90	0.18	7.89
9090.0	-3390.587	-135.955	-5605.652	6674.0	-57.0	-4040.4	4.81	0.18	7.94
9100.0	-3323.608	-136.515	-5645.658	6721.6	-55.2	-3960.7	4.71	0.18	8.00
9110.0	-3256.158	-137.058	-5684.864	6768.3	-53.3	-3880.4	4.62	0.18	8.06
9120.0	-3188.245	-137.582	-5723.264	6814.0	-51.5	-3799.6	4.52	0.18	8.11
9130.0	-3119.880	-138.088	-5760.853	6858.8	-49.6	-3718.2	4.42	0.18	8.16
9140.0	-3051.072	-138.575	-5797.626	6902.6	-47.8	-3636.3	4.33	0.18	8.22
9150.0	-2981.831	-139.043	-5833.577	6945.4	-45.9	-3553.9	4.23	0.19	8.27
9160.0	-2912.090	-139.493	-5868.730	6987.3	-44.1	-3470.9	4.14	0.19	8.32
9170.0	-2842.012	-139.924	-5903.022	7028.2	-42.2	-3387.5	4.03	0.19	8.36
9180.0	-2771.529	-140.337	-5936.479	7068.1	-40.3	-3303.6	3.93	0.19	8.42
9190.0	-2700.654	-140.730	-5969.093	7106.9	-38.4	-3219.3	3.83	0.19	8.46
9200.0	-2629.394	-141.105	-6000.862	7144.8	-36.5	-3134.5	3.74	0.19	8.50
9210.0	-2557.761	-141.460	-6031.781	7181.6	-34.6	-3049.2	3.64	0.19	8.55
	S-IVB SECOND IGNITION (STDV OPEN)								
9216.5	-2511.004	-141.682	-6051.421	7205.1	-33.4	-2993.5	3.59	0.19	8.59
9218.0	-2500.192	-141.731	-6055.902	7212.0	-33.1	-2981.2	6.46	0.15	7.41
9220.0	-2485.753	-141.797	-6061.851	7228.0	-32.8	-2967.6	8.70	0.17	6.42
9222.0	-2471.279	-141.862	-6067.773	7245.6	-32.5	-2954.8	8.84	0.13	6.32
9224.0	-2456.769	-141.927	-6073.671	7263.3	-32.3	-2942.2	8.91	0.11	6.32
9226.0	-2442.225	-141.991	-6079.543	7281.2	-32.0	-2929.5	8.93	0.16	6.41
9228.0	-2427.645	-142.054	-6085.389	7299.1	-31.6	-2916.5	8.97	0.22	6.53
9230.0	-2413.029	-142.117	-6091.209	7317.1	-31.1	-2903.3	9.04	0.28	6.69
9232.0	-2398.376	-142.178	-6097.002	7335.2	-30.4	-2889.8	9.09	0.29	6.81
9234.0	-2383.688	-142.238	-6102.768	7353.4	-29.9	-2876.1	9.10	0.27	6.84
9236.0	-2368.963	-142.298	-6108.507	7371.6	-29.3	-2862.6	9.09	0.26	6.82
9238.0	-2354.201	-142.356	-6114.218	7389.8	-28.7	-2848.9	9.09	0.28	6.82
9240.0	-2339.403	-142.413	-6119.903	7408.0	-28.2	-2835.2	9.10	0.29	6.85
9242.0	-2324.569	-142.468	-6125.559	7426.2	-27.6	-2821.5	9.11	0.29	6.88
9244.0	-2309.698	-142.523	-6131.189	7444.4	-27.0	-2807.8	9.10	0.28	6.89
9246.0	-2294.791	-142.576	-6136.790	7462.7	-26.4	-2794.0	9.10	0.29	6.89
9248.0	-2279.848	-142.629	-6142.365	7480.9	-25.8	-2780.2	9.10	0.31	6.91
9250.0	-2264.868	-142.680	-6147.911	7499.1	-25.2	-2766.4	9.10	0.32	6.93
9252.0	-2249.852	-142.729	-6153.430	7517.3	-24.5	-2752.5	9.09	0.32	6.94
9254.0	-2234.799	-142.778	-6158.921	7535.4	-23.9	-2738.6	9.09	0.31	6.95
9256.0	-2219.710	-142.825	-6164.384	7553.6	-23.3	-2724.7	9.10	0.31	6.96

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	-2204.584	-142.871	-6169.820	7571.8	-22.7	-2710.8	9.11	0.32	6.98
9260.0	-2189.422	-142.916	-6175.227	7590.1	-22.0	-2696.8	9.10	0.33	7.01
9262.0	-2174.224	-142.959	-6180.607	7608.3	-21.4	-2682.7	9.08	0.33	7.01
9264.0	-2158.989	-143.001	-6185.958	7626.5	-20.7	-2668.8	9.26	0.32	6.97
9266.0	-2143.718	-143.042	-6191.282	7645.2	-20.0	-2654.9	9.60	0.33	6.89
9268.0	-2128.408	-143.081	-6196.578	7664.9	-19.4	-2641.2	9.85	0.33	6.82
9270.0	-2113.058	-143.119	-6201.847	7684.6	-18.7	-2627.6	9.88	0.33	6.82
9272.0	-2097.669	-143.156	-6207.088	7704.4	-18.1	-2613.9	9.92	0.33	6.83
9274.0	-2082.240	-143.191	-6212.303	7724.3	-17.4	-2600.2	9.92	0.33	6.84
9276.0	-2066.772	-143.226	-6217.489	7744.1	-16.7	-2586.5	9.92	0.34	6.86
9278.0	-2051.264	-143.258	-6222.649	7764.0	-16.0	-2572.8	9.92	0.35	6.87
9280.0	-2035.716	-143.290	-6227.781	7783.8	-15.3	-2559.1	9.93	0.34	6.88
9282.0	-2020.128	-143.320	-6232.885	7803.7	-14.6	-2545.3	9.93	0.34	6.89
9284.0	-2004.501	-143.348	-6237.962	7823.6	-13.9	-2531.5	9.94	0.35	6.91
9286.0	-1988.834	-143.375	-6243.011	7843.5	-13.2	-2517.7	9.96	0.35	6.92
9288.0	-1973.127	-143.401	-6248.033	7863.4	-12.5	-2503.8	9.96	0.35	6.93
9290.0	-1957.380	-143.426	-6253.026	7883.4	-11.8	-2490.0	9.97	0.35	6.94
9292.0	-1941.594	-143.448	-6257.992	7903.3	-11.1	-2476.1	9.96	0.35	6.95
9294.0	-1925.767	-143.470	-6262.931	7923.2	-10.4	-2462.2	9.96	0.35	6.96
9296.0	-1909.901	-143.490	-6267.841	7943.2	-9.7	-2448.3	9.97	0.34	6.96
9298.0	-1893.995	-143.509	-6272.724	7963.1	-9.0	-2434.3	9.98	0.34	6.97
9300.0	-1878.048	-143.526	-6277.578	7983.1	-8.4	-2420.4	9.98	0.34	6.98
9302.0	-1862.062	-143.542	-6282.405	8003.0	-7.7	-2406.4	9.98	0.35	6.98
9304.0	-1846.036	-143.557	-6287.204	8023.0	-7.0	-2392.4	9.99	0.35	6.99
9306.0	-1829.970	-143.570	-6291.975	8043.0	-6.3	-2378.4	10.01	0.36	7.01
9308.0	-1813.864	-143.582	-6296.718	8063.0	-5.6	-2364.4	10.01	0.35	7.02
9310.0	-1797.718	-143.593	-6301.433	8083.1	-4.8	-2350.4	10.01	0.35	7.03
9312.0	-1781.532	-143.602	-6306.119	8103.1	-4.1	-2336.3	10.02	0.35	7.04
9314.0	-1765.306	-143.609	-6310.778	8123.2	-3.5	-2322.2	10.03	0.35	7.05
9316.0	-1749.039	-143.615	-6315.408	8143.2	-2.8	-2308.1	10.03	0.34	7.06
9318.0	-1732.733	-143.620	-6320.010	8163.3	-2.1	-2294.0	10.03	0.34	7.07
9320.0	-1716.386	-143.624	-6324.584	8183.4	-1.4	-2279.8	10.04	0.34	7.08
9322.0	-1699.999	-143.626	-6329.130	8203.5	-0.7	-2265.7	10.05	0.34	7.09
9324.0	-1683.572	-143.627	-6333.647	8223.6	-0.0	-2251.5	10.06	0.34	7.10
9326.0	-1667.105	-143.626	-6338.136	8243.7	0.7	-2237.3	10.08	0.34	7.11
9328.0	-1650.597	-143.624	-6342.596	8263.9	1.3	-2223.1	10.08	0.34	7.12
9330.0	-1634.049	-143.621	-6347.028	8284.1	2.0	-2208.8	10.08	0.34	7.12
9332.0	-1617.461	-143.616	-6351.431	8304.3	2.7	-2194.6	10.09	0.33	7.12
9334.0	-1600.832	-143.610	-6355.806	8324.5	3.4	-2180.3	10.10	0.33	7.14
9336.0	-1584.163	-143.602	-6360.153	8344.7	4.0	-2166.1	10.11	0.33	7.15
9338.0	-1567.453	-143.594	-6364.470	8364.9	4.7	-2151.8	10.12	0.33	7.16
9340.0	-1550.703	-143.584	-6368.760	8385.2	5.3	-2137.4	10.13	0.33	7.17
9342.0	-1533.912	-143.572	-6373.020	8405.5	6.0	-2123.1	10.15	0.33	7.18

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	-1517.081	-143.560	-6377.252	8425.8	6.6	-2108.7	10.16	0.33	7.19
9346.0	-1500.209	-143.546	-6381.455	8446.1	7.3	-2094.3	10.16	0.33	7.20
9348.0	-1483.297	-143.531	-6385.629	8466.4	8.0	-2079.9	10.16	0.32	7.19
9350.0	-1466.343	-143.514	-6389.775	8486.8	8.6	-2065.5	10.17	0.32	7.20
9352.0	-1449.350	-143.496	-6393.891	8507.2	9.3	-2051.1	10.19	0.32	7.21
9354.0	-1432.315	-143.477	-6397.979	8527.6	9.9	-2036.7	10.20	0.32	7.22
9356.0	-1415.239	-143.457	-6402.038	8548.0	10.5	-2022.3	10.23	0.31	7.24
9358.0	-1398.123	-143.435	-6406.068	8568.5	11.2	-2007.8	10.26	0.31	7.26
9360.0	-1380.965	-143.412	-6410.069	8589.0	11.8	-1993.2	10.27	0.31	7.27
9362.0	-1363.767	-143.388	-6414.041	8609.6	12.4	-1978.7	10.28	0.31	7.27
9364.0	-1346.527	-143.362	-6417.984	8630.1	13.0	-1964.2	10.27	0.31	7.26
9366.0	-1329.246	-143.336	-6421.898	8650.7	13.7	-1949.7	10.27	0.31	7.26
9368.0	-1311.924	-143.308	-6425.783	8671.2	14.3	-1935.1	10.27	0.31	7.26
9370.0	-1294.561	-143.278	-6429.639	8691.8	14.9	-1920.6	10.27	0.31	7.26
9372.0	-1277.157	-143.248	-6433.465	8712.3	15.5	-1906.1	10.27	0.31	7.26
9374.0	-1259.712	-143.216	-6437.263	8732.9	16.1	-1891.6	10.27	0.31	7.26
9376.0	-1242.226	-143.183	-6441.032	8753.4	16.8	-1877.0	10.28	0.31	7.27
9378.0	-1224.698	-143.149	-6444.771	8774.0	17.4	-1862.5	10.30	0.30	7.28
9380.0	-1207.129	-143.114	-6448.482	8794.7	18.0	-1847.9	10.33	0.30	7.30
9382.0	-1189.519	-143.077	-6452.163	8815.4	18.6	-1833.3	10.35	0.30	7.31
9384.0	-1171.868	-143.040	-6455.815	8836.1	19.2	-1818.7	10.37	0.30	7.33
9386.0	-1154.175	-143.001	-6459.437	8856.9	19.8	-1804.0	10.38	0.30	7.33
9388.0	-1136.441	-142.960	-6463.031	8877.6	20.4	-1789.3	10.40	0.29	7.34
9390.0	-1118.664	-142.919	-6466.595	8898.5	20.9	-1774.7	10.42	0.29	7.35
9392.0	-1100.847	-142.877	-6470.129	8919.3	21.5	-1760.0	10.44	0.29	7.35
9394.0	-1082.987	-142.833	-6473.635	8940.2	22.1	-1745.3	10.45	0.29	7.36
9396.0	-1065.086	-142.788	-6477.111	8961.1	22.7	-1730.5	10.46	0.29	7.36
9398.0	-1047.142	-142.742	-6480.557	8982.1	23.3	-1715.8	10.47	0.28	7.37
9400.0	-1029.157	-142.695	-6483.974	9003.1	23.8	-1701.1	10.49	0.28	7.38
9402.0	-1011.130	-142.647	-6487.361	9024.1	24.4	-1686.3	10.51	0.28	7.39
9404.0	-993.061	-142.598	-6490.719	9045.1	24.9	-1671.5	10.53	0.28	7.39
9406.0	-974.950	-142.547	-6494.047	9066.2	25.5	-1656.7	10.55	0.28	7.40
9408.0	-956.796	-142.496	-6497.346	9087.3	26.0	-1641.9	10.57	0.28	7.40
9410.0	-938.600	-142.443	-6500.615	9108.5	26.6	-1627.1	10.59	0.28	7.41
9412.0	-920.362	-142.389	-6503.854	9129.7	27.2	-1612.3	10.60	0.27	7.42
9414.0	-902.082	-142.335	-6507.064	9150.9	27.7	-1597.4	10.61	0.26	7.43
9416.0	-883.759	-142.279	-6510.244	9172.1	28.2	-1582.6	10.62	0.26	7.43
9418.0	-865.393	-142.222	-6513.394	9193.4	28.7	-1567.7	10.64	0.26	7.44
9420.0	-846.985	-142.164	-6516.515	9214.7	29.3	-1552.8	10.66	0.26	7.45
9422.0	-828.534	-142.105	-6519.605	9236.1	29.8	-1537.9	10.69	0.26	7.46
9424.0	-810.041	-142.045	-6522.666	9257.5	30.3	-1523.0	10.71	0.25	7.46
9426.0	-791.504	-141.983	-6525.697	9278.9	30.8	-1508.1	10.73	0.25	7.47
9428.0	-772.925	-141.921	-6528.699	9300.4	31.3	-1493.1	10.75	0.25	7.47

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	-754.303	-141.858	-6531.670	9321.9	31.8	-1478.2	10.77	0.24	7.47
9432.0	-735.637	-141.794	-6534.611	9343.5	32.3	-1463.2	10.79	0.24	7.49
9434.0	-716.929	-141.729	-6537.523	9365.1	32.8	-1448.2	10.81	0.25	7.50
9436.0	-698.177	-141.663	-6540.404	9386.8	33.3	-1433.2	10.83	0.25	7.51
9438.0	-679.382	-141.596	-6543.256	9408.4	33.8	-1418.2	10.85	0.24	7.51
9440.0	-660.543	-141.528	-6546.077	9430.2	34.2	-1403.2	10.87	0.24	7.51
9442.0	-641.661	-141.459	-6548.869	9451.9	34.7	-1388.2	10.89	0.23	7.52
9444.0	-622.735	-141.389	-6551.630	9473.7	35.2	-1373.1	10.92	0.23	7.53
9446.0	-603.766	-141.318	-6554.361	9495.6	35.6	-1358.1	10.94	0.22	7.54
9448.0	-584.753	-141.247	-6557.062	9517.5	36.1	-1343.0	10.97	0.22	7.55
9450.0	-565.696	-141.174	-6559.733	9539.5	36.5	-1327.9	10.99	0.22	7.56
9452.0	-546.595	-141.101	-6562.374	9561.5	37.0	-1312.7	11.03	0.22	7.57
9454.0	-527.450	-141.026	-6564.984	9583.6	37.4	-1297.6	11.05	0.22	7.57
9456.0	-508.260	-140.951	-6567.564	9605.7	37.9	-1282.4	11.07	0.22	7.57
9458.0	-489.027	-140.875	-6570.114	9627.9	38.3	-1267.3	11.09	0.21	7.58
9460.0	-469.749	-140.798	-6572.633	9650.1	38.7	-1252.1	11.12	0.21	7.60
9462.0	-450.426	-140.720	-6575.122	9672.4	39.2	-1236.9	11.15	0.21	7.61
9464.0	-431.059	-140.641	-6577.581	9694.7	39.6	-1221.7	11.18	0.21	7.63
9466.0	-411.647	-140.561	-6580.009	9717.1	40.0	-1206.4	11.21	0.21	7.64
9468.0	-392.191	-140.481	-6582.407	9739.6	40.4	-1191.1	11.24	0.20	7.65
9470.0	-372.689	-140.400	-6584.773	9762.1	40.8	-1175.8	11.26	0.20	7.65
9472.0	-353.142	-140.318	-6587.110	9784.6	41.2	-1160.5	11.29	0.19	7.66
9474.0	-333.550	-140.235	-6589.415	9807.3	41.6	-1145.2	11.34	0.20	7.67
9476.0	-313.913	-140.152	-6591.690	9830.0	42.0	-1129.8	11.38	0.19	7.68
9478.0	-294.230	-140.067	-6593.935	9852.8	42.4	-1114.5	11.41	0.19	7.69
9480.0	-274.502	-139.982	-6596.148	9875.6	42.7	-1099.1	11.45	0.18	7.71
9482.0	-254.728	-139.896	-6598.331	9898.6	43.1	-1083.7	11.49	0.18	7.72
9484.0	-234.907	-139.810	-6600.483	9921.6	43.4	-1068.2	11.52	0.18	7.72
9486.0	-215.041	-139.723	-6602.604	9944.7	43.8	-1052.8	11.55	0.18	7.73
9488.0	-195.129	-139.635	-6604.694	9967.8	44.2	-1037.3	11.58	0.18	7.76
9490.0	-175.170	-139.546	-6606.753	9991.0	44.5	-1021.7	11.61	0.17	7.79
9492.0	-155.164	-139.456	-6608.781	10014.3	44.9	-1006.1	11.65	0.17	7.81
9494.0	-135.113	-139.366	-6610.778	10037.6	45.2	-990.5	11.69	0.17	7.81
9496.0	-115.014	-139.276	-6612.743	10061.0	45.5	-974.9	11.73	0.16	7.82
9498.0	-94.868	-139.184	-6614.677	10084.6	45.8	-959.2	11.77	0.15	7.84
9500.0	-74.676	-139.092	-6616.580	10108.1	46.1	-943.5	11.82	0.14	7.87
9502.0	-54.436	-139.000	-6618.451	10131.8	46.4	-927.8	11.85	0.15	7.89
9504.0	-34.148	-138.907	-6620.291	10155.6	46.7	-912.0	11.88	0.15	7.90
9506.0	-13.813	-138.813	-6622.099	10179.4	47.0	-896.2	11.92	0.15	7.92
9508.0	6.569	-138.719	-6623.875	10203.3	47.3	-880.3	11.98	0.14	7.95
9510.0	27.000	-138.624	-6625.620	10227.3	47.6	-864.4	12.03	0.14	7.97
9512.0	47.478	-138.528	-6627.333	10251.4	47.9	-848.4	12.08	0.14	8.00
9514.0	68.005	-138.432	-6629.014	10275.6	48.1	-832.4	12.11	0.14	8.02

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	88.581	-138.336	-6630.663	10299.9	48.4	-816.3	12.15	0.13	8.05
9518.0	109.205	-138.239	-6632.279	10324.2	48.7	-800.2	12.19	0.12	8.08
9520.0	129.878	-138.141	-6633.863	10348.7	48.9	-784.0	12.25	0.11	8.12
9522.0	150.600	-138.043	-6635.415	10373.2	49.1	-767.8	12.30	0.11	8.14
9524.0	171.371	-137.944	-6636.934	10397.9	49.4	-751.4	12.35	0.11	8.17
9526.0	192.191	-137.846	-6638.421	10422.6	49.6	-735.1	12.38	0.11	8.21
9528.0	213.061	-137.746	-6639.875	10447.4	49.8	-718.6	12.43	0.10	8.23
9530.0	233.981	-137.646	-6641.295	10472.4	50.0	-702.1	12.48	0.10	8.30
9532.0	254.951	-137.546	-6642.683	10497.4	50.2	-685.3	12.54	0.09	8.48
9534.0	275.971	-137.446	-6644.036	10522.5	50.4	-668.2	12.59	0.09	8.68
9536.0	297.041	-137.345	-6645.355	10547.8	50.5	-650.7	12.65	0.08	8.80
9538.0	318.162	-137.243	-6646.639	10573.1	50.7	-633.1	12.71	0.08	8.80
9540.0	339.333	-137.142	-6647.888	10598.6	50.9	-615.5	12.77	0.07	8.78
9542.0	360.556	-137.040	-6649.101	10624.2	51.0	-598.0	12.82	0.06	8.77
9544.0	381.830	-136.938	-6650.279	10649.9	51.1	-580.4	12.86	0.07	8.75
9546.0	403.156	-136.835	-6651.423	10675.7	51.3	-562.9	12.92	0.07	8.73
9548.0	424.533	-136.733	-6652.531	10701.6	51.4	-545.5	12.99	0.06	8.71
9550.0	445.962	-136.630	-6653.605	10727.6	51.5	-528.1	13.04	0.05	8.69
9552.0	467.444	-136.527	-6654.644	10753.8	51.6	-510.8	13.08	0.04	8.66
9554.0	488.978	-136.423	-6655.648	10780.0	51.7	-493.4	13.13	0.04	8.63
9556.0	510.564	-136.319	-6656.617	10806.3	51.8	-476.2	13.16	0.05	8.59
9558.0	532.203	-136.216	-6657.553	10832.9	51.9	-459.0	13.18	0.05	8.55
S-IVB SECOND GUIDANCE CUTOFF									
9558.42	536.754	-136.194	-6657.744	10838.2	51.9	-455.3	13.19	0.05	8.54
9560.0	553.881	-136.111	-6658.453	10841.0	52.3	-441.3	-0.69	0.20	8.93
9562.0	575.563	-136.007	-6659.318	10839.4	52.6	-423.5	-0.73	0.19	8.91
9564.0	597.240	-135.901	-6660.147	10837.8	53.0	-405.7	-0.77	0.19	8.89
9566.0	618.914	-135.795	-6660.941	10836.2	53.3	-388.0	-0.81	0.18	8.88
9568.0	640.585	-135.688	-6661.699	10834.6	53.7	-370.2	-0.85	0.17	8.86
TRANSLUNAR INJECTION									
9568.42	645.135	-135.665	-6661.853	10834.2	53.8	-366.5	-0.86	0.17	8.86
9600.0	986.782	-133.880	-6669.037	10800.4	59.2	-89.4	-1.28	0.17	8.68
9650.0	1524.938	-130.709	-6662.794	10720.6	67.5	336.1	-1.90	0.16	8.33
9700.0	2058.355	-127.137	-6635.756	10611.6	75.3	741.8	-2.45	0.15	7.90
9750.0	2585.677	-123.191	-6588.994	10477.4	82.4	1124.7	-2.91	0.14	7.41
9800.0	3105.743	-118.902	-6523.706	10322.2	89.0	1482.6	-3.29	0.12	6.90
9850.0	3617.615	-114.300	-6441.171	10150.2	95.0	1814.4	-3.58	0.11	6.37
9900.0	4120.553	-109.415	-6342.703	9965.5	100.3	2119.9	-3.80	0.10	5.85
9950.0	4614.006	-104.276	-6229.614	9771.4	105.1	2399.4	-3.95	0.09	5.33

TABLE B-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	5097.594	-98.912	-6103.185	9571.3	109.4	2653.7	-4.05	0.08	4.84
10050.0	5571.079	-93.350	-5964.648	9367.8	113.1	2883.9	-4.09	0.07	4.38
10100.0	6034.353	-87.613	-5815.166	9163.2	116.3	3091.7	-4.09	0.06	3.94
10150.0	6487.407	-81.724	-5655.826	8959.3	119.2	3278.5	-4.06	0.05	3.54
10200.0	6930.318	-75.703	-5487.635	8757.6	121.6	3446.0	-4.00	0.04	3.17
10250.0	7363.228	-69.570	-5311.518	8559.4	123.7	3595.8	-3.93	0.04	2.83
10300.0	7786.329	-63.340	-5128.319	8365.4	125.5	3729.5	-3.83	0.03	2.52
10350.0	8199.851	-57.029	-4938.808	8176.3	126.9	3848.6	-3.73	0.03	2.25
10400.0	8604.052	-50.650	-4743.679	7992.6	128.2	3954.5	-3.62	0.02	1.99
10450.0	8999.208	-44.215	-4543.561	7814.6	129.2	4048.4	-3.50	0.02	1.77
10500.0	9385.607	-37.733	-4339.018	7642.3	130.0	4131.6	-3.39	0.01	1.56
10550.0	9763.541	-31.215	-4130.560	7476.0	130.7	4205.2	-3.27	0.01	1.38
10600.0	10133.304	-24.668	-3918.644	7315.5	131.2	4270.1	-3.15	0.01	1.22
10650.0	10495.190	-18.099	-3703.681	7160.9	131.5	4327.2	-3.04	0.01	1.07
10700.0	10849.484	-11.516	-3486.037	7011.9	131.8	4377.4	-2.92	0.00	0.94
10750.0	11196.470	-4.922	-3266.044	6868.4	131.9	4421.3	-2.81	0.00	0.82
10800.0	11536.419	1.677	-3043.997	6730.4	132.0	4459.6	-2.71	0.00	0.71
10850.0	11869.596	8.276	-2820.163	6597.5	132.0	4492.9	-2.61	-0.00	0.62
10900.0	12196.257	14.873	-2594.780	6469.7	131.9	4521.7	-2.51	-0.00	0.53
10950.0	12516.645	21.463	-2368.063	6346.6	131.7	4546.4	-2.41	-0.00	0.46
11000.0	12830.997	28.045	-2140.203	6228.2	131.5	4567.4	-2.32	-0.00	0.39
11050.0	13139.538	34.615	-1911.373	6114.2	131.3	4585.2	-2.24	-0.00	0.32
CSM SEPARATION									
11099.0	13436.471	41.041	-1686.331	6006.5	131.0	4599.8	-2.16	-0.01	0.27

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES

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 TIMEBASE 6									
8638.6	6550.983	95.6068	-32.5433	90.02	0.02	7400.1	90.02	0.02	7802.8	179027
8640.0	6550.991	95.7143	-32.5433	89.96	0.02	7400.1	89.96	0.02	7802.8	179035
8650.0	6551.023	96.4821	-32.5402	89.50	0.02	7400.0	89.53	0.02	7802.7	179065
8660.0	6551.054	97.2497	-32.5320	89.04	0.02	7400.0	89.09	0.02	7802.7	179094
8670.0	6551.087	98.0171	-32.5185	88.58	0.02	7400.0	88.65	0.02	7802.7	179122
8680.0	6551.119	98.7843	-32.4999	88.12	0.03	7400.0	88.22	0.02	7802.7	179148
8690.0	6551.151	99.5511	-32.4761	87.66	0.03	7399.9	87.78	0.02	7802.6	179172
8700.0	6551.185	100.3173	-32.4471	87.20	0.03	7399.9	87.35	0.02	7802.6	179196
8710.0	6551.218	101.0830	-32.4129	86.75	0.03	7399.9	86.91	0.02	7802.6	179218
8720.0	6551.252	101.8480	-32.3736	86.29	0.03	7399.9	86.48	0.03	7802.6	179239
8730.0	6551.287	102.6123	-32.3292	85.83	0.03	7399.9	86.05	0.03	7802.5	179258
8740.0	6551.321	103.3758	-32.2796	85.38	0.03	7399.9	85.62	0.03	7802.5	179276
8750.0	6551.356	104.1383	-32.2249	84.92	0.03	7399.8	85.19	0.03	7802.5	179292
8760.0	6551.392	104.8997	-32.1651	84.47	0.03	7399.8	84.76	0.03	7802.5	179307
8770.0	6551.427	105.6601	-32.1002	84.02	0.03	7399.8	84.33	0.03	7802.4	179321
8780.0	6551.464	106.4193	-32.0303	83.57	0.03	7399.8	83.90	0.03	7802.4	179334
8790.0	6551.500	107.1772	-31.9553	83.12	0.03	7399.8	83.48	0.03	7802.4	179345
8800.0	6551.537	107.9337	-31.8753	82.68	0.03	7399.8	83.06	0.03	7802.3	179355
8810.0	6551.574	108.6889	-31.7903	82.23	0.03	7399.8	82.64	0.03	7802.3	179364
8820.0	6551.611	109.4425	-31.7004	81.79	0.03	7399.8	82.22	0.03	7802.3	179371
8830.0	6551.649	110.1945	-31.6055	81.35	0.03	7399.8	81.80	0.03	7802.3	179377
8840.0	6551.687	110.9448	-31.5057	80.91	0.03	7399.8	81.38	0.03	7802.3	179381
8850.0	6551.725	111.6934	-31.4011	80.47	0.03	7399.8	80.97	0.03	7802.2	179385
8860.0	6551.763	112.4402	-31.2915	80.04	0.03	7399.8	80.56	0.03	7802.2	179387
8870.0	6551.802	113.1851	-31.1772	79.61	0.03	7399.8	80.15	0.03	7802.2	179387
8880.0	6551.841	113.9281	-31.0581	79.18	0.03	7399.8	79.74	0.03	7802.2	179387
8890.0	6551.880	114.6690	-30.9343	78.75	0.03	7399.8	79.34	0.03	7802.2	179385
8900.0	6551.919	115.4079	-30.8057	78.33	0.03	7399.8	78.94	0.03	7802.1	179382
8910.0	6551.959	116.1446	-30.6724	77.91	0.03	7399.8	78.54	0.03	7802.1	179378
8920.0	6551.999	116.8792	-30.5346	77.49	0.03	7399.8	78.14	0.03	7802.1	179373
8930.0	6552.039	117.6115	-30.3921	77.07	0.03	7399.9	77.75	0.03	7802.1	179366
8940.0	6552.079	118.3415	-30.2450	76.66	0.03	7399.9	77.36	0.03	7802.1	179358
8950.0	6552.119	119.0692	-30.0935	76.25	0.03	7399.9	76.97	0.03	7802.1	179349
8960.0	6552.160	119.7945	-29.9375	75.84	0.03	7399.9	76.59	0.03	7802.1	179339
8970.0	6552.201	120.5173	-29.7770	75.44	0.03	7400.0	76.21	0.03	7802.0	179328
8980.0	6552.241	121.2376	-29.6121	75.04	0.03	7400.0	75.83	0.03	7802.0	179316
8990.0	6552.283	121.9554	-29.4429	74.64	0.03	7400.0	75.45	0.03	7802.0	179303
9000.0	6552.324	122.6706	-29.2694	74.25	0.03	7400.0	75.08	0.03	7802.0	179289
9010.0	6552.365	123.3833	-29.0916	73.86	0.03	7400.1	74.71	0.03	7802.0	179273
9020.0	6552.407	124.0933	-28.9096	73.47	0.03	7400.1	74.35	0.03	7802.0	179257

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	6552.449	124.8006	-28.7234	73.09	0.03	7400.1	73.98	0.03	7802.0	179240
9040.0	6552.490	125.5052	-28.5332	72.71	0.03	7400.2	73.63	0.03	7802.0	179222
9050.0	6552.533	126.2071	-28.3388	72.33	0.03	7400.2	73.27	0.03	7802.0	179203
9060.0	6552.575	126.9062	-28.1404	71.96	0.03	7400.2	72.92	0.03	7802.0	179184
9070.0	6552.617	127.6026	-27.9381	71.59	0.03	7400.3	72.57	0.03	7802.0	179163
9080.0	6552.659	128.2961	-27.7318	71.23	0.03	7400.3	72.23	0.03	7801.9	179142
9090.0	6552.702	128.9869	-27.5216	70.87	0.03	7400.4	71.89	0.03	7801.9	179120
9100.0	6552.745	129.6748	-27.3076	70.51	0.03	7400.4	71.55	0.03	7801.9	179097
9110.0	6552.787	130.3599	-27.0898	70.16	0.03	7400.5	71.22	0.03	7802.0	179073
9120.0	6552.830	131.0421	-26.8683	69.81	0.03	7400.5	70.89	0.03	7802.0	179049
9130.0	6552.873	131.7215	-26.6431	69.46	0.03	7400.6	70.56	0.03	7802.0	179024
9140.0	6552.916	132.3980	-26.4143	69.12	0.03	7400.6	70.24	0.03	7802.0	178999
9150.0	6552.959	133.0716	-26.1819	68.78	0.03	7400.7	69.92	0.03	7802.0	178973
9160.0	6552.993	133.7431	-25.9457	68.45	0.03	7400.8	69.61	0.03	7802.1	178937
9170.0	6553.036	134.4109	-25.7063	68.12	0.03	7400.9	69.30	0.03	7802.1	178909
9180.0	6553.079	135.0759	-25.4635	67.80	0.03	7401.0	68.99	0.03	7802.1	178882
9190.0	6553.122	135.7381	-25.2172	67.47	0.03	7401.1	68.69	0.03	7802.2	178854
9200.0	6553.165	136.3973	-24.9677	67.16	0.03	7401.1	68.39	0.03	7802.2	178825
9210.0	6553.208	137.0537	-24.7148	66.84	0.03	7401.2	68.10	0.03	7802.2	178796
	S-IVB SECOND IGNITION (STDV OPEN)									
9216.5	6553.237	137.4789	-24.5488	66.64	0.03	7401.3	67.91	0.03	7802.3	178777
9218.0	6553.243	137.5768	-24.5102	66.60	0.03	7402.9	67.87	0.03	7803.9	178772
9220.0	6553.251	137.7074	-24.4587	66.54	0.03	7412.6	67.81	0.03	7813.6	178766
9222.0	6553.260	137.8381	-24.4070	66.48	0.03	7424.1	67.75	0.03	7825.0	178760
9224.0	6553.269	137.9688	-24.3551	66.42	0.04	7435.8	67.69	0.03	7836.7	178755
9226.0	6553.279	138.0997	-24.3030	66.36	0.04	7447.5	67.63	0.04	7848.5	178750
9228.0	6553.289	138.2306	-24.2507	66.30	0.04	7459.3	67.58	0.04	7860.2	178745
9230.0	6553.299	138.3617	-24.1982	66.24	0.04	7471.2	67.52	0.04	7872.1	178741
9232.0	6553.309	138.4928	-24.1454	66.19	0.04	7483.0	67.47	0.03	7883.9	178736
9234.0	6553.318	138.6240	-24.0925	66.13	0.03	7495.0	67.41	0.03	7895.9	178730
9236.0	6553.327	138.7554	-24.0393	66.07	0.03	7507.1	67.35	0.03	7908.0	178724
9238.0	6553.335	138.8868	-23.9860	66.02	0.03	7519.1	67.30	0.03	7920.0	178717
9240.0	6553.342	139.0183	-23.9325	65.96	0.03	7531.2	67.24	0.03	7932.1	178710
9242.0	6553.350	139.1500	-23.8787	65.90	0.03	7543.3	67.19	0.03	7944.2	178703
9244.0	6553.357	139.2817	-23.8247	65.84	0.03	7555.5	67.13	0.03	7956.4	178695
9246.0	6553.365	139.4135	-23.7706	65.79	0.03	7567.7	67.08	0.03	7968.6	178688
9248.0	6553.373	139.5454	-23.7162	65.73	0.03	7579.9	67.02	0.03	7980.8	178680
9250.0	6553.380	139.6775	-23.6616	65.68	0.03	7592.2	66.97	0.03	7993.1	178673
9252.0	6553.389	139.8096	-23.6068	65.62	0.03	7604.5	66.91	0.03	8005.4	178666
9254.0	6553.398	139.9418	-23.5519	65.56	0.03	7616.8	66.86	0.03	8017.7	178660
9256.0	6553.407	140.0741	-23.4967	65.51	0.04	7629.2	66.81	0.04	8030.1	178654

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	6553.418	140.2066	-23.4412	65.45	0.04	7641.6	66.75	0.04	8042.5	178650
9260.0	6553.429	140.3391	-23.3856	65.40	0.04	7654.1	66.70	0.04	8055.0	178646
9262.0	6553.441	140.4717	-23.3298	65.34	0.05	7666.5	66.64	0.05	8067.4	178643
9264.0	6553.455	140.6045	-23.2738	65.29	0.05	7679.1	66.59	0.05	8080.0	178641
9266.0	6553.469	140.7373	-23.2175	65.23	0.06	7692.2	66.54	0.05	8093.1	178641
9268.0	6553.485	140.8703	-23.1611	65.18	0.06	7706.3	66.48	0.06	8107.2	178641
9270.0	6553.503	141.0033	-23.1044	65.12	0.07	7720.6	66.43	0.07	8121.5	178644
9272.0	6553.522	141.1366	-23.0475	65.07	0.07	7734.9	66.37	0.07	8135.8	178648
9274.0	6553.544	141.2699	-22.9904	65.01	0.08	7749.3	66.32	0.08	8150.2	178653
9276.0	6553.567	141.4034	-22.9330	64.96	0.09	7763.8	66.27	0.08	8164.7	178661
9278.0	6553.592	141.5370	-22.8755	64.91	0.10	7778.3	66.21	0.09	8179.2	178671
9280.0	6553.619	141.6708	-22.8177	64.85	0.11	7792.8	66.16	0.10	8193.7	178683
9282.0	6553.649	141.8046	-22.7597	64.80	0.11	7807.4	66.11	0.11	8208.3	178697
9284.0	6553.682	141.9387	-22.7014	64.74	0.12	7822.1	66.06	0.12	8223.0	178714
9286.0	6553.717	142.0728	-22.6430	64.69	0.13	7836.8	66.00	0.13	8237.7	178734
9288.0	6553.755	142.2071	-22.5843	64.64	0.15	7851.5	65.95	0.14	8252.4	178756
9290.0	6553.797	142.3415	-22.5253	64.58	0.16	7866.3	65.90	0.15	8267.2	178782
9292.0	6553.841	142.4761	-22.4662	64.53	0.17	7881.2	65.84	0.16	8282.1	178811
9294.0	6553.889	142.6108	-22.4068	64.48	0.18	7896.1	65.79	0.17	8297.0	178843
9296.0	6553.941	142.7456	-22.3472	64.42	0.19	7911.0	65.74	0.19	8311.9	178880
9298.0	6553.997	142.8806	-22.2874	64.37	0.21	7926.0	65.69	0.20	8326.9	178919
9300.0	6554.057	143.0157	-22.2273	64.32	0.22	7941.0	65.63	0.21	8341.9	178963
9302.0	6554.121	143.1509	-22.1671	64.26	0.24	7956.1	65.58	0.23	8357.0	179012
9304.0	6554.189	143.2863	-22.1065	64.21	0.25	7971.2	65.53	0.24	8372.1	179064
9306.0	6554.262	143.4218	-22.0458	64.16	0.27	7986.4	65.48	0.26	8387.3	179122
9308.0	6554.340	143.5574	-21.9848	64.11	0.29	8001.6	65.43	0.27	8402.6	179184
9310.0	6554.423	143.6932	-21.9236	64.05	0.31	8016.9	65.37	0.29	8417.9	179251
9312.0	6554.511	143.8291	-21.8622	64.00	0.32	8032.3	65.32	0.31	8433.2	179323
9314.0	6554.605	143.9652	-21.8005	63.95	0.34	8047.6	65.27	0.33	8448.6	179401
9316.0	6554.704	144.1014	-21.7386	63.90	0.36	8063.1	65.22	0.35	8464.0	179484
9318.0	6554.809	144.2377	-21.6765	63.84	0.38	8078.5	65.17	0.36	8479.5	179573
9320.0	6554.920	144.3742	-21.6141	63.79	0.40	8094.1	65.12	0.38	8495.0	179668
9322.0	6555.037	144.5108	-21.5515	63.74	0.42	8109.6	65.06	0.40	8510.6	179769
9324.0	6555.160	144.6476	-21.4886	63.69	0.45	8125.3	65.01	0.43	8526.2	179876
9326.0	6555.290	144.7845	-21.4256	63.64	0.47	8141.0	64.96	0.45	8541.9	179990
9328.0	6555.427	144.9215	-21.3623	63.58	0.49	8156.7	64.91	0.47	8557.7	180110
9330.0	6555.571	145.0587	-21.2987	63.53	0.52	8172.5	64.86	0.49	8573.5	180238
9332.0	6555.722	145.1961	-21.2349	63.48	0.54	8188.4	64.81	0.52	8589.4	180373
9334.0	6555.880	145.3335	-21.1709	63.43	0.57	8204.3	64.76	0.54	8605.3	180515
9336.0	6556.046	145.4711	-21.1066	63.38	0.59	8220.2	64.71	0.56	8621.2	180665
9338.0	6556.219	145.6089	-21.0421	63.33	0.62	8236.2	64.65	0.59	8637.3	180822
9340.0	6556.401	145.7468	-20.9774	63.27	0.65	8252.3	64.60	0.62	8653.3	180988
9342.0	6556.591	145.8848	-20.9124	63.22	0.67	8268.4	64.55	0.64	8669.5	181161

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	6556.789	146.0230	-20.8472	63.17	0.70	8284.6	64.50	0.67	8685.7	181343
9346.0	6556.996	146.1613	-20.7817	63.12	0.73	8300.8	64.45	0.70	8701.9	181534
9348.0	6557.212	146.2997	-20.7160	63.07	0.76	8317.1	64.40	0.72	8718.2	181734
9350.0	6557.437	146.4383	-20.6501	63.02	0.79	8333.5	64.35	0.75	8734.5	181942
9352.0	6557.671	146.5771	-20.5839	62.97	0.82	8349.9	64.30	0.78	8750.9	182160
9354.0	6557.915	146.7160	-20.5175	62.92	0.85	8366.3	64.25	0.81	8767.4	182387
9356.0	6558.169	146.8550	-20.4508	62.87	0.88	8382.8	64.20	0.84	8784.0	182625
9358.0	6558.432	146.9942	-20.3839	62.82	0.92	8399.5	64.15	0.87	8800.6	182872
9360.0	6558.706	147.1335	-20.3167	62.77	0.95	8416.1	64.10	0.91	8817.3	183129
9362.0	6558.990	147.2730	-20.2493	62.72	0.98	8432.9	64.05	0.94	8834.0	183396
9364.0	6559.284	147.4126	-20.1817	62.66	1.02	8449.7	64.00	0.97	8850.8	183674
9366.0	6559.590	147.5524	-20.1138	62.61	1.05	8466.5	63.95	1.00	8867.7	183963
9368.0	6559.906	147.6923	-20.0456	62.56	1.09	8483.4	63.90	1.04	8884.6	184263
9370.0	6560.234	147.8323	-19.9772	62.51	1.12	8500.3	63.85	1.07	8901.5	184575
9372.0	6560.574	147.9725	-19.9086	62.46	1.16	8517.2	63.80	1.11	8918.4	184898
9374.0	6560.925	148.1129	-19.8397	62.42	1.20	8534.2	63.75	1.15	8935.4	185233
9376.0	6561.289	148.2534	-19.7706	62.37	1.24	8551.2	63.70	1.18	8952.4	185580
9378.0	6561.665	148.3940	-19.7012	62.32	1.28	8568.3	63.65	1.22	8969.5	185940
9380.0	6562.054	148.5348	-19.6316	62.27	1.32	8585.5	63.60	1.26	8986.7	186313
9382.0	6562.456	148.6757	-19.5617	62.22	1.36	8602.7	63.56	1.30	9004.0	186698
9384.0	6562.871	148.8168	-19.4916	62.17	1.40	8620.0	63.51	1.34	9021.3	187096
9386.0	6563.300	148.9580	-19.4212	62.12	1.44	8637.4	63.46	1.38	9038.7	187508
9388.0	6563.741	149.0994	-19.3506	62.07	1.49	8654.9	63.41	1.42	9056.2	187934
9390.0	6564.197	149.2409	-19.2797	62.02	1.53	8672.4	63.36	1.46	9073.7	188373
9392.0	6564.667	149.3826	-19.2086	61.97	1.57	8690.0	63.31	1.50	9091.3	188826
9394.0	6565.151	149.5244	-19.1372	61.92	1.62	8707.6	63.26	1.55	9109.0	189293
9396.0	6565.650	149.6663	-19.0656	61.87	1.66	8725.3	63.21	1.59	9126.7	189775
9398.0	6566.163	149.8084	-18.9937	61.83	1.71	8743.1	63.17	1.63	9144.5	190272
9400.0	6566.692	149.9507	-18.9215	61.78	1.75	8760.9	63.12	1.68	9162.4	190784
9402.0	6567.236	150.0931	-18.8492	61.73	1.80	8778.8	63.07	1.72	9180.3	191312
9404.0	6567.795	150.2357	-18.7765	61.68	1.85	8796.8	63.02	1.77	9198.3	191855
9406.0	6568.371	150.3784	-18.7036	61.63	1.90	8814.8	62.97	1.81	9216.4	192413
9408.0	6568.962	150.5212	-18.6305	61.59	1.95	8833.0	62.93	1.86	9234.5	192988
9410.0	6569.570	150.6643	-18.5571	61.54	1.99	8851.2	62.88	1.91	9252.7	193580
9412.0	6570.195	150.8074	-18.4834	61.49	2.05	8869.4	62.83	1.96	9271.0	194188
9414.0	6570.836	150.9507	-18.4095	61.44	2.10	8887.7	62.78	2.01	9289.3	194813
9416.0	6571.495	151.0942	-18.3353	61.39	2.15	8906.1	62.74	2.05	9307.7	195455
9418.0	6572.171	151.2378	-18.2609	61.35	2.20	8924.5	62.69	2.10	9326.2	196114
9420.0	6572.865	151.3816	-18.1862	61.30	2.25	8943.0	62.64	2.16	9344.7	196792
9422.0	6573.577	151.5255	-18.1112	61.25	2.31	8961.6	62.59	2.21	9363.3	197487
9424.0	6574.308	151.6695	-18.0360	61.21	2.36	8980.2	62.55	2.26	9382.0	198201
9426.0	6575.056	151.8138	-17.9606	61.16	2.41	8999.0	62.50	2.31	9400.7	198933
9428.0	6575.824	151.9581	-17.8849	61.11	2.47	9017.8	62.45	2.36	9419.6	199684

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	6576.611	152.1026	-17.8089	61.07	2.53	9036.7	62.41	2.42	9438.5	200454
9432.0	6577.417	152.2473	-17.7327	61.02	2.58	9055.6	62.36	2.47	9457.4	201244
9434.0	6578.243	152.3921	-17.6562	60.97	2.64	9074.6	62.31	2.53	9476.5	202053
9436.0	6579.089	152.5371	-17.5794	60.93	2.70	9093.7	62.27	2.58	9495.6	202882
9438.0	6579.955	152.6822	-17.5024	60.88	2.76	9112.9	62.22	2.64	9514.8	203732
9440.0	6580.842	152.8275	-17.4251	60.83	2.82	9132.1	62.18	2.70	9534.0	204602
9442.0	6581.749	152.9730	-17.3476	60.79	2.88	9151.4	62.13	2.75	9553.4	205493
9444.0	6582.678	153.1185	-17.2698	60.74	2.94	9170.8	62.08	2.81	9572.8	206405
9446.0	6583.628	153.2643	-17.1917	60.70	3.00	9190.3	62.04	2.87	9592.3	207338
9448.0	6584.600	153.4102	-17.1134	60.65	3.06	9209.8	61.99	2.93	9611.9	208294
9450.0	6585.594	153.5562	-17.0349	60.61	3.12	9229.4	61.95	2.99	9631.5	209271
9452.0	6586.610	153.7024	-16.9560	60.56	3.18	9249.1	61.90	3.05	9651.3	210271
9454.0	6587.648	153.8488	-16.8769	60.52	3.25	9268.9	61.86	3.11	9671.1	211293
9456.0	6588.710	153.9953	-16.7976	60.47	3.31	9288.8	61.81	3.17	9691.0	212338
9458.0	6589.794	154.1420	-16.7179	60.43	3.38	9308.8	61.77	3.24	9711.0	213406
9460.0	6590.903	154.2888	-16.6380	60.38	3.44	9328.8	61.72	3.30	9731.1	214498
9462.0	6592.035	154.4357	-16.5579	60.34	3.51	9348.9	61.68	3.36	9751.2	215613
9464.0	6593.191	154.5829	-16.4775	60.29	3.57	9369.1	61.63	3.43	9771.5	216753
9466.0	6594.371	154.7302	-16.3968	60.25	3.64	9389.4	61.59	3.49	9791.8	217917
9468.0	6595.576	154.8776	-16.3159	60.20	3.71	9409.8	61.55	3.56	9812.2	219105
9470.0	6596.806	155.0252	-16.2347	60.16	3.78	9430.2	61.50	3.62	9832.7	220319
9472.0	6598.061	155.1729	-16.1532	60.12	3.85	9450.8	61.46	3.69	9853.3	221558
9474.0	6599.342	155.3208	-16.0715	60.07	3.92	9471.4	61.41	3.76	9874.0	222823
9476.0	6600.649	155.4689	-15.9895	60.03	3.99	9492.2	61.37	3.82	9894.8	224113
9478.0	6601.982	155.6171	-15.9072	59.98	4.06	9513.1	61.33	3.89	9915.7	225430
9480.0	6603.342	155.7655	-15.8247	59.94	4.13	9534.0	61.28	3.96	9936.7	226775
9482.0	6604.728	155.9140	-15.7419	59.90	4.20	9555.1	61.24	4.03	9957.8	228143
9484.0	6606.141	156.0627	-15.6589	59.86	4.27	9576.3	61.20	4.10	9979.0	229540
9486.0	6607.582	156.2116	-15.5755	59.81	4.35	9597.5	61.15	4.17	10000.4	230965
9488.0	6609.051	156.3606	-15.4920	59.77	4.42	9618.9	61.11	4.24	10021.7	232418
9490.0	6610.548	156.5097	-15.4081	59.73	4.49	9640.3	61.07	4.31	10043.2	233898
9492.0	6612.073	156.6591	-15.3240	59.68	4.57	9661.9	61.03	4.39	10064.8	235407
9494.0	6613.627	156.8085	-15.2396	59.64	4.64	9683.5	60.98	4.46	10086.5	236945
9496.0	6615.209	156.9582	-15.1549	59.60	4.72	9705.2	60.94	4.53	10108.3	238512
9498.0	6616.821	157.1080	-15.0700	59.56	4.80	9727.1	60.90	4.61	10130.2	240108
9500.0	6618.463	157.2579	-14.9848	59.52	4.87	9749.1	60.86	4.68	10152.2	241733
9502.0	6620.134	157.4081	-14.8994	59.47	4.95	9771.1	60.81	4.75	10174.3	243389
9504.0	6621.836	157.5583	-14.8137	59.43	5.03	9793.3	60.77	4.83	10196.5	245074
9506.0	6623.568	157.7088	-14.7277	59.39	5.11	9815.6	60.73	4.90	10218.8	246791
9508.0	6625.331	157.8594	-14.6414	59.35	5.19	9838.0	60.69	4.98	10241.3	248538
9510.0	6627.125	158.0101	-14.5549	59.31	5.27	9860.5	60.65	5.06	10263.9	250316
9512.0	6628.951	158.1611	-14.4681	59.27	5.34	9883.1	60.61	5.13	10286.6	252126
9514.0	6630.808	158.3121	-14.3811	59.23	5.43	9905.9	60.57	5.21	10309.4	253967

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	6632.697	158.4634	-14.2937	59.19	5.51	9928.7	60.53	5.29	10332.3	255840
9518.0	6634.618	158.6148	-14.2062	59.15	5.59	9951.7	60.48	5.37	10355.3	257746
9520.0	6636.572	158.7664	-14.1183	59.11	5.67	9974.8	60.44	5.45	10378.4	259685
9522.0	6638.559	158.9181	-14.0302	59.07	5.75	9998.0	60.40	5.53	10401.7	261656
9524.0	6640.579	159.0700	-13.9418	59.03	5.83	10021.4	60.36	5.61	10425.1	263660
9526.0	6642.633	159.2221	-13.8531	58.99	5.91	10044.8	60.32	5.69	10448.6	265698
9528.0	6644.720	159.3743	-13.7642	58.95	6.00	10068.4	60.28	5.77	10472.2	267770
9530.0	6646.841	159.5267	-13.6750	58.91	6.08	10092.0	60.24	5.85	10496.0	269876
9532.0	6648.996	159.6793	-13.5855	58.87	6.16	10115.8	60.20	5.93	10519.8	272016
9534.0	6651.186	159.8320	-13.4957	58.83	6.24	10139.8	60.16	6.00	10543.8	274190
9536.0	6653.408	159.9849	-13.4057	58.79	6.33	10163.8	60.13	6.08	10567.9	276397
9538.0	6655.665	160.1380	-13.3154	58.75	6.41	10188.0	60.09	6.16	10592.2	278638
9540.0	6657.955	160.2912	-13.2249	58.71	6.49	10212.3	60.05	6.24	10616.6	280913
9542.0	6660.280	160.4446	-13.1340	58.68	6.57	10236.8	60.01	6.32	10641.1	283223
9544.0	6662.639	160.5981	-13.0429	58.64	6.65	10261.4	59.97	6.40	10665.8	285568
9546.0	6665.034	160.7519	-12.9516	58.60	6.74	10286.2	59.93	6.48	10690.6	287948
9548.0	6667.466	160.9058	-12.8599	58.56	6.82	10311.1	59.89	6.56	10715.6	290364
9550.0	6669.933	161.0599	-12.7680	58.52	6.91	10336.2	59.85	6.65	10740.8	292817
9552.0	6672.438	161.2141	-12.6758	58.49	6.99	10361.4	59.82	6.73	10766.0	295306
9554.0	6674.980	161.3685	-12.5834	58.45	7.08	10386.7	59.78	6.82	10791.4	297834
9556.0	6677.560	161.5231	-12.4907	58.41	7.17	10412.2	59.74	6.90	10816.9	300399
9558.0	6680.180	161.6779	-12.3977	58.38	7.26	10437.8	59.70	6.99	10842.7	303004
S-IVB SECOND GUIDANCE CUTOFF										
9558.42	6680.735	161.7104	-12.3781	58.37	7.28	10443.0	59.70	7.01	10847.9	303556
9560.0	6682.837	161.8327	-12.3045	58.34	7.35	10445.2	59.67	7.08	10850.2	305646
9562.0	6685.528	161.9873	-12.2112	58.30	7.45	10442.8	59.63	7.17	10847.8	308323
9564.0	6688.253	162.1417	-12.1179	58.26	7.54	10440.5	59.60	7.26	10845.6	311033
9566.0	6691.011	162.2958	-12.0246	58.23	7.64	10438.2	59.57	7.35	10843.3	313777
9568.0	6693.803	162.4497	-11.9313	58.19	7.73	10435.8	59.53	7.44	10841.0	316555
TRANSLUNAR INJECTION										
9568.42	6694.393	162.4820	-11.9117	58.18	7.75	10435.3	59.52	7.46	10840.5	317142
9600.0	6742.976	164.8780	-10.4377	57.64	9.23	10394.5	59.03	8.88	10801.0	365515
9650.0	6836.325	168.5433	-8.1138	56.94	11.53	10317.1	58.41	11.09	10726.1	458587
9700.0	6948.831	172.0507	-5.8241	56.41	13.77	10225.7	57.96	13.22	10637.7	570886
9750.0	7079.247	175.4016	-3.5900	56.04	15.93	10122.4	57.66	15.29	10537.9	701165
9800.0	7226.238	178.5991	-1.4286	55.81	18.02	10009.0	57.51	17.27	10428.5	848086
9850.0	7388.429	-178.3523	0.6471	55.71	20.03	9887.8	57.49	19.17	10311.6	1010266
9900.0	7564.444	-175.4470	2.6281	55.71	21.96	9760.5	57.58	20.99	10188.9	1186323
9950.0	7752.936	-172.6792	4.5087	55.81	23.80	9628.9	57.77	22.72	10062.2	1374903

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	7952.617	-170.0425	6.2861	55.99	25.57	9494.5	58.03	24.36	9932.9	1574709
10050.0	8162.271	-167.5308	7.9602	56.24	27.25	9358.6	58.37	25.92	9802.3	1784517
10100.0	8380.767	-165.1377	9.5321	56.55	28.86	9222.2	58.77	27.40	9671.4	2003190
10150.0	8607.061	-162.8570	11.0049	56.91	30.40	9086.3	59.21	28.81	9541.1	2229678
10200.0	8840.202	-160.6829	12.3821	57.30	31.86	8951.7	59.70	30.14	9412.0	2463024
10250.0	9079.327	-158.6097	13.6684	57.73	33.26	8818.9	60.21	31.40	9284.9	2702361
10300.0	9323.657	-156.6319	14.8685	58.18	34.60	8688.3	60.75	32.59	9160.0	2946906
10350.0	9572.493	-154.7445	15.9874	58.65	35.88	8560.4	61.31	33.72	9037.7	3195957
10400.0	9825.211	-152.9425	17.0302	59.13	37.11	8435.4	61.88	34.80	8918.3	3448888
10450.0	10081.252	-151.2214	18.0019	59.62	38.28	8313.4	62.46	35.82	8801.9	3705138
10500.0	10340.122	-149.5768	18.9072	60.12	39.41	8194.6	63.05	36.78	8688.6	3964211
10550.0	10601.379	-148.0046	19.7509	60.63	40.49	8079.0	63.64	37.70	8578.5	4225665
10600.0	10864.632	-146.5011	20.5374	61.13	41.54	7966.7	64.23	38.58	8471.6	4489110
10650.0	11129.536	-145.0626	21.2707	61.63	42.54	7857.6	64.82	39.41	8367.8	4754197
10700.0	11395.784	-143.6856	21.9548	62.13	43.51	7751.8	65.40	40.20	8267.1	5020620
10750.0	11663.104	-142.3671	22.5932	62.63	44.44	7649.1	65.98	40.96	8169.5	5288108
10800.0	11931.257	-141.1041	23.1894	63.12	45.34	7549.4	66.56	41.68	8074.9	5556420
10850.0	12200.029	-139.8936	23.7465	63.60	46.21	7452.8	67.12	42.37	7983.2	5825345
10900.0	12469.233	-138.7331	24.2672	64.08	47.06	7359.2	67.68	43.03	7894.3	6094694
10950.0	12738.704	-137.6201	24.7544	64.55	47.88	7268.3	68.23	43.67	7808.1	6364303
11000.0	13008.295	-136.5522	25.2103	65.01	48.67	7180.3	68.77	44.27	7724.6	6634025
11050.0	13277.877	-135.5273	25.6374	65.46	49.45	7094.9	69.30	44.85	7643.6	6903730
	CSM SEPARATION									
11099.0	13541.940	-134.5625	26.0299	65.90	50.19	7013.6	69.81	45.40	7566.6	7167908

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 Table 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 and translunar phases of flight.

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

Table C-VII gives the geographic polar coordinates for the second burn and translunar phases of flight.

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									
-16.963	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	366	0	0	0.0	0.0	0.0	0.0	0.0	0.0
ALL HOLDDOWN ARMS RELEASED									
0.3	366	0	0	0.1	0.0	-0.0	2.59	-0.01	-0.04
LIFTOFF - START OF TIME BASE 1									
0.6	366	0	0	1.1	0.0	-0.0	3.14	-0.01	-0.04
1.0	367	0	0	3.1	-0.0	-0.0	6.63	-0.02	-0.03
2.0	374	0	0	10.0	-0.0	-0.1	7.14	0.01	-0.02
3.0	387	0	0	17.2	0.2	-0.1	7.33	0.41	-0.01
4.0	408	1	0	24.6	0.8	-0.1	7.49	0.81	0.01
5.0	437	2	0	32.2	1.7	-0.0	7.68	0.88	0.03
6.0	473	4	0	40.0	2.4	-0.0	7.88	0.57	0.06
7.0	517	6	0	48.0	2.9	0.1	8.07	0.48	0.08
8.0	569	10	0	56.1	3.5	0.1	8.26	0.86	0.09
9.0	629	14	0	64.5	4.5	0.2	8.44	1.03	0.11
10.0	698	19	0	73.0	5.6	0.4	8.62	1.12	0.12
11.0	775	25	1	81.7	6.6	0.5	8.80	0.69	0.16
12.0	861	31	1	90.6	6.9	0.6	8.97	0.08	0.12
13.0	957	38	2	99.7	6.9	0.8	9.14	-0.04	0.35
14.0	1061	45	3	108.9	6.9	1.2	9.30	0.06	0.39

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	1174	52	4	118.3	7.0	1.6	9.45	0.06	0.45
16.0	1297	59	6	127.8	7.0	2.1	9.63	-0.07	0.47
17.0	1430	66	9	137.5	6.9	2.6	9.84	-0.20	0.54
18.0	1573	73	11	147.5	6.6	3.1	10.11	-0.36	0.60
19.0	1725	79	15	157.6	6.2	3.9	10.24	-0.35	0.89
20.0	1888	85	19	168.0	5.9	4.9	10.52	-0.32	1.12
21.0	2061	91	25	178.6	5.6	6.1	10.73	-0.31	1.36
22.0	2245	96	32	189.5	5.3	7.6	10.95	-0.27	1.61
23.0	2440	102	40	200.5	5.0	9.3	11.19	-0.23	1.86
24.0	2646	106	50	211.9	4.8	11.3	11.44	-0.22	2.13
25.0	2864	111	63	223.4	4.5	13.6	11.69	-0.22	2.43
26.0	3093	116	78	235.2	4.3	16.2	11.94	-0.22	2.77
27.0	3335	120	95	247.3	4.1	19.2	12.19	-0.23	3.12
28.0	3588	124	116	259.6	3.9	22.4	12.43	-0.22	3.48
29.0	3854	127	140	272.1	3.7	26.1	12.66	-0.21	3.82
30.0	4132	131	168	284.9	3.4	30.1	12.89	-0.20	4.16
31.0	4424	134	200	297.9	3.3	34.4	13.13	-0.19	4.51
32.0	4728	138	237	311.2	3.1	39.1	13.38	-0.17	4.87
33.0	5046	141	279	324.7	2.9	44.2	13.63	-0.15	5.24
34.0	5378	143	326	338.5	2.8	49.6	13.88	-0.11	5.62
35.0	5723	146	378	352.5	2.7	55.4	14.12	-0.06	6.02
36.0	6083	149	437	366.7	2.7	61.6	14.36	-0.03	6.43
37.0	6457	151	501	381.2	2.7	68.2	14.60	0.00	6.84
38.0	6845	154	573	395.9	2.6	75.3	14.85	-0.00	7.24
39.0	7249	157	652	410.9	2.6	82.7	15.09	-0.03	7.65
40.0	7667	159	739	426.1	2.6	90.6	15.34	-0.07	8.09
41.0	8101	162	834	441.5	2.5	98.9	15.58	-0.13	8.55
42.0	8550	164	937	457.3	2.3	107.7	15.84	-0.17	9.04
43.0	9015	167	1049	473.2	2.2	117.0	16.08	-0.20	9.57
44.0	9497	169	1171	489.4	2.0	126.9	16.33	-0.21	10.13
45.0	9994	170	1303	505.9	1.8	137.3	16.56	-0.20	10.71
46.0	10509	172	1446	522.5	1.6	148.3	16.80	-0.18	11.32
47.0	11039	174	1600	539.5	1.4	159.9	17.04	-0.17	11.94
48.0	11588	175	1766	556.6	1.2	172.2	17.28	-0.20	12.55
49.0	12153	176	1944	574.0	1.0	185.0	17.54	-0.27	13.15
50.0	12736	177	2136	591.7	0.6	198.4	17.80	-0.37	13.73
51.0	13336	177	2342	609.7	0.2	212.4	18.05	-0.50	14.28
52.0	13955	177	2561	627.8	-0.4	227.0	18.30	-0.66	14.83
53.0	14592	176	2796	646.2	-1.1	242.1	18.52	-0.81	15.38
54.0	15248	175	3046	664.8	-2.0	257.8	18.73	-0.95	15.95
55.0	15922	172	3311	683.7	-3.0	274.0	18.94	-1.04	16.53
56.0	16615	169	3594	702.8	-4.0	290.9	19.18	-1.07	17.14
57.0	17327	164	3893	722.0	-5.1	308.3	19.41	-1.06	17.75

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	18059	159	4211	741.6	-6.1	326.4	19.64	-1.00	18.40
59.0	18811	152	4546	761.3	-7.1	345.1	19.88	-0.94	19.05
60.0	19582	145	4901	781.3	-8.0	364.5	20.10	-0.86	19.72
61.0	20373	136	5276	801.5	-8.8	384.6	20.29	-0.78	20.42
62.0	21185	127	5670	821.9	-9.6	405.3	20.45	-0.68	21.12
63.0	22017	117	6086	842.4	-10.2	426.8	20.57	-0.56	21.82
64.0	22870	107	6524	863.0	-10.6	448.9	20.66	-0.43	22.50
65.0	23743	96	6985	883.7	-11.0	471.8	20.73	-0.28	23.17
66.0	24637	85	7468	904.4	-11.2	495.3	20.81	-0.14	23.82
67.0	25552	73	7975	925.3	-11.3	519.4	20.90	-0.00	24.49
MACH 1									
67.5	26017	68	8238	935.8	-11.3	531.8	20.95	0.04	24.83
68.0	26488	62	8507	946.3	-11.3	544.3	21.01	0.09	25.17
69.0	27444	51	9064	967.3	-11.1	569.8	21.14	0.15	25.86
70.0	28422	40	9647	988.6	-10.9	596.0	21.29	0.22	26.55
71.0	29422	29	10256	1009.9	-10.7	622.9	21.49	0.26	27.26
72.0	30442	18	10893	1031.6	-10.4	650.5	21.72	0.29	27.96
73.0	31485	8	11558	1053.4	-10.1	678.8	21.96	0.30	28.65
74.0	32549	-2	12251	1075.5	-9.9	707.8	22.20	0.28	29.36
75.0	33636	-11	12973	1097.8	-9.6	737.5	22.42	0.24	30.09
76.0	34745	-21	13726	1120.3	-9.4	768.0	22.64	0.18	30.85
77.0	35876	-30	14510	1143.0	-9.2	799.3	22.83	0.13	31.68
78.0	37031	-39	15325	1165.9	-9.1	831.4	23.00	0.12	32.56
79.0	38208	-49	16173	1189.0	-8.9	864.4	23.17	0.16	33.50
80.0	39409	-57	17054	1212.3	-8.7	898.4	23.33	0.27	34.46
81.0	40633	-66	17970	1235.7	-8.3	933.3	23.51	0.41	35.39
82.0	41880	-74	18921	1259.3	-7.9	969.1	23.71	0.55	36.31
83.0	43152	-82	19908	1283.1	-7.3	1005.8	23.90	0.63	37.24
84.0	44447	-89	20933	1307.1	-6.7	1043.6	24.05	0.67	38.20
85.0	45766	-95	21996	1331.2	-6.1	1082.3	24.14	0.69	39.21
MAXIMUM DYNAMIC PRESSURE									
86.0	47109	-101	23098	1355.3	-5.4	1122.1	24.16	0.70	40.34
87.0	48477	-106	24240	1379.5	-4.6	1163.1	24.12	0.73	41.58
88.0	49868	-110	25425	1403.5	-3.8	1205.4	24.01	0.78	42.92
89.0	51284	-113	26652	1427.5	-3.0	1249.0	23.86	0.85	44.32
90.0	52723	-116	27923	1451.2	-2.1	1294.0	23.66	0.92	45.74
91.0	54186	-118	29240	1474.8	-1.2	1340.4	23.46	0.97	47.15
92.0	55672	-118	30604	1498.2	-0.2	1388.2	23.27	0.96	48.51
93.0	57182	-118	32017	1521.4	0.7	1437.4	23.10	0.89	49.83

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
94.0	58715	-117	33480	1544.4	1.5	1487.9	22.94	0.73	51.14
95.0	60271	-115	34993	1567.3	2.1	1539.7	22.79	0.53	52.44
96.0	61850	-113	36559	1590.0	2.5	1592.8	22.63	0.33	53.70
97.0	63451	-110	38179	1612.5	2.8	1647.1	22.49	0.14	54.94
98.0	65075	-107	39854	1634.9	2.9	1702.6	22.38	-0.01	56.14
99.0	66721	-104	41585	1657.3	2.8	1759.3	22.31	-0.11	57.30
100.0	68389	-102	43373	1679.6	2.7	1817.2	22.29	-0.16	58.43
101.0	70080	-99	45220	1701.9	2.6	1876.2	22.31	-0.15	59.53
102.0	71793	-96	47126	1724.3	2.4	1936.2	22.39	-0.13	60.58
103.0	73529	-94	49092	1746.7	2.3	1997.3	22.48	-0.11	61.63
104.0	75286	-92	51121	1769.2	2.1	2059.5	22.56	-0.12	62.66
105.0	77067	-90	53212	1791.8	2.0	2122.7	22.60	-0.14	63.72
106.0	78870	-88	55366	1814.4	1.9	2186.9	22.60	-0.16	64.80
107.0	80696	-86	57586	1837.0	1.7	2252.3	22.57	-0.15	65.91
108.0	82544	-85	59871	1859.5	1.6	2318.8	22.51	-0.11	67.04
109.0	84415	-83	62224	1882.0	1.5	2386.4	22.45	-0.05	68.20
110.0	86308	-81	64645	1904.4	1.5	2455.2	22.41	0.02	69.36
111.0	88224	-80	67135	1926.8	1.6	2525.1	22.39	0.10	70.50
112.0	90162	-78	69695	1949.2	1.7	2596.2	22.44	0.16	71.63
113.0	92122	-77	72328	1971.7	1.8	2668.4	22.55	0.18	72.71
114.0	94105	-75	75032	1994.4	2.0	2741.6	22.73	0.18	73.74
115.0	96111	-73	77811	2017.3	2.2	2815.8	22.98	0.17	74.74
116.0	98140	-70	80664	2040.4	2.3	2891.0	23.27	0.15	75.72
117.0	100192	-68	83593	2063.8	2.5	2967.2	23.58	0.15	76.71
118.0	102267	-65	86599	2087.5	2.7	3044.5	23.86	0.16	77.74
119.0	104367	-63	89683	2111.5	2.9	3122.8	24.08	0.21	78.81
120.0	106490	-60	92845	2135.6	3.1	3202.2	24.22	0.27	79.97
121.0	108638	-56	96087	2159.8	3.4	3282.8	24.27	0.34	81.20
122.0	110810	-53	99411	2184.1	3.8	3364.6	24.25	0.40	82.50
123.0	113006	-49	102817	2208.3	4.2	3447.8	24.21	0.44	83.83
124.0	115227	-44	106307	2232.5	4.6	3532.3	24.18	0.45	85.17
125.0	117471	-39	109882	2256.7	5.1	3618.1	24.20	0.43	86.52
126.0	119740	-34	113544	2280.9	5.5	3705.3	24.30	0.39	87.84
127.0	122033	-29	117293	2305.3	5.8	3793.8	24.45	0.33	89.15
128.0	124351	-23	121132	2329.9	6.1	3883.6	24.64	0.28	90.46
129.0	126693	-16	125061	2354.6	6.4	3974.7	24.78	0.24	91.80
130.0	129060	-10	129082	2379.4	6.6	4067.2	24.92	0.19	93.24
131.0	131452	-3	133195	2404.4	6.8	4161.2	25.07	0.21	94.71
132.0	133869	4	137404	2429.5	7.0	4256.7	25.21	0.21	96.18
133.0	136312	11	141709	2454.8	7.3	4353.6	25.35	0.35	97.64
134.0	138780	19	146111	2480.3	7.7	4451.9	25.50	0.30	99.11
135.0	141273	26	150612	2505.8	7.9	4551.8	25.64	0.25	100.57
136.0	143792	34	155214	2531.5	8.1	4653.1	25.79	0.11	102.04

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
137.0	146337	43	159918	2557.4	8.2	4755.9	25.93	0.14	103.51
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
137.85	148520	50	163999	2579.5	8.3	4844.4	26.05	0.18	104.75
138.0	148906	51	164723	2582.8	8.4	4859.8	17.99	0.18	100.53
139.0	151495	59	169622	2598.7	8.6	4947.2	15.17	0.23	84.00
140.0	154104	68	174613	2613.8	8.8	5031.3	15.17	0.25	85.07
141.0	156726	77	179687	2629.0	9.1	5116.4	15.17	0.40	86.14
142.0	159363	86	184846	2644.2	9.6	5202.8	15.17	0.45	87.21
143.0	162015	96	190092	2659.3	10.0	5290.3	15.17	0.47	88.27
144.0	164681	106	195426	2674.5	10.5	5378.9	15.17	0.51	89.32
145.0	167363	117	200848	2689.7	11.1	5468.6	15.17	0.55	90.37
146.0	170060	129	206362	2704.8	11.6	5559.4	15.22	0.56	91.42
147.0	172772	141	211967	2720.1	12.2	5651.4	15.31	0.56	92.59
148.0	175500	153	217664	2735.5	12.8	5744.7	15.41	0.56	93.84
149.0	178243	166	223455	2750.9	13.3	5839.1	15.48	0.55	95.05
150.0	181002	180	229341	2766.4	13.9	5934.7	15.57	0.54	96.30
151.0	183776	194	235323	2781.9	14.4	6031.0	15.67	0.54	97.61
152.0	186565	209	241403	2797.6	15.0	6129.3	15.77	0.55	98.99
153.0	189371	224	247583	2813.4	15.5	6229.0	15.86	0.57	100.41
154.0	192192	240	253862	2829.3	16.1	6330.2	15.91	0.60	101.87
155.0	195029	256	260244	2845.2	16.7	6432.8	15.97	0.70	103.42
156.0	197883	273	266729	2861.2	17.4	6536.9	16.03	0.69	104.93
157.0	200752	291	273318	2877.3	18.1	6642.5	16.09	0.70	106.40
158.0	203637	309	280014	2893.4	18.8	6749.6	16.16	0.72	107.97
159.0	206539	328	286818	2909.6	19.5	6858.4	16.22	0.74	109.51
160.0	209456	348	293731	2925.9	20.2	6968.6	16.28	0.76	110.99
161.0	212390	369	300755	2942.2	21.0	7080.1	16.34	0.77	111.89
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.78	214688	385	306310	2954.9	21.6	7167.8	16.39	0.58	112.76
162.0	215336	390	307881	2955.8	21.7	7186.2	-8.68	0.51	55.17
163.0	218274	412	315063	2931.2	22.1	7199.8	-30.27	0.42	-0.25
S-IC/S-II SEPARATION COMMAND									
163.5	219741	423	318674	2916.1	22.3	7199.6	-30.27	0.39	-0.21
164.0	221195	434	322274	2900.9	22.5	7199.5	-30.27	0.39	-0.17
166.0	226936	480	336671	2840.7	23.3	7199.9	-29.51	0.41	1.70
168.0	232562	528	351086	2788.8	24.2	7221.4	-22.73	0.44	17.33
170.0	238095	577	365565	2744.1	25.1	7257.5	-22.22	0.51	18.89

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	243541	628	380121	2701.5	26.1	7299.3	-20.76	0.51	21.73
174.0	248902	681	394764	2660.0	27.0	7342.8	-20.63	0.51	22.27
176.0	254181	736	409494	2618.9	28.1	7387.6	-20.53	0.53	22.46
178.0	259377	794	424315	2577.9	29.2	7432.7	-20.48	0.56	22.52
180.0	264492	853	439225	2537.0	30.3	7477.8	-20.40	0.55	22.65
182.0	269525	915	454226	2496.1	31.4	7523.2	-20.33	0.55	22.75
184.0	274476	979	469318	2455.5	32.5	7568.8	-20.25	0.55	22.84
186.0	279347	1045	484502	2415.1	33.6	7614.6	-20.17	0.55	22.94
188.0	284137	1113	499777	2374.8	34.7	7660.6	-20.09	0.57	23.04
190.0	288846	1184	515144	2334.7	35.9	7706.8	-20.02	0.59	23.14
192.0	293476	1256	530604	2294.7	37.0	7753.2	-19.94	0.60	23.24
194.0	298025	1332	546157	2255.0	38.2	7799.8	-19.85	0.61	23.36
196.0	302496	1409	561803	2215.3	39.5	7846.6	-19.77	0.61	23.46
198.0	306887	1490	577543	2175.8	40.7	7893.6	-19.71	0.61	23.58
200.0	311199	1572	593378	2136.5	41.9	7940.9	-19.64	0.61	23.73
202.0	315433	1657	609307	2097.3	43.1	7988.5	-19.55	0.61	23.87
204.0	319588	1745	625332	2058.4	44.4	8036.4	-19.37	0.61	23.94
206.0	323667	1835	641453	2019.9	45.6	8084.2	-19.05	0.60	23.89
208.0	327669	1927	657669	1982.3	46.7	8131.9	-18.58	0.56	23.78
210.0	331597	2022	673980	1945.7	47.8	8179.3	-18.07	0.51	23.65
212.0	335452	2118	690386	1909.9	48.8	8226.6	-17.72	0.48	23.61
214.0	339236	2217	706886	1874.6	49.8	8273.8	-17.57	0.49	23.67
216.0	342951	2317	723481	1839.5	50.8	8321.3	-17.56	0.51	23.78
218.0	346594	2420	740171	1804.4	51.8	8368.9	-17.58	0.52	23.90
220.0	350168	2524	756957	1769.2	52.9	8416.9	-17.58	0.53	24.03
222.0	353671	2631	773839	1734.1	53.9	8465.1	-17.58	0.54	24.17
224.0	357104	2740	790818	1698.9	55.0	8513.5	-17.59	0.55	24.30
226.0	360467	2851	807893	1663.7	56.1	8562.2	-17.60	0.57	24.41
228.0	363759	2965	825067	1628.5	57.3	8611.2	-17.60	0.59	24.54
230.0	366981	3081	842338	1593.3	58.5	8660.4	-17.60	0.60	24.67
232.0	370132	3199	859709	1558.1	59.7	8709.9	-17.60	0.61	24.78
234.0	373213	3319	877178	1522.9	60.9	8759.5	-17.61	0.61	24.89
236.0	376224	3442	894747	1487.7	62.1	8809.5	-17.60	0.62	25.02
238.0	379164	3568	912416	1452.5	63.4	8859.6	-17.57	0.63	25.15
240.0	382034	3696	930186	1417.3	64.7	8910.0	-17.56	0.63	25.28
242.0	384833	3827	948056	1382.2	65.9	8960.7	-17.58	0.64	25.39
244.0	387562	3960	966029	1347.0	67.2	9011.6	-17.60	0.66	25.53
246.0	390221	4096	984103	1311.8	68.6	9062.8	-17.60	0.68	25.67
248.0	392810	4234	1002280	1276.6	69.9	9114.3	-17.60	0.68	25.78
250.0	395328	4375	1020560	1241.4	71.3	9166.0	-17.59	0.68	25.90
252.0	397776	4519	1038944	1206.3	72.6	9217.9	-17.58	0.68	26.03
254.0	400153	4666	1057432	1171.1	74.0	9270.1	-17.56	0.69	26.18
256.0	402460	4815	1076025	1136.0	75.4	9322.6	-17.56	0.69	26.30

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	404697	4967	1094723	1100.8	76.8	9375.3	-17.59	0.69	26.43
260.0	406863	5122	1113526	1065.6	78.2	9428.4	-17.62	0.71	26.58
262.0	408959	5280	1132436	1030.4	79.6	9481.7	-17.63	0.72	26.73
264.0	410985	5441	1151453	995.2	81.1	9535.2	-17.61	0.73	26.86
266.0	412940	5604	1170578	959.9	82.6	9589.1	-17.60	0.75	26.99
268.0	414825	5771	1189810	924.7	84.1	9643.2	-17.61	0.77	27.13
270.0	416639	5941	1209151	889.5	85.6	9697.6	-17.62	0.77	27.27
272.0	418383	6113	1228601	854.2	87.1	9752.3	-17.63	0.76	27.41
274.0	420056	6289	1248160	819.0	88.7	9807.3	-17.65	0.78	27.56
276.0	421659	6468	1267830	783.7	90.3	9862.6	-17.66	0.81	27.72
278.0	423191	6650	1287611	748.3	91.9	9918.1	-17.66	0.83	27.86
280.0	424652	6836	1307503	713.0	93.5	9974.0	-17.68	0.82	28.02
282.0	426043	7024	1327507	677.6	95.2	10030.2	-17.71	0.81	28.18
284.0	427362	7216	1347624	642.2	96.8	10086.7	-17.74	0.82	28.33
286.0	428611	7412	1367854	606.7	98.5	10143.5	-17.74	0.85	28.47
288.0	429789	7610	1388198	571.2	100.2	10200.6	-17.74	0.87	28.61
290.0	430896	7812	1408657	535.7	101.9	10258.0	-17.76	0.86	28.76
292.0	431932	8018	1429230	500.2	103.6	10315.7	-17.78	0.85	28.94
294.0	432897	8227	1449920	464.6	105.3	10373.7	-17.79	0.87	29.11
296.0	433790	8439	1470725	429.0	107.1	10432.1	-17.80	0.89	29.27
298.0	434613	8655	1491648	393.4	108.9	10490.8	-17.83	0.92	29.41
300.0	435364	8875	1512689	357.7	110.8	10549.8	-17.86	0.92	29.57
302.0	436044	9098	1533848	322.0	112.6	10609.1	-17.88	0.93	29.74
304.0	436652	9325	1555125	286.2	114.5	10668.7	-17.89	0.94	29.92
306.0	437189	9556	1576523	250.4	116.4	10728.7	-17.90	0.95	30.08
308.0	437654	9791	1598041	214.6	118.3	10789.0	-17.91	0.96	30.23
310.0	438047	10030	1619679	178.7	120.2	10849.7	-17.94	0.97	30.41
312.0	438368	10272	1641440	142.8	122.2	10910.7	-17.98	0.98	30.61
314.0	438618	10518	1663322	106.8	124.1	10972.1	-18.02	0.99	30.78
316.0	438796	10768	1685328	70.8	126.1	11033.8	-18.04	1.00	30.94
318.0	438901	11023	1707458	34.7	128.1	11095.9	-18.08	1.01	31.12
320.0	438934	11281	1729712	-1.6	130.2	11158.3	-18.13	1.02	31.31
322.0	438895	11543	1752092	-37.9	132.2	11221.1	-18.18	1.03	31.50
324.0	438783	11810	1774597	-74.2	134.3	11284.3	-18.19	1.04	31.69
326.0	438598	12081	1797229	-110.6	136.4	11347.9	-18.19	1.05	31.88
328.0	438340	12356	1819989	-147.0	138.5	11411.8	-18.22	1.07	32.06
330.0	438010	12635	1842877	-183.5	140.7	11476.1	-18.26	1.10	32.25
332.0	437606	12918	1865894	-220.0	142.9	11540.8	-18.29	1.11	32.43
334.0	437130	13206	1889040	-256.7	145.1	11605.8	-18.32	1.13	32.62
336.0	436580	13499	1912317	-293.4	147.4	11671.3	-18.38	1.14	32.82
338.0	435956	13796	1935726	-330.2	149.7	11737.1	-18.44	1.15	33.02
340.0	435259	14098	1959266	-367.1	152.0	11803.4	-18.47	1.16	33.23
342.0	434488	14404	1982939	-404.1	154.3	11870.1	-18.49	1.17	33.43

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	433643	14715	2006747	-441.1	156.7	11937.1	-18.53	1.20	33.64
346.0	432723	15031	2030688	-478.2	159.1	12004.6	-18.59	1.21	33.84
348.0	431730	15351	2054765	-515.5	161.5	12072.5	-18.65	1.20	34.03
350.0	430661	15676	2078978	-552.8	163.9	12140.7	-18.70	1.21	34.24
352.0	429518	16007	2103328	-590.2	166.3	12209.4	-18.74	1.23	34.46
354.0	428300	16342	2127816	-627.8	168.8	12278.6	-18.78	1.26	34.68
356.0	427007	16682	2152443	-665.4	171.4	12348.1	-18.82	1.29	34.89
358.0	425639	17027	2177209	-703.1	174.0	12418.1	-18.89	1.31	35.10
360.0	424195	17378	2202116	-740.9	176.6	12488.6	-18.96	1.34	35.32
362.0	422675	17734	2227164	-778.9	179.3	12559.4	-19.02	1.35	35.56
364.0	421079	18095	2252354	-817.0	182.0	12630.8	-19.08	1.36	35.79
366.0	419407	18462	2277687	-855.2	184.7	12702.6	-19.12	1.36	36.02
368.0	417658	18834	2303164	-893.5	187.5	12774.8	-19.17	1.36	36.24
370.0	415833	19212	2328787	-931.9	190.2	12847.6	-19.22	1.37	36.48
372.0	413930	19595	2354555	-970.4	192.9	12920.8	-19.27	1.38	36.72
374.0	411951	19983	2380470	-1009.0	195.7	12994.5	-19.33	1.39	36.96
376.0	409894	20378	2406533	-1047.7	198.5	13068.6	-19.42	1.41	37.20
378.0	407760	20777	2432745	-1086.6	201.3	13143.2	-19.49	1.43	37.43
380.0	405548	21183	2459106	-1125.7	204.2	13218.3	-19.54	1.46	37.68
382.0	403257	21594	2485619	-1164.8	207.2	13294.0	-19.57	1.48	37.94
384.0	400889	22012	2512282	-1203.9	210.1	13370.1	-19.62	1.49	38.20
386.0	398442	22435	2539099	-1243.3	213.1	13446.7	-19.71	1.51	38.46
388.0	395915	22864	2566070	-1282.8	216.1	13523.9	-19.81	1.51	38.71
390.0	393310	23299	2593195	-1322.5	219.2	13601.6	-19.89	1.51	38.97
392.0	390625	23741	2620477	-1362.3	222.2	13679.8	-19.94	1.51	39.24
394.0	387861	24188	2647915	-1402.3	225.2	13758.6	-20.01	1.54	39.51
396.0	385016	24642	2675511	-1442.4	228.3	13837.8	-20.09	1.56	39.78
398.0	382091	25101	2703266	-1482.6	231.5	13917.7	-20.17	1.57	40.04
400.0	379086	25568	2731182	-1523.0	234.6	13998.0	-20.25	1.57	40.32
402.0	375999	26040	2759259	-1563.6	237.8	14078.9	-20.33	1.60	40.61
404.0	372831	26519	2787498	-1604.4	241.0	14160.4	-20.42	1.63	40.89
406.0	369582	27004	2815901	-1645.3	244.3	14242.5	-20.51	1.65	41.18
408.0	366250	27496	2844469	-1686.4	247.6	14325.2	-20.59	1.66	41.49
410.0	362836	27994	2873202	-1727.7	250.9	14408.4	-20.67	1.68	41.78
412.0	359339	28499	2902103	-1769.1	254.3	14492.3	-20.76	1.70	42.07
414.0	355759	29012	2931172	-1810.7	257.7	14576.7	-20.87	1.71	42.38
416.0	352096	29530	2960410	-1852.6	261.1	14661.8	-20.98	1.73	42.68
418.0	348349	30056	2989819	-1894.6	264.6	14747.5	-21.07	1.76	42.98
420.0	344517	30589	3019401	-1936.9	268.2	14833.8	-21.16	1.79	43.30
422.0	340601	31129	3049155	-1979.3	271.8	14920.7	-21.25	1.80	43.64
424.0	336600	31676	3079084	-2021.9	275.4	15008.3	-21.34	1.81	43.96
426.0	332514	32231	3109188	-2064.6	279.0	15096.5	-21.44	1.83	44.29
428.0	328342	32792	3139470	-2107.6	282.7	15185.5	-21.55	1.87	44.63

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
430.0	324083	33362	3169931	-2150.9	286.5	15275.1	-21.67	1.90	44.97
432.0	319738	33938	3200571	-2194.3	290.3	15365.3	-21.77	1.92	45.31
434.0	315306	34523	3231393	-2238.0	294.2	15456.3	-21.89	1.94	45.64
436.0	310786	35115	3262397	-2281.9	298.1	15547.9	-22.02	1.95	46.01
438.0	306178	35715	3293585	-2326.1	302.0	15640.3	-22.14	1.96	46.37
440.0	301482	36323	3324958	-2370.4	305.9	15733.4	-22.24	1.99	46.74
442.0	296696	36939	3356519	-2415.0	310.0	15827.3	-22.35	2.03	47.10
444.0	291821	37563	3388268	-2459.9	314.0	15921.8	-22.47	2.05	47.46
446.0	286856	38195	3420207	-2504.9	318.1	16017.1	-22.61	2.05	47.81
448.0	281801	38835	3452337	-2550.3	322.3	16113.1	-22.73	2.07	48.19
450.0	276655	39484	3484660	-2595.9	326.4	16209.9	-22.86	2.11	48.59
452.0	271418	40141	3517177	-2641.7	330.7	16307.4	-23.00	2.14	49.00
454.0	266088	40807	3549890	-2687.9	335.0	16405.8	-23.14	2.16	49.39
456.0	260666	41481	3582801	-2734.3	339.3	16505.0	-23.25	2.18	49.79
458.0	255151	42164	3615910	-2780.9	343.7	16605.1	-23.39	2.20	50.19
460.0	249542	42856	3649221	-2827.8	348.1	16706.0	-23.56	2.22	50.60
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
461.77	244499	43476	3678871	-2869.9	351.9	16791.9	-23.73	2.06	50.95
462.0	243839	43557	3682733	-2875.5	352.4	16802.1	-24.22	2.05	39.90
464.0	238040	44265	3716425	-2924.2	356.4	16887.4	-24.70	1.90	40.08
466.0	232142	44982	3750279	-2973.6	360.2	16967.7	-24.72	1.92	40.27
468.0	226145	45706	3784295	-3022.9	364.0	17048.4	-24.53	1.84	40.47
470.0	220050	46438	3818474	-3071.4	367.9	17129.5	-23.88	1.95	40.66
472.0	213860	47178	3852814	-3118.1	371.8	17211.0	-22.92	1.96	40.89
474.0	207579	47925	3887319	-3163.1	375.7	17293.2	-21.98	1.95	41.05
476.0	201209	48680	3921987	-3206.5	379.6	17375.5	-21.44	1.94	41.26
478.0	194753	49443	3956821	-3249.2	383.4	17458.3	-21.30	1.94	41.51
480.0	188212	50214	3991821	-3291.8	387.3	17541.6	-21.37	1.95	41.81
482.0	181586	50993	4026988	-3334.6	391.3	17625.5	-21.48	1.98	42.13
484.0	174874	51779	4062324	-3377.8	395.3	17710.1	-21.70	2.03	42.46
486.0	168075	52574	4097829	-3421.5	399.4	17795.3	-22.01	2.09	42.79
488.0	161188	53377	4133506	-3465.7	403.6	17881.2	-22.37	2.15	43.12
490.0	154211	54188	4169355	-3510.8	407.9	17967.8	-22.74	2.17	43.46
492.0	147144	55009	4205378	-3556.5	412.3	18055.0	-23.02	2.19	43.79
494.0	139984	55838	4241576	-3602.9	416.7	18142.9	-23.41	2.23	44.12
496.0	132732	56676	4277943	-3650.1	421.2	18223.3	-23.93	2.21	37.86
498.0	125383	57522	4314466	-3698.5	425.6	18299.0	-24.34	2.21	37.91
500.0	117937	58378	4351141	-3747.4	430.0	18374.9	-24.59	2.22	37.97
502.0	110393	59242	4387966	-3796.7	434.5	18450.9	-24.79	2.27	38.02
504.0	102750	60116	4424944	-3846.5	439.1	18527.0	-24.99	2.30	38.19
506.0	95007	60999	4462075	-3896.7	443.7	18603.6	-25.16	2.31	38.40

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	87163	61891	4499360	-3947.2	448.4	18680.6	-25.33	2.33	38.63
510.0	79218	62793	4536799	-3998.0	453.1	18758.1	-25.50	2.37	38.87
512.0	71171	63703	4574393	-4049.1	457.8	18836.2	-25.66	2.40	39.11
514.0	63021	64624	4612144	-4100.6	462.7	18914.7	-25.78	2.42	39.34
516.0	54769	65554	4650052	-4152.3	467.5	18993.6	-25.91	2.45	39.59
518.0	46412	66494	4688118	-4204.3	472.5	19073.0	-26.11	2.48	39.87
520.0	37951	67444	4726344	-4256.7	477.5	19153.1	-26.34	2.51	40.15
522.0	29385	68404	4764731	-4309.6	482.5	19233.6	-26.57	2.51	40.42
524.0	20712	69374	4803279	-4363.0	487.5	19314.7	-26.80	2.51	40.68
526.0	11933	70354	4841990	-4416.8	492.5	19396.4	-27.04	2.53	40.95
528.0	3045	71344	4880865	-4471.1	497.6	19478.5	-27.26	2.55	41.23
530.0	-5952	72344	4919905	-4525.8	502.7	19561.2	-27.43	2.57	41.51
532.0	-15059	73355	4959110	-4580.8	507.9	19644.5	-27.59	2.60	41.78
534.0	-24276	74376	4998483	-4636.2	513.1	19728.4	-27.78	2.64	42.07
536.0	-33604	75408	5038024	-4692.0	518.5	19812.8	-27.99	2.67	42.36
538.0	-43044	76450	5077735	-4748.2	523.8	19897.8	-28.20	2.69	42.65
540.0	-52597	77503	5117616	-4804.8	529.2	19983.4	-28.39	2.71	42.95
542.0	-62263	78567	5157669	-4861.7	534.6	20069.6	-28.56	2.72	43.23
544.0	-72044	79642	5197895	-4919.0	540.1	20156.3	-28.71	2.75	43.50
546.0	-81939	80727	5238295	-4976.6	545.6	20243.6	-28.88	2.79	43.80
548.0	-91950	81824	5278870	-5034.5	551.3	20331.5	-29.07	2.83	44.11
550.0	-102078	82932	5319621	-5092.8	556.9	20420.1	-29.26	2.85	44.42
552.0	-112322	84052	5360550	-5151.6	562.7	20509.2	-29.43	2.86	44.68
554.0	-122684	85183	5401658	-5210.5	568.4	20598.8	-29.55	2.86	44.94
556.0	-133164	86325	5442946	-5269.8	574.0	20688.9	-29.67	2.85	45.21
558.0	-143764	87479	5484416	-5329.2	579.9	20779.6	-29.78	2.64	45.47
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
559.54	-152006	88375	5516442	-5375.1	583.5	20849.7	-29.71	2.32	45.68
560.0	-154481	88644	5526027	-5388.4	584.5	20858.3	-28.11	2.32	-8.40
S-II/S-IVB SEPARATION COMMAND									
560.5	-157178	88936	5536441	-5402.3	585.7	20854.1	-27.45	2.22	-8.33
562.0	-165312	89817	5567710	-5442.9	588.3	20841.7	-26.83	1.57	-8.09
564.0	-176251	90997	5609376	-5496.6	591.5	20825.8	-26.96	1.58	-7.77
566.0	-187298	92183	5651027	-5551.4	594.9	20828.6	-27.75	1.85	7.59
568.0	-198456	93377	5692704	-5606.9	598.7	20846.5	-27.75	1.94	9.69
570.0	-209725	94578	5734417	-5662.4	602.7	20866.2	-27.77	1.97	9.93
572.0	-221105	95787	5776171	-5718.6	606.4	20886.5	-28.41	1.86	10.15
574.0	-232599	97004	5817964	-5775.9	610.1	20906.6	-28.93	1.84	10.00
576.0	-244209	98228	5859797	-5834.1	613.8	20926.7	-29.16	1.88	10.06

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	-255935	99459	5901671	-5892.4	617.6	20946.8	-29.10	1.92	10.12
580.0	-267778	100698	5943585	-5950.5	621.5	20967.1	-29.04	1.93	10.17
582.0	-279737	101945	5985540	-6008.5	625.4	20987.6	-29.09	1.96	10.18
584.0	-291812	103200	6027535	-6066.8	629.4	21007.9	-29.17	2.02	10.15
586.0	-304004	104463	6069571	-6125.2	633.4	21028.2	-29.24	2.08	10.13
588.0	-316313	105734	6111648	-6183.7	637.6	21048.4	-29.32	2.11	10.12
590.0	-328739	107013	6153765	-6242.5	641.9	21068.7	-29.42	2.14	10.11
592.0	-341283	108301	6195923	-6301.4	646.2	21088.9	-29.52	2.15	10.10
594.0	-353945	109598	6238121	-6360.5	650.5	21109.1	-29.59	2.17	10.08
596.0	-366725	110903	6280359	-6419.8	654.8	21129.2	-29.65	2.17	10.07
598.0	-379624	112217	6322638	-6479.1	659.2	21149.3	-29.68	2.18	10.05
600.0	-392642	113540	6364956	-6538.5	663.6	21169.4	-29.71	2.21	10.01
602.0	-405778	114872	6407315	-6598.0	668.0	21189.4	-29.75	2.21	9.99
604.0	-419034	116212	6449714	-6657.5	672.4	21209.4	-29.79	2.22	9.99
606.0	-432408	117561	6492153	-6717.1	676.9	21229.4	-29.82	2.24	10.00
608.0	-445902	118920	6534631	-6776.8	681.4	21249.3	-29.85	2.27	9.99
610.0	-459515	120287	6577150	-6836.5	686.0	21269.3	-29.89	2.29	9.97
612.0	-473248	121663	6619708	-6896.4	690.5	21289.2	-29.94	2.28	9.92
614.0	-487101	123049	6662307	-6956.3	695.1	21309.0	-29.97	2.26	9.88
616.0	-501073	124444	6704944	-7016.3	699.6	21328.7	-30.00	2.25	9.86
618.0	-515166	125847	6747621	-7076.3	704.1	21348.4	-30.03	2.25	9.85
620.0	-529379	127260	6790338	-7136.4	708.6	21368.1	-30.06	2.25	9.85
622.0	-543712	128682	6833094	-7196.5	713.1	21387.9	-30.08	2.28	9.88
624.0	-558165	130112	6875890	-7256.7	717.7	21407.7	-30.10	2.30	9.90
626.0	-572738	131552	6918725	-7316.9	722.3	21427.4	-30.13	2.30	9.88
628.0	-587433	133001	6961599	-7377.3	726.9	21447.2	-30.20	2.30	9.83
630.0	-602248	134460	7004513	-7437.8	731.5	21466.8	-30.28	2.32	9.80
632.0	-617184	135927	7047466	-7498.4	736.1	21486.4	-30.33	2.32	9.79
634.0	-632241	137404	7090459	-7559.0	740.8	21505.9	-30.34	2.31	9.78
636.0	-647420	138891	7133490	-7619.7	745.4	21525.5	-30.35	2.31	9.77
638.0	-662720	140386	7176561	-7680.4	750.0	21545.0	-30.36	2.31	9.76
640.0	-678142	141891	7219670	-7741.2	754.6	21564.5	-30.38	2.32	9.75
642.0	-693685	143405	7262819	-7802.0	759.3	21584.0	-30.42	2.31	9.74
644.0	-709350	144928	7306006	-7862.8	763.9	21603.5	-30.46	2.31	9.74
646.0	-725136	146460	7349233	-7923.8	768.5	21623.0	-30.51	2.32	9.75
648.0	-741045	148002	7392498	-7984.9	773.2	21642.5	-30.56	2.32	9.77
650.0	-757076	149553	7435803	-8046.1	777.8	21662.1	-30.61	2.33	9.76
652.0	-773229	151113	7479146	-8107.3	782.5	21681.6	-30.64	2.34	9.74
654.0	-789505	152683	7522529	-8168.6	787.2	21701.0	-30.66	2.34	9.71
656.0	-805904	154262	7565950	-8230.0	791.8	21720.4	-30.68	2.32	9.69
658.0	-822425	155850	7609411	-8291.3	796.5	21739.8	-30.68	2.31	9.68
660.0	-839069	157448	7652910	-8352.7	801.1	21759.2	-30.70	2.30	9.69
662.0	-855836	159055	7696447	-8414.1	805.7	21778.5	-30.73	2.32	9.69

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	-872725	160671	7740024	-8475.6	810.4	21797.9	-30.78	2.33	9.67
666.0	-889738	162296	7783639	-8537.2	815.0	21817.2	-30.83	2.34	9.64
668.0	-906874	163931	7827293	-8598.9	819.7	21836.5	-30.85	2.34	9.63
670.0	-924134	165575	7870985	-8660.6	824.4	21855.7	-30.85	2.35	9.63
672.0	-941517	167228	7914716	-8722.3	829.1	21875.0	-30.86	2.35	9.63
674.0	-959023	168891	7958485	-8784.1	833.8	21894.2	-30.92	2.35	9.61
676.0	-976653	170563	8002292	-8846.1	838.5	21913.4	-31.06	2.35	9.57
678.0	-994408	172245	8046138	-8908.4	843.2	21932.5	-31.20	2.36	9.54
680.0	-1012287	173936	8090023	-8970.8	847.9	21951.6	-31.27	2.36	9.54
682.0	-1030291	175637	8133945	-9033.3	852.6	21970.7	-31.22	2.37	9.55
684.0	-1048420	177347	8177905	-9095.7	857.4	21989.8	-31.12	2.36	9.55
686.0	-1066674	179066	8221904	-9157.9	862.1	22008.9	-31.09	2.34	9.53
688.0	-1085052	180795	8265941	-9220.1	866.8	22027.9	-31.12	2.35	9.52
690.0	-1103554	182533	8310016	-9282.4	871.5	22047.0	-31.14	2.37	9.53
692.0	-1122181	184281	8354129	-9344.6	876.2	22066.1	-31.12	2.38	9.55
694.0	-1140933	186038	8398280	-9406.8	881.0	22085.2	-31.09	2.38	9.59
696.0	-1159809	187805	8442470	-9469.0	885.7	22104.4	-31.06	2.38	9.60
698.0	-1178809	189581	8486698	-9531.1	890.5	22123.5	-31.03	2.39	9.62
700.0	-1197933	191367	8530964	-9593.1	895.3	22142.8	-31.00	2.34	9.63
702.0	-1217181	193162	8575269	-9655.0	900.0	22162.0	-30.98	2.36	9.65
704.0	-1236553	194967	8619612	-9717.1	904.9	22181.3	-30.95	2.33	9.67
706.0	-1256049	196782	8663995	-9778.8	909.8	22200.6	-30.92	2.14	9.69
S-IVB FIRST GUIDANCE CUTOFF									
706.21	-1258104	196973	8668656	-9784.5	910.2	22202.7	-30.92	2.01	9.69
708.0	-1275661	198605	8708385	-9831.8	913.4	22187.8	-25.11	1.75	-11.23
710.0	-1295375	200435	8752737	-9882.1	916.8	22165.3	-25.08	1.67	-11.27
712.0	-1315189	202272	8797045	-9932.3	920.1	22142.7	-25.06	1.67	-11.31
714.0	-1335104	204116	8841308	-9982.5	923.5	22120.0	-25.03	1.66	-11.37
716.0	-1355119	205966	8885526	-10032.6	926.8	22097.2	-25.00	1.66	-11.42
PARKING ORBIT INSERTION									
716.21	-1357227	206161	8890166	-10037.8	927.1	22095.2	-25.00	1.66	-11.43

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									
-16.963	3441.351	9.225	-2.991	-0.0	413.5	1275.3	-0.07	-0.04	0.01
-16.0	3441.351	9.290	-2.789	-0.1	413.5	1275.3	-0.07	-0.04	0.01
-15.0	3441.351	9.358	-2.579	-0.2	413.4	1275.3	-0.07	-0.04	0.01
-14.0	3441.351	9.426	-2.369	-0.3	413.4	1275.4	-0.07	-0.04	0.01
-13.0	3441.351	9.494	-2.159	-0.3	413.4	1275.4	-0.07	-0.04	0.01
-12.0	3441.351	9.562	-1.949	-0.4	413.3	1275.4	-0.07	-0.04	0.01
-11.0	3441.351	9.631	-1.740	-0.5	413.3	1275.4	-0.07	-0.04	0.01
-10.0	3441.350	9.699	-1.530	-0.6	413.2	1275.4	-0.07	-0.04	0.01
-9.0	3441.350	9.767	-1.320	-0.7	413.2	1275.4	-0.07	-0.04	0.01
-8.0	3441.350	9.835	-1.110	-0.8	413.1	1275.4	-0.07	-0.04	0.01
-7.0	3441.350	9.903	-0.900	-0.9	413.1	1275.5	-0.07	-0.04	0.01
-6.0	3441.350	9.970	-0.690	-0.9	413.0	1275.5	-0.07	-0.04	0.01
-5.0	3441.350	10.038	-0.480	-1.0	413.0	1275.5	-0.07	-0.04	0.01
-4.0	3441.350	10.106	-0.270	-1.1	413.0	1275.5	-0.07	-0.04	0.01
-3.0	3441.349	10.174	-0.060	-1.2	412.9	1275.5	-0.07	-0.04	0.01
-2.0	3441.349	10.242	0.150	-1.3	412.9	1275.5	-0.07	-0.04	0.01
-1.0	3441.349	10.310	0.360	-1.4	412.8	1275.5	-0.07	-0.04	0.01
0.0	3441.349	10.378	0.570	-1.5	412.8	1275.6	-0.07	-0.04	0.01
ALL HOLDDOWN ARMS RELEASED									
0.3	3441.349	10.399	0.632	-1.4	412.8	1275.6	2.51	-0.05	-0.02
LIFTOFF - START OF TIME BASE 1									
0.6	3441.349	10.419	0.695	-0.4	412.8	1275.6	3.07	-0.05	-0.02
1.0	3441.349	10.446	0.779	1.5	412.7	1275.5	6.56	-0.05	-0.02
2.0	3441.350	10.514	0.989	8.4	412.7	1275.5	7.07	-0.02	-0.00
3.0	3441.351	10.582	1.199	15.5	412.8	1275.6	7.26	0.37	0.02
4.0	3441.355	10.650	1.409	22.8	413.4	1275.6	7.42	0.77	0.04
5.0	3441.359	10.718	1.619	30.3	414.2	1275.6	7.61	0.85	0.06
6.0	3441.365	10.786	1.829	38.0	414.9	1275.7	7.80	0.54	0.08
7.0	3441.372	10.855	2.039	45.9	415.4	1275.8	7.99	0.45	0.10
8.0	3441.380	10.923	2.249	54.0	415.9	1275.9	8.18	0.83	0.12
9.0	3441.389	10.992	2.459	62.3	416.9	1276.1	8.37	1.00	0.14
10.0	3441.400	11.060	2.669	70.7	417.9	1276.2	8.55	1.09	0.15
11.0	3441.413	11.129	2.879	79.3	418.9	1276.4	8.73	0.66	0.19
12.0	3441.426	11.198	3.089	88.1	419.2	1276.6	8.90	0.05	0.16
13.0	3441.442	11.267	3.299	97.1	419.2	1276.8	9.07	-0.07	0.38
14.0	3441.458	11.336	3.509	106.2	419.1	1277.2	9.23	0.03	0.43

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	3441.477	11.405	3.720	115.5	419.2	1277.7	9.38	0.03	0.49
16.0	3441.496	11.474	3.930	125.0	419.2	1278.2	9.56	-0.10	0.52
17.0	3441.518	11.543	4.140	134.6	419.0	1278.7	9.77	-0.23	0.58
18.0	3441.541	11.612	4.351	144.4	418.7	1279.3	10.03	-0.38	0.65
19.0	3441.565	11.681	4.562	154.5	418.3	1280.1	10.17	-0.38	0.94
20.0	3441.592	11.750	4.772	164.8	417.9	1281.2	10.44	-0.35	1.18
21.0	3441.620	11.818	4.983	175.3	417.5	1282.5	10.66	-0.33	1.42
22.0	3441.649	11.887	5.194	186.1	417.2	1284.0	10.88	-0.29	1.67
23.0	3441.681	11.956	5.406	197.1	416.9	1285.8	11.12	-0.25	1.92
24.0	3441.714	12.024	5.618	208.3	416.7	1287.9	11.36	-0.24	2.19
25.0	3441.749	12.093	5.830	219.8	416.4	1290.3	11.61	-0.24	2.49
26.0	3441.787	12.161	6.042	231.5	416.2	1292.9	11.86	-0.25	2.84
27.0	3441.826	12.230	6.255	243.5	415.9	1296.0	12.11	-0.25	3.20
28.0	3441.867	12.298	6.469	255.7	415.7	1299.3	12.34	-0.25	3.55
29.0	3441.910	12.367	6.683	268.1	415.4	1303.0	12.57	-0.24	3.90
30.0	3441.955	12.435	6.898	280.8	415.2	1307.1	12.81	-0.23	4.24
31.0	3442.002	12.503	7.113	293.7	414.9	1311.5	13.04	-0.21	4.59
32.0	3442.052	12.572	7.330	306.9	414.7	1316.3	13.29	-0.20	4.96
33.0	3442.103	12.640	7.547	320.3	414.5	1321.5	13.53	-0.17	5.33
34.0	3442.157	12.708	7.765	333.9	414.4	1327.0	13.78	-0.13	5.71
35.0	3442.213	12.776	7.984	347.8	414.3	1332.9	14.03	-0.09	6.12
36.0	3442.272	12.844	8.203	361.9	414.2	1339.2	14.26	-0.05	6.53
37.0	3442.332	12.913	8.424	376.3	414.2	1346.0	14.50	-0.03	6.94
38.0	3442.395	12.981	8.646	390.9	414.1	1353.1	14.74	-0.03	7.35
39.0	3442.461	13.049	8.870	405.7	414.0	1360.7	14.98	-0.05	7.76
40.0	3442.529	13.117	9.094	420.8	414.0	1368.7	15.23	-0.10	8.20
41.0	3442.599	13.185	9.320	436.2	413.8	1377.1	15.47	-0.15	8.66
42.0	3442.673	13.253	9.548	451.7	413.7	1386.0	15.72	-0.20	9.16
43.0	3442.748	13.321	9.777	467.6	413.5	1395.5	15.96	-0.23	9.70
44.0	3442.826	13.389	10.007	483.6	413.2	1405.4	16.20	-0.24	10.25
45.0	3442.907	13.457	10.239	499.9	413.0	1416.0	16.44	-0.23	10.84
46.0	3442.991	13.525	10.473	516.5	412.8	1427.2	16.66	-0.21	11.45
47.0	3443.077	13.593	10.709	533.2	412.6	1438.9	16.90	-0.20	12.08
48.0	3443.167	13.661	10.947	550.3	412.3	1451.3	17.14	-0.24	12.70
49.0	3443.259	13.729	11.187	567.5	412.0	1464.3	17.39	-0.31	13.30
50.0	3443.353	13.797	11.429	585.0	411.7	1477.9	17.65	-0.41	13.88
51.0	3443.451	13.864	11.673	602.8	411.2	1492.0	17.90	-0.54	14.44
52.0	3443.552	13.932	11.920	620.8	410.5	1506.8	18.13	-0.70	14.99
53.0	3443.655	14.000	12.169	639.0	409.7	1522.0	18.35	-0.85	15.55
54.0	3443.762	14.067	12.421	657.4	408.8	1537.9	18.56	-0.99	16.12
55.0	3443.872	14.134	12.675	676.1	407.8	1554.3	18.76	-1.08	16.71
56.0	3443.985	14.201	12.933	695.0	406.7	1571.3	18.99	-1.12	17.32
57.0	3444.101	14.268	13.193	714.1	405.6	1588.9	19.22	-1.11	17.94

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	3444.220	14.335	13.456	733.4	404.5	1607.2	19.44	-1.05	18.58
59.0	3444.342	14.401	13.722	752.9	403.5	1626.1	19.67	-0.99	19.24
60.0	3444.468	14.467	13.991	772.7	402.5	1645.7	19.89	-0.92	19.91
61.0	3444.596	14.534	14.264	792.7	401.6	1666.0	20.07	-0.84	20.62
62.0	3444.729	14.600	14.539	812.8	400.8	1687.0	20.22	-0.74	21.33
63.0	3444.864	14.666	14.819	833.0	400.1	1708.6	20.34	-0.63	22.03
64.0	3445.003	14.731	15.102	853.4	399.6	1731.0	20.42	-0.49	22.71
65.0	3445.145	14.797	15.389	873.8	399.2	1754.0	20.49	-0.35	23.39
66.0	3445.290	14.863	15.679	894.3	398.9	1777.8	20.55	-0.21	24.04
67.0	3445.439	14.928	15.974	914.9	398.7	1802.1	20.64	-0.08	24.71
MACH 1									
67.5	3445.515	14.961	16.123	925.3	398.7	1814.6	20.69	-0.03	25.06
68.0	3445.592	14.994	16.272	935.6	398.6	1827.2	20.74	0.01	25.40
69.0	3445.747	15.060	16.575	956.4	398.7	1853.0	20.86	0.07	26.10
70.0	3445.906	15.125	16.882	977.3	398.8	1879.4	21.00	0.13	26.79
71.0	3446.069	15.191	17.194	998.4	399.0	1906.6	21.20	0.17	27.51
72.0	3446.235	15.257	17.510	1019.7	399.1	1934.4	21.41	0.19	28.21
73.0	3446.405	15.322	17.831	1041.2	399.3	1963.0	21.64	0.20	28.91
74.0	3446.578	15.388	18.156	1063.0	399.5	1992.3	21.88	0.18	29.62
75.0	3446.754	15.454	18.487	1085.0	399.6	2022.2	22.09	0.13	30.36
76.0	3446.935	15.520	18.822	1107.1	399.7	2053.0	22.30	0.07	31.12
77.0	3447.119	15.585	19.162	1129.5	399.8	2084.5	22.47	0.01	31.95
78.0	3447.307	15.651	19.508	1152.0	399.8	2117.0	22.64	0.01	32.84
79.0	3447.498	15.717	19.859	1174.7	399.8	2150.3	22.79	0.04	33.78
80.0	3447.693	15.783	20.216	1197.6	399.9	2184.6	22.94	0.14	34.75
81.0	3447.892	15.849	20.578	1220.6	400.2	2219.8	23.11	0.28	35.69
82.0	3448.095	15.914	20.947	1243.8	400.5	2255.9	23.30	0.41	36.62
83.0	3448.302	15.980	21.321	1267.2	400.9	2292.9	23.48	0.49	37.55
84.0	3448.512	16.046	21.701	1290.7	401.3	2331.0	23.61	0.52	38.51
85.0	3448.727	16.112	22.088	1314.4	401.8	2370.0	23.69	0.53	39.53
MAXIMUM DYNAMIC PRESSURE									
86.0	3448.945	16.179	22.482	1338.0	402.4	2410.2	23.69	0.54	40.67
87.0	3449.167	16.245	22.882	1361.7	403.0	2451.5	23.64	0.56	41.91
88.0	3449.393	16.311	23.289	1385.2	403.6	2494.1	23.52	0.61	43.25
89.0	3449.623	16.378	23.703	1408.6	404.2	2538.1	23.34	0.67	44.66
90.0	3449.857	16.444	24.124	1431.9	404.9	2583.4	23.13	0.72	46.08
91.0	3450.094	16.511	24.553	1454.9	405.6	2630.2	22.91	0.76	47.49
92.0	3450.336	16.578	24.990	1477.7	406.4	2678.3	22.71	0.75	48.86
93.0	3450.581	16.645	25.435	1500.3	407.0	2727.9	22.52	0.67	50.18

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
94.0	3450.829	16.712	25.888	1522.7	407.6	2778.7	22.34	0.50	51.49
95.0	3451.082	16.779	26.349	1545.0	408.0	2830.9	22.17	0.29	52.79
96.0	3451.338	16.846	26.820	1567.0	408.2	2884.3	21.99	0.08	54.06
97.0	3451.598	16.913	27.299	1588.9	408.1	2939.0	21.83	-0.12	55.29
98.0	3451.861	16.980	27.787	1610.7	408.0	2994.9	21.71	-0.28	56.50
99.0	3452.128	17.048	28.285	1632.3	407.6	3052.0	21.62	-0.39	57.67
100.0	3452.398	17.115	28.792	1653.9	407.3	3110.2	21.57	-0.44	58.80
101.0	3452.672	17.182	29.309	1675.5	406.8	3169.5	21.58	-0.45	59.90
102.0	3452.950	17.249	29.835	1697.1	406.3	3230.0	21.64	-0.43	60.96
103.0	3453.231	17.315	30.372	1718.8	405.9	3291.5	21.72	-0.43	62.01
104.0	3453.515	17.382	30.919	1740.5	405.4	3354.0	21.78	-0.45	63.05
105.0	3453.804	17.449	31.476	1762.2	404.9	3417.6	21.80	-0.48	64.11
106.0	3454.096	17.515	32.044	1784.0	404.4	3482.3	21.78	-0.50	65.20
107.0	3454.391	17.582	32.622	1805.7	403.9	3548.0	21.72	-0.50	66.31
108.0	3454.690	17.648	33.212	1827.4	403.5	3614.9	21.64	-0.48	67.45
109.0	3454.992	17.715	33.812	1849.0	403.0	3683.0	21.56	-0.43	68.60
110.0	3455.299	17.781	34.424	1870.5	402.6	3752.2	21.50	-0.36	69.77
111.0	3455.608	17.847	35.047	1892.0	402.3	3822.5	21.46	-0.30	70.92
112.0	3455.921	17.913	35.682	1913.4	402.0	3894.0	21.48	-0.26	72.04
113.0	3456.238	17.980	36.329	1935.0	401.7	3966.6	21.58	-0.24	73.13
114.0	3456.558	18.046	36.988	1956.6	401.4	4040.2	21.74	-0.25	74.17
115.0	3456.882	18.112	37.659	1978.5	401.2	4114.9	21.96	-0.28	75.18
116.0	3457.209	18.178	38.342	2000.6	400.9	4190.5	22.23	-0.30	76.16
117.0	3457.540	18.244	39.038	2022.9	400.6	4267.2	22.52	-0.32	77.15
118.0	3457.875	18.310	39.747	2045.5	400.3	4344.9	22.78	-0.31	78.19
119.0	3458.214	18.375	40.469	2068.4	400.0	4423.6	22.97	-0.28	79.27
120.0	3458.556	18.441	41.203	2091.4	399.7	4503.5	23.09	-0.23	80.43
121.0	3458.902	18.507	41.951	2114.4	399.5	4584.6	23.11	-0.17	81.67
122.0	3459.252	18.573	42.712	2137.5	399.3	4666.9	23.07	-0.13	82.97
123.0	3459.606	18.638	43.487	2160.5	399.2	4750.5	23.00	-0.10	84.30
124.0	3459.963	18.704	44.276	2183.5	399.1	4835.5	22.94	-0.10	85.66
125.0	3460.324	18.770	45.079	2206.4	399.0	4921.8	22.94	-0.14	87.00
126.0	3460.689	18.835	45.896	2229.4	398.8	5009.5	23.00	-0.19	88.33
127.0	3461.058	18.901	46.728	2252.4	398.6	5098.5	23.13	-0.26	89.65
128.0	3461.431	18.967	47.574	2275.6	398.3	5188.8	23.29	-0.33	90.97
129.0	3461.807	19.032	48.436	2298.9	397.9	5280.5	23.41	-0.38	92.31
130.0	3462.188	19.098	49.313	2322.4	397.5	5373.5	23.52	-0.45	93.76
131.0	3462.572	19.163	50.205	2345.9	397.0	5468.0	23.63	-0.45	95.23
132.0	3462.960	19.228	51.112	2369.6	396.6	5564.0	23.74	-0.47	96.70
133.0	3463.352	19.294	52.036	2393.4	396.1	5661.4	23.86	-0.34	98.17
134.0	3463.748	19.359	52.976	2417.3	395.8	5760.3	23.97	-0.41	99.64
135.0	3464.148	19.424	53.932	2441.3	395.3	5860.7	24.08	-0.47	101.11
136.0	3464.552	19.489	54.905	2465.4	394.8	5962.5	24.19	-0.63	102.59

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
137.0	3464.959	19.554	55.895	2489.7	394.2	6065.9	24.30	-0.61	104.06
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
137.85	3465.309	19.609	56.750	2510.3	393.6	6154.9	24.40	-0.59	105.31
138.0	3465.371	19.619	56.901	2513.4	393.6	6170.3	16.37	-0.59	101.01
139.0	3465.785	19.683	57.923	2527.8	393.0	6258.3	13.69	-0.47	84.46
140.0	3466.203	19.748	58.960	2541.4	392.6	6342.8	13.67	-0.46	85.53
141.0	3466.623	19.813	60.011	2555.1	392.2	6428.4	13.64	-0.32	86.61
142.0	3467.044	19.877	61.076	2568.7	391.9	6515.2	13.61	-0.29	87.68
143.0	3467.468	19.942	62.156	2582.3	391.6	6603.2	13.59	-0.28	88.74
144.0	3467.894	20.006	63.250	2595.8	391.3	6692.3	13.56	-0.26	89.79
145.0	3468.322	20.070	64.358	2609.4	391.1	6782.5	13.53	-0.23	90.85
146.0	3468.753	20.135	65.482	2622.9	390.8	6873.8	13.56	-0.23	91.90
147.0	3469.186	20.199	66.621	2636.5	390.6	6966.3	13.62	-0.25	93.07
148.0	3469.621	20.263	67.775	2650.1	390.3	7060.0	13.69	-0.27	94.33
149.0	3470.058	20.327	68.944	2663.8	390.0	7154.9	13.73	-0.30	95.54
150.0	3470.497	20.392	70.130	2677.5	389.7	7251.0	13.79	-0.32	96.79
151.0	3470.939	20.456	71.331	2691.2	389.4	7347.8	13.86	-0.34	98.11
152.0	3471.383	20.520	72.548	2705.1	389.0	7446.6	13.93	-0.34	99.48
153.0	3471.830	20.584	73.782	2719.0	388.7	7546.8	13.99	-0.34	100.91
154.0	3472.278	20.648	75.033	2733.0	388.4	7648.5	14.00	-0.33	102.37
155.0	3472.729	20.712	76.300	2747.0	388.0	7751.6	14.03	-0.25	103.93
156.0	3473.182	20.775	77.584	2761.0	387.7	7856.3	14.05	-0.28	105.44
157.0	3473.638	20.839	78.886	2775.1	387.4	7962.4	14.08	-0.29	106.92
158.0	3474.096	20.903	80.205	2789.2	387.1	8070.0	14.11	-0.29	108.49
159.0	3474.556	20.967	81.542	2803.3	386.8	8179.3	14.13	-0.29	110.03
160.0	3475.019	21.030	82.897	2817.4	386.5	8290.1	14.16	-0.28	111.52
161.0	3475.483	21.094	84.271	2831.5	386.2	8402.1	14.19	-0.29	112.42
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
161.78	3475.847	21.143	85.355	2842.6	385.9	8490.1	14.21	-0.50	113.29
162.0	3475.950	21.157	85.661	2843.0	385.9	8508.7	-10.23	-0.30	55.43
163.0	3476.415	21.221	87.061	2817.4	385.7	8522.3	-31.22	-0.12	-0.22
S-IC/S-II SEPARATION COMMAND									
163.5	3476.647	21.253	87.764	2801.7	385.6	8522.2	-31.22	-0.14	-0.19
164.0	3476.877	21.284	88.465	2786.1	385.5	8522.1	-31.22	-0.14	-0.16
166.0	3477.783	21.411	91.270	2724.0	385.2	8522.5	-30.48	-0.15	1.71
168.0	3478.671	21.538	94.078	2669.9	384.9	8544.1	-23.88	-0.19	17.41
170.0	3479.542	21.665	96.896	2622.8	384.5	8580.4	-23.39	-0.14	18.97

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	3480.398	21.791	99.727	2577.8	384.2	8622.4	-21.97	-0.16	21.82
174.0	3481.239	21.918	102.573	2533.9	383.8	8666.0	-21.86	-0.17	22.35
176.0	3482.066	22.044	105.433	2490.2	383.4	8711.0	-21.77	-0.15	22.53
178.0	3482.878	22.170	108.308	2446.7	383.1	8756.2	-21.73	-0.14	22.59
180.0	3483.676	22.296	111.197	2403.3	382.8	8801.6	-21.66	-0.15	22.71
182.0	3484.460	22.422	114.102	2359.8	382.5	8847.1	-21.60	-0.16	22.80
184.0	3485.230	22.548	117.021	2316.7	382.2	8892.8	-21.53	-0.17	22.89
186.0	3485.985	22.674	119.956	2273.6	381.8	8938.7	-21.46	-0.17	22.98
188.0	3486.727	22.799	122.906	2230.8	381.5	8984.7	-21.39	-0.16	23.07
190.0	3487.454	22.925	125.871	2188.0	381.1	9031.0	-21.33	-0.15	23.17
192.0	3488.167	23.050	128.851	2145.4	380.8	9077.4	-21.26	-0.15	23.26
194.0	3488.866	23.175	131.847	2102.9	380.5	9124.0	-21.18	-0.15	23.37
196.0	3489.551	23.301	134.858	2060.6	380.2	9170.9	-21.11	-0.15	23.47
198.0	3490.223	23.426	137.884	2018.4	379.9	9217.9	-21.05	-0.16	23.58
200.0	3490.880	23.551	140.926	1976.4	379.5	9265.3	-20.99	-0.17	23.72
202.0	3491.524	23.675	143.984	1934.4	379.2	9312.9	-20.91	-0.18	23.86
204.0	3492.154	23.800	147.057	1892.7	378.8	9360.7	-20.74	-0.18	23.92
206.0	3492.770	23.925	150.146	1851.5	378.4	9408.5	-20.43	-0.20	23.87
208.0	3493.373	24.049	153.251	1811.1	377.9	9456.1	-19.97	-0.24	23.75
210.0	3493.962	24.174	156.371	1771.6	377.4	9503.5	-19.47	-0.29	23.63
212.0	3494.539	24.298	159.507	1733.0	376.7	9550.7	-19.12	-0.33	23.59
214.0	3495.103	24.422	162.658	1694.8	376.1	9598.0	-18.98	-0.33	23.64
216.0	3495.655	24.545	165.825	1656.9	375.4	9645.4	-18.98	-0.32	23.74
218.0	3496.194	24.669	169.008	1618.9	374.7	9693.0	-19.02	-0.31	23.86
220.0	3496.720	24.792	172.206	1580.8	374.1	9740.8	-19.03	-0.31	23.98
222.0	3497.234	24.915	175.421	1542.7	373.5	9788.9	-19.03	-0.32	24.11
224.0	3497.736	25.038	178.651	1504.6	372.8	9837.3	-19.06	-0.31	24.23
226.0	3498.225	25.160	181.897	1466.4	372.2	9885.9	-19.08	-0.30	24.34
228.0	3498.701	25.283	185.159	1428.2	371.6	9934.7	-19.09	-0.29	24.46
230.0	3499.165	25.405	188.437	1390.0	371.0	9983.7	-19.09	-0.28	24.58
232.0	3499.616	25.527	191.731	1351.7	370.4	10033.0	-19.11	-0.29	24.69
234.0	3500.055	25.649	195.042	1313.4	369.8	10082.5	-19.13	-0.29	24.80
236.0	3500.481	25.771	198.369	1275.2	369.2	10132.3	-19.13	-0.29	24.92
238.0	3500.894	25.892	201.712	1236.9	368.6	10182.2	-19.11	-0.29	25.04
240.0	3501.295	26.013	205.072	1198.6	368.0	10232.4	-19.11	-0.29	25.16
242.0	3501.683	26.134	208.448	1160.3	367.4	10282.9	-19.14	-0.29	25.27
244.0	3502.059	26.255	211.841	1122.0	366.8	10333.6	-19.17	-0.28	25.40
246.0	3502.422	26.376	215.251	1083.6	366.3	10384.5	-19.19	-0.28	25.54
248.0	3502.772	26.496	218.677	1045.2	365.7	10435.7	-19.20	-0.29	25.64
250.0	3503.110	26.617	222.121	1006.7	365.1	10487.1	-19.20	-0.30	25.75
252.0	3503.435	26.737	225.581	968.3	364.5	10538.8	-19.20	-0.30	25.88
254.0	3503.748	26.856	229.059	929.9	363.9	10590.7	-19.20	-0.30	26.01
256.0	3504.047	26.976	232.553	891.4	363.2	10642.8	-19.21	-0.31	26.13

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	3504.334	27.096	236.065	852.9	362.6	10695.2	-19.25	-0.31	26.25
260.0	3504.609	27.215	239.594	814.3	362.0	10747.9	-19.29	-0.30	26.39
262.0	3504.870	27.334	243.141	775.7	361.3	10800.8	-19.31	-0.30	26.54
264.0	3505.119	27.453	246.705	737.1	360.7	10854.0	-19.30	-0.30	26.66
266.0	3505.356	27.571	250.286	698.4	360.1	10907.5	-19.30	-0.30	26.79
268.0	3505.579	27.690	253.885	659.8	359.5	10961.2	-19.32	-0.29	26.92
270.0	3505.790	27.808	257.502	621.1	358.9	11015.2	-19.35	-0.29	27.05
272.0	3505.988	27.926	261.137	582.3	358.3	11069.4	-19.37	-0.31	27.19
274.0	3506.173	28.044	264.789	543.5	357.7	11124.0	-19.40	-0.30	27.33
276.0	3506.346	28.162	268.460	504.6	357.1	11178.8	-19.42	-0.28	27.48
278.0	3506.506	28.279	272.148	465.7	356.5	11233.9	-19.44	-0.27	27.62
280.0	3506.652	28.396	275.855	426.8	355.9	11289.3	-19.47	-0.29	27.76
282.0	3506.787	28.513	279.580	387.8	355.3	11345.0	-19.51	-0.31	27.91
284.0	3506.908	28.630	283.324	348.7	354.7	11401.0	-19.55	-0.31	28.06
286.0	3507.016	28.747	287.086	309.5	354.0	11457.2	-19.57	-0.29	28.19
288.0	3507.111	28.863	290.866	270.3	353.5	11513.8	-19.58	-0.28	28.32
290.0	3507.194	28.979	294.666	231.1	352.9	11570.6	-19.61	-0.30	28.47
292.0	3507.264	29.095	298.483	191.8	352.2	11627.7	-19.65	-0.31	28.64
294.0	3507.320	29.211	302.320	152.4	351.6	11685.2	-19.67	-0.31	28.81
296.0	3507.364	29.327	306.176	113.0	351.0	11743.0	-19.69	-0.29	28.96
298.0	3507.395	29.442	310.051	73.5	350.4	11801.0	-19.74	-0.28	29.10
300.0	3507.412	29.558	313.945	34.0	349.8	11859.4	-19.78	-0.29	29.24
302.0	3507.417	29.673	317.858	-5.7	349.2	11918.0	-19.82	-0.29	29.41
304.0	3507.409	29.787	321.791	-45.4	348.6	11977.0	-19.84	-0.29	29.58
306.0	3507.387	29.902	325.743	-85.1	348.0	12036.4	-19.87	-0.29	29.73
308.0	3507.353	30.017	329.714	-124.9	347.4	12096.0	-19.89	-0.29	29.88
310.0	3507.305	30.131	333.706	-164.8	346.8	12155.9	-19.93	-0.29	30.05
312.0	3507.244	30.245	337.717	-204.7	346.2	12216.2	-19.99	-0.29	30.24
314.0	3507.170	30.359	341.748	-244.8	345.6	12276.9	-20.04	-0.29	30.41
316.0	3507.083	30.472	345.799	-285.0	345.0	12337.9	-20.08	-0.29	30.56
318.0	3506.982	30.586	349.870	-325.2	344.4	12399.2	-20.13	-0.29	30.72
320.0	3506.869	30.699	353.962	-365.6	343.8	12460.8	-20.20	-0.30	30.91
322.0	3506.742	30.812	358.073	-406.1	343.2	12522.8	-20.26	-0.30	31.09
324.0	3506.601	30.925	362.206	-446.7	342.6	12585.2	-20.29	-0.30	31.27
326.0	3506.448	31.038	366.358	-487.3	341.9	12647.9	-20.31	-0.30	31.45
328.0	3506.281	31.150	370.532	-528.0	341.3	12711.0	-20.35	-0.29	31.62
330.0	3506.100	31.262	374.726	-568.8	340.8	12774.5	-20.40	-0.27	31.81
332.0	3505.906	31.374	378.942	-609.7	340.2	12838.3	-20.45	-0.27	31.98
334.0	3505.699	31.486	383.178	-650.7	339.6	12902.4	-20.49	-0.27	32.16
336.0	3505.478	31.598	387.436	-691.8	339.1	12967.0	-20.57	-0.27	32.36
338.0	3505.243	31.710	391.714	-733.1	338.5	13031.9	-20.65	-0.27	32.55
340.0	3504.995	31.821	396.015	-774.5	337.9	13097.2	-20.70	-0.27	32.75
342.0	3504.733	31.932	400.337	-816.0	337.4	13162.9	-20.73	-0.27	32.94

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	3504.458	32.043	404.680	-857.5	336.8	13229.0	-20.79	-0.26	33.14
346.0	3504.169	32.154	409.046	-899.2	336.3	13295.5	-20.87	-0.26	33.34
348.0	3503.866	32.264	413.433	-941.1	335.7	13362.4	-20.94	-0.28	33.51
350.0	3503.549	32.375	417.842	-983.1	335.1	13429.6	-21.01	-0.28	33.72
352.0	3503.219	32.485	422.274	-1025.2	334.6	13497.3	-21.07	-0.28	33.93
354.0	3502.874	32.595	426.728	-1067.4	334.0	13565.4	-21.12	-0.26	34.15
356.0	3502.516	32.705	431.204	-1109.8	333.5	13633.9	-21.18	-0.24	34.35
358.0	3502.144	32.815	435.703	-1152.3	333.0	13702.8	-21.27	-0.23	34.55
360.0	3501.758	32.924	440.225	-1194.9	332.5	13772.1	-21.36	-0.22	34.76
362.0	3501.357	33.033	444.770	-1237.8	332.1	13841.9	-21.44	-0.22	34.98
364.0	3500.943	33.143	449.337	-1280.8	331.6	13912.1	-21.51	-0.22	35.21
366.0	3500.514	33.252	453.928	-1323.9	331.1	13982.8	-21.57	-0.23	35.43
368.0	3500.071	33.361	458.543	-1367.2	330.6	14053.9	-21.64	-0.25	35.65
370.0	3499.614	33.469	463.180	-1410.5	330.1	14125.4	-21.70	-0.26	35.87
372.0	3499.142	33.578	467.842	-1454.1	329.5	14197.4	-21.77	-0.26	36.10
374.0	3498.657	33.686	472.527	-1497.7	329.0	14269.9	-21.86	-0.26	36.33
376.0	3498.156	33.794	477.236	-1541.6	328.5	14342.8	-21.96	-0.26	36.56
378.0	3497.642	33.903	481.969	-1585.7	327.9	14416.1	-22.05	-0.24	36.79
380.0	3497.113	34.010	486.726	-1629.9	327.4	14490.0	-22.12	-0.23	37.03
382.0	3496.569	34.118	491.508	-1674.2	327.0	14564.3	-22.17	-0.23	37.28
384.0	3496.010	34.226	496.314	-1718.7	326.5	14639.1	-22.24	-0.23	37.53
386.0	3495.437	34.333	501.145	-1763.3	326.0	14714.4	-22.35	-0.23	37.78
388.0	3494.850	34.440	506.001	-1808.2	325.5	14790.2	-22.47	-0.24	38.02
390.0	3494.247	34.547	510.882	-1853.3	325.0	14866.5	-22.57	-0.26	38.27
392.0	3493.630	34.654	515.788	-1898.5	324.4	14943.4	-22.65	-0.27	38.53
394.0	3492.997	34.761	520.719	-1944.0	323.9	15020.7	-22.73	-0.26	38.80
396.0	3492.350	34.867	525.676	-1989.6	323.4	15098.6	-22.83	-0.25	39.05
398.0	3491.687	34.974	530.659	-2035.4	322.8	15176.9	-22.94	-0.26	39.30
400.0	3491.010	35.080	535.667	-2081.4	322.3	15255.8	-23.04	-0.27	39.57
402.0	3490.317	35.186	540.702	-2127.7	321.7	15335.3	-23.14	-0.26	39.85
404.0	3489.609	35.292	545.763	-2174.1	321.2	15415.3	-23.25	-0.24	40.12
406.0	3488.886	35.397	550.850	-2220.8	320.7	15495.8	-23.37	-0.24	40.41
408.0	3488.147	35.503	555.964	-2267.6	320.2	15576.9	-23.47	-0.24	40.70
410.0	3487.393	35.608	561.105	-2314.7	319.7	15658.6	-23.57	-0.24	40.98
412.0	3486.623	35.713	566.272	-2362.0	319.2	15740.9	-23.69	-0.24	41.26
414.0	3485.838	35.818	571.467	-2409.6	318.7	15823.7	-23.82	-0.25	41.56
416.0	3485.037	35.923	576.690	-2457.4	318.2	15907.1	-23.95	-0.24	41.85
418.0	3484.220	36.028	581.939	-2505.5	317.7	15991.1	-24.06	-0.23	42.14
420.0	3483.388	36.132	587.217	-2553.8	317.2	16075.8	-24.17	-0.21	42.45
422.0	3482.539	36.237	592.522	-2602.3	316.8	16161.0	-24.29	-0.22	42.77
424.0	3481.674	36.341	597.856	-2651.0	316.3	16246.9	-24.41	-0.23	43.09
426.0	3480.794	36.445	603.218	-2700.0	315.8	16333.4	-24.53	-0.23	43.41
428.0	3479.897	36.549	608.609	-2749.3	315.3	16420.5	-24.67	-0.21	43.73

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	3478.984	36.652	614.028	-2798.8	314.9	16508.3	-24.81	-0.19	44.06
432.0	3478.054	36.756	619.476	-2848.6	314.5	16596.8	-24.94	-0.19	44.39
434.0	3477.109	36.859	624.954	-2898.7	314.1	16685.9	-25.08	-0.19	44.71
436.0	3476.146	36.963	630.461	-2949.1	313.7	16775.7	-25.24	-0.21	45.06
438.0	3475.167	37.066	635.998	-2999.8	313.2	16866.2	-25.39	-0.21	45.41
440.0	3474.171	37.169	641.564	-3050.7	312.8	16957.4	-25.51	-0.20	45.77
442.0	3473.159	37.272	647.161	-3101.9	312.4	17049.3	-25.65	-0.18	46.12
444.0	3472.129	37.375	652.788	-3153.4	312.0	17142.0	-25.80	-0.18	46.47
446.0	3471.083	37.477	658.446	-3205.2	311.6	17235.2	-25.97	-0.20	46.81
448.0	3470.019	37.580	664.135	-3257.4	311.2	17329.2	-26.11	-0.20	47.17
450.0	3468.938	37.682	669.854	-3309.8	310.8	17424.0	-26.27	-0.18	47.56
452.0	3467.840	37.784	675.605	-3362.6	310.4	17519.5	-26.44	-0.17	47.95
454.0	3466.725	37.886	681.388	-3415.7	310.0	17615.9	-26.60	-0.17	48.33
456.0	3465.592	37.988	687.202	-3469.1	309.7	17712.9	-26.75	-0.17	48.72
458.0	3464.441	38.090	693.048	-3522.8	309.3	17810.8	-26.92	-0.17	49.11
460.0	3463.272	38.192	698.927	-3576.9	308.9	17909.6	-27.12	-0.17	49.50
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)									
461.77	3462.223	38.282	704.157	-3625.2	308.5	17993.6	-27.31	-0.35	49.84
462.0	3462.086	38.294	704.838	-3631.6	308.5	18003.5	-27.48	-0.18	38.78
464.0	3460.882	38.395	710.778	-3687.1	307.8	18086.6	-27.98	-0.35	38.94
466.0	3459.659	38.496	716.744	-3743.1	307.1	18164.6	-28.02	-0.35	39.12
468.0	3458.417	38.597	722.736	-3799.1	306.3	18243.0	-27.85	-0.44	39.30
470.0	3457.158	38.698	728.754	-3854.3	305.6	18321.8	-27.22	-0.34	39.50
472.0	3455.880	38.798	734.798	-3907.8	304.9	18401.1	-26.28	-0.34	39.75
474.0	3454.585	38.899	740.868	-3959.5	304.2	18481.0	-25.36	-0.35	39.94
476.0	3453.274	38.999	746.964	-4009.8	303.4	18561.1	-24.84	-0.37	40.15
478.0	3451.946	39.098	753.087	-4059.4	302.6	18641.7	-24.73	-0.39	40.40
480.0	3450.601	39.198	759.237	-4108.9	301.8	18722.8	-24.82	-0.39	40.69
482.0	3449.241	39.297	765.413	-4158.7	301.0	18804.5	-24.96	-0.38	41.00
484.0	3447.864	39.396	771.616	-4208.9	300.3	18886.8	-25.20	-0.35	41.31
486.0	3446.470	39.495	777.846	-4259.7	299.6	18969.7	-25.54	-0.31	41.63
488.0	3445.059	39.593	784.104	-4311.1	299.0	19053.3	-25.92	-0.27	41.94
490.0	3443.632	39.692	790.390	-4363.4	298.4	19137.5	-26.32	-0.27	42.25
492.0	3442.187	39.790	796.703	-4416.3	297.8	19222.3	-26.62	-0.27	42.56
494.0	3440.724	39.888	803.044	-4470.0	297.3	19307.7	-27.04	-0.25	42.88
496.0	3439.244	39.985	809.412	-4524.3	296.9	19385.7	-27.38	-0.18	36.59
498.0	3437.746	40.083	815.806	-4579.7	296.5	19458.9	-27.81	-0.19	36.63
500.0	3436.229	40.181	822.223	-4635.5	296.0	19532.2	-28.07	-0.19	36.66
502.0	3434.694	40.278	828.664	-4691.9	295.7	19605.5	-28.29	-0.16	36.70
504.0	3433.140	40.375	835.129	-4748.8	295.4	19679.1	-28.51	-0.15	36.86
506.0	3431.568	40.472	841.619	-4806.0	295.0	19753.0	-28.70	-0.15	37.05

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	3429.976	40.569	848.133	-4863.7	294.7	19827.3	-28.89	-0.15	37.26
510.0	3428.366	40.666	854.672	-4921.7	294.4	19902.0	-29.07	-0.13	37.49
512.0	3426.736	40.763	861.235	-4980.1	294.1	19977.4	-29.25	-0.12	37.71
514.0	3425.087	40.860	867.823	-5038.8	293.9	20053.1	-29.40	-0.11	37.93
516.0	3423.419	40.957	874.437	-5097.8	293.6	20129.2	-29.55	-0.10	38.16
518.0	3421.731	41.053	881.075	-5157.2	293.4	20205.8	-29.77	-0.09	38.42
520.0	3420.024	41.150	887.738	-5217.1	293.2	20282.9	-30.03	-0.08	38.69
522.0	3418.297	41.246	894.427	-5277.4	293.0	20360.6	-30.28	-0.09	38.94
524.0	3416.550	41.343	901.142	-5338.3	292.8	20438.7	-30.53	-0.11	39.18
526.0	3414.782	41.439	907.883	-5399.7	292.5	20517.4	-30.80	-0.12	39.43
528.0	3412.995	41.535	914.649	-5461.6	292.2	20596.5	-31.04	-0.12	39.69
530.0	3411.187	41.631	921.442	-5523.9	292.0	20676.2	-31.23	-0.11	39.96
532.0	3409.358	41.727	928.261	-5586.7	291.7	20756.4	-31.41	-0.10	40.22
534.0	3407.509	41.823	935.106	-5649.8	291.5	20837.1	-31.63	-0.08	40.49
536.0	3405.639	41.919	941.978	-5713.3	291.3	20918.4	-31.87	-0.07	40.76
538.0	3403.748	42.015	948.877	-5777.4	291.2	21000.2	-32.10	-0.07	41.03
540.0	3401.836	42.111	955.803	-5841.9	291.0	21082.6	-32.32	-0.08	41.31
542.0	3399.902	42.207	962.756	-5906.8	290.8	21165.5	-32.51	-0.08	41.58
544.0	3397.947	42.302	969.737	-5972.0	290.6	21248.9	-32.69	-0.07	41.84
546.0	3395.971	42.398	976.745	-6037.7	290.4	21332.9	-32.88	-0.05	42.11
548.0	3393.972	42.494	983.780	-6103.7	290.3	21417.4	-33.10	-0.04	42.41
550.0	3391.952	42.589	990.844	-6170.2	290.2	21502.6	-33.31	-0.03	42.70
552.0	3389.910	42.685	997.936	-6237.1	290.1	21588.3	-33.52	-0.04	42.94
554.0	3387.846	42.780	1005.056	-6304.4	290.0	21674.4	-33.66	-0.06	43.19
556.0	3385.760	42.876	1012.205	-6371.9	289.8	21761.0	-33.80	-0.09	43.44
558.0	3383.651	42.971	1019.382	-6439.7	289.6	21848.1	-33.94	-0.32	43.68
S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)									
559.54	3382.013	43.044	1024.923	-6492.1	288.6	21915.5	-33.88	-0.65	43.87
560.0	3381.521	43.066	1026.581	-6506.9	288.6	21923.3	-30.39	0.46	-10.10
S-II/S-IVB SEPARATION COMMAND									
560.5	3380.985	43.090	1028.383	-6521.9	288.8	21918.3	-29.73	0.37	-10.01
562.0	3379.369	43.161	1033.792	-6566.0	288.6	21903.4	-29.11	-0.28	-9.78
564.0	3377.199	43.256	1040.998	-6624.3	288.0	21884.1	-29.25	-0.28	-9.47
566.0	3375.009	43.351	1048.200	-6684.4	287.4	21883.5	-30.58	-0.34	5.85
568.0	3372.798	43.445	1055.406	-6745.8	286.7	21897.9	-30.66	-0.30	7.93
570.0	3370.568	43.540	1062.617	-6807.1	286.2	21914.2	-30.69	-0.28	8.16
572.0	3368.317	43.634	1069.833	-6869.3	285.3	21930.9	-31.34	-0.40	8.34
574.0	3366.046	43.728	1077.054	-6932.6	284.4	21947.4	-31.86	-0.43	8.16
576.0	3363.753	43.821	1084.281	-6996.6	283.6	21963.8	-32.09	-0.41	8.21

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	3361.440	43.914	1091.514	-7060.9	282.7	21980.2	-32.04	-0.37	8.26
580.0	3359.105	44.007	1098.751	-7125.0	282.0	21996.8	-31.99	-0.36	8.30
582.0	3356.749	44.100	1105.994	-7189.0	281.2	22013.5	-32.04	-0.34	8.30
584.0	3354.373	44.192	1113.243	-7253.2	280.6	22030.1	-32.12	-0.29	8.26
586.0	3351.974	44.285	1120.497	-7317.6	280.0	22046.6	-32.19	-0.23	8.23
588.0	3349.555	44.377	1127.757	-7382.1	279.5	22063.1	-32.27	-0.21	8.20
590.0	3347.115	44.469	1135.022	-7446.8	279.1	22079.5	-32.38	-0.19	8.17
592.0	3344.653	44.560	1142.292	-7511.8	278.7	22095.8	-32.48	-0.18	8.15
594.0	3342.170	44.652	1149.568	-7576.9	278.3	22112.1	-32.56	-0.17	8.12
596.0	3339.665	44.744	1156.849	-7642.1	277.9	22128.4	-32.62	-0.17	8.10
598.0	3337.139	44.835	1164.135	-7707.5	277.6	22144.5	-32.65	-0.16	8.06
600.0	3334.591	44.926	1171.427	-7772.9	277.2	22160.6	-32.69	-0.15	8.01
602.0	3332.022	45.018	1178.724	-7838.4	276.9	22176.6	-32.72	-0.14	7.98
604.0	3329.431	45.109	1186.026	-7904.0	276.6	22192.6	-32.77	-0.14	7.96
606.0	3326.818	45.200	1193.334	-7969.6	276.3	22208.6	-32.80	-0.13	7.96
608.0	3324.184	45.290	1200.646	-8035.3	276.0	22224.5	-32.84	-0.11	7.94
610.0	3321.528	45.381	1207.964	-8101.1	275.8	22240.4	-32.88	-0.10	7.90
612.0	3318.851	45.472	1215.287	-8167.0	275.5	22256.1	-32.92	-0.11	7.84
614.0	3316.152	45.563	1222.616	-8233.0	275.2	22271.8	-32.96	-0.13	7.79
616.0	3313.431	45.653	1229.949	-8299.0	274.9	22287.4	-32.99	-0.15	7.76
618.0	3310.689	45.744	1237.288	-8365.1	274.6	22302.9	-33.02	-0.16	7.73
620.0	3307.924	45.834	1244.632	-8431.3	274.2	22318.4	-33.06	-0.15	7.72
622.0	3305.138	45.924	1251.980	-8497.5	273.9	22333.9	-33.08	-0.14	7.74
624.0	3302.330	46.014	1259.334	-8563.7	273.6	22349.4	-33.11	-0.13	7.75
626.0	3299.501	46.104	1266.693	-8630.1	273.3	22364.9	-33.14	-0.12	7.72
628.0	3296.649	46.194	1274.057	-8696.5	273.0	22380.3	-33.21	-0.13	7.65
630.0	3293.776	46.284	1281.427	-8763.1	272.8	22395.6	-33.29	-0.12	7.61
632.0	3290.880	46.374	1288.801	-8829.8	272.5	22410.8	-33.34	-0.12	7.58
634.0	3287.963	46.463	1296.180	-8896.6	272.2	22425.9	-33.36	-0.14	7.56
636.0	3285.023	46.553	1303.564	-8963.4	271.9	22441.1	-33.37	-0.15	7.54
638.0	3282.062	46.642	1310.953	-9030.2	271.6	22456.2	-33.38	-0.14	7.52
640.0	3279.079	46.732	1318.347	-9097.1	271.2	22471.2	-33.40	-0.15	7.50
642.0	3276.073	46.821	1325.746	-9164.0	270.9	22486.2	-33.44	-0.16	7.47
644.0	3273.046	46.910	1333.150	-9231.0	270.5	22501.2	-33.49	-0.17	7.46
646.0	3269.996	46.999	1340.559	-9298.1	270.2	22516.1	-33.54	-0.16	7.46
648.0	3266.925	47.088	1347.973	-9365.3	269.8	22531.1	-33.59	-0.16	7.46
650.0	3263.831	47.177	1355.392	-9432.7	269.4	22546.0	-33.64	-0.16	7.44
652.0	3260.715	47.265	1362.815	-9500.1	269.1	22560.9	-33.68	-0.16	7.40
654.0	3257.577	47.354	1370.244	-9567.6	268.7	22575.7	-33.70	-0.17	7.36
656.0	3254.417	47.442	1377.677	-9635.1	268.3	22590.4	-33.72	-0.18	7.33
658.0	3251.234	47.530	1385.116	-9702.6	267.9	22605.1	-33.72	-0.21	7.31
660.0	3248.029	47.619	1392.559	-9770.1	267.4	22619.7	-33.75	-0.22	7.30
662.0	3244.802	47.706	1400.006	-9837.8	266.9	22634.3	-33.78	-0.21	7.29

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	3241.553	47.794	1407.459	-9905.5	266.5	22648.9	-33.84	-0.20	7.26
666.0	3238.281	47.882	1414.917	-9973.3	266.0	22663.4	-33.89	-0.20	7.22
668.0	3234.987	47.969	1422.379	-10041.1	265.6	22677.9	-33.90	-0.20	7.19
670.0	3231.671	48.057	1429.846	-10109.0	265.2	22692.3	-33.91	-0.20	7.18
672.0	3228.332	48.144	1437.317	-10177.0	264.7	22706.6	-33.93	-0.21	7.17
674.0	3224.971	48.231	1444.794	-10245.0	264.3	22721.0	-33.99	-0.21	7.14
676.0	3221.588	48.318	1452.275	-10313.2	263.8	22735.2	-34.12	-0.22	7.08
678.0	3218.182	48.405	1459.761	-10381.7	263.3	22749.4	-34.27	-0.21	7.03
680.0	3214.753	48.491	1467.251	-10450.4	262.8	22763.4	-34.34	-0.22	7.01
682.0	3211.302	48.578	1474.746	-10519.1	262.4	22777.5	-34.29	-0.21	7.02
684.0	3207.829	48.664	1482.246	-10587.7	261.9	22791.6	-34.20	-0.22	7.01
686.0	3204.332	48.750	1489.750	-10656.1	261.4	22805.6	-34.17	-0.25	6.98
688.0	3200.814	48.836	1497.259	-10724.6	260.8	22819.5	-34.20	-0.25	6.96
690.0	3197.272	48.922	1504.773	-10793.1	260.3	22833.5	-34.22	-0.24	6.95
692.0	3193.708	49.007	1512.291	-10861.6	259.8	22847.4	-34.21	-0.23	6.96
694.0	3190.122	49.093	1519.814	-10930.1	259.3	22861.4	-34.18	-0.23	6.99
696.0	3186.513	49.178	1527.341	-10998.5	258.8	22875.4	-34.15	-0.24	6.99
698.0	3182.881	49.263	1534.873	-11066.9	258.2	22889.3	-34.13	-0.23	6.99
700.0	3179.227	49.348	1542.409	-11135.2	257.8	22903.3	-34.10	-0.30	7.00
702.0	3175.551	49.433	1549.951	-11203.4	257.2	22917.4	-34.08	-0.28	7.01
704.0	3171.852	49.517	1557.496	-11271.8	256.7	22931.4	-34.06	-0.31	7.01
706.0	3168.130	49.602	1565.047	-11339.9	256.3	22945.4	-34.03	-0.50	7.01
S-IVB FIRST GUIDANCE CUTOFF									
706.21	3167.738	49.611	1565.839	-11346.1	256.1	22946.9	-34.03	-0.64	7.01
708.0	3164.388	49.686	1572.597	-11397.7	255.5	22927.7	-27.29	-0.28	-13.64
710.0	3160.628	49.770	1580.139	-11452.5	254.8	22900.4	-27.26	-0.37	-13.69
712.0	3156.849	49.854	1587.672	-11507.1	254.0	22873.0	-27.23	-0.37	-13.74
714.0	3153.052	49.937	1595.197	-11561.8	253.2	22845.4	-27.20	-0.37	-13.80
716.0	3149.238	50.020	1602.712	-11616.3	252.4	22817.8	-27.16	-0.37	-13.87
PARKING ORBIT INSERTION									
716.21	3148.836	50.029	1603.500	-11622.0	252.3	22815.3	-27.16	-0.37	-13.87

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										
-16.963	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-16.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-15.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-14.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-13.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-12.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-11.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-10.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-9.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-8.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-7.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-6.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-5.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-4.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-3.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-2.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
-1.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
0.0	3441.364	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	366
	ALL HOLDDOWN ARMS RELEASED										
0.3	3441.364	-80.6041	28.4470	0.0	90.00	0.1	90.00	0.00	1340.7	0.0	366
	LIFTOFF - START OF TIME BASE 1										
0.6	3441.365	-80.6041	28.4470	247.35	89.13	1.1	90.00	0.05	1340.7	0.000	366
1.0	3441.365	-80.6041	28.4470	268.62	89.42	3.1	90.00	0.13	1340.7	-0.000	367
2.0	3441.366	-80.6041	28.4470	292.36	89.61	10.0	90.00	0.43	1340.7	0.000	374
3.0	3441.368	-80.6041	28.4470	184.70	89.48	17.2	90.01	0.74	1340.8	-0.000	387
4.0	3441.371	-80.6041	28.4470	165.91	88.29	24.7	90.03	1.05	1341.1	-0.000	408
5.0	3441.376	-80.6041	28.4470	162.76	87.20	32.3	90.06	1.38	1341.5	-0.000	437
6.0	3441.382	-80.6041	28.4470	161.19	86.77	40.1	90.09	1.71	1342.0	0.000	473
7.0	3441.389	-80.6041	28.4469	159.83	86.70	48.1	90.11	2.05	1342.5	0.001	517
8.0	3441.398	-80.6041	28.4469	158.66	86.60	56.3	90.13	2.40	1343.1	0.001	569
9.0	3441.408	-80.6041	28.4469	158.01	86.18	64.6	90.17	2.75	1343.9	0.002	629
10.0	3441.419	-80.6041	28.4469	157.54	85.78	73.2	90.21	3.11	1344.8	0.003	698
11.0	3441.432	-80.6041	28.4469	156.94	85.53	82.0	90.25	3.48	1345.7	0.004	775
12.0	3441.446	-80.6041	28.4469	155.97	85.75	90.9	90.26	3.86	1346.5	0.005	861
13.0	3441.462	-80.6041	28.4469	154.42	86.15	99.9	90.26	4.24	1347.3	0.006	957
14.0	3441.479	-80.6041	28.4469	151.17	86.46	109.1	90.25	4.63	1348.4	0.007	1061

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	3441.498	-80.6041	28.4468	147.74	86.67	118.5	90.25	5.03	1349.6	0.008	1174
16.0	3441.518	-80.6041	28.4468	143.99	86.87	128.0	90.24	5.43	1350.9	0.009	1297
17.0	3441.540	-80.6040	28.4468	139.55	87.08	137.7	90.23	5.84	1352.3	0.010	1430
18.0	3441.563	-80.6040	28.4468	134.27	87.29	147.6	90.21	6.25	1353.8	0.011	1573
19.0	3441.588	-80.6040	28.4468	127.44	87.44	157.8	90.18	6.68	1355.6	0.012	1725
20.0	3441.615	-80.6040	28.4468	119.14	87.48	168.2	90.15	7.11	1357.7	0.013	1888
21.0	3441.643	-80.6040	28.4468	110.98	87.41	178.8	90.12	7.55	1360.1	0.015	2061
22.0	3441.674	-80.6039	28.4468	103.46	87.25	189.7	90.09	7.99	1362.9	0.016	2245
23.0	3441.706	-80.6039	28.4467	97.13	87.01	200.8	90.06	8.44	1366.0	0.017	2440
24.0	3441.740	-80.6039	28.4467	92.05	86.69	212.2	90.02	8.90	1369.6	0.018	2646
25.0	3441.776	-80.6038	28.4467	87.97	86.33	223.9	89.98	9.36	1373.5	0.020	2864
26.0	3441.813	-80.6038	28.4468	84.72	85.91	235.8	89.93	9.83	1377.8	0.022	3093
27.0	3441.853	-80.6037	28.4468	82.10	85.45	248.1	89.89	10.30	1382.7	0.024	3335
28.0	3441.895	-80.6037	28.4468	80.02	84.96	260.6	89.83	10.78	1387.9	0.027	3588
29.0	3441.938	-80.6036	28.4468	78.38	84.44	273.4	89.78	11.26	1393.7	0.030	3854
30.0	3441.984	-80.6035	28.4468	77.10	83.90	286.5	89.72	11.74	1399.9	0.034	4132
31.0	3442.032	-80.6034	28.4468	76.09	83.35	299.9	89.65	12.23	1406.6	0.039	4424
32.0	3442.082	-80.6033	28.4468	75.29	82.78	313.7	89.58	12.71	1413.8	0.045	4728
33.0	3442.135	-80.6032	28.4469	74.67	82.20	327.7	89.51	13.20	1421.5	0.051	5046
34.0	3442.189	-80.6030	28.4469	74.19	81.61	342.1	89.44	13.69	1429.7	0.058	5378
35.0	3442.246	-80.6029	28.4469	73.85	81.01	356.8	89.36	14.18	1438.5	0.066	5723
36.0	3442.305	-80.6027	28.4470	73.60	80.41	371.8	89.28	14.67	1447.8	0.076	6083
37.0	3442.367	-80.6025	28.4470	73.40	79.80	387.2	89.20	15.16	1457.6	0.086	6457
38.0	3442.431	-80.6023	28.4471	73.23	79.18	403.0	89.12	15.64	1468.0	0.098	6845
39.0	3442.497	-80.6021	28.4472	73.07	78.57	419.1	89.02	16.13	1479.0	0.110	7249
40.0	3442.566	-80.6018	28.4472	72.92	77.95	435.6	88.93	16.61	1490.5	0.125	7667
41.0	3442.637	-80.6015	28.4473	72.77	77.32	452.5	88.83	17.09	1502.6	0.140	8101
42.0	3442.711	-80.6012	28.4474	72.62	76.70	469.8	88.72	17.56	1515.3	0.157	8550
43.0	3442.788	-80.6009	28.4475	72.47	76.06	487.5	88.61	18.03	1528.7	0.175	9015
44.0	3442.867	-80.6005	28.4476	72.33	75.42	505.6	88.49	18.49	1542.7	0.195	9497
45.0	3442.949	-80.6001	28.4477	72.20	74.77	524.2	88.36	18.95	1557.4	0.217	9994
46.0	3443.034	-80.5997	28.4478	72.10	74.11	543.2	88.23	19.40	1572.9	0.240	10509
47.0	3443.121	-80.5992	28.4479	72.02	73.44	562.7	88.10	19.84	1589.0	0.266	11040
48.0	3443.211	-80.5987	28.4481	71.94	72.77	582.7	87.96	20.27	1606.0	0.293	11588
49.0	3443.304	-80.5982	28.4482	71.86	72.09	603.1	87.82	20.70	1623.6	0.322	12153
50.0	3443.400	-80.5976	28.4484	71.76	71.42	624.1	87.67	21.12	1641.9	0.354	12736
51.0	3443.499	-80.5970	28.4486	71.65	70.75	645.6	87.51	21.53	1660.9	0.388	13337
52.0	3443.601	-80.5964	28.4488	71.51	70.08	667.6	87.35	21.93	1680.5	0.424	13955
53.0	3443.705	-80.5957	28.4490	71.36	69.42	690.1	87.18	22.32	1700.8	0.462	14592
54.0	3443.813	-80.5949	28.4492	71.20	68.76	713.1	87.00	22.71	1721.8	0.503	15248
55.0	3443.924	-80.5942	28.4494	71.03	68.11	736.5	86.81	23.08	1743.3	0.547	15922
56.0	3444.038	-80.5933	28.4497	70.88	67.47	760.6	86.62	23.45	1765.6	0.594	16615
57.0	3444.155	-80.5924	28.4500	70.74	66.83	785.1	86.43	23.80	1788.6	0.643	17328

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	3444.276	-80.5915	28.4502	70.62	66.20	810.2	86.24	24.14	1812.3	0.695	18060
59.0	3444.399	-80.5905	28.4505	70.53	65.57	835.9	86.05	24.48	1836.8	0.750	18811
60.0	3444.526	-80.5895	28.4509	70.46	64.94	862.2	85.86	24.80	1862.1	0.809	19583
61.0	3444.657	-80.5884	28.4512	70.41	64.32	889.0	85.67	25.11	1888.2	0.870	20374
62.0	3444.790	-80.5872	28.4516	70.38	63.70	916.4	85.48	25.41	1915.0	0.935	21186
63.0	3444.927	-80.5860	28.4520	70.38	63.09	944.4	85.30	25.69	1942.6	1.004	22018
64.0	3445.067	-80.5847	28.4524	70.39	62.47	972.8	85.12	25.96	1970.9	1.076	22871
65.0	3445.211	-80.5834	28.4528	70.42	61.86	1001.8	84.94	26.21	1999.9	1.151	23744
66.0	3445.358	-80.5819	28.4532	70.47	61.26	1031.2	84.77	26.45	2029.6	1.231	24638
67.0	3445.509	-80.5804	28.4537	70.53	60.65	1061.2	84.60	26.68	2060.1	1.314	25554
	MACH 1										
67.5	3445.585	-80.5797	28.4539	70.56	60.36	1076.4	84.51	26.79	2075.5	1.358	26019
68.0	3445.663	-80.5789	28.4542	70.60	60.06	1091.7	84.43	26.90	2091.2	1.402	26489
69.0	3445.820	-80.5772	28.4547	70.67	59.47	1122.7	84.27	27.10	2123.0	1.494	27447
70.0	3445.981	-80.5755	28.4552	70.74	58.88	1154.4	84.10	27.29	2155.6	1.589	28425
71.0	3446.145	-80.5737	28.4558	70.82	58.31	1186.6	83.95	27.47	2188.8	1.690	29424
72.0	3446.313	-80.5719	28.4563	70.89	57.74	1219.6	83.79	27.64	2222.9	1.794	30445
73.0	3446.485	-80.5699	28.4569	70.96	57.18	1253.2	83.63	27.81	2257.6	1.904	31488
74.0	3446.660	-80.5679	28.4576	71.02	56.63	1287.5	83.47	27.96	2293.2	2.018	32553
75.0	3446.839	-80.5657	28.4582	71.08	56.09	1322.5	83.31	28.11	2329.4	2.136	33640
76.0	3447.021	-80.5635	28.4589	71.13	55.55	1358.3	83.15	28.25	2366.5	2.260	34749
77.0	3447.207	-80.5612	28.4596	71.17	55.02	1394.8	82.99	28.38	2404.3	2.389	35882
78.0	3447.397	-80.5588	28.4603	71.21	54.50	1432.0	82.83	28.50	2443.1	2.523	37037
79.0	3447.591	-80.5563	28.4610	71.25	53.97	1470.1	82.68	28.61	2482.7	2.662	38215
80.0	3447.789	-80.5537	28.4618	71.30	53.45	1508.9	82.52	28.71	2523.2	2.807	39416
81.0	3447.990	-80.5510	28.4626	71.34	52.93	1548.6	82.37	28.80	2564.7	2.957	40641
82.0	3448.195	-80.5482	28.4634	71.40	52.42	1589.1	82.22	28.89	2607.0	3.114	41889
83.0	3448.405	-80.5453	28.4643	71.45	51.91	1630.4	82.07	28.96	2650.3	3.276	43161
84.0	3448.618	-80.5423	28.4652	71.50	51.40	1672.6	81.92	29.02	2694.5	3.444	44457
85.0	3448.835	-80.5391	28.4661	71.56	50.90	1715.7	81.78	29.08	2739.7	3.619	45778
	MAXIMUM DYNAMIC PRESSURE										
86.0	3449.056	-80.5359	28.4670	71.61	50.39	1759.6	81.64	29.12	2785.9	3.800	47122
87.0	3449.281	-80.5325	28.4680	71.66	49.88	1804.4	81.50	29.15	2833.1	3.987	48491
88.0	3449.510	-80.5290	28.4690	71.71	49.36	1850.1	81.36	29.16	2881.4	4.182	49884
89.0	3449.743	-80.5254	28.4701	71.76	48.84	1896.7	81.22	29.16	2930.8	4.383	51301
90.0	3449.980	-80.5217	28.4712	71.81	48.30	1944.3	81.08	29.14	2981.3	4.592	52742
91.0	3450.221	-80.5178	28.4723	71.86	47.76	1992.9	80.94	29.11	3033.0	4.808	54207
92.0	3450.466	-80.5137	28.4735	71.90	47.21	2042.5	80.81	29.06	3085.8	5.031	55695
93.0	3450.715	-80.5096	28.4747	71.94	46.66	2093.0	80.67	29.00	3139.7	5.263	57207

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
94.0	3450.967	-80.5052	28.4759	71.98	46.11	2144.5	80.53	28.93	3194.7	5.503	58742
95.0	3451.223	-80.5008	28.4772	72.01	45.55	2197.0	80.39	28.85	3250.7	5.751	60300
96.0	3451.483	-80.4961	28.4785	72.02	45.00	2250.5	80.25	28.76	3307.8	6.008	61882
97.0	3451.747	-80.4914	28.4799	72.03	44.45	2305.0	80.10	28.66	3365.8	6.274	63486
98.0	3452.015	-80.4864	28.4813	72.04	43.90	2360.5	79.96	28.55	3424.9	6.548	65113
99.0	3452.286	-80.4813	28.4827	72.04	43.35	2417.0	79.82	28.43	3485.0	6.832	66762
100.0	3452.561	-80.4760	28.4842	72.04	42.82	2474.5	79.67	28.31	3546.1	7.125	68434
101.0	3452.839	-80.4706	28.4858	72.04	42.29	2533.1	79.53	28.19	3608.2	7.427	70129
102.0	3453.122	-80.4649	28.4874	72.04	41.77	2592.7	79.39	28.06	3671.2	7.740	71846
103.0	3453.408	-80.4591	28.4890	72.03	41.26	2653.4	79.26	27.93	3735.3	8.062	73586
104.0	3453.698	-80.4532	28.4907	72.03	40.75	2715.1	79.12	27.80	3800.4	8.394	75349
105.0	3453.991	-80.4470	28.4925	72.03	40.26	2777.8	78.99	27.67	3866.4	8.736	77135
106.0	3454.289	-80.4406	28.4943	72.03	39.78	2841.6	78.87	27.53	3933.5	9.089	78943
107.0	3454.590	-80.4341	28.4962	72.03	39.31	2906.4	78.74	27.39	4001.5	9.452	80775
108.0	3454.895	-80.4273	28.4981	72.04	38.84	2972.3	78.62	27.25	4070.6	9.827	82630
109.0	3455.203	-80.4204	28.5001	72.04	38.38	3039.2	78.50	27.11	4140.7	10.212	84507
110.0	3455.516	-80.4133	28.5021	72.04	37.93	3107.2	78.39	26.96	4211.8	10.608	86408
111.0	3455.832	-80.4059	28.5042	72.05	37.48	3176.3	78.28	26.82	4284.0	11.015	88331
112.0	3456.152	-80.3984	28.5064	72.05	37.04	3246.5	78.17	26.67	4357.3	11.434	90277
113.0	3456.476	-80.3906	28.5086	72.06	36.61	3317.8	78.06	26.52	4431.6	11.864	92247
114.0	3456.803	-80.3826	28.5108	72.07	36.19	3390.2	77.96	26.37	4506.9	12.307	94239
115.0	3457.135	-80.3744	28.5132	72.08	35.78	3463.8	77.86	26.22	4583.4	12.761	96255
116.0	3457.470	-80.3660	28.5155	72.09	35.38	3538.5	77.76	26.08	4660.8	13.227	98295
117.0	3457.809	-80.3574	28.5180	72.09	35.00	3614.4	77.67	25.94	4739.4	13.706	100358
118.0	3458.152	-80.3485	28.5205	72.10	34.62	3691.4	77.57	25.80	4819.0	14.197	102446
119.0	3458.499	-80.3395	28.5231	72.11	34.26	3769.6	77.48	25.67	4899.7	14.701	104558
120.0	3458.851	-80.3301	28.5257	72.12	33.90	3849.0	77.40	25.53	4981.5	15.218	106696
121.0	3459.206	-80.3206	28.5284	72.13	33.55	3929.5	77.31	25.40	5064.4	15.748	108858
122.0	3459.566	-80.3108	28.5312	72.14	33.21	4011.3	77.23	25.26	5148.6	16.290	111045
123.0	3459.929	-80.3008	28.5341	72.15	32.87	4094.4	77.15	25.12	5234.0	16.846	113258
124.0	3460.297	-80.2905	28.5370	72.16	32.53	4178.6	77.07	24.98	5320.6	17.416	115495
125.0	3460.669	-80.2800	28.5399	72.17	32.20	4264.2	76.99	24.84	5408.5	18.000	117758
126.0	3461.045	-80.2692	28.5430	72.18	31.88	4351.1	76.92	24.70	5497.7	18.597	120047
127.0	3461.425	-80.2581	28.5461	72.19	31.56	4439.3	76.84	24.57	5588.1	19.209	122360
128.0	3461.810	-80.2468	28.5493	72.20	31.24	4528.9	76.77	24.43	5679.9	19.835	124700
129.0	3462.199	-80.2353	28.5525	72.21	30.93	4619.8	76.70	24.29	5772.9	20.476	127065
130.0	3462.591	-80.2234	28.5559	72.22	30.63	4712.1	76.63	24.15	5867.4	21.132	129456
131.0	3462.989	-80.2113	28.5593	72.23	30.33	4805.9	76.56	24.02	5963.2	21.803	131874
132.0	3463.390	-80.1989	28.5628	72.24	30.04	4901.2	76.49	23.88	6060.5	22.489	134318
133.0	3463.797	-80.1863	28.5663	72.24	29.75	4998.0	76.42	23.75	6159.3	23.190	136789
134.0	3464.207	-80.1733	28.5700	72.25	29.47	5096.2	76.36	23.61	6259.5	23.908	139287
135.0	3464.622	-80.1601	28.5737	72.26	29.19	5196.0	76.30	23.48	6361.1	24.641	141812
136.0	3465.041	-80.1466	28.5775	72.27	28.92	5297.2	76.24	23.35	6464.2	25.390	144364

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
137.0	3465.465	-80.1327	28.5814	72.28	28.65	5399.9	76.18	23.22	6568.8	26.156	146944
S-IC CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
137.85	3465.829	-80.1207	28.5847	72.28	28.43	5488.3	76.12	23.10	6658.8	26.821	149158
138.0	3465.893	-80.1186	28.5853	72.28	28.39	5503.5	76.12	23.08	6674.2	26.939	149550
139.0	3466.325	-80.1042	28.5894	72.29	28.12	5588.2	76.07	22.93	6760.9	27.736	152178
140.0	3466.761	-80.0895	28.5935	72.30	27.88	5669.7	76.03	22.79	6844.2	28.549	154828
141.0	3467.199	-80.0746	28.5977	72.31	27.63	5752.4	75.99	22.65	6928.7	29.374	157493
142.0	3467.639	-80.0594	28.6019	72.32	27.39	5836.1	75.95	22.51	7014.2	30.213	160173
143.0	3468.082	-80.0440	28.6062	72.33	27.16	5921.1	75.91	22.37	7100.9	31.067	162872
144.0	3468.529	-80.0283	28.6106	72.35	26.92	6007.1	75.87	22.23	7188.7	31.934	165587
145.0	3468.978	-80.0124	28.6151	72.36	26.69	6094.3	75.83	22.09	7277.6	32.816	168320
146.0	3469.429	-79.9962	28.6196	72.37	26.46	6182.5	75.80	21.95	7367.6	33.712	171070
147.0	3469.884	-79.9797	28.6242	72.38	26.23	6272.0	75.76	21.82	7458.7	34.623	173838
148.0	3470.342	-79.9630	28.6288	72.40	26.00	6362.7	75.73	21.68	7551.1	35.548	176623
149.0	3470.802	-79.9460	28.6336	72.41	25.78	6454.6	75.70	21.55	7644.6	36.489	179426
150.0	3471.266	-79.9287	28.6384	72.42	25.57	6547.9	75.66	21.41	7739.4	37.445	182248
151.0	3471.732	-79.9111	28.6433	72.43	25.35	6641.7	75.63	21.28	7834.8	38.416	185088
152.0	3472.202	-79.8933	28.6482	72.44	25.14	6737.6	75.60	21.15	7932.3	39.403	187946
153.0	3472.675	-79.8752	28.6533	72.46	24.93	6834.9	75.57	21.02	8031.1	40.406	190823
154.0	3473.150	-79.8567	28.6584	72.47	24.72	6933.7	75.54	20.89	8131.4	41.425	193718
155.0	3473.629	-79.8380	28.6636	72.48	24.52	7034.0	75.51	20.76	8233.1	42.460	196633
156.0	3474.111	-79.8190	28.6688	72.50	24.31	7135.7	75.48	20.64	8336.3	43.512	199567
157.0	3474.596	-79.7996	28.6742	72.51	24.11	7238.9	75.45	20.51	8441.0	44.581	202520
158.0	3475.085	-79.7800	28.6796	72.52	23.91	7343.7	75.43	20.38	8547.1	45.666	205493
159.0	3475.576	-79.7600	28.6851	72.54	23.72	7450.1	75.40	20.26	8655.0	46.769	208485
160.0	3476.071	-79.7397	28.6907	72.55	23.52	7558.0	75.37	20.13	8764.3	47.889	211498
161.0	3476.569	-79.7191	28.6964	72.56	23.33	7667.2	75.35	20.01	8874.8	49.027	214530
S-IC OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)											
161.78	3476.959	-79.7028	28.7009	72.58	23.19	7753.0	75.33	19.91	8961.7	49.927	216907
162.0	3477.070	-79.6982	28.7021	72.58	23.14	7770.4	75.32	19.88	8979.4	50.181	217578
163.0	3477.570	-79.6771	28.7079	72.59	22.96	7773.6	75.33	19.72	8984.2	51.344	220622
S-IC/S-II SEPARATION COMMAND											
163.5	3477.819	-79.6666	28.7109	72.60	22.86	7767.8	75.34	19.64	8979.2	51.929	222143
164.0	3478.067	-79.6560	28.7138	72.61	22.77	7762.0	75.34	19.56	8974.3	52.512	223651
166.0	3479.047	-79.6138	28.7253	72.63	22.40	7740.0	75.37	19.23	8955.5	54.842	229615
168.0	3480.009	-79.5715	28.7369	72.66	22.02	7741.2	75.39	18.90	8959.8	57.174	235475
170.0	3480.958	-79.5291	28.7485	72.69	21.65	7759.0	75.40	18.59	8980.6	59.515	241252

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	3481.894	-79.4864	28.7602	72.72	21.29	7783.2	75.41	18.28	9007.7	61.868	246953
174.0	3482.819	-79.4435	28.7719	72.75	20.93	7809.8	75.42	17.99	9037.0	64.234	252582
176.0	3483.731	-79.4003	28.7836	72.78	20.58	7838.1	75.43	17.69	9068.1	66.613	258139
178.0	3484.632	-79.3569	28.7954	72.80	20.23	7867.1	75.44	17.39	9099.7	69.005	263626
180.0	3485.522	-79.3132	28.8072	72.83	19.88	7896.6	75.46	17.10	9131.8	71.412	269043
182.0	3486.400	-79.2693	28.8191	72.86	19.53	7926.6	75.47	16.81	9164.4	73.832	274391
184.0	3487.267	-79.2251	28.8310	72.89	19.19	7957.3	75.48	16.53	9197.5	76.266	279670
186.0	3488.122	-79.1806	28.8430	72.92	18.86	7988.5	75.49	16.24	9231.2	78.714	284881
188.0	3488.967	-79.1359	28.8551	72.95	18.53	8020.3	75.51	15.96	9265.4	81.176	290024
190.0	3489.800	-79.0909	28.8671	72.98	18.20	8052.7	75.52	15.69	9300.0	83.652	295099
192.0	3490.622	-79.0456	28.8793	73.01	17.87	8085.7	75.53	15.42	9335.3	86.142	300108
194.0	3491.433	-79.0001	28.8914	73.04	17.55	8119.3	75.55	15.15	9371.0	88.646	305051
196.0	3492.234	-78.9542	28.9036	73.07	17.23	8153.4	75.56	14.88	9407.2	91.165	309927
198.0	3493.024	-78.9081	28.9159	73.10	16.92	8188.1	75.57	14.62	9444.0	93.698	314739
200.0	3493.803	-78.8618	28.9282	73.13	16.61	8223.4	75.59	14.36	9481.3	96.245	319486
202.0	3494.572	-78.8151	28.9406	73.16	16.31	8259.4	75.60	14.10	9519.2	98.807	324169
204.0	3495.330	-78.7682	28.9530	73.19	16.01	8295.9	75.61	13.85	9557.6	101.384	328788
206.0	3496.077	-78.7210	28.9655	73.23	15.71	8332.9	75.63	13.60	9596.4	103.976	333345
208.0	3496.815	-78.6735	28.9780	73.26	15.43	8370.1	75.64	13.36	9635.4	106.582	337840
210.0	3497.543	-78.6257	28.9906	73.29	15.15	8407.7	75.66	13.13	9674.6	109.203	342277
212.0	3498.262	-78.5776	29.0032	73.31	14.88	8445.5	75.67	12.90	9714.0	111.838	346656
214.0	3498.971	-78.5293	29.0158	73.34	14.62	8483.7	75.68	12.68	9753.7	114.488	350980
216.0	3499.672	-78.4807	29.0285	73.37	14.37	8522.3	75.70	12.47	9793.8	117.153	355250
218.0	3500.363	-78.4318	29.0413	73.40	14.11	8561.4	75.71	12.26	9834.4	119.832	359465
220.0	3501.046	-78.3826	29.0541	73.43	13.86	8601.0	75.73	12.04	9875.3	122.527	363627
222.0	3501.720	-78.3332	29.0669	73.46	13.61	8641.0	75.74	11.83	9916.8	125.236	367735
224.0	3502.385	-78.2834	29.0798	73.49	13.37	8681.6	75.76	11.63	9958.6	127.960	371789
226.0	3503.041	-78.2334	29.0928	73.52	13.12	8722.6	75.77	11.42	10001.0	130.699	375790
228.0	3503.689	-78.1830	29.1058	73.55	12.88	8764.0	75.79	11.22	10043.7	133.453	379737
230.0	3504.327	-78.1324	29.1188	73.59	12.64	8805.9	75.80	11.02	10086.9	136.223	383632
232.0	3504.957	-78.0815	29.1319	73.62	12.41	8848.3	75.82	10.82	10130.4	139.008	387475
234.0	3505.579	-78.0303	29.1450	73.65	12.17	8891.1	75.84	10.62	10174.4	141.808	391264
236.0	3506.192	-77.9787	29.1582	73.68	11.94	8934.4	75.85	10.42	10218.9	144.624	395002
238.0	3506.796	-77.9269	29.1715	73.71	11.72	8978.1	75.87	10.23	10263.7	147.456	398688
240.0	3507.392	-77.8748	29.1848	73.74	11.49	9022.3	75.89	10.04	10309.0	150.303	402323
242.0	3507.980	-77.8224	29.1981	73.78	11.27	9066.9	75.90	9.85	10354.7	153.167	405906
244.0	3508.559	-77.7696	29.2115	73.81	11.05	9112.0	75.92	9.67	10400.8	156.046	409439
246.0	3509.129	-77.7166	29.2249	73.84	10.83	9157.6	75.94	9.48	10447.3	158.941	412921
248.0	3509.692	-77.6632	29.2384	73.87	10.62	9203.5	75.96	9.30	10494.3	161.852	416352
250.0	3510.246	-77.6096	29.2519	73.91	10.41	9249.9	75.98	9.12	10541.6	164.780	419733
252.0	3510.792	-77.5556	29.2655	73.94	10.20	9296.8	76.00	8.94	10589.4	167.723	423065
254.0	3511.330	-77.5013	29.2791	73.97	9.99	9344.1	76.01	8.77	10637.6	170.684	426347
256.0	3511.859	-77.4467	29.2928	74.01	9.79	9391.9	76.03	8.59	10686.2	173.660	429579

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	3512.381	-77.3917	29.3065	74.04	9.59	9440.1	76.05	8.42	10735.3	176.654	432763
260.0	3512.895	-77.3364	29.3203	74.07	9.39	9488.7	76.07	8.25	10784.7	179.664	435899
262.0	3513.400	-77.2808	29.3341	74.11	9.20	9537.8	76.09	8.09	10834.6	182.691	438986
264.0	3513.898	-77.2249	29.3479	74.14	9.00	9587.4	76.11	7.92	10885.0	185.735	442024
266.0	3514.388	-77.1687	29.3619	74.18	8.81	9637.4	76.13	7.76	10935.8	188.795	445015
268.0	3514.870	-77.1121	29.3758	74.21	8.62	9687.8	76.15	7.60	10986.9	191.873	447959
270.0	3515.344	-77.0552	29.3898	74.24	8.44	9738.7	76.17	7.44	11038.5	194.969	450855
272.0	3515.811	-76.9979	29.4039	74.28	8.26	9790.0	76.19	7.28	11090.5	198.081	453705
274.0	3516.270	-76.9403	29.4180	74.31	8.07	9841.8	76.22	7.13	11143.0	201.211	456508
276.0	3516.721	-76.8824	29.4321	74.35	7.90	9894.1	76.24	6.97	11195.9	204.359	459264
278.0	3517.164	-76.8241	29.4463	74.39	7.72	9946.8	76.26	6.82	11249.2	207.524	461975
280.0	3517.601	-76.7655	29.4606	74.42	7.55	9999.9	76.28	6.67	11303.0	210.707	464640
282.0	3518.029	-76.7065	29.4749	74.46	7.38	10053.5	76.30	6.53	11357.2	213.908	467260
284.0	3518.450	-76.6472	29.4892	74.49	7.21	10107.6	76.33	6.38	11411.8	217.128	469834
286.0	3518.864	-76.5875	29.5036	74.53	7.04	10162.1	76.35	6.24	11466.9	220.365	472364
288.0	3519.271	-76.5275	29.5181	74.57	6.88	10217.1	76.37	6.10	11522.4	223.620	474849
290.0	3519.670	-76.4671	29.5326	74.60	6.72	10272.5	76.40	5.96	11578.3	226.894	477290
292.0	3520.062	-76.4063	29.5471	74.64	6.56	10328.3	76.42	5.82	11634.6	230.186	479687
294.0	3520.447	-76.3452	29.5617	74.68	6.40	10384.7	76.44	5.69	11691.5	233.497	482041
296.0	3520.825	-76.2837	29.5763	74.71	6.25	10441.5	76.47	5.55	11748.7	236.827	484351
298.0	3521.195	-76.2219	29.5910	74.75	6.10	10498.7	76.49	5.42	11806.4	240.175	486618
300.0	3521.559	-76.1597	29.6057	74.79	5.95	10556.4	76.52	5.29	11864.6	243.543	488843
302.0	3521.915	-76.0971	29.6205	74.83	5.80	10614.6	76.54	5.16	11923.2	246.930	491026
304.0	3522.265	-76.0341	29.6353	74.87	5.66	10673.2	76.57	5.04	11982.2	250.335	493166
306.0	3522.608	-75.9707	29.6502	74.90	5.51	10732.3	76.59	4.91	12041.7	253.760	495265
308.0	3522.944	-75.9070	29.6651	74.94	5.37	10791.8	76.62	4.79	12101.6	257.205	497323
310.0	3523.273	-75.8429	29.6801	74.98	5.24	10851.8	76.64	4.67	12162.0	260.669	499339
312.0	3523.596	-75.7784	29.6951	75.02	5.10	10912.4	76.67	4.55	12222.9	264.153	501316
314.0	3523.912	-75.7135	29.7102	75.06	4.97	10973.3	76.70	4.44	12284.2	267.657	503251
316.0	3524.221	-75.6482	29.7253	75.10	4.83	11034.8	76.72	4.32	12346.0	271.181	505147
318.0	3524.524	-75.5826	29.7404	75.14	4.70	11096.7	76.75	4.21	12408.2	274.725	507003
320.0	3524.821	-75.5165	29.7556	75.18	4.58	11159.1	76.78	4.10	12470.9	278.289	508820
322.0	3525.110	-75.4500	29.7709	75.22	4.45	11222.0	76.80	3.98	12534.1	281.874	510598
324.0	3525.394	-75.3831	29.7862	75.26	4.33	11285.4	76.83	3.88	12597.8	285.479	512337
326.0	3525.671	-75.3158	29.8015	75.30	4.21	11349.3	76.86	3.77	12661.9	289.104	514038
328.0	3525.942	-75.2481	29.8169	75.34	4.09	11413.6	76.89	3.67	12726.6	292.751	515700
330.0	3526.207	-75.1800	29.8323	75.38	3.97	11478.5	76.92	3.56	12791.7	296.419	517325
332.0	3526.465	-75.1115	29.8478	75.42	3.86	11543.8	76.95	3.46	12857.3	300.107	518913
334.0	3526.718	-75.0426	29.8633	75.47	3.74	11609.6	76.98	3.36	12923.3	303.817	520464
336.0	3526.965	-74.9732	29.8789	75.51	3.63	11675.9	77.01	3.27	12989.9	307.548	521978
338.0	3527.205	-74.9034	29.8945	75.55	3.52	11742.7	77.04	3.17	13056.9	311.301	523456
340.0	3527.440	-74.8332	29.9102	75.59	3.42	11810.1	77.07	3.07	13124.5	315.076	524899
342.0	3527.669	-74.7626	29.9259	75.64	3.31	11877.9	77.10	2.98	13192.5	318.872	526305

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	3527.891	-74.6915	29.9416	75.68	3.21	11946.3	77.13	2.89	13261.1	322.690	527677
346.0	3528.109	-74.6200	29.9574	75.72	3.11	12015.2	77.16	2.80	13330.1	326.531	529014
348.0	3528.320	-74.5480	29.9732	75.77	3.01	12084.5	77.19	2.71	13399.7	330.393	530316
350.0	3528.526	-74.4756	29.9891	75.81	2.91	12154.4	77.22	2.63	13469.7	334.279	531585
352.0	3528.727	-74.4028	30.0051	75.85	2.82	12224.8	77.25	2.54	13540.3	338.186	532819
354.0	3528.922	-74.3295	30.0210	75.90	2.72	12295.8	77.29	2.46	13611.4	342.117	534021
356.0	3529.111	-74.2557	30.0370	75.94	2.63	12367.2	77.32	2.38	13683.1	346.070	535189
358.0	3529.295	-74.1815	30.0531	75.99	2.54	12439.2	77.35	2.30	13755.2	350.047	536325
360.0	3529.474	-74.1069	30.0692	76.03	2.45	12511.8	77.39	2.22	13827.9	354.046	537429
362.0	3529.648	-74.0317	30.0853	76.08	2.37	12584.8	77.42	2.14	13901.1	358.069	538501
364.0	3529.816	-73.9561	30.1015	76.12	2.28	12658.5	77.45	2.07	13974.9	362.116	539541
366.0	3529.979	-73.8801	30.1178	76.17	2.20	12732.7	77.49	1.99	14049.2	366.187	540551
368.0	3530.138	-73.8035	30.1340	76.22	2.12	12807.4	77.52	1.92	14124.1	370.281	541529
370.0	3530.291	-73.7265	30.1503	76.26	2.04	12882.7	77.56	1.85	14199.5	374.399	542478
372.0	3530.439	-73.6490	30.1667	76.31	1.96	12958.6	77.59	1.78	14275.5	378.542	543397
374.0	3530.583	-73.5710	30.1831	76.36	1.89	13035.0	77.63	1.71	14352.0	382.709	544286
376.0	3530.722	-73.4925	30.1995	76.40	1.81	13112.0	77.67	1.65	14429.1	386.901	545147
378.0	3530.856	-73.4135	30.2160	76.45	1.74	13189.6	77.70	1.58	14506.8	391.117	545979
380.0	3530.985	-73.3341	30.2325	76.50	1.67	13267.8	77.74	1.52	14585.0	395.359	546783
382.0	3531.110	-73.2541	30.2491	76.55	1.60	13346.5	77.77	1.46	14663.8	399.625	547560
384.0	3531.230	-73.1736	30.2657	76.59	1.53	13425.8	77.81	1.40	14743.3	403.917	548309
386.0	3531.346	-73.0926	30.2823	76.64	1.47	13505.8	77.85	1.34	14823.3	408.235	549032
388.0	3531.458	-73.0111	30.2990	76.69	1.40	13586.3	77.89	1.28	14903.9	412.578	549729
390.0	3531.566	-72.9291	30.3157	76.74	1.34	13667.5	77.93	1.22	14985.1	416.947	550400
392.0	3531.669	-72.8466	30.3325	76.79	1.28	13749.3	77.96	1.17	15067.0	421.342	551045
394.0	3531.768	-72.7635	30.3493	76.84	1.22	13831.7	78.00	1.12	15149.4	425.763	551666
396.0	3531.863	-72.6800	30.3661	76.89	1.17	13914.7	78.04	1.06	15232.5	430.211	552262
398.0	3531.954	-72.5958	30.3830	76.94	1.11	13998.3	78.08	1.01	15316.2	434.686	552835
400.0	3532.042	-72.5112	30.3999	76.99	1.06	14082.6	78.12	0.97	15400.5	439.187	553384
402.0	3532.125	-72.4260	30.4168	77.04	1.00	14167.5	78.16	0.92	15485.5	443.716	553910
404.0	3532.205	-72.3402	30.4338	77.09	0.95	14253.1	78.20	0.87	15571.1	448.272	554413
406.0	3532.282	-72.2539	30.4508	77.14	0.90	14339.3	78.24	0.83	15657.4	452.855	554895
408.0	3532.354	-72.1671	30.4679	77.20	0.86	14426.2	78.28	0.78	15744.4	457.466	555355
410.0	3532.424	-72.0797	30.4849	77.25	0.81	14513.8	78.32	0.74	15832.0	462.105	555794
412.0	3532.489	-71.9917	30.5021	77.30	0.77	14602.1	78.37	0.70	15920.3	466.772	556213
414.0	3532.552	-71.9032	30.5192	77.35	0.72	14691.0	78.41	0.66	16009.3	471.468	556612
416.0	3532.611	-71.8140	30.5364	77.41	0.68	14780.7	78.45	0.63	16099.0	476.192	556991
418.0	3532.668	-71.7243	30.5536	77.46	0.64	14871.0	78.49	0.59	16189.3	480.945	557352
420.0	3532.721	-71.6341	30.5709	77.51	0.60	14962.1	78.54	0.55	16280.4	485.727	557694
422.0	3532.771	-71.5432	30.5882	77.57	0.57	15053.8	78.58	0.52	16372.2	490.538	558018
424.0	3532.819	-71.4518	30.6055	77.62	0.53	15146.4	78.63	0.49	16464.8	495.379	558326
426.0	3532.864	-71.3597	30.6228	77.68	0.50	15239.6	78.67	0.46	16558.1	500.249	558616
428.0	3532.906	-71.2670	30.6402	77.73	0.46	15333.6	78.72	0.43	16652.1	505.150	558891

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	3532.945	-71.1738	30.6576	77.79	0.43	15428.4	78.76	0.40	16746.9	510.080	559150
432.0	3532.982	-71.0799	30.6751	77.84	0.40	15523.9	78.81	0.37	16842.4	515.041	559394
434.0	3533.017	-70.9854	30.6925	77.90	0.37	15620.2	78.85	0.35	16938.8	520.033	559624
436.0	3533.050	-70.8903	30.7100	77.95	0.35	15717.3	78.90	0.32	17035.9	525.056	559840
438.0	3533.080	-70.7945	30.7276	78.01	0.32	15815.2	78.95	0.30	17133.8	530.110	560043
440.0	3533.108	-70.6981	30.7451	78.07	0.30	15913.9	78.99	0.28	17232.5	535.195	560233
442.0	3533.134	-70.6011	30.7627	78.13	0.28	16013.4	79.04	0.25	17332.0	540.312	560412
444.0	3533.159	-70.5035	30.7803	78.18	0.25	16113.8	79.09	0.23	17432.4	545.462	560579
446.0	3533.181	-70.4051	30.7979	78.24	0.23	16214.9	79.14	0.22	17533.5	550.643	560736
448.0	3533.202	-70.3062	30.8155	78.30	0.22	16316.8	79.19	0.20	17635.5	555.857	560883
450.0	3533.222	-70.2065	30.8332	78.36	0.20	16419.6	79.24	0.18	17738.3	561.104	561020
452.0	3533.240	-70.1062	30.8509	78.42	0.18	16523.3	79.29	0.17	17842.0	566.383	561149
454.0	3533.257	-70.0052	30.8686	78.48	0.17	16627.9	79.34	0.16	17946.6	571.697	561271
456.0	3533.272	-69.9036	30.8864	78.54	0.16	16733.4	79.39	0.15	18052.1	577.043	561385
458.0	3533.287	-69.8012	30.9041	78.60	0.15	16839.8	79.44	0.13	18158.5	582.424	561492
460.0	3533.301	-69.6982	30.9219	78.66	0.14	16947.2	79.49	0.13	18265.9	587.839	561594
S-II CENTER ENGINE CUTOFF (ENGINE SOLENOID)											
461.77	3533.312	-69.6064	30.9376	78.72	0.12	17039.0	79.54	0.12	18357.7	592.660	561680
462.0	3533.313	-69.5945	30.9397	78.72	0.12	17050.0	79.54	0.11	18368.7	593.288	561691
464.0	3533.324	-69.4901	30.9575	78.78	0.10	17142.5	79.59	0.09	18461.2	598.769	561777
466.0	3533.333	-69.3852	30.9753	78.84	0.08	17230.1	79.65	0.07	18548.8	604.277	561850
468.0	3533.340	-69.2796	30.9931	78.91	0.05	17318.2	79.70	0.05	18636.9	609.814	561908
470.0	3533.344	-69.1735	31.0109	78.97	0.04	17406.6	79.75	0.03	18725.3	615.379	561954
472.0	3533.347	-69.0668	31.0286	79.03	0.03	17495.1	79.81	0.02	18813.9	620.973	561992
474.0	3533.349	-68.9596	31.0464	79.09	0.02	17584.1	79.86	0.02	18902.9	626.595	562026
476.0	3533.352	-68.8517	31.0642	79.15	0.03	17673.0	79.92	0.03	18991.7	632.245	562060
478.0	3533.355	-68.7432	31.0819	79.22	0.03	17762.2	79.97	0.03	19081.0	637.924	562098
480.0	3533.359	-68.6342	31.0996	79.28	0.04	17852.0	80.03	0.04	19170.8	643.632	562142
482.0	3533.364	-68.5246	31.1173	79.34	0.05	17942.5	80.08	0.05	19261.2	649.369	562192
484.0	3533.370	-68.4143	31.1351	79.41	0.07	18033.7	80.14	0.06	19352.4	655.134	562249
486.0	3533.378	-68.3035	31.1527	79.47	0.08	18125.7	80.19	0.07	19444.4	660.929	562314
488.0	3533.387	-68.1920	31.1704	79.54	0.09	18218.5	80.25	0.08	19537.2	666.754	562386
490.0	3533.396	-68.0800	31.1881	79.60	0.10	18312.1	80.31	0.09	19630.9	672.608	562465
492.0	3533.407	-67.9673	31.2057	79.67	0.11	18406.6	80.37	0.10	19725.4	678.493	562551
494.0	3533.420	-67.8540	31.2233	79.73	0.12	18501.8	80.42	0.11	19820.6	684.408	562644
496.0	3533.433	-67.7400	31.2409	79.80	0.12	18590.0	80.48	0.12	19908.8	690.352	562743
498.0	3533.446	-67.6255	31.2584	79.87	0.12	18673.9	80.54	0.12	19992.7	696.324	562843
500.0	3533.459	-67.5105	31.2759	79.94	0.12	18758.0	80.60	0.12	20076.9	702.323	562943
502.0	3533.473	-67.3949	31.2934	80.01	0.12	18842.4	80.67	0.12	20161.3	708.349	563043
504.0	3533.486	-67.2787	31.3109	80.07	0.12	18927.2	80.73	0.11	20246.1	714.402	563143
506.0	3533.499	-67.1619	31.3282	80.14	0.12	19012.5	80.79	0.12	20331.4	720.482	563243

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	3533.513	-67.0446	31.3456	80.21	0.12	19098.3	80.85	0.12	20417.2	726.589	563344
510.0	3533.527	-66.9267	31.3629	80.28	0.13	19184.8	80.91	0.12	20503.7	732.724	563446
512.0	3533.541	-66.8082	31.3802	80.35	0.13	19272.0	80.98	0.12	20590.9	738.887	563550
514.0	3533.555	-66.6891	31.3974	80.42	0.13	19359.6	81.04	0.12	20678.5	745.078	563656
516.0	3533.570	-66.5695	31.4145	80.49	0.13	19447.8	81.10	0.13	20766.8	751.297	563765
518.0	3533.585	-66.4492	31.4316	80.57	0.14	19536.6	81.17	0.13	20855.6	757.544	563877
520.0	3533.601	-66.3284	31.4487	80.64	0.15	19626.2	81.23	0.14	20945.2	763.820	563993
522.0	3533.618	-66.2069	31.4657	80.71	0.15	19716.4	81.30	0.14	21035.5	770.125	564113
524.0	3533.635	-66.0849	31.4827	80.78	0.16	19807.4	81.36	0.15	21126.4	776.458	564238
526.0	3533.654	-65.9622	31.4996	80.86	0.16	19899.0	81.43	0.15	21218.0	782.821	564367
528.0	3533.673	-65.8389	31.5164	80.93	0.17	19991.3	81.49	0.16	21310.4	789.213	564502
530.0	3533.693	-65.7150	31.5332	81.00	0.18	20084.3	81.56	0.17	21403.4	795.635	564642
532.0	3533.714	-65.5905	31.5500	81.08	0.19	20178.0	81.63	0.18	21497.1	802.087	564789
534.0	3533.736	-65.4653	31.5666	81.15	0.20	20272.3	81.69	0.18	21591.5	808.568	564942
536.0	3533.760	-65.3396	31.5833	81.22	0.21	20367.4	81.76	0.19	21686.6	815.081	565103
538.0	3533.784	-65.2131	31.5998	81.30	0.22	20463.2	81.83	0.20	21782.4	821.623	565272
540.0	3533.811	-65.0861	31.6163	81.37	0.23	20559.7	81.90	0.21	21878.9	828.197	565450
542.0	3533.839	-64.9583	31.6327	81.45	0.24	20657.0	81.97	0.23	21976.2	834.801	565637
544.0	3533.868	-64.8300	31.6491	81.53	0.25	20754.9	82.04	0.24	22074.1	841.437	565833
546.0	3533.899	-64.7010	31.6654	81.60	0.27	20853.5	82.11	0.25	22172.7	848.104	566041
548.0	3533.932	-64.5713	31.6816	81.68	0.28	20952.8	82.18	0.27	22272.1	854.802	566260
550.0	3533.968	-64.4409	31.6977	81.76	0.30	21052.9	82.25	0.28	22372.2	861.533	566492
552.0	3534.005	-64.3099	31.7138	81.84	0.32	21153.8	82.32	0.30	22473.1	868.295	566736
554.0	3534.044	-64.1782	31.7298	81.91	0.33	21255.2	82.39	0.31	22574.5	875.090	566994
556.0	3534.086	-64.0458	31.7457	81.99	0.35	21357.2	82.46	0.33	22676.6	881.918	567267
558.0	3534.131	-63.9128	31.7615	82.07	0.37	21459.9	82.53	0.35	22779.3	888.778	567556
	S-II OUTBOARD ENGINE CUTOFF (ENGINE SOLENOID)										
559.54	3534.166	-63.8100	31.7737	82.13	0.39	21539.3	82.59	0.37	22858.7	894.079	567782
560.0	3534.177	-63.7792	31.7773	82.15	0.39	21551.0	82.60	0.37	22870.4	895.665	567852
	S-II/S-IVB SEPARATION COMMAND										
560.5	3534.188	-63.7457	31.7812	82.17	0.38	21550.4	82.62	0.36	22869.8	897.389	567925
562.0	3534.222	-63.6452	31.7929	82.23	0.35	21548.8	82.68	0.33	22868.2	902.568	568143
564.0	3534.264	-63.5111	31.8084	82.31	0.32	21547.1	82.76	0.30	22866.6	909.472	568412
566.0	3534.301	-63.3770	31.8237	82.39	0.29	21563.9	82.83	0.28	22883.4	916.378	568659
568.0	3534.337	-63.2426	31.8389	82.47	0.28	21595.7	82.90	0.26	22915.2	923.293	568892
570.0	3534.371	-63.1080	31.8539	82.55	0.27	21629.3	82.98	0.25	22948.8	930.218	569115
572.0	3534.403	-62.9732	31.8688	82.63	0.25	21663.7	83.05	0.24	22983.3	937.154	569328
574.0	3534.434	-62.8381	31.8836	82.71	0.24	21698.4	83.13	0.22	23018.0	944.101	569529
576.0	3534.462	-62.7027	31.8982	82.79	0.22	21733.4	83.20	0.21	23053.0	951.059	569717

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	3534.488	-62.5670	31.9127	82.87	0.20	21768.6	83.28	0.19	23088.2	958.028	569893
580.0	3534.512	-62.4311	31.9271	82.95	0.18	21804.0	83.35	0.17	23123.7	965.009	570055
582.0	3534.535	-62.2950	31.9413	83.03	0.17	21839.7	83.43	0.16	23159.4	972.001	570205
584.0	3534.555	-62.1585	31.9553	83.11	0.15	21875.4	83.50	0.14	23195.1	979.004	570344
586.0	3534.573	-62.0218	31.9693	83.19	0.14	21911.3	83.58	0.13	23231.0	986.018	570471
588.0	3534.590	-61.8848	31.9831	83.27	0.12	21947.3	83.65	0.12	23267.0	993.045	570586
590.0	3534.604	-61.7476	31.9967	83.35	0.11	21983.4	83.73	0.10	23303.1	1000.082	570691
592.0	3534.617	-61.6101	32.0102	83.44	0.09	22019.7	83.81	0.09	23339.4	1007.131	570784
594.0	3534.628	-61.4723	32.0236	83.52	0.08	22056.1	83.89	0.08	23375.9	1014.192	570865
596.0	3534.638	-61.3342	32.0368	83.60	0.07	22092.7	83.96	0.06	23412.5	1021.265	570936
598.0	3534.645	-61.1959	32.0499	83.68	0.05	22129.3	84.04	0.05	23449.2	1028.349	570995
600.0	3534.651	-61.0573	32.0628	83.77	0.04	22166.1	84.12	0.04	23485.9	1035.445	571045
602.0	3534.655	-60.9185	32.0755	83.85	0.03	22202.9	84.20	0.02	23522.8	1042.552	571083
604.0	3534.657	-60.7793	32.0882	83.93	0.01	22239.9	84.27	0.01	23559.7	1049.672	571112
606.0	3534.658	-60.6399	32.1006	84.02	0.00	22277.0	84.35	0.00	23596.8	1056.803	571131
608.0	3534.657	-60.5002	32.1129	84.10	-0.01	22314.2	84.43	-0.01	23634.1	1063.946	571141
610.0	3534.655	-60.3603	32.1251	84.19	-0.02	22351.6	84.51	-0.02	23671.4	1071.102	571142
612.0	3534.652	-60.2200	32.1371	84.27	-0.03	22389.0	84.59	-0.03	23708.9	1078.269	571134
614.0	3534.647	-60.0795	32.1489	84.35	-0.04	22426.5	84.67	-0.04	23746.4	1085.448	571117
616.0	3534.641	-59.9388	32.1606	84.44	-0.05	22464.0	84.75	-0.05	23783.9	1092.639	571093
618.0	3534.633	-59.7977	32.1722	84.52	-0.06	22501.7	84.83	-0.06	23821.6	1099.842	571060
620.0	3534.625	-59.6564	32.1836	84.61	-0.07	22539.5	84.91	-0.07	23859.4	1107.058	571020
622.0	3534.615	-59.5148	32.1948	84.69	-0.08	22577.4	84.99	-0.08	23897.3	1114.285	570973
624.0	3534.604	-59.3729	32.2058	84.78	-0.09	22615.5	85.07	-0.08	23935.5	1121.525	570919
626.0	3534.592	-59.2307	32.2167	84.86	-0.10	22653.8	85.15	-0.09	23973.7	1128.777	570859
628.0	3534.579	-59.0883	32.2275	84.95	-0.10	22692.1	85.23	-0.10	24012.1	1136.041	570793
630.0	3534.566	-58.9456	32.2381	85.04	-0.11	22730.6	85.31	-0.10	24050.5	1143.317	570721
632.0	3534.551	-58.8026	32.2485	85.12	-0.12	22769.1	85.39	-0.11	24089.0	1150.606	570643
634.0	3534.535	-58.6593	32.2587	85.21	-0.12	22807.7	85.47	-0.11	24127.7	1157.908	570560
636.0	3534.519	-58.5158	32.2688	85.29	-0.13	22846.5	85.55	-0.12	24166.5	1165.221	570473
638.0	3534.502	-58.3720	32.2787	85.38	-0.13	22885.3	85.63	-0.12	24205.3	1172.547	570380
640.0	3534.484	-58.2279	32.2885	85.47	-0.14	22924.3	85.71	-0.13	24244.3	1179.886	570284
642.0	3534.466	-58.0835	32.2981	85.55	-0.14	22963.4	85.80	-0.13	24283.4	1187.237	570184
644.0	3534.448	-57.9388	32.3075	85.64	-0.14	23002.6	85.88	-0.14	24322.6	1194.601	570081
646.0	3534.428	-57.7939	32.3167	85.73	-0.15	23042.0	85.96	-0.14	24361.9	1201.977	569975
648.0	3534.409	-57.6487	32.3258	85.81	-0.15	23081.5	86.04	-0.14	24401.5	1209.366	569866
650.0	3534.389	-57.5032	32.3347	85.90	-0.15	23121.2	86.12	-0.14	24441.1	1216.768	569755
652.0	3534.369	-57.3574	32.3434	85.99	-0.15	23161.0	86.21	-0.14	24480.9	1224.183	569642
654.0	3534.348	-57.2113	32.3520	86.08	-0.15	23200.9	86.29	-0.15	24520.8	1231.610	569527
656.0	3534.328	-57.0650	32.3604	86.16	-0.15	23240.8	86.37	-0.15	24560.8	1239.050	569412
658.0	3534.307	-56.9183	32.3686	86.25	-0.15	23280.9	86.45	-0.15	24600.8	1246.503	569295
660.0	3534.286	-56.7714	32.3766	86.34	-0.15	23321.0	86.54	-0.15	24641.0	1253.969	569179
662.0	3534.266	-56.6242	32.3845	86.43	-0.15	23361.3	86.62	-0.14	24681.3	1261.448	569062

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	3534.245	-56.4768	32.3921	86.52	-0.15	23401.7	86.70	-0.14	24721.7	1268.940	568946
666.0	3534.225	-56.3290	32.3996	86.60	-0.15	23442.3	86.79	-0.14	24762.2	1276.445	568831
668.0	3534.205	-56.1810	32.4070	86.69	-0.15	23482.9	86.87	-0.14	24802.8	1283.962	568718
670.0	3534.185	-56.0327	32.4141	86.78	-0.14	23523.6	86.95	-0.14	24843.6	1291.493	568606
672.0	3534.166	-55.8841	32.4210	86.87	-0.14	23564.4	87.04	-0.13	24884.4	1299.037	568496
674.0	3534.147	-55.7352	32.4278	86.96	-0.14	23605.4	87.12	-0.13	24925.3	1306.594	568389
676.0	3534.129	-55.5860	32.4344	87.05	-0.13	23646.4	87.21	-0.13	24966.4	1314.165	568285
678.0	3534.111	-55.4366	32.4408	87.14	-0.13	23687.7	87.29	-0.12	25007.6	1321.748	568183
680.0	3534.094	-55.2868	32.4470	87.23	-0.12	23729.1	87.37	-0.12	25049.0	1329.345	568085
682.0	3534.077	-55.1368	32.4531	87.32	-0.12	23770.6	87.46	-0.11	25090.5	1336.955	567990
684.0	3534.061	-54.9865	32.4589	87.41	-0.11	23812.1	87.54	-0.11	25132.1	1344.579	567899
686.0	3534.046	-54.8359	32.4646	87.50	-0.11	23853.8	87.63	-0.10	25173.7	1352.216	567813
688.0	3534.031	-54.6850	32.4700	87.59	-0.10	23895.4	87.71	-0.10	25215.4	1359.866	567732
690.0	3534.018	-54.5339	32.4753	87.68	-0.09	23937.2	87.80	-0.09	25257.2	1367.529	567658
692.0	3534.006	-54.3825	32.4804	87.77	-0.08	23979.2	87.88	-0.08	25299.1	1375.207	567590
694.0	3533.995	-54.2307	32.4853	87.86	-0.07	24021.2	87.97	-0.07	25341.2	1382.897	567529
696.0	3533.985	-54.0787	32.4900	87.95	-0.06	24063.4	88.06	-0.06	25383.4	1390.601	567475
698.0	3533.977	-53.9264	32.4945	88.04	-0.05	24105.7	88.14	-0.05	25425.7	1398.319	567431
700.0	3533.971	-53.7739	32.4988	88.13	-0.04	24148.1	88.23	-0.04	25468.1	1406.050	567395
702.0	3533.966	-53.6210	32.5029	88.22	-0.03	24190.6	88.31	-0.03	25510.6	1413.795	567370
704.0	3533.963	-53.4679	32.5068	88.31	-0.02	24233.3	88.40	-0.02	25553.2	1421.553	567355
706.0	3533.961	-53.3144	32.5105	88.40	-0.00	24276.0	88.49	-0.00	25595.9	1429.326	567351
	S-IVB FIRST GUIDANCE CUTOFF										
706.21	3533.961	-53.2983	32.5109	88.41	0.00	24280.1	88.50	0.00	25600.0	1430.142	567350
708.0	3533.961	-53.1608	32.5140	88.50	0.00	24285.7	88.57	0.00	25605.7	1437.106	567355
710.0	3533.961	-53.0072	32.5173	88.59	0.00	24285.7	88.66	0.00	25605.7	1444.888	567359
712.0	3533.961	-52.8535	32.5204	88.68	0.00	24285.7	88.75	0.00	25605.7	1452.670	567363
714.0	3533.962	-52.6999	32.5232	88.77	0.00	24285.8	88.84	0.00	25605.7	1460.453	567367
716.0	3533.962	-52.5462	32.5259	88.86	0.00	24285.7	88.92	0.00	25605.7	1468.235	567371
	PARKING ORBIT INSERTION										
716.21	3533.962	-52.5300	32.5262	88.87	0.00	24286.1	88.93	0.00	25606.1	1469.052	567371

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								
716.21	3533.962	-52.5300	32.5262	32.6963	88.93	0.00	25606.1	93.377
750.0	3533.989	-49.9329	32.5390	32.7091	90.41	-0.00	25606.2	93.407
800.0	3533.987	-46.0926	32.4496	32.6194	92.59	-0.00	25607.1	93.389
850.0	3533.986	-42.2660	32.2307	32.4000	94.75	-0.00	25607.4	93.348
900.0	3533.987	-38.4643	31.8841	32.0523	96.89	0.00	25607.8	93.286
950.0	3533.988	-34.6981	31.4123	31.5792	98.98	0.00	25608.3	93.202
1000.0	3533.991	-30.9767	30.8190	30.9841	101.01	0.00	25608.8	93.099
1050.0	3533.996	-27.3083	30.1083	30.2712	102.99	0.00	25609.4	92.978
1100.0	3534.001	-23.6995	29.2852	29.4454	104.88	0.00	25610.0	92.840
1150.0	3534.007	-20.1556	28.3552	28.5121	106.70	0.00	25610.7	92.687
1200.0	3534.014	-16.6804	27.3240	27.4771	108.42	0.00	25611.4	92.522
1250.0	3534.021	-13.2761	26.1978	26.3465	110.05	0.00	25612.2	92.346
1300.0	3534.029	-9.9436	24.9828	25.1266	111.59	0.00	25613.0	92.163
1350.0	3534.037	-6.6828	23.6855	23.8237	113.02	0.00	25613.8	91.974
1400.0	3534.045	-3.4921	22.3123	22.4442	114.35	0.00	25614.6	91.782
1450.0	3534.053	-0.3693	20.8694	20.9944	115.58	0.00	25615.4	91.590
1500.0	3534.060	2.6888	19.3630	19.4806	116.71	0.00	25616.2	91.401
1550.0	3534.067	5.6860	17.7993	17.9087	117.73	0.00	25617.0	91.217
1600.0	3534.074	8.6266	16.1840	16.2847	118.66	0.00	25617.7	91.041
1650.0	3534.079	11.5154	14.5231	14.6143	119.48	0.00	25618.4	90.874
1700.0	3534.084	14.3574	12.8219	12.9033	120.20	0.00	25619.1	90.721
1750.0	3534.087	17.1582	11.0859	11.1569	120.83	0.00	25619.8	90.582
1800.0	3534.089	19.9231	9.3203	9.3804	121.36	0.00	25620.4	90.459
1850.0	3534.090	22.6579	7.5302	7.5791	121.79	0.00	25620.9	90.355
1900.0	3534.090	25.3683	5.7205	5.7578	122.13	-0.00	25621.4	90.271
1950.0	3534.089	28.0603	3.8961	3.9216	122.37	-0.00	25621.8	90.208
2000.0	3534.087	30.7398	2.0617	2.0752	122.52	-0.00	25622.1	90.168
2050.0	3534.083	33.4126	0.2220	0.2235	122.58	-0.00	25622.3	90.149
2100.0	3534.079	36.0847	-1.6182	-1.6289	122.55	-0.00	25622.5	90.155
2150.0	3534.075	38.7620	-3.4544	-3.4770	122.42	-0.00	25622.6	90.183
2200.0	3534.070	41.4506	-5.2817	-5.3162	122.20	-0.00	25622.6	90.234
2250.0	3534.065	44.1562	-7.0956	-7.1417	121.88	-0.00	25622.5	90.308
2300.0	3534.061	46.8848	-8.8910	-8.9484	121.47	-0.00	25622.3	90.404
2350.0	3534.057	49.6422	-10.6631	-10.7315	120.97	-0.00	25622.1	90.520
2400.0	3534.054	52.4341	-12.4069	-12.4858	120.36	-0.00	25621.8	90.655
2450.0	3534.052	55.2660	-14.1172	-14.2061	119.66	-0.00	25621.4	90.808
2500.0	3534.053	58.1434	-15.7886	-15.8870	118.87	0.00	25621.0	90.977
2550.0	3534.055	61.0715	-17.4156	-17.5229	117.97	0.00	25620.5	91.160
2600.0	3534.060	64.0551	-18.9925	-19.1082	116.97	0.00	25620.0	91.354
2650.0	3534.068	67.0986	-20.5135	-20.6368	115.86	0.00	25619.4	91.558

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	3534.080	70.2060	-21.9725	-22.1028	114.66	0.00	25618.7	91.770
2750.0	3534.096	73.3807	-23.3633	-23.5000	113.35	0.00	25618.1	91.985
2800.0	3534.116	76.6250	-24.6796	-24.8221	111.94	0.01	25617.4	92.203
2850.0	3534.141	79.9407	-25.9151	-26.0627	110.43	0.01	25616.7	92.421
2900.0	3534.171	83.3283	-27.0634	-27.2155	108.82	0.01	25615.9	92.637
2950.0	3534.207	86.7871	-28.1181	-28.2741	107.12	0.01	25615.2	92.847
3000.0	3534.248	90.3152	-29.0731	-29.2325	105.33	0.01	25614.4	93.050
3050.0	3534.295	93.9093	-29.9224	-30.0847	103.45	0.01	25613.7	93.245
3100.0	3534.348	97.5643	-30.6606	-30.8252	101.49	0.02	25613.0	93.428
3150.0	3534.408	101.2739	-31.2825	-31.4490	99.47	0.02	25612.3	93.598
3200.0	3534.474	105.0303	-31.7838	-31.9517	97.39	0.02	25611.6	93.754
3250.0	3534.546	108.8244	-32.1607	-32.3297	95.27	0.02	25610.9	93.895
3300.0	3534.624	112.6459	-32.4103	-32.5800	93.11	0.02	25610.3	94.019
3350.0	3534.709	116.4838	-32.5309	-32.7009	90.93	0.02	25609.7	94.126
3400.0	3534.800	120.3265	-32.5213	-32.6913	88.75	0.03	25609.2	94.215
3450.0	3534.896	124.1623	-32.3818	-32.5514	86.57	0.03	25608.6	94.285
3500.0	3534.998	127.9797	-32.1134	-32.2823	84.42	0.03	25608.2	94.339
3550.0	3535.105	131.7678	-31.7183	-31.8860	82.30	0.03	25607.7	94.374
3600.0	3535.217	135.5164	-31.1994	-31.3656	80.23	0.03	25607.3	94.392
3650.0	3535.333	139.2167	-30.5606	-30.7248	78.22	0.03	25607.0	94.395
3700.0	3535.453	142.8610	-29.8065	-29.9683	76.28	0.03	25606.6	94.382
3750.0	3535.575	146.4434	-28.9421	-29.1010	74.41	0.03	25606.3	94.355
3800.0	3535.701	149.9590	-27.9731	-28.1286	72.63	0.03	25606.1	94.317
3850.0	3535.828	153.4047	-26.9056	-27.0570	70.94	0.03	25605.8	94.267
3900.0	3535.956	156.7788	-25.7456	-25.8924	69.35	0.03	25605.6	94.209
3950.0	3536.085	160.0809	-24.4996	-24.6412	67.86	0.04	25605.4	94.145
4000.0	3536.214	163.3117	-23.1738	-23.3097	66.46	0.03	25605.3	94.075
4050.0	3536.341	166.4730	-21.7748	-21.9041	65.17	0.03	25605.1	94.003
4100.0	3536.467	169.5674	-20.3087	-20.4309	63.98	0.03	25604.9	93.930
4150.0	3536.591	172.5984	-18.7817	-18.8962	62.89	0.03	25604.8	93.859
4200.0	3536.712	175.5699	-17.1998	-17.3059	61.91	0.03	25604.6	93.792
4250.0	3536.829	178.4866	-15.5688	-15.6660	61.02	0.03	25604.5	93.730
4300.0	3536.941	-178.6468	-13.8944	-13.9820	60.24	0.03	25604.3	93.676
4350.0	3537.049	-175.8250	-12.1821	-12.2596	59.55	0.03	25604.1	93.631
4400.0	3537.151	-173.0426	-10.4371	-10.5040	58.96	0.03	25603.9	93.597
4450.0	3537.246	-170.2940	-8.6645	-8.7205	58.47	0.03	25603.7	93.576
4500.0	3537.336	-167.5735	-6.8695	-6.9141	58.07	0.02	25603.4	93.568
4550.0	3537.418	-164.8752	-5.0568	-5.0898	57.77	0.02	25603.2	93.574
4600.0	3537.494	-162.1933	-3.2312	-3.2524	57.56	0.02	25602.9	93.596
4650.0	3537.561	-159.5220	-1.3975	-1.4067	57.44	0.02	25602.6	93.634
4700.0	3537.621	-156.8552	0.4396	0.4425	57.42	0.02	25602.3	93.688
4750.0	3537.673	-154.1871	2.2756	2.2905	57.49	0.01	25601.9	93.757
4800.0	3537.717	-151.5117	4.1058	4.1327	57.65	0.01	25601.5	93.842

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	3537.753	-148.8232	5.9255	5.9641	57.90	0.01	25601.1	93.943
4900.0	3537.781	-146.1156	7.7300	7.7800	58.25	0.01	25600.7	94.057
4950.0	3537.801	-143.3832	9.5144	9.5756	58.69	0.00	25600.3	94.184
5000.0	3537.814	-140.6201	11.2738	11.3458	59.23	0.00	25599.8	94.323
5050.0	3537.819	-137.8208	13.0031	13.0855	59.87	0.00	25599.4	94.473
5100.0	3537.818	-134.9796	14.6973	14.7895	60.60	-0.00	25598.9	94.630
5150.0	3537.809	-132.0914	16.3508	16.4523	61.43	-0.00	25598.5	94.795
5200.0	3537.795	-129.1509	17.9582	18.0683	62.36	-0.00	25598.1	94.963
5250.0	3537.774	-126.1536	19.5138	19.6320	63.40	-0.01	25597.7	95.134
5300.0	3537.749	-123.0951	21.0116	21.1372	64.53	-0.01	25597.3	95.305
5350.0	3537.718	-119.9717	22.4456	22.5781	65.77	-0.01	25596.9	95.474
5400.0	3537.683	-116.7804	23.8097	23.9483	67.11	-0.01	25596.6	95.639
5450.0	3537.645	-113.5188	25.0975	25.2416	68.55	-0.01	25596.3	95.796
5500.0	3537.603	-110.1858	26.3026	26.4516	70.09	-0.01	25596.0	95.945
5550.0	3537.559	-106.7810	27.4189	27.5722	71.73	-0.01	25595.8	96.083
5600.0	3537.512	-103.3055	28.4398	28.5969	73.46	-0.01	25595.6	96.207
5650.0	3537.465	-99.7617	29.3595	29.5197	75.28	-0.01	25595.5	96.316
5700.0	3537.416	-96.1535	30.1721	30.3350	77.18	-0.01	25595.5	96.409
5750.0	3537.367	-92.4862	30.8722	31.0373	79.15	-0.01	25595.5	96.484
5800.0	3537.317	-88.7666	31.4550	31.6219	81.19	-0.01	25595.6	96.539
5850.0	3537.269	-85.0028	31.9162	32.0844	83.28	-0.01	25595.8	96.573
5900.0	3537.221	-81.2043	32.2525	32.4216	85.41	-0.01	25596.0	96.586
5950.0	3537.174	-77.3817	32.4611	32.6308	87.58	-0.01	25596.3	96.578
6000.0	3537.129	-73.5460	32.5406	32.7105	89.76	-0.01	25596.7	96.547
6050.0	3537.086	-69.7088	32.4902	32.6600	91.94	-0.01	25597.1	96.495
6100.0	3537.044	-65.8819	32.3104	32.4797	94.10	-0.01	25597.6	96.421
6150.0	3537.005	-62.0766	32.0025	32.1709	96.25	-0.01	25598.2	96.325
6200.0	3536.969	-58.3034	31.5688	31.7361	98.35	-0.01	25598.8	96.210
6250.0	3536.934	-54.5722	31.0128	31.1783	100.40	-0.01	25599.4	96.076
6300.0	3536.903	-50.8914	30.3382	30.5017	102.39	-0.01	25600.2	95.925
6350.0	3536.873	-47.2681	29.5500	29.7109	104.31	-0.01	25600.9	95.758
6400.0	3536.846	-43.7082	28.6533	28.8111	106.15	-0.01	25601.7	95.577
6450.0	3536.822	-40.2156	27.6539	27.8081	107.90	-0.01	25602.6	95.385
6500.0	3536.800	-36.7932	26.5577	26.7077	109.56	-0.01	25603.4	95.183
6550.0	3536.779	-33.4423	25.3710	25.5163	111.12	-0.01	25604.3	94.974
6600.0	3536.761	-30.1631	24.1002	24.2400	112.58	-0.00	25605.2	94.760
6650.0	3536.744	-26.9543	22.7515	22.8854	113.95	-0.00	25606.1	94.545
6700.0	3536.729	-23.8141	21.3314	21.4586	115.21	-0.00	25606.9	94.330
6750.0	3536.716	-20.7395	19.8459	19.9659	116.36	-0.00	25607.8	94.118
6800.0	3536.703	-17.7269	18.3014	18.4133	117.42	-0.00	25608.6	93.912
6850.0	3536.691	-14.7721	16.7036	16.8070	118.37	-0.00	25609.4	93.715
6900.0	3536.680	-11.8707	15.0583	15.1525	119.23	-0.00	25610.2	93.529
6950.0	3536.670	-9.0174	13.3711	13.4557	119.98	-0.00	25610.9	93.356

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	3536.659	-6.2072	11.6475	11.7218	120.64	-0.00	25611.6	93.198
7050.0	3536.650	-3.4345	9.8927	9.9563	121.20	-0.00	25612.2	93.058
7100.0	3536.640	-0.6936	8.1118	8.1643	121.66	-0.00	25612.7	92.937
7150.0	3536.630	2.0211	6.3098	6.3508	122.03	-0.00	25613.2	92.836
7200.0	3536.620	4.7154	4.4915	4.5208	122.30	-0.00	25613.6	92.757
7250.0	3536.611	7.3953	2.6617	2.6791	122.48	-0.00	25613.9	92.701
7300.0	3536.601	10.0667	0.8251	0.8305	122.57	-0.00	25614.2	92.669
7350.0	3536.591	12.7354	-1.0136	-1.0203	122.57	-0.00	25614.3	92.661
7400.0	3536.582	15.4074	-2.8498	-2.8684	122.47	-0.00	25614.4	92.677
7450.0	3536.574	18.0886	-4.6787	-4.7092	122.28	-0.00	25614.4	92.717
7500.0	3536.566	20.7849	-6.4957	-6.5379	122.00	-0.00	25614.3	92.780
7550.0	3536.558	23.5022	-8.2959	-8.3496	121.62	-0.00	25614.2	92.866
7600.0	3536.553	26.2463	-10.0746	-10.1393	121.15	-0.00	25613.9	92.973
7650.0	3536.548	29.0229	-11.8266	-11.9020	120.58	-0.00	25613.6	93.101
7700.0	3536.546	31.8377	-13.5470	-13.6325	119.91	-0.00	25613.2	93.248
7750.0	3536.545	34.6960	-15.2303	-15.3256	119.15	0.00	25612.7	93.412
7800.0	3536.548	37.6032	-16.8713	-16.9756	118.28	0.00	25612.2	93.590
7850.0	3536.553	40.5642	-18.4641	-18.5770	117.32	0.00	25611.6	93.782
7900.0	3536.561	43.5835	-20.0032	-20.1239	116.25	0.00	25611.0	93.984
7950.0	3536.574	46.6653	-21.4825	-21.6104	115.08	0.00	25610.3	94.195
8000.0	3536.590	49.8132	-22.8958	-23.0303	113.81	0.01	25609.6	94.411
8050.0	3536.611	53.0298	-24.2370	-24.3775	112.44	0.01	25608.8	94.630
8100.0	3536.636	56.3171	-25.4997	-25.6455	110.96	0.01	25608.0	94.851
8150.0	3536.667	59.6762	-26.6775	-26.8280	109.39	0.01	25607.2	95.069
8200.0	3536.702	63.1067	-27.7642	-27.9188	107.72	0.01	25606.4	95.284
8250.0	3536.744	66.6071	-28.7534	-28.9116	105.96	0.01	25605.6	95.492
8300.0	3536.790	70.1747	-29.6392	-29.8004	104.11	0.01	25604.7	95.691
8350.0	3536.843	73.8049	-30.4160	-30.5797	102.19	0.02	25603.9	95.879
8400.0	3536.901	77.4921	-31.0785	-31.2442	100.19	0.02	25603.1	96.055
8450.0	3536.964	81.2288	-31.6220	-31.7894	98.13	0.02	25602.3	96.216
8500.0	3537.033	85.0064	-32.0426	-32.2112	96.02	0.02	25601.5	96.361
8550.0	3537.107	88.8151	-32.3372	-32.5066	93.88	0.02	25600.8	96.488
8600.0	3537.186	92.6441	-32.5035	-32.6733	91.71	0.02	25600.1	96.598
	BEGIN S-IVB RESTART PREPARATIONS - START OF TIMEBASE 6							
8638.6	3537.248	95.6068	-32.5433	-32.7132	90.02	0.02	25599.6	96.667

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

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 TIMEBASE 6								
8638.6	-42316973	1734253	696320	-1418.0	-8192.4	-22810.4	27.17	-4.16	-0.19
8640.0	-42318943	1722782	664385	-1380.0	-8198.2	-22810.7	27.17	-4.14	-0.15
8650.0	-42331383	1640594	436274	-1108.2	-8239.1	-22810.7	27.19	-4.04	0.15
8660.0	-42341105	1558002	208179	-836.2	-8279.0	-22807.8	27.20	-3.93	0.44
8670.0	-42348108	1475019	-19867	-564.2	-8317.8	-22802.0	27.21	-3.83	0.73
8680.0	-42352389	1391652	-247846	-292.1	-8355.5	-22793.2	27.21	-3.72	1.02
8690.0	-42353947	1307911	-475729	-19.9	-8392.1	-22781.5	27.21	-3.61	1.31
8700.0	-42352786	1223811	-703473	252.2	-8427.6	-22766.9	27.21	-3.50	1.60
8710.0	-42348903	1139362	-931056	524.3	-8462.1	-22749.4	27.21	-3.39	1.90
8720.0	-42342302	1054575	-1158445	796.3	-8495.4	-22729.0	27.20	-3.28	2.19
8730.0	-42332978	969459	-1385622	1068.3	-8527.7	-22705.7	27.19	-3.17	2.48
8740.0	-42320935	884024	-1612553	1340.1	-8558.8	-22679.5	27.17	-3.06	2.76
8750.0	-42306177	798286	-1839205	1611.7	-8588.8	-22650.4	27.15	-2.94	3.05
8760.0	-42288703	712252	-2065551	1883.1	-8617.7	-22618.4	27.13	-2.83	3.34
8770.0	-42268516	625936	-2291563	2154.3	-8645.4	-22583.6	27.10	-2.72	3.63
8780.0	-42245618	539348	-2517213	2425.2	-8672.0	-22545.8	27.08	-2.60	3.92
8790.0	-42220013	452500	-2742471	2695.8	-8697.5	-22505.2	27.04	-2.49	4.20
8800.0	-42191704	365403	-2967308	2966.0	-8721.8	-22461.8	27.01	-2.37	4.49
8810.0	-42160694	278068	-3191696	3235.9	-8744.9	-22415.4	26.97	-2.26	4.77
8820.0	-42126987	190508	-3415607	3505.4	-8766.9	-22366.3	26.93	-2.14	5.06
8830.0	-42090588	102735	-3639012	3774.4	-8787.7	-22314.3	26.88	-2.02	5.34
8840.0	-42051500	14758	-3861883	4043.0	-8807.3	-22259.4	26.83	-1.90	5.63
8850.0	-42009730	-73408	-4084191	4311.0	-8825.8	-22201.7	26.78	-1.79	5.91
8860.0	-41965282	-161753	-4305908	4578.5	-8843.1	-22141.2	26.72	-1.67	6.19
8870.0	-41918161	-250266	-4527006	4845.4	-8859.2	-22077.9	26.66	-1.55	6.47
8880.0	-41868375	-338933	-4747457	5111.7	-8874.1	-22011.8	26.60	-1.43	6.75
8890.0	-41815929	-427743	-4967234	5377.4	-8887.8	-21942.9	26.53	-1.31	7.03
8900.0	-41760830	-516684	-5186307	5642.4	-8900.2	-21871.3	26.46	-1.19	7.31
8910.0	-41703084	-605744	-5404650	5906.6	-8911.5	-21796.8	26.39	-1.07	7.58
8920.0	-41642699	-694910	-5622234	6170.2	-8921.6	-21719.6	26.31	-0.95	7.86
8930.0	-41579683	-784172	-5839033	6432.9	-8930.5	-21639.7	26.23	-0.83	8.13
8940.0	-41514044	-873516	-6055018	6694.8	-8938.1	-21557.0	26.15	-0.70	8.41
8950.0	-41445790	-962931	-6270163	6955.9	-8944.6	-21471.5	26.06	-0.58	8.68
8960.0	-41374930	-1052403	-6484440	7216.1	-8949.8	-21383.4	25.97	-0.46	8.95
8970.0	-41301472	-1141922	-6697822	7475.3	-8953.8	-21292.6	25.88	-0.34	9.22
8980.0	-41225426	-1231474	-6910283	7733.7	-8956.5	-21199.1	25.78	-0.21	9.49
8990.0	-41146802	-1321048	-7121794	7991.0	-8958.0	-21102.8	25.68	-0.09	9.75
9000.0	-41065609	-1410630	-7332331	8247.4	-8958.3	-21004.0	25.58	0.03	10.02
9010.0	-40981858	-1500210	-7541865	8502.6	-8957.3	-20902.5	25.48	0.16	10.28
9020.0	-40895560	-1589773	-7750371	8756.9	-8955.1	-20798.3	25.37	0.28	10.55

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	-40806725	-1679308	-7957823	9010.0	-8951.7	-20691.5	25.25	0.41	10.81
9040.0	-40715365	-1768803	-8164193	9261.9	-8947.0	-20582.1	25.14	0.53	11.07
9050.0	-40621490	-1858245	-8369457	9512.7	-8941.1	-20470.2	25.02	0.65	11.33
9060.0	-40525114	-1947621	-8573588	9762.3	-8933.9	-20355.6	24.90	0.78	11.58
9070.0	-40426248	-2036919	-8776561	10010.7	-8925.5	-20238.5	24.77	0.90	11.84
9080.0	-40324905	-2126127	-8978350	10257.8	-8915.8	-20118.9	24.64	1.03	12.09
9090.0	-40221098	-2215232	-9178930	10503.5	-8904.9	-19996.7	24.51	1.15	12.34
9100.0	-40114839	-2304221	-9378275	10748.0	-8892.7	-19872.0	24.38	1.28	12.59
9110.0	-40006142	-2393083	-9576361	10991.1	-8879.3	-19744.8	24.24	1.40	12.84
9120.0	-39895021	-2481804	-9773163	11232.9	-8864.7	-19615.2	24.10	1.53	13.09
9130.0	-39781490	-2570372	-9968656	11473.2	-8848.7	-19483.0	23.96	1.65	13.33
9140.0	-39665563	-2658774	-10162816	11712.0	-8831.6	-19348.5	23.81	1.78	13.58
9150.0	-39547254	-2746999	-10355618	11949.4	-8813.2	-19211.5	23.66	1.90	13.82
9160.0	-39426419	-2835119	-10547236	12185.7	-8793.5	-19072.0	23.53	2.03	14.05
9170.0	-39303388	-2922951	-10737250	12420.0	-8772.6	-18930.4	23.34	2.15	14.28
9180.0	-39178023	-3010567	-10925835	12652.8	-8750.4	-18786.3	23.19	2.28	14.55
9190.0	-39050337	-3097956	-11112967	12884.1	-8727.0	-18639.8	23.04	2.41	14.78
9200.0	-38920348	-3185104	-11298622	13113.6	-8702.4	-18490.9	22.89	2.52	14.98
9210.0	-38788071	-3271999	-11482779	13341.5	-8676.5	-18339.9	22.75	2.65	15.22
S-IVB SECOND IGNITION (STDV OPEN)									
9216.5	-38700871	-3328340	-11601666	13489.2	-8659.0	-18240.3	22.69	2.74	15.39
9218.0	-38680611	-3341326	-11629012	13526.1	-8656.7	-18221.1	28.39	-0.76	7.67
9220.0	-38653498	-3358644	-11665445	13589.4	-8661.7	-18214.0	32.72	-3.40	1.43
9222.0	-38626253	-3375974	-11701872	13655.0	-8668.9	-18211.6	32.91	-3.73	0.99
9224.0	-38598877	-3393320	-11738296	13721.0	-8676.5	-18209.7	33.11	-3.85	0.89
9226.0	-38571369	-3410680	-11774714	13787.4	-8684.0	-18207.8	33.34	-3.65	1.03
9228.0	-38543728	-3428054	-11811128	13854.4	-8691.1	-18205.6	33.69	-3.40	1.17
9230.0	-38515951	-3445442	-11847537	13922.2	-8697.6	-18203.0	34.17	-3.15	1.40
9232.0	-38488038	-3462843	-11883941	13990.9	-8703.5	-18199.9	34.53	-3.06	1.62
9234.0	-38459987	-3480256	-11920338	14060.0	-8709.7	-18196.6	34.61	-3.11	1.70
9236.0	-38431798	-3497682	-11956729	14129.2	-8715.9	-18193.7	34.54	-3.16	1.64
9238.0	-38403471	-3515120	-11993113	14198.3	-8722.2	-18190.4	34.54	-3.11	1.61
9240.0	-38375005	-3532571	-12029490	14267.5	-8728.4	-18187.1	34.64	-3.06	1.65
9242.0	-38346400	-3550034	-12065861	14336.8	-8734.5	-18183.8	34.70	-3.05	1.71
9244.0	-38317657	-3567509	-12102226	14406.2	-8740.6	-18180.4	34.69	-3.06	1.73
9246.0	-38288776	-3584996	-12138583	14475.6	-8746.7	-18176.9	34.70	-3.03	1.72
9248.0	-38259755	-3602495	-12174933	14545.1	-8752.7	-18173.5	34.74	-2.96	1.73
9250.0	-38230595	-3620007	-12211277	14614.6	-8758.6	-18170.0	34.78	-2.92	1.76
9252.0	-38201296	-3637529	-12247613	14684.2	-8764.4	-18166.4	34.79	-2.91	1.79
9254.0	-38171859	-3655064	-12283942	14753.7	-8770.2	-18162.8	34.80	-2.93	1.80
9256.0	-38142281	-3672610	-12320264	14823.4	-8776.1	-18159.2	34.84	-2.93	1.82

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	-38112565	-3690168	-12356579	14893.1	-8781.9	-18155.5	34.90	-2.91	1.84
9260.0	-38082709	-3707738	-12392887	14962.9	-8787.7	-18151.8	34.93	-2.86	1.89
9262.0	-38052713	-3725319	-12429186	15032.8	-8793.4	-18148.0	34.89	-2.84	1.91
9264.0	-38022578	-3742912	-12465479	15102.6	-8799.1	-18144.3	35.31	-3.04	1.52
9266.0	-37992302	-3760516	-12501764	15173.8	-8805.5	-18141.7	36.08	-3.39	0.73
9268.0	-37961881	-3778134	-12538047	15247.0	-8812.7	-18141.4	36.63	-3.65	0.12
9270.0	-37931314	-3795767	-12574330	15320.3	-8820.1	-18141.2	36.73	-3.67	0.08
9272.0	-37900600	-3813415	-12610612	15393.9	-8827.4	-18141.0	36.85	-3.71	0.01
9274.0	-37869738	-3831077	-12646894	15467.6	-8834.8	-18141.0	36.88	-3.69	0.03
9276.0	-37838729	-3848754	-12683176	15541.4	-8842.2	-18140.9	36.91	-3.67	0.05
9278.0	-37807573	-3866446	-12719458	15615.2	-8849.5	-18140.8	36.93	-3.65	0.07
9280.0	-37776268	-3884152	-12755740	15689.1	-8856.8	-18140.7	36.96	-3.65	0.07
9282.0	-37744816	-3901873	-12792021	15763.1	-8864.1	-18140.5	36.99	-3.65	0.07
9284.0	-37713216	-3919608	-12828302	15837.1	-8871.4	-18140.4	37.05	-3.64	0.08
9286.0	-37681468	-3937358	-12864582	15911.3	-8878.7	-18140.2	37.12	-3.64	0.09
9288.0	-37649571	-3955123	-12900863	15985.5	-8886.0	-18140.0	37.16	-3.64	0.09
9290.0	-37617525	-3972902	-12937143	16059.9	-8893.3	-18139.9	37.18	-3.64	0.09
9292.0	-37585331	-3990696	-12973422	16134.2	-8900.5	-18139.7	37.18	-3.63	0.10
9294.0	-37552988	-4008504	-13009701	16208.6	-8907.8	-18139.5	37.19	-3.63	0.11
9296.0	-37520497	-4026327	-13045980	16283.0	-8915.1	-18139.2	37.22	-3.66	0.11
9298.0	-37487856	-4044165	-13082258	16357.5	-8922.4	-18139.0	37.26	-3.67	0.10
9300.0	-37455067	-4062017	-13118536	16432.0	-8929.7	-18138.8	37.28	-3.67	0.10
9302.0	-37422128	-4079884	-13154814	16506.6	-8937.1	-18138.6	37.30	-3.66	0.10
9304.0	-37389040	-4097765	-13191091	16581.3	-8944.3	-18138.4	37.35	-3.64	0.09
9306.0	-37355803	-4115661	-13227367	16656.0	-8951.6	-18138.3	37.41	-3.63	0.09
9308.0	-37322416	-4133571	-13263644	16730.9	-8958.9	-18138.1	37.44	-3.64	0.11
9310.0	-37288879	-4151497	-13299919	16805.8	-8966.2	-18137.8	37.47	-3.65	0.12
9312.0	-37255193	-4169436	-13336195	16880.7	-8973.5	-18137.6	37.50	-3.66	0.11
9314.0	-37221356	-4187391	-13372470	16955.8	-8980.8	-18137.4	37.54	-3.67	0.10
9316.0	-37187370	-4205360	-13408745	17030.9	-8988.2	-18137.2	37.57	-3.67	0.12
9318.0	-37153233	-4223343	-13445019	17106.0	-8995.5	-18136.9	37.59	-3.68	0.14
9320.0	-37118946	-4241342	-13481292	17181.2	-9002.9	-18136.7	37.62	-3.68	0.13
9322.0	-37084508	-4259355	-13517565	17256.5	-9010.3	-18136.4	37.67	-3.69	0.12
9324.0	-37049919	-4277383	-13553838	17331.9	-9017.7	-18136.1	37.73	-3.70	0.12
9326.0	-37015180	-4295425	-13590110	17407.4	-9025.1	-18135.9	37.79	-3.70	0.12
9328.0	-36980290	-4313483	-13626381	17483.0	-9032.5	-18135.7	37.81	-3.70	0.11
9330.0	-36945248	-4331555	-13662653	17558.7	-9039.9	-18135.5	37.81	-3.72	0.10
9332.0	-36910055	-4349643	-13698923	17634.3	-9047.4	-18135.3	37.85	-3.75	0.10
9334.0	-36874710	-4367745	-13735194	17710.1	-9054.9	-18135.1	37.90	-3.76	0.10
9336.0	-36839215	-4385862	-13771464	17785.9	-9062.4	-18134.9	37.95	-3.77	0.10
9338.0	-36803567	-4403995	-13807733	17861.9	-9070.0	-18134.7	37.99	-3.77	0.09
9340.0	-36767767	-4422142	-13844002	17937.9	-9077.5	-18134.5	38.03	-3.78	0.09
9342.0	-36731815	-4440305	-13880271	18014.0	-9085.0	-18134.3	38.10	-3.77	0.09

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	-36695711	-4458482	-13916540	18090.3	-9092.6	-18134.1	38.15	-3.76	0.09
9346.0	-36659454	-4476675	-13952808	18166.6	-9100.1	-18134.0	38.16	-3.78	0.08
9348.0	-36623044	-4494883	-13989076	18242.9	-9107.7	-18133.8	38.17	-3.81	0.06
9350.0	-36586482	-4513106	-14025343	18319.3	-9115.3	-18133.7	38.21	-3.82	0.04
9352.0	-36549767	-4531344	-14061610	18395.7	-9123.0	-18133.6	38.25	-3.83	0.03
9354.0	-36512899	-4549598	-14097878	18472.3	-9130.6	-18133.6	38.32	-3.84	0.03
9356.0	-36475878	-4567866	-14134145	18549.1	-9138.4	-18133.5	38.42	-3.88	0.03
9358.0	-36438703	-4586151	-14170412	18626.0	-9146.1	-18133.5	38.53	-3.91	0.02
9360.0	-36401374	-4604451	-14206679	18703.1	-9154.0	-18133.5	38.59	-3.92	-0.00
9362.0	-36363890	-4622767	-14242946	18780.3	-9161.8	-18133.5	38.60	-3.92	-0.02
9364.0	-36326252	-4641098	-14279213	18857.5	-9169.6	-18133.5	38.59	-3.92	-0.03
9366.0	-36288460	-4659445	-14315480	18934.7	-9177.5	-18133.6	38.59	-3.93	-0.05
9368.0	-36250514	-4677808	-14351747	19011.9	-9185.3	-18133.7	38.59	-3.93	-0.06
9370.0	-36212413	-4696187	-14388015	19089.0	-9193.2	-18133.8	38.59	-3.93	-0.07
9372.0	-36174157	-4714581	-14424283	19166.2	-9201.1	-18134.0	38.59	-3.94	-0.09
9374.0	-36135748	-4732991	-14460551	19243.4	-9209.0	-18134.2	38.58	-3.94	-0.10
9376.0	-36097184	-4751417	-14496819	19320.6	-9216.8	-18134.4	38.61	-3.95	-0.11
9378.0	-36058466	-4769858	-14533088	19397.9	-9224.8	-18134.6	38.70	-3.99	-0.13
9380.0	-36019592	-4788316	-14569358	19475.4	-9232.8	-18134.9	38.80	-4.02	-0.14
9382.0	-35980564	-4806790	-14605628	19553.0	-9240.9	-18135.2	38.89	-4.03	-0.16
9384.0	-35941380	-4825280	-14641899	19630.9	-9248.9	-18135.5	38.95	-4.03	-0.16
9386.0	-35902040	-4843785	-14678170	19708.9	-9257.0	-18135.8	39.01	-4.05	-0.17
9388.0	-35862545	-4862308	-14714442	19786.9	-9265.1	-18136.2	39.07	-4.08	-0.20
9390.0	-35822892	-4880846	-14750715	19865.2	-9273.3	-18136.6	39.13	-4.11	-0.22
9392.0	-35783084	-4899401	-14786989	19943.5	-9281.6	-18137.1	39.18	-4.13	-0.24
9394.0	-35743119	-4917972	-14823263	20021.9	-9289.8	-18137.6	39.23	-4.13	-0.26
9396.0	-35702996	-4936560	-14859539	20100.4	-9298.1	-18138.1	39.27	-4.14	-0.28
9398.0	-35662717	-4955165	-14895816	20179.0	-9306.4	-18138.7	39.32	-4.16	-0.28
9400.0	-35622280	-4973786	-14932094	20257.7	-9314.8	-18139.3	39.38	-4.19	-0.29
9402.0	-35581686	-4992424	-14968373	20336.5	-9323.2	-18139.9	39.45	-4.21	-0.33
9404.0	-35540934	-5011079	-15004653	20415.4	-9331.6	-18140.6	39.51	-4.23	-0.36
9406.0	-35500024	-5029750	-15040935	20494.5	-9340.1	-18141.3	39.57	-4.24	-0.39
9408.0	-35458956	-5048439	-15077219	20573.7	-9348.6	-18142.1	39.64	-4.26	-0.43
9410.0	-35417729	-5067145	-15113504	20653.1	-9357.1	-18143.0	39.71	-4.28	-0.46
9412.0	-35376344	-5085868	-15149791	20732.6	-9365.7	-18144.0	39.76	-4.30	-0.47
9414.0	-35334799	-5104608	-15186080	20812.1	-9374.3	-18144.9	39.78	-4.33	-0.46
9416.0	-35293095	-5123365	-15222371	20891.7	-9383.0	-18145.8	39.81	-4.36	-0.48
9418.0	-35251232	-5142140	-15258663	20971.4	-9391.7	-18146.8	39.88	-4.37	-0.50
9420.0	-35209210	-5160932	-15294958	21051.2	-9400.5	-18147.9	39.97	-4.39	-0.53
9422.0	-35167027	-5179742	-15331255	21131.2	-9409.3	-18148.9	40.04	-4.42	-0.55
9424.0	-35124685	-5198569	-15367554	21211.4	-9418.2	-18150.1	40.11	-4.45	-0.58
9426.0	-35082181	-5217414	-15403855	21291.7	-9427.1	-18151.3	40.18	-4.47	-0.62
9428.0	-35039518	-5236278	-15440159	21372.1	-9436.1	-18152.6	40.25	-4.51	-0.67

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	-34996693	-5255159	-15476465	21452.7	-9445.1	-18153.9	40.30	-4.54	-0.70
9432.0	-34953707	-5274058	-15512775	21533.3	-9454.2	-18155.3	40.37	-4.55	-0.70
9434.0	-34910559	-5292976	-15549087	21614.2	-9463.3	-18156.7	40.44	-4.54	-0.72
9436.0	-34867250	-5311911	-15585402	21695.1	-9472.4	-18158.2	40.52	-4.55	-0.75
9438.0	-34823779	-5330865	-15621719	21776.2	-9481.6	-18159.8	40.58	-4.59	-0.79
9440.0	-34780145	-5349838	-15658041	21857.4	-9490.8	-18161.4	40.62	-4.63	-0.83
9442.0	-34736349	-5368829	-15694365	21938.7	-9500.1	-18163.1	40.70	-4.66	-0.86
9444.0	-34692390	-5387838	-15730693	22020.2	-9509.4	-18164.8	40.80	-4.69	-0.88
9446.0	-34648268	-5406866	-15767024	22101.9	-9518.8	-18166.6	40.88	-4.72	-0.89
9448.0	-34603982	-5425913	-15803359	22183.8	-9528.3	-18168.4	40.97	-4.76	-0.91
9450.0	-34559533	-5444980	-15839698	22265.8	-9537.9	-18170.3	41.05	-4.78	-0.95
9452.0	-34514919	-5464065	-15876040	22348.0	-9547.4	-18172.2	41.16	-4.79	-1.00
9454.0	-34470141	-5483169	-15912387	22430.4	-9557.0	-18174.3	41.23	-4.81	-1.05
9456.0	-34425198	-5502293	-15948738	22512.9	-9566.7	-18176.4	41.27	-4.85	-1.09
9458.0	-34380089	-5521436	-15985093	22595.5	-9576.4	-18178.6	41.35	-4.88	-1.12
9460.0	-34334815	-5540599	-16021452	22678.3	-9586.2	-18180.9	41.44	-4.91	-1.13
9462.0	-34289376	-5559781	-16057816	22761.3	-9596.1	-18183.1	41.56	-4.93	-1.15
9464.0	-34243770	-5578983	-16094185	22844.6	-9605.9	-18185.5	41.69	-4.95	-1.18
9466.0	-34197997	-5598205	-16130558	22928.0	-9615.9	-18187.9	41.79	-4.98	-1.21
9468.0	-34152058	-5617447	-16166936	23011.7	-9625.9	-18190.3	41.86	-5.02	-1.24
9470.0	-34105951	-5636708	-16203319	23095.4	-9635.9	-18192.8	41.92	-5.05	-1.28
9472.0	-34059676	-5655990	-16239708	23179.4	-9646.1	-18195.4	42.02	-5.09	-1.34
9474.0	-34013233	-5675293	-16276101	23263.6	-9656.3	-18198.2	42.15	-5.12	-1.40
9476.0	-33966621	-5694615	-16312500	23348.0	-9666.6	-18201.0	42.29	-5.16	-1.44
9478.0	-33919841	-5713959	-16348905	23432.7	-9676.9	-18203.9	42.40	-5.20	-1.47
9480.0	-33872890	-5733323	-16385316	23517.6	-9687.3	-18206.9	42.52	-5.24	-1.50
9482.0	-33825770	-5752708	-16421733	23602.8	-9697.9	-18210.0	42.65	-5.29	-1.56
9484.0	-33778479	-5772115	-16458156	23688.2	-9708.5	-18213.1	42.76	-5.33	-1.62
9486.0	-33731017	-5791542	-16494586	23773.8	-9719.2	-18216.4	42.85	-5.34	-1.65
9488.0	-33683384	-5810991	-16531022	23859.6	-9729.8	-18219.7	42.97	-5.35	-1.65
9490.0	-33635578	-5830462	-16567464	23945.7	-9740.6	-18223.0	43.11	-5.36	-1.63
9492.0	-33587601	-5849954	-16603914	24032.1	-9751.3	-18226.3	43.25	-5.40	-1.65
9494.0	-33539450	-5869467	-16640369	24118.7	-9762.2	-18229.6	43.36	-5.45	-1.72
9496.0	-33491126	-5889002	-16676832	24205.5	-9773.1	-18233.1	43.48	-5.51	-1.77
9498.0	-33442627	-5908560	-16713302	24292.7	-9784.2	-18236.7	43.64	-5.57	-1.80
9500.0	-33393955	-5928139	-16749779	24380.1	-9795.4	-18240.3	43.81	-5.60	-1.81
9502.0	-33345107	-5947741	-16786263	24467.8	-9806.6	-18243.9	43.93	-5.60	-1.84
9504.0	-33296083	-5967366	-16822755	24555.8	-9817.8	-18247.6	44.04	-5.62	-1.87
9506.0	-33246883	-5987013	-16859254	24644.0	-9829.1	-18251.4	44.18	-5.65	-1.90
9508.0	-33197507	-6006682	-16895760	24732.6	-9840.4	-18255.2	44.37	-5.71	-1.93
9510.0	-33147953	-6026374	-16932275	24821.5	-9851.9	-18259.1	44.58	-5.74	-1.96
9512.0	-33098221	-6046090	-16968797	24910.8	-9863.4	-18263.1	44.74	-5.76	-1.99
9514.0	-33048309	-6065828	-17005327	25000.4	-9874.9	-18267.1	44.87	-5.79	-2.02

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	-32998219	-6085590	-17041865	25090.4	-9886.6	-18271.1	45.03	-5.83	-2.01
9518.0	-32947948	-6105374	-17078412	25180.6	-9898.3	-18275.1	45.21	-5.87	-2.00
9520.0	-32897496	-6125183	-17114966	25271.2	-9910.0	-18279.1	45.41	-5.92	-2.01
9522.0	-32846863	-6145015	-17151528	25362.2	-9921.9	-18283.2	45.60	-5.95	-2.05
9524.0	-32796047	-6164870	-17188099	25453.6	-9933.9	-18287.3	45.78	-5.98	-2.06
9526.0	-32745048	-6184750	-17224677	25545.3	-9945.8	-18291.4	45.94	-6.00	-2.03
9528.0	-32693865	-6204654	-17261264	25637.3	-9957.9	-18295.5	46.10	-6.03	-2.05
9530.0	-32642498	-6224582	-17297860	25729.8	-9969.9	-18299.6	46.37	-6.04	-1.98
9532.0	-32590946	-6244534	-17334462	25823.1	-9981.9	-18303.1	46.86	-5.97	-1.63
9534.0	-32539205	-6264509	-17371072	25917.3	-9993.8	-18306.0	47.37	-5.87	-1.20
9536.0	-32487276	-6284509	-17407686	26012.4	-10005.5	-18308.2	47.74	-5.83	-1.01
9538.0	-32435156	-6304531	-17444304	26108.0	-10017.2	-18310.3	47.91	-5.90	-1.11
9540.0	-32382844	-6324577	-17480927	26204.0	-10029.1	-18312.7	48.02	-6.01	-1.29
9542.0	-32330339	-6344648	-17517555	26300.1	-10041.2	-18315.4	48.14	-6.08	-1.38
9544.0	-32277643	-6364742	-17554189	26396.5	-10053.4	-18318.3	48.23	-6.13	-1.54
9546.0	-32224753	-6384861	-17590829	26493.1	-10065.7	-18321.5	48.36	-6.21	-1.70
9548.0	-32171670	-6405005	-17627475	26590.0	-10078.2	-18325.1	48.49	-6.32	-1.87
9550.0	-32118393	-6425174	-17664129	26687.0	-10091.0	-18329.0	48.60	-6.42	-2.01
9552.0	-32064922	-6445369	-17700791	26784.3	-10103.9	-18333.2	48.64	-6.50	-2.18
9554.0	-32011256	-6465590	-17737462	26881.7	-10117.0	-18337.6	48.71	-6.57	-2.35
9556.0	-31957395	-6485836	-17774142	26979.2	-10130.2	-18342.6	48.70	-6.63	-2.52
9558.0	-31903338	-6506109	-17810833	27077.3	-10143.5	-18347.8	48.69	-6.69	-2.69
S-IVB SECOND GUIDANCE CUTOFF									
9558.42	-31891960	-6510370	-17818539	27097.3	-10146.3	-18348.5	48.68	-6.71	-2.72
9560.0	-31849123	-6526396	-17847509	27126.9	-10139.7	-18321.8	12.15	6.28	21.15
9562.0	-31794843	-6546664	-17884112	27150.4	-10127.1	-18279.1	12.01	6.28	21.17
9564.0	-31740518	-6566906	-17920628	27174.1	-10114.6	-18236.7	11.86	6.28	21.19
9566.0	-31686147	-6587123	-17957059	27197.5	-10102.0	-18194.2	11.75	6.29	21.25
9568.0	-31631728	-6607314	-17993405	27220.9	-10089.4	-18151.7	11.60	6.30	21.25
TRANSLUNAR INJECTION									
9568.42	-31620294	-6611551	-18001027	27225.7	-10086.8	-18142.8	11.60	6.31	21.27
9600.0	-30754941	-6926901	-18563339	27571.1	-9883.4	-17468.3	10.27	6.57	21.43
9650.0	-29364431	-7412719	-19409940	28031.7	-9546.8	-16395.8	8.16	6.87	21.42
9700.0	-27953505	-7881377	-20203042	28388.4	-9198.0	-15330.8	6.13	7.06	21.13
9750.0	-26527240	-8332415	-20943364	28646.0	-8842.9	-14286.4	4.21	7.13	20.60
9800.0	-25090432	-8765655	-21632219	28811.7	-8486.9	-13273.9	2.45	7.10	19.87
9850.0	-23647463	-9181171	-22271433	28894.0	-8134.7	-12302.0	0.87	6.98	18.99
9900.0	-22202270	-9579247	-22863206	28902.2	-7789.9	-11377.2	-0.51	6.80	18.00
9950.0	-20758319	-9960334	-23410003	28845.8	-7455.5	-10503.6	-1.71	6.57	16.94

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	-19318606	-10325010	-23914458	28734.2	-7133.8	-9683.7	-2.72	6.30	15.85
10050.0	-17885669	-10673950	-24379284	28576.2	-6826.2	-8918.4	-3.57	6.00	14.76
10100.0	-16461628	-11007885	-24807207	28379.7	-6533.8	-8207.4	-4.26	5.69	13.68
10150.0	-15048217	-11327585	-25200913	28152.1	-6256.9	-7549.5	-4.82	5.38	12.64
10200.0	-13646830	-11633832	-25563004	27899.8	-5995.6	-6942.5	-5.26	5.07	11.64
10250.0	-12258561	-11927407	-25895976	27628.2	-5749.9	-6384.2	-5.59	4.76	10.70
10300.0	-10884250	-12209075	-26202194	27342.2	-5519.3	-5871.9	-5.84	4.46	9.80
10350.0	-9524514	-12479578	-26483889	27045.8	-5303.2	-5402.8	-6.01	4.18	8.97
10400.0	-8179787	-12739631	-26743145	26742.4	-5101.1	-4973.9	-6.12	3.91	8.19
10450.0	-6850347	-12989911	-26981907	26434.7	-4912.2	-4582.5	-6.18	3.65	7.47
10500.0	-5536344	-13231062	-27201977	26125.2	-4735.9	-4225.8	-6.20	3.41	6.80
10550.0	-4237823	-13463693	-27405026	25815.7	-4571.3	-3901.2	-6.18	3.18	6.19
10600.0	-2954743	-13688372	-27592595	25507.8	-4417.7	-3606.2	-6.13	2.97	5.62
10650.0	-1686996	-13905637	-27766104	25202.6	-4274.5	-3338.5	-6.07	2.77	5.10
10700.0	-434417	-14115985	-27926864	24901.2	-4141.0	-3095.9	-5.99	2.58	4.62
10750.0	803200	-14319886	-28076078	24604.3	-4016.5	-2876.4	-5.89	2.40	4.17
10800.0	2026095	-14517776	-28214855	24312.4	-3900.4	-2678.1	-5.78	2.24	3.76
10850.0	3234534	-14710060	-28344212	24026.1	-3792.2	-2499.3	-5.67	2.09	3.39
10900.0	4428800	-14897118	-28465086	23745.6	-3691.3	-2338.5	-5.55	1.95	3.05
10950.0	5609190	-15079303	-28578339	23471.1	-3597.2	-2194.2	-5.43	1.82	2.73
11000.0	6776008	-15256945	-28684763	23202.7	-3509.5	-2065.2	-5.30	1.69	2.44
11050.0	7929564	-15430350	-28785088	22940.6	-3427.7	-1950.1	-5.18	1.58	2.17
	CSM SEPARATION								
11099.0	9047461	-15596444	-28878128	22689.8	-3352.8	-1849.8	-5.06	1.48	1.93

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

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 TIMEBASE 6									
8638.6	-3122.014	-50.473	-1662.109	12024.8	-415.2	-22595.9	26.90	0.39	14.32
8640.0	-3119.240	-50.569	-1667.314	12062.4	-414.6	-22575.8	26.88	0.39	14.36
8650.0	-3099.167	-51.248	-1704.350	12330.4	-410.7	-22430.6	26.71	0.40	14.68
8660.0	-3078.655	-51.921	-1741.144	12596.6	-406.6	-22282.2	26.53	0.40	15.00
8670.0	-3057.706	-52.587	-1777.691	12861.0	-402.6	-22130.6	26.35	0.41	15.32
8680.0	-3036.323	-53.246	-1813.987	13123.5	-398.4	-21975.9	26.16	0.42	15.63
8690.0	-3014.509	-53.898	-1850.026	13384.2	-394.2	-21818.0	25.97	0.42	15.94
8700.0	-2992.268	-54.543	-1885.802	13643.0	-390.0	-21657.1	25.78	0.43	16.25
8710.0	-2969.603	-55.182	-1921.310	13899.9	-385.7	-21493.2	25.58	0.43	16.55
8720.0	-2946.518	-55.813	-1956.546	14154.8	-381.3	-21326.1	25.38	0.44	16.86
8730.0	-2923.013	-56.437	-1991.504	14407.6	-376.9	-21156.1	25.18	0.44	17.16
8740.0	-2899.094	-57.053	-2026.181	14658.5	-372.4	-20983.0	24.97	0.45	17.45
8750.0	-2874.765	-57.662	-2060.570	14907.2	-367.9	-20807.0	24.77	0.45	17.75
8760.0	-2850.028	-58.264	-2094.667	15153.8	-363.3	-20628.1	24.55	0.46	18.04
8770.0	-2824.886	-58.858	-2128.468	15398.3	-358.7	-20446.2	24.33	0.46	18.33
8780.0	-2799.344	-59.445	-2161.966	15640.6	-354.0	-20261.4	24.11	0.47	18.62
8790.0	-2773.405	-60.023	-2195.158	15880.7	-349.3	-20073.8	23.89	0.47	18.91
8800.0	-2747.073	-60.594	-2228.039	16118.5	-344.5	-19883.3	23.66	0.48	19.19
8810.0	-2720.351	-61.157	-2260.604	16354.1	-339.7	-19690.0	23.43	0.48	19.47
8820.0	-2693.243	-61.712	-2292.848	16587.3	-334.8	-19493.9	23.20	0.49	19.75
8830.0	-2665.754	-62.259	-2324.768	16818.2	-329.9	-19295.0	22.96	0.49	20.02
8840.0	-2637.886	-62.798	-2356.358	17046.7	-324.9	-19093.4	22.72	0.50	20.30
8850.0	-2609.645	-63.329	-2387.614	17272.8	-319.9	-18889.2	22.48	0.50	20.57
8860.0	-2581.033	-63.851	-2418.532	17496.4	-314.8	-18682.2	22.23	0.51	20.83
8870.0	-2552.055	-64.365	-2449.106	17717.6	-309.7	-18472.6	21.98	0.51	21.09
8880.0	-2522.715	-64.870	-2479.334	17936.2	-304.5	-18260.4	21.73	0.52	21.35
8890.0	-2493.018	-65.367	-2509.210	18152.3	-299.3	-18045.6	21.48	0.52	21.61
8900.0	-2462.967	-65.855	-2538.731	18365.9	-294.1	-17828.2	21.22	0.52	21.87
8910.0	-2432.567	-66.335	-2567.892	18576.8	-288.8	-17608.3	20.96	0.53	22.12
8920.0	-2401.822	-66.806	-2596.689	18785.1	-283.4	-17385.9	20.69	0.53	22.36
8930.0	-2370.736	-67.268	-2625.118	18990.7	-278.1	-17161.1	20.42	0.54	22.61
8940.0	-2339.314	-67.721	-2653.174	19193.7	-272.6	-16933.8	20.15	0.54	22.85
8950.0	-2307.560	-68.165	-2680.855	19393.9	-267.2	-16704.1	19.88	0.54	23.09
8960.0	-2275.479	-68.600	-2708.156	19591.4	-261.7	-16472.1	19.60	0.55	23.32
8970.0	-2243.075	-69.027	-2735.073	19786.1	-256.1	-16237.7	19.32	0.55	23.55
8980.0	-2210.353	-69.444	-2761.603	19978.0	-250.6	-16001.1	19.04	0.56	23.78
8990.0	-2177.317	-69.851	-2787.741	20167.0	-245.0	-15762.1	18.76	0.56	24.01
9000.0	-2143.973	-70.250	-2813.484	20353.3	-239.3	-15521.0	18.47	0.56	24.23
9010.0	-2110.324	-70.639	-2838.828	20536.6	-233.6	-15277.6	18.18	0.57	24.45
9020.0	-2076.377	-71.019	-2863.770	20717.0	-227.9	-15032.1	17.89	0.57	24.66

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	-2042.135	-71.389	-2888.306	20894.5	-222.1	-14784.4	17.59	0.57	24.87
9040.0	-2007.603	-71.750	-2912.433	21069.0	-216.4	-14534.7	17.29	0.58	25.08
9050.0	-1972.786	-72.101	-2936.147	21240.5	-210.5	-14282.9	16.99	0.58	25.28
9060.0	-1937.689	-72.443	-2959.445	21409.1	-204.7	-14029.1	16.69	0.58	25.49
9070.0	-1902.318	-72.775	-2982.324	21574.6	-198.8	-13773.3	16.39	0.59	25.68
9080.0	-1866.677	-73.097	-3004.780	21737.0	-192.9	-13515.5	16.08	0.59	25.88
9090.0	-1830.771	-73.410	-3026.810	21896.4	-186.9	-13255.9	15.77	0.59	26.06
9100.0	-1794.605	-73.712	-3048.411	22052.6	-181.0	-12994.3	15.46	0.59	26.25
9110.0	-1758.185	-74.005	-3069.581	22205.8	-174.9	-12730.9	15.15	0.60	26.43
9120.0	-1721.515	-74.288	-3090.315	22355.8	-168.9	-12465.7	14.83	0.60	26.61
9130.0	-1684.600	-74.561	-3110.612	22502.7	-162.9	-12198.8	14.52	0.60	26.79
9140.0	-1647.447	-74.824	-3130.468	22646.3	-156.8	-11930.1	14.20	0.60	26.96
9150.0	-1610.060	-75.077	-3149.880	22786.8	-150.7	-11659.8	13.88	0.61	27.12
9160.0	-1572.403	-75.320	-3168.861	22924.4	-144.5	-11387.4	13.57	0.61	27.29
9170.0	-1534.563	-75.553	-3187.377	23058.4	-138.4	-11113.9	13.22	0.61	27.42
9180.0	-1496.506	-75.776	-3205.442	23189.2	-132.2	-10838.7	12.88	0.61	27.61
9190.0	-1458.236	-75.988	-3223.053	23316.7	-126.0	-10561.9	12.57	0.61	27.76
9200.0	-1419.759	-76.190	-3240.206	23440.9	-119.8	-10283.7	12.27	0.62	27.90
9210.0	-1381.081	-76.383	-3256.901	23561.8	-113.6	-10004.0	11.94	0.62	28.06
	S-IVB SECOND IGNITION (STDV OPEN)								
9216.5	-1355.834	-76.502	-3267.506	23638.8	-109.6	-9821.1	11.76	0.63	28.20
9218.0	-1349.996	-76.529	-3269.925	23661.3	-108.7	-9780.8	21.19	0.51	24.30
9220.0	-1342.199	-76.564	-3273.137	23714.1	-107.6	-9736.1	28.54	0.57	21.05
9222.0	-1334.384	-76.600	-3276.335	23771.6	-106.6	-9694.3	29.00	0.42	20.73
9224.0	-1326.549	-76.634	-3279.520	23829.8	-105.9	-9652.9	29.23	0.37	20.74
9226.0	-1318.696	-76.669	-3282.690	23888.3	-105.0	-9611.1	29.29	0.52	21.04
9228.0	-1310.823	-76.703	-3285.847	23947.0	-103.7	-9568.6	29.44	0.73	21.43
9230.0	-1302.931	-76.737	-3288.990	24006.1	-102.0	-9525.3	29.66	0.92	21.94
9232.0	-1295.020	-76.770	-3292.118	24065.6	-99.9	-9480.9	29.82	0.96	22.34
9234.0	-1287.088	-76.803	-3295.231	24125.2	-98.0	-9436.1	29.85	0.89	22.46
9236.0	-1279.137	-76.835	-3298.330	24185.1	-96.1	-9391.6	29.82	0.86	22.37
9238.0	-1271.167	-76.866	-3301.414	24244.8	-94.3	-9346.8	29.82	0.92	22.36
9240.0	-1263.177	-76.897	-3304.483	24304.5	-92.4	-9302.0	29.87	0.96	22.48
9242.0	-1255.167	-76.927	-3307.537	24364.3	-90.5	-9257.0	29.87	0.95	22.57
9244.0	-1247.137	-76.956	-3310.577	24424.0	-88.6	-9211.8	29.86	0.93	22.59
9246.0	-1239.088	-76.985	-3313.602	24483.8	-86.7	-9166.6	29.85	0.96	22.60
9248.0	-1231.019	-77.013	-3316.612	24543.5	-84.7	-9121.4	29.85	1.02	22.67
9250.0	-1222.931	-77.041	-3319.606	24603.2	-82.7	-9076.0	29.85	1.05	22.73
9252.0	-1214.823	-77.068	-3322.586	24662.9	-80.5	-9030.5	29.84	1.05	22.77
9254.0	-1206.695	-77.094	-3325.551	24722.6	-78.4	-8984.9	29.83	1.03	22.79
9256.0	-1198.547	-77.119	-3328.501	24782.3	-76.4	-8939.3	29.84	1.03	22.84

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	-1190.380	-77.144	-3331.436	24842.0	-74.3	-8893.6	29.88	1.04	22.91
9260.0	-1182.193	-77.168	-3334.356	24901.8	-72.2	-8847.7	29.86	1.07	22.99
9262.0	-1173.987	-77.192	-3337.261	24961.5	-70.0	-8801.7	29.80	1.08	22.99
9264.0	-1165.761	-77.214	-3340.150	25021.2	-67.9	-8755.8	30.39	1.06	22.88
9266.0	-1157.515	-77.236	-3343.025	25082.8	-65.8	-8710.1	31.50	1.07	22.60
9268.0	-1149.248	-77.258	-3345.885	25147.3	-63.6	-8665.4	32.32	1.08	22.36
9270.0	-1140.960	-77.278	-3348.729	25212.0	-61.4	-8620.7	32.42	1.09	22.39
9272.0	-1132.651	-77.298	-3351.560	25277.0	-59.2	-8575.8	32.55	1.09	22.41
9274.0	-1124.320	-77.317	-3354.375	25342.1	-57.0	-8531.0	32.55	1.10	22.45
9276.0	-1115.968	-77.336	-3357.176	25407.3	-54.8	-8486.0	32.55	1.12	22.50
9278.0	-1107.594	-77.353	-3359.962	25472.4	-52.5	-8441.0	32.55	1.13	22.54
9280.0	-1099.199	-77.370	-3362.733	25537.5	-50.3	-8395.9	32.57	1.13	22.57
9282.0	-1090.782	-77.386	-3365.489	25602.7	-48.0	-8350.7	32.58	1.13	22.61
9284.0	-1082.344	-77.402	-3368.230	25667.9	-45.7	-8305.5	32.62	1.14	22.66
9286.0	-1073.884	-77.416	-3370.956	25733.2	-43.4	-8260.1	32.66	1.14	22.71
9288.0	-1065.403	-77.430	-3373.668	25798.6	-41.2	-8214.7	32.69	1.14	22.75
9290.0	-1056.901	-77.444	-3376.364	25864.0	-38.9	-8169.2	32.70	1.15	22.77
9292.0	-1048.377	-77.456	-3379.046	25929.4	-36.5	-8123.6	32.68	1.16	22.80
9294.0	-1039.831	-77.468	-3381.712	25994.8	-34.2	-8078.0	32.68	1.15	22.82
9296.0	-1031.264	-77.479	-3384.363	26060.2	-31.9	-8032.3	32.71	1.13	22.84
9298.0	-1022.675	-77.489	-3387.000	26125.7	-29.7	-7986.6	32.74	1.12	22.87
9300.0	-1014.065	-77.498	-3389.621	26191.2	-27.4	-7940.9	32.74	1.12	22.89
9302.0	-1005.433	-77.507	-3392.227	26256.7	-25.2	-7895.1	32.75	1.13	22.92
9304.0	-996.780	-77.515	-3394.819	26322.2	-22.9	-7849.2	32.78	1.15	22.95
9306.0	-988.105	-77.522	-3397.395	26387.9	-20.5	-7803.3	32.83	1.17	22.99
9308.0	-979.408	-77.528	-3399.956	26453.5	-18.2	-7757.3	32.84	1.16	23.04
9310.0	-970.690	-77.534	-3402.501	26519.3	-15.9	-7711.2	32.85	1.14	23.07
9312.0	-961.950	-77.539	-3405.032	26585.0	-13.6	-7665.0	32.88	1.14	23.09
9314.0	-953.189	-77.543	-3407.547	26650.8	-11.3	-7618.8	32.90	1.14	23.11
9316.0	-944.406	-77.546	-3410.048	26716.6	-9.1	-7572.5	32.91	1.13	23.16
9318.0	-935.601	-77.549	-3412.533	26782.5	-6.8	-7526.2	32.91	1.11	23.20
9320.0	-926.774	-77.551	-3415.002	26848.3	-4.6	-7479.8	32.94	1.12	23.22
9322.0	-917.926	-77.552	-3417.457	26914.3	-2.3	-7433.3	32.97	1.11	23.25
9324.0	-909.056	-77.552	-3419.896	26980.3	-0.1	-7386.8	33.02	1.11	23.29
9326.0	-900.165	-77.552	-3422.319	27046.4	2.1	-7340.2	33.06	1.11	23.33
9328.0	-891.251	-77.551	-3424.728	27112.6	4.4	-7293.5	33.08	1.12	23.35
9330.0	-882.316	-77.549	-3427.121	27178.7	6.6	-7246.8	33.08	1.10	23.35
9332.0	-873.359	-77.546	-3429.499	27245.0	8.8	-7200.1	33.11	1.08	23.37
9334.0	-864.380	-77.543	-3431.861	27311.3	11.0	-7153.3	33.15	1.07	23.41
9336.0	-855.380	-77.539	-3434.208	27377.6	13.1	-7106.5	33.19	1.07	23.45
9338.0	-846.357	-77.534	-3436.539	27444.0	15.3	-7059.6	33.21	1.07	23.48
9340.0	-837.313	-77.529	-3438.855	27510.5	17.5	-7012.6	33.24	1.07	23.51
9342.0	-828.246	-77.523	-3441.156	27577.1	19.6	-6965.5	33.29	1.08	23.57

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	-819.158	-77.516	-3443.441	27643.7	21.8	-6918.4	33.32	1.09	23.60
9346.0	-810.048	-77.509	-3445.710	27710.4	24.0	-6871.2	33.33	1.08	23.61
9348.0	-800.916	-77.500	-3447.964	27777.1	26.1	-6823.9	33.34	1.06	23.61
9350.0	-791.762	-77.491	-3450.202	27843.8	28.3	-6776.7	33.38	1.06	23.62
9352.0	-782.586	-77.482	-3452.425	27910.6	30.4	-6729.5	33.42	1.06	23.65
9354.0	-773.388	-77.471	-3454.632	27977.5	32.5	-6682.1	33.47	1.05	23.69
9356.0	-764.168	-77.460	-3456.824	28044.6	34.6	-6634.7	33.56	1.03	23.75
9358.0	-754.926	-77.449	-3459.000	28111.8	36.7	-6587.2	33.65	1.01	23.81
9360.0	-745.662	-77.436	-3461.161	28179.2	38.7	-6539.5	33.71	1.01	23.84
9362.0	-736.375	-77.423	-3463.305	28246.6	40.7	-6491.9	33.71	1.02	23.84
9364.0	-727.066	-77.409	-3465.434	28314.1	42.8	-6444.2	33.70	1.02	23.83
9366.0	-717.736	-77.395	-3467.548	28381.5	44.8	-6396.5	33.70	1.02	23.83
9368.0	-708.382	-77.380	-3469.645	28448.9	46.8	-6348.9	33.70	1.02	23.83
9370.0	-699.007	-77.364	-3471.727	28516.4	48.9	-6301.2	33.70	1.02	23.83
9372.0	-689.610	-77.348	-3473.793	28583.8	50.9	-6253.6	33.70	1.02	23.83
9374.0	-680.190	-77.331	-3475.844	28651.2	53.0	-6205.9	33.69	1.02	23.83
9376.0	-670.748	-77.313	-3477.879	28718.6	55.0	-6158.2	33.72	1.01	23.85
9378.0	-661.284	-77.294	-3479.898	28786.2	57.0	-6110.5	33.80	0.99	23.89
9380.0	-651.798	-77.275	-3481.901	28853.9	59.0	-6062.7	33.90	0.97	23.94
9382.0	-642.289	-77.256	-3483.889	28921.8	61.0	-6014.8	33.97	0.98	23.99
9384.0	-632.758	-77.235	-3485.861	28989.8	62.9	-5966.8	34.02	0.98	24.03
9386.0	-623.205	-77.214	-3487.817	29057.9	64.9	-5918.7	34.07	0.97	24.06
9388.0	-613.629	-77.192	-3489.757	29126.1	66.8	-5870.6	34.13	0.96	24.08
9390.0	-604.030	-77.170	-3491.682	29194.5	68.7	-5822.4	34.19	0.94	24.10
9392.0	-594.410	-77.147	-3493.590	29262.9	70.6	-5774.2	34.24	0.94	24.12
9394.0	-584.766	-77.124	-3495.483	29331.5	72.5	-5725.9	34.28	0.94	24.14
9396.0	-575.100	-77.099	-3497.360	29400.1	74.4	-5677.6	34.32	0.94	24.16
9398.0	-565.412	-77.075	-3499.221	29468.8	76.3	-5629.3	34.35	0.93	24.19
9400.0	-555.700	-77.049	-3501.066	29537.6	78.1	-5580.9	34.41	0.91	24.22
9402.0	-545.967	-77.023	-3502.895	29606.5	80.0	-5532.4	34.48	0.91	24.24
9404.0	-536.210	-76.997	-3504.708	29675.5	81.8	-5484.0	34.55	0.91	24.26
9406.0	-526.431	-76.969	-3506.505	29744.7	83.6	-5435.4	34.61	0.91	24.28
9408.0	-516.629	-76.942	-3508.286	29814.0	85.4	-5386.9	34.68	0.91	24.29
9410.0	-506.804	-76.913	-3510.051	29883.5	87.3	-5338.3	34.75	0.91	24.32
9412.0	-496.956	-76.884	-3511.800	29953.0	89.1	-5289.6	34.79	0.90	24.35
9414.0	-487.085	-76.855	-3513.533	30022.7	90.9	-5240.9	34.80	0.87	24.36
9416.0	-477.192	-76.824	-3515.250	30092.3	92.6	-5192.2	34.84	0.85	24.37
9418.0	-467.275	-76.794	-3516.951	30162.1	94.3	-5143.4	34.90	0.85	24.40
9420.0	-457.335	-76.762	-3518.636	30232.0	96.0	-5094.6	34.99	0.85	24.44
9422.0	-447.373	-76.730	-3520.305	30302.1	97.7	-5045.7	35.06	0.84	24.47
9424.0	-437.387	-76.698	-3521.958	30372.3	99.4	-4996.7	35.13	0.82	24.49
9426.0	-427.378	-76.665	-3523.595	30442.6	101.1	-4947.7	35.21	0.82	24.51
9428.0	-417.346	-76.631	-3525.215	30513.1	102.7	-4898.7	35.28	0.81	24.50

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	-407.291	-76.597	-3526.820	30583.8	104.3	-4849.7	35.34	0.79	24.52
9432.0	-397.212	-76.563	-3528.408	30654.5	105.9	-4800.6	35.39	0.79	24.57
9434.0	-387.111	-76.528	-3529.980	30725.4	107.5	-4751.5	35.45	0.81	24.61
9436.0	-376.985	-76.492	-3531.536	30796.4	109.1	-4702.2	35.53	0.82	24.63
9438.0	-366.837	-76.456	-3533.076	30867.6	110.8	-4653.0	35.60	0.80	24.64
9440.0	-356.665	-76.419	-3534.599	30938.8	112.3	-4603.7	35.65	0.77	24.64
9442.0	-346.469	-76.382	-3536.106	31010.3	113.9	-4554.4	35.74	0.77	24.66
9444.0	-336.250	-76.344	-3537.597	31081.8	115.4	-4505.1	35.83	0.76	24.71
9446.0	-326.008	-76.306	-3539.072	31153.6	116.9	-4455.6	35.90	0.73	24.75
9448.0	-315.741	-76.267	-3540.530	31225.5	118.4	-4406.1	35.98	0.72	24.79
9450.0	-305.451	-76.228	-3541.973	31297.6	119.8	-4356.5	36.07	0.71	24.81
9452.0	-295.138	-76.188	-3543.398	31369.8	121.3	-4306.9	36.18	0.73	24.84
9454.0	-284.800	-76.148	-3544.808	31442.3	122.8	-4257.2	36.26	0.74	24.85
9456.0	-274.439	-76.107	-3546.201	31514.9	124.2	-4207.5	36.31	0.72	24.85
9458.0	-264.053	-76.066	-3547.578	31587.6	125.7	-4157.8	36.39	0.70	24.87
9460.0	-253.644	-76.025	-3548.938	31660.5	127.1	-4108.0	36.47	0.68	24.92
9462.0	-243.211	-75.983	-3550.282	31733.6	128.4	-4058.1	36.58	0.69	24.98
9464.0	-232.753	-75.940	-3551.610	31806.8	129.8	-4008.1	36.69	0.69	25.04
9466.0	-222.272	-75.897	-3552.921	31880.3	131.2	-3958.0	36.79	0.67	25.07
9468.0	-211.766	-75.854	-3554.215	31954.0	132.5	-3907.8	36.86	0.66	25.09
9470.0	-201.236	-75.810	-3555.493	32027.8	133.9	-3857.6	36.93	0.64	25.10
9472.0	-190.682	-75.766	-3556.755	32101.8	135.1	-3807.4	37.05	0.64	25.12
9474.0	-180.103	-75.721	-3558.000	32176.1	136.4	-3757.2	37.19	0.64	25.15
9476.0	-169.499	-75.676	-3559.228	32250.6	137.7	-3706.8	37.32	0.63	25.20
9478.0	-158.872	-75.630	-3560.440	32325.4	139.0	-3656.4	37.43	0.61	25.24
9480.0	-148.219	-75.584	-3561.635	32400.4	140.2	-3605.9	37.55	0.60	25.29
9482.0	-137.542	-75.538	-3562.814	32475.7	141.4	-3555.3	37.69	0.58	25.32
9484.0	-126.840	-75.491	-3563.976	32551.2	142.5	-3504.7	37.81	0.58	25.33
9486.0	-116.113	-75.444	-3565.121	32626.9	143.7	-3454.0	37.90	0.58	25.37
9488.0	-105.361	-75.397	-3566.249	32702.8	144.9	-3403.1	37.99	0.58	25.45
9490.0	-94.584	-75.349	-3567.361	32778.9	146.0	-3352.1	38.09	0.57	25.56
9492.0	-83.782	-75.300	-3568.456	32855.3	147.2	-3301.0	38.21	0.55	25.63
9494.0	-72.955	-75.252	-3569.534	32931.8	148.3	-3249.7	38.34	0.54	25.63
9496.0	-62.103	-75.203	-3570.596	33008.7	149.4	-3198.4	38.48	0.52	25.66
9498.0	-51.225	-75.154	-3571.640	33085.8	150.4	-3147.1	38.63	0.48	25.73
9500.0	-40.322	-75.104	-3572.667	33163.2	151.3	-3095.5	38.77	0.47	25.81
9502.0	-29.393	-75.054	-3573.678	33240.9	152.3	-3043.9	38.88	0.48	25.88
9504.0	-18.439	-75.004	-3574.671	33318.8	153.3	-2992.1	38.98	0.49	25.92
9506.0	-7.459	-74.953	-3575.647	33396.9	154.2	-2940.2	39.11	0.48	25.98
9508.0	3.547	-74.902	-3576.607	33475.3	155.2	-2888.1	39.29	0.46	26.07
9510.0	14.579	-74.851	-3577.549	33554.1	156.1	-2835.9	39.47	0.45	26.16
9512.0	25.636	-74.799	-3578.473	33633.2	157.0	-2783.5	39.62	0.46	26.24
9514.0	36.720	-74.747	-3579.381	33712.6	158.0	-2731.0	39.74	0.45	26.31

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	47.830	-74.695	-3580.271	33792.2	158.9	-2678.3	39.87	0.43	26.40
9518.0	58.966	-74.643	-3581.144	33872.1	159.7	-2625.3	40.01	0.39	26.52
9520.0	70.128	-74.590	-3582.000	33952.3	160.5	-2572.2	40.18	0.37	26.63
9522.0	81.317	-74.537	-3582.837	34032.9	161.2	-2518.9	40.36	0.37	26.71
9524.0	92.533	-74.484	-3583.658	34113.8	161.9	-2465.4	40.52	0.36	26.81
9526.0	103.775	-74.431	-3584.460	34194.9	162.7	-2411.6	40.63	0.35	26.93
9528.0	115.044	-74.377	-3585.245	34276.4	163.4	-2357.8	40.77	0.34	27.01
9530.0	126.340	-74.323	-3586.013	34358.1	164.0	-2303.5	40.95	0.33	27.23
9532.0	137.662	-74.269	-3586.762	34440.2	164.7	-2248.4	41.14	0.30	27.82
9534.0	149.012	-74.215	-3587.493	34522.7	165.3	-2192.1	41.31	0.28	28.48
9536.0	160.389	-74.160	-3588.205	34605.5	165.8	-2134.9	41.49	0.28	28.87
9538.0	171.794	-74.106	-3588.898	34688.7	166.4	-2077.1	41.70	0.27	28.88
9540.0	183.225	-74.051	-3589.572	34772.3	166.9	-2019.4	41.89	0.24	28.79
9542.0	194.685	-73.996	-3590.227	34856.3	167.4	-1961.8	42.05	0.21	28.79
9544.0	206.172	-73.941	-3590.864	34940.6	167.8	-1904.3	42.21	0.22	28.72
9546.0	217.687	-73.885	-3591.481	35025.2	168.3	-1846.9	42.40	0.22	28.65
9548.0	229.230	-73.830	-3592.080	35110.3	168.7	-1789.7	42.62	0.19	28.59
9550.0	240.800	-73.774	-3592.659	35195.7	169.0	-1732.6	42.79	0.16	28.53
9552.0	252.399	-73.718	-3593.220	35281.5	169.4	-1675.7	42.93	0.14	28.41
9554.0	264.027	-73.663	-3593.762	35367.5	169.6	-1618.9	43.08	0.14	28.32
9556.0	275.682	-73.607	-3594.286	35453.8	170.0	-1562.4	43.16	0.15	28.18
9558.0	287.367	-73.551	-3594.791	35540.9	170.3	-1505.8	43.24	0.15	28.04
S-IVB SECOND GUIDANCE CUTOFF									
9558.42	289.824	-73.539	-3594.894	35558.4	170.2	-1493.9	43.26	0.15	28.01
9560.0	299.072	-73.494	-3595.277	35567.7	171.5	-1447.9	-2.26	0.65	29.30
9562.0	310.779	-73.438	-3595.744	35562.4	172.6	-1389.4	-2.40	0.63	29.23
9564.0	322.484	-73.381	-3596.192	35557.2	173.8	-1331.1	-2.53	0.61	29.16
9566.0	334.187	-73.323	-3596.620	35551.9	175.0	-1272.9	-2.67	0.58	29.14
9568.0	345.888	-73.266	-3597.030	35546.5	176.2	-1214.7	-2.80	0.57	29.06
TRANSLUNAR INJECTION									
9568.42	348.345	-73.253	-3597.113	35545.3	176.4	-1202.5	-2.81	0.57	29.08
9600.0	532.820	-72.290	-3600.992	35434.5	194.4	-293.2	-4.21	0.55	28.49
9650.0	823.400	-70.577	-3597.621	35172.6	221.5	1102.7	-6.25	0.52	27.31
9700.0	1111.423	-68.648	-3583.022	34814.9	247.0	2433.8	-8.03	0.49	25.90
9750.0	1396.154	-66.518	-3557.772	34374.5	270.5	3689.8	-9.55	0.45	24.32
9800.0	1676.967	-64.202	-3522.520	33865.4	292.0	4864.1	-10.79	0.41	22.64
9850.0	1953.356	-61.717	-3477.954	33301.3	311.6	5952.9	-11.76	0.37	20.91
9900.0	2224.920	-59.079	-3424.786	32695.1	329.2	6955.1	-12.48	0.33	19.19
9950.0	2491.364	-56.305	-3363.722	32058.5	344.9	7872.0	-12.97	0.29	17.50

TABLE C-VI. LAUNCH VEHICLE NAVIGATION POSITIONS, VELOCITIES, AND ACCELERATIONS - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	2752.480	-53.408	-3295.456	31401.9	358.8	8706.2	-13.28	0.26	15.89
10050.0	3008.142	-50.405	-3220.652	30734.2	371.0	9461.8	-13.42	0.22	14.36
10100.0	3258.290	-47.307	-3139.939	30062.8	381.7	10143.4	-13.43	0.20	12.93
10150.0	3502.920	-44.127	-3053.902	29394.0	390.9	10756.3	-13.33	0.17	11.61
10200.0	3742.072	-40.876	-2963.086	28732.4	398.9	11305.9	-13.14	0.14	10.40
10250.0	3975.825	-37.565	-2867.990	28082.0	405.8	11797.4	-12.88	0.12	9.29
10300.0	4204.281	-34.201	-2769.071	27445.6	411.6	12236.0	-12.58	0.10	8.28
10350.0	4427.565	-30.793	-2666.743	26825.3	416.5	12626.6	-12.24	0.09	7.37
10400.0	4645.816	-27.349	-2561.382	26222.5	420.5	12973.9	-11.88	0.07	6.54
10450.0	4859.184	-23.874	-2453.327	25638.4	423.9	13282.1	-11.50	0.06	5.80
10500.0	5067.822	-20.374	-2342.882	25073.3	426.6	13555.1	-11.11	0.05	5.13
10550.0	5271.890	-16.855	-2230.324	24527.5	428.7	13796.5	-10.72	0.04	4.53
10600.0	5471.547	-13.320	-2115.899	24001.0	430.4	14009.5	-10.34	0.03	4.00
10650.0	5666.949	-9.773	-1999.827	23493.6	431.6	14197.0	-9.96	0.02	3.51
10700.0	5858.253	-6.218	-1882.309	23004.8	432.4	14361.6	-9.59	0.01	3.08
10750.0	6045.610	-2.658	-1763.522	22534.3	432.9	14505.7	-9.23	0.01	2.69
10800.0	6229.168	0.905	-1643.627	22081.4	433.1	14631.4	-8.89	0.00	2.34
10850.0	6409.069	4.469	-1522.766	21645.5	433.0	14740.6	-8.55	-0.00	2.03
10900.0	6585.452	8.031	-1401.069	21226.0	432.7	14834.9	-8.23	-0.01	1.75
10950.0	6758.448	11.589	-1278.652	20822.3	432.2	14916.0	-7.92	-0.01	1.50
11000.0	6928.184	15.143	-1155.617	20433.7	431.5	14985.0	-7.62	-0.01	1.27
11050.0	7094.783	18.691	-1032.059	20059.6	430.7	15043.4	-7.34	-0.02	1.07
CSM SEPARATION									
11099.0	7255.114	22.161	-910.546	19706.4	429.8	15091.2	-7.07	-0.02	0.89

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES

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 TIMEBASE 6										
8638.6	3537.248	95.6068	-32.5433	90.02	0.02	24278.4	90.02	0.02	25599.6	587359
8640.0	3537.252	95.7143	-32.5433	89.96	0.02	24278.4	89.96	0.02	25599.6	587385
8650.0	3537.269	96.4821	-32.5402	89.50	0.02	24278.4	89.53	0.02	25599.6	587484
8660.0	3537.286	97.2497	-32.5320	89.04	0.02	24278.3	89.09	0.02	25599.5	587579
8670.0	3537.304	98.0171	-32.5185	88.58	0.02	24278.3	88.65	0.02	25599.4	587670
8680.0	3537.321	98.7843	-32.4999	88.12	0.03	24278.1	88.22	0.02	25599.3	587756
8690.0	3537.339	99.5511	-32.4761	87.66	0.03	24278.0	87.78	0.02	25599.2	587835
8700.0	3537.357	100.3173	-32.4471	87.20	0.03	24278.0	87.35	0.02	25599.1	587912
8710.0	3537.375	101.0830	-32.4129	86.75	0.03	24277.9	86.91	0.02	25599.1	587984
8720.0	3537.393	101.8480	-32.3736	86.29	0.03	24277.9	86.48	0.03	25599.0	588053
8730.0	3537.412	102.6123	-32.3292	85.83	0.03	24277.8	86.05	0.03	25598.9	588116
8740.0	3537.430	103.3758	-32.2796	85.38	0.03	24277.7	85.62	0.03	25598.8	588174
8750.0	3537.449	104.1383	-32.2249	84.92	0.03	24277.7	85.19	0.03	25598.7	588229
8760.0	3537.468	104.8997	-32.1651	84.47	0.03	24277.6	84.76	0.03	25598.6	588279
8770.0	3537.488	105.6601	-32.1002	84.02	0.03	24277.6	84.33	0.03	25598.5	588324
8780.0	3537.507	106.4193	-32.0303	83.57	0.03	24277.6	83.90	0.03	25598.4	588366
8790.0	3537.527	107.1772	-31.9553	83.12	0.03	24277.5	83.48	0.03	25598.3	588402
8800.0	3537.547	107.9337	-31.8753	82.68	0.03	24277.5	83.06	0.03	25598.3	588435
8810.0	3537.567	108.6889	-31.7903	82.23	0.03	24277.5	82.64	0.03	25598.2	588463
8820.0	3537.587	109.4425	-31.7004	81.79	0.03	24277.5	82.22	0.03	25598.1	588487
8830.0	3537.607	110.1945	-31.6055	81.35	0.03	24277.5	81.80	0.03	25598.0	588506
8840.0	3537.628	110.9448	-31.5057	80.91	0.03	24277.5	81.38	0.03	25597.9	588521
8850.0	3537.648	111.6934	-31.4011	80.47	0.03	24277.5	80.97	0.03	25597.9	588532
8860.0	3537.669	112.4402	-31.2915	80.04	0.03	24277.5	80.56	0.03	25597.8	588539
8870.0	3537.690	113.1851	-31.1772	79.61	0.03	24277.5	80.15	0.03	25597.7	588542
8880.0	3537.711	113.9281	-31.0581	79.18	0.03	24277.5	79.74	0.03	25597.7	588540
8890.0	3537.732	114.6690	-30.9343	78.75	0.03	24277.6	79.34	0.03	25597.6	588534
8900.0	3537.753	115.4079	-30.8057	78.33	0.03	24277.6	78.94	0.03	25597.6	588524
8910.0	3537.775	116.1446	-30.6724	77.91	0.03	24277.7	78.54	0.03	25597.5	588510
8920.0	3537.796	116.8792	-30.5346	77.49	0.03	24277.7	78.14	0.03	25597.5	588493
8930.0	3537.818	117.6115	-30.3921	77.07	0.03	24277.8	77.75	0.03	25597.4	588471
8940.0	3537.840	118.3415	-30.2450	76.66	0.03	24277.8	77.36	0.03	25597.4	588446
8950.0	3537.861	119.0692	-30.0935	76.25	0.03	24277.9	76.97	0.03	25597.3	588416
8960.0	3537.883	119.7945	-29.9375	75.84	0.03	24278.0	76.59	0.03	25597.3	588384
8970.0	3537.905	120.5173	-29.7770	75.44	0.03	24278.1	76.21	0.03	25597.2	588347
8980.0	3537.927	121.2376	-29.6121	75.04	0.03	24278.1	75.83	0.03	25597.2	588307
8990.0	3537.950	121.9554	-29.4429	74.64	0.03	24278.2	75.45	0.03	25597.2	588264
9000.0	3537.972	122.6706	-29.2694	74.25	0.03	24278.3	75.08	0.03	25597.1	588217
9010.0	3537.994	123.3833	-29.0916	73.86	0.03	24278.4	74.71	0.03	25597.1	588167
9020.0	3538.017	124.0933	-28.9096	73.47	0.03	24278.5	74.35	0.03	25597.1	588114

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9030.0	3538.039	124.8006	-28.7234	73.09	0.03	24278.6	73.98	0.03	25597.0	588058
9040.0	3538.062	125.5052	-28.5332	72.71	0.03	24278.7	73.63	0.03	25597.0	587999
9050.0	3538.084	126.2071	-28.3388	72.33	0.03	24278.9	73.27	0.03	25597.0	587937
9060.0	3538.107	126.9062	-28.1404	71.96	0.03	24279.0	72.92	0.03	25597.0	587872
9070.0	3538.130	127.6026	-27.9381	71.59	0.03	24279.1	72.57	0.03	25597.0	587805
9080.0	3538.153	128.2961	-27.7318	71.23	0.03	24279.3	72.23	0.03	25596.9	587735
9090.0	3538.176	128.9869	-27.5216	70.87	0.03	24279.4	71.89	0.03	25596.9	587663
9100.0	3538.199	129.6748	-27.3076	70.51	0.03	24279.6	71.55	0.03	25596.9	587588
9110.0	3538.222	130.3599	-27.0898	70.16	0.03	24279.7	71.22	0.03	25597.0	587511
9120.0	3538.245	131.0421	-26.8683	69.81	0.03	24279.9	70.89	0.03	25597.0	587431
9130.0	3538.268	131.7215	-26.6431	69.46	0.03	24280.1	70.56	0.03	25597.0	587350
9140.0	3538.292	132.3980	-26.4143	69.12	0.03	24280.3	70.24	0.03	25597.0	587266
9150.0	3538.315	133.0716	-26.1819	68.78	0.03	24280.5	69.92	0.03	25597.1	587181
9160.0	3538.333	133.7431	-25.9457	68.45	0.03	24280.9	69.61	0.03	25597.3	587063
9170.0	3538.356	134.4109	-25.7063	68.12	0.03	24281.1	69.30	0.03	25597.4	586973
9180.0	3538.380	135.0759	-25.4635	67.80	0.03	24281.4	68.99	0.03	25597.5	586883
9190.0	3538.403	135.7381	-25.2172	67.47	0.03	24281.7	68.69	0.03	25597.6	586790
9200.0	3538.426	136.3973	-24.9677	67.16	0.03	24281.9	68.39	0.03	25597.7	586695
9210.0	3538.449	137.0537	-24.7148	66.84	0.03	24282.3	68.10	0.03	25597.9	586600
	S-IVB SECOND IGNITION (STDV OPEN)									
9216.5	3538.465	137.4789	-24.5488	66.64	0.03	24282.6	67.91	0.03	25598.1	586538
9218.0	3538.468	137.5768	-24.5102	66.60	0.03	24287.9	67.87	0.03	25603.3	586523
9220.0	3538.473	137.7074	-24.4587	66.54	0.03	24319.7	67.81	0.03	25635.1	586503
9222.0	3538.477	137.8381	-24.4070	66.48	0.03	24357.2	67.75	0.03	25672.6	586483
9224.0	3538.482	137.9688	-24.3551	66.42	0.04	24395.5	67.69	0.03	25710.9	586466
9226.0	3538.487	138.0997	-24.3030	66.36	0.04	24434.2	67.63	0.04	25749.5	586449
9228.0	3538.493	138.2306	-24.2507	66.30	0.04	24472.9	67.58	0.04	25788.2	586434
9230.0	3538.498	138.3617	-24.1982	66.24	0.04	24511.7	67.52	0.04	25827.0	586419
9232.0	3538.504	138.4928	-24.1454	66.19	0.04	24550.7	67.47	0.03	25866.0	586403
9234.0	3538.509	138.6240	-24.0925	66.13	0.03	24589.8	67.41	0.03	25905.1	586385
9236.0	3538.513	138.7554	-24.0393	66.07	0.03	24629.5	67.35	0.03	25944.8	586364
9238.0	3538.518	138.8868	-23.9860	66.02	0.03	24669.0	67.30	0.03	25984.3	586342
9240.0	3538.522	139.0183	-23.9325	65.96	0.03	24708.7	67.24	0.03	26023.9	586318
9242.0	3538.526	139.1500	-23.8787	65.90	0.03	24748.5	67.19	0.03	26063.7	586294
9244.0	3538.530	139.2817	-23.8247	65.84	0.03	24788.4	67.13	0.03	26103.6	586270
9246.0	3538.534	139.4135	-23.7706	65.79	0.03	24828.4	67.08	0.03	26143.6	586245
9248.0	3538.538	139.5454	-23.7162	65.73	0.03	24868.5	67.02	0.03	26183.8	586221
9250.0	3538.542	139.6775	-23.6616	65.68	0.03	24908.8	66.97	0.03	26224.0	586198
9252.0	3538.547	139.8096	-23.6068	65.62	0.03	24949.1	66.91	0.03	26264.3	586175
9254.0	3538.552	139.9418	-23.5519	65.56	0.03	24989.6	66.86	0.03	26304.8	586155
9256.0	3538.557	140.0741	-23.4967	65.51	0.04	25030.2	66.81	0.04	26345.4	586137

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9258.0	3538.562	140.2066	-23.4412	65.45	0.04	25070.8	66.75	0.04	26386.1	586121
9260.0	3538.568	140.3391	-23.3856	65.40	0.04	25111.8	66.70	0.04	26427.0	586108
9262.0	3538.575	140.4717	-23.3298	65.34	0.05	25152.7	66.64	0.05	26467.9	586098
9264.0	3538.582	140.6045	-23.2738	65.29	0.05	25193.8	66.59	0.05	26509.0	586093
9266.0	3538.590	140.7373	-23.2175	65.23	0.06	25236.9	66.54	0.05	26552.1	586091
9268.0	3538.599	140.8703	-23.1611	65.18	0.06	25283.3	66.48	0.06	26598.5	586094
9270.0	3538.609	141.0033	-23.1044	65.12	0.07	25330.0	66.43	0.07	26645.2	586101
9272.0	3538.619	141.1366	-23.0475	65.07	0.07	25377.0	66.37	0.07	26692.2	586114
9274.0	3538.630	141.2699	-22.9904	65.01	0.08	25424.3	66.32	0.08	26739.6	586133
9276.0	3538.643	141.4034	-22.9330	64.96	0.09	25471.8	66.27	0.08	26787.0	586158
9278.0	3538.656	141.5370	-22.8755	64.91	0.10	25519.4	66.21	0.09	26834.6	586190
9280.0	3538.671	141.6708	-22.8177	64.85	0.11	25567.1	66.16	0.10	26882.3	586229
9282.0	3538.687	141.8046	-22.7597	64.80	0.11	25615.0	66.11	0.11	26930.2	586276
9284.0	3538.705	141.9387	-22.7014	64.74	0.12	25663.0	66.06	0.12	26978.2	586332
9286.0	3538.724	142.0728	-22.6430	64.69	0.13	25711.2	66.00	0.13	27026.5	586397
9288.0	3538.745	142.2071	-22.5843	64.64	0.15	25759.6	65.95	0.14	27074.9	586471
9290.0	3538.767	142.3415	-22.5253	64.58	0.16	25808.2	65.90	0.15	27123.5	586555
9292.0	3538.791	142.4761	-22.4662	64.53	0.17	25856.9	65.84	0.16	27172.2	586650
9294.0	3538.817	142.6108	-22.4068	64.48	0.18	25905.7	65.79	0.17	27221.0	586757
9296.0	3538.845	142.7456	-22.3472	64.42	0.19	25954.7	65.74	0.19	27270.0	586875
9298.0	3538.875	142.8806	-22.2874	64.37	0.21	26003.9	65.69	0.20	27319.2	587006
9300.0	3538.907	143.0157	-22.2273	64.32	0.22	26053.2	65.63	0.21	27368.5	587150
9302.0	3538.942	143.1509	-22.1671	64.26	0.24	26102.7	65.58	0.23	27418.0	587309
9304.0	3538.979	143.2863	-22.1065	64.21	0.25	26152.3	65.53	0.24	27467.6	587482
9306.0	3539.018	143.4218	-22.0458	64.16	0.27	26202.1	65.48	0.26	27517.5	587670
9308.0	3539.061	143.5574	-21.9848	64.11	0.29	26252.1	65.43	0.27	27567.5	587873
9310.0	3539.105	143.6932	-21.9236	64.05	0.31	26302.2	65.37	0.29	27617.6	588093
9312.0	3539.153	143.8291	-21.8622	64.00	0.32	26352.5	65.32	0.31	27667.9	588330
9314.0	3539.203	143.9652	-21.8005	63.95	0.34	26403.0	65.27	0.33	27718.4	588585
9316.0	3539.257	144.1014	-21.7386	63.90	0.36	26453.6	65.22	0.35	27769.1	588858
9318.0	3539.314	144.2377	-21.6765	63.84	0.38	26504.4	65.17	0.36	27819.9	589149
9320.0	3539.373	144.3742	-21.6141	63.79	0.40	26555.3	65.12	0.38	27870.8	589461
9322.0	3539.437	144.5108	-21.5515	63.74	0.42	26606.4	65.06	0.40	27921.9	589792
9324.0	3539.503	144.6476	-21.4886	63.69	0.45	26657.7	65.01	0.43	27973.2	590144
9326.0	3539.574	144.7845	-21.4256	63.64	0.47	26709.2	64.96	0.45	28024.7	590518
9328.0	3539.647	144.9215	-21.3623	63.58	0.49	26760.9	64.91	0.47	28076.4	590914
9330.0	3539.725	145.0587	-21.2987	63.53	0.52	26812.7	64.86	0.49	28128.3	591332
9332.0	3539.806	145.1961	-21.2349	63.48	0.54	26864.7	64.81	0.52	28180.3	591774
9334.0	3539.892	145.3335	-21.1709	63.43	0.57	26916.9	64.76	0.54	28232.5	592240
9336.0	3539.981	145.4711	-21.1066	63.38	0.59	26969.3	64.71	0.56	28284.9	592732
9338.0	3540.075	145.6089	-21.0421	63.33	0.62	27021.8	64.65	0.59	28337.5	593248
9340.0	3540.173	145.7468	-20.9774	63.27	0.65	27074.5	64.60	0.62	28390.2	593791
9342.0	3540.276	145.8848	-20.9124	63.22	0.67	27127.4	64.55	0.64	28443.1	594361

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9344.0	3540.383	146.0230	-20.8472	63.17	0.70	27180.5	64.50	0.67	28496.3	594959
9346.0	3540.495	146.1613	-20.7817	63.12	0.73	27233.8	64.45	0.70	28549.6	595584
9348.0	3540.611	146.2997	-20.7160	63.07	0.76	27287.2	64.40	0.72	28603.0	596239
9350.0	3540.733	146.4383	-20.6501	63.02	0.79	27340.8	64.35	0.75	28656.6	596923
9352.0	3540.859	146.5771	-20.5839	62.97	0.82	27394.5	64.30	0.78	28710.4	597638
9354.0	3540.991	146.7160	-20.5175	62.92	0.85	27448.5	64.25	0.81	28764.5	598384
9356.0	3541.128	146.8550	-20.4508	62.87	0.88	27502.8	64.20	0.84	28818.7	599162
9358.0	3541.270	146.9942	-20.3839	62.82	0.92	27557.3	64.15	0.87	28873.3	599973
9360.0	3541.418	147.1335	-20.3167	62.77	0.95	27612.0	64.10	0.91	28928.1	600817
9362.0	3541.571	147.2730	-20.2493	62.72	0.98	27667.0	64.05	0.94	28983.1	601694
9364.0	3541.730	147.4126	-20.1817	62.66	1.02	27722.1	64.00	0.97	29038.2	602607
9366.0	3541.895	147.5524	-20.1138	62.61	1.05	27777.3	63.95	1.00	29093.4	603555
9368.0	3542.066	147.6923	-20.0456	62.56	1.09	27832.6	63.90	1.04	29148.8	604539
9370.0	3542.243	147.8323	-19.9772	62.51	1.12	27888.0	63.85	1.07	29204.3	605561
9372.0	3542.426	147.9725	-19.9086	62.46	1.16	27943.6	63.80	1.11	29259.9	606621
9374.0	3542.616	148.1129	-19.8397	62.42	1.20	27999.3	63.75	1.15	29315.6	607720
9376.0	3542.813	148.2534	-19.7706	62.37	1.24	28055.1	63.70	1.18	29371.5	608860
9378.0	3543.016	148.3940	-19.7012	62.32	1.28	28111.2	63.65	1.22	29427.6	610040
9380.0	3543.226	148.5348	-19.6316	62.27	1.32	28167.5	63.60	1.26	29484.0	611262
9382.0	3543.443	148.6757	-19.5617	62.22	1.36	28224.1	63.56	1.30	29540.7	612526
9384.0	3543.667	148.8168	-19.4916	62.17	1.40	28280.9	63.51	1.34	29597.5	613834
9386.0	3543.898	148.9580	-19.4212	62.12	1.44	28338.0	63.46	1.38	29654.6	615185
9388.0	3544.137	149.0994	-19.3506	62.07	1.49	28395.2	63.41	1.42	29711.9	616580
9390.0	3544.383	149.2409	-19.2797	62.02	1.53	28452.7	63.36	1.46	29769.5	618021
9392.0	3544.637	149.3826	-19.2086	61.97	1.57	28510.4	63.31	1.50	29827.2	619508
9394.0	3544.898	149.5244	-19.1372	61.92	1.62	28568.3	63.26	1.55	29885.2	621041
9396.0	3545.167	149.6663	-19.0656	61.87	1.66	28626.4	63.21	1.59	29943.4	622623
9398.0	3545.445	149.8084	-18.9937	61.83	1.71	28684.7	63.17	1.63	30001.7	624253
9400.0	3545.730	149.9507	-18.9215	61.78	1.75	28743.2	63.12	1.68	30060.3	625933
9402.0	3546.024	150.0931	-18.8492	61.73	1.80	28801.9	63.07	1.72	30119.1	627663
9404.0	3546.326	150.2357	-18.7765	61.68	1.85	28860.9	63.02	1.77	30178.1	629445
9406.0	3546.636	150.3784	-18.7036	61.63	1.90	28920.1	62.97	1.81	30237.4	631278
9408.0	3546.956	150.5212	-18.6305	61.59	1.95	28979.5	62.93	1.86	30296.9	633164
9410.0	3547.284	150.6643	-18.5571	61.54	1.99	29039.2	62.88	1.91	30356.7	635104
9412.0	3547.621	150.8074	-18.4834	61.49	2.05	29099.1	62.83	1.96	30416.6	637099
9414.0	3547.968	150.9507	-18.4095	61.44	2.10	29159.2	62.78	2.01	30476.8	639149
9416.0	3548.323	151.0942	-18.3353	61.39	2.15	29219.4	62.74	2.05	30537.1	641256
9418.0	3548.689	151.2378	-18.2609	61.35	2.20	29279.9	62.69	2.10	30597.6	643420
9420.0	3549.063	151.3816	-18.1862	61.30	2.25	29340.6	62.64	2.16	30658.4	645642
9422.0	3549.448	151.5255	-18.1112	61.25	2.31	29401.5	62.59	2.21	30719.4	647923
9424.0	3549.842	151.6695	-18.0360	61.21	2.36	29462.7	62.55	2.26	30780.7	650264
9426.0	3550.246	151.8138	-17.9606	61.16	2.41	29524.1	62.50	2.31	30842.2	652667
9428.0	3550.661	151.9581	-17.8849	61.11	2.47	29585.9	62.45	2.36	30904.0	655131

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9430.0	3551.086	152.1026	-17.8089	61.07	2.53	29647.8	62.41	2.42	30966.1	657658
9432.0	3551.521	152.2473	-17.7327	61.02	2.58	29710.0	62.36	2.47	31028.4	660248
9434.0	3551.967	152.3921	-17.6562	60.97	2.64	29772.4	62.31	2.53	31090.8	662903
9436.0	3552.424	152.5371	-17.5794	60.93	2.70	29835.0	62.27	2.58	31153.5	665624
9438.0	3552.891	152.6822	-17.5024	60.88	2.76	29897.8	62.22	2.64	31216.5	668411
9440.0	3553.370	152.8275	-17.4251	60.83	2.82	29960.9	62.18	2.70	31279.7	671266
9442.0	3553.860	152.9730	-17.3476	60.79	2.88	30024.3	62.13	2.75	31343.1	674189
9444.0	3554.362	153.1185	-17.2698	60.74	2.94	30087.9	62.08	2.81	31406.8	677182
9446.0	3554.875	153.2643	-17.1917	60.70	3.00	30151.7	62.04	2.87	31470.8	680244
9448.0	3555.399	153.4102	-17.1134	60.65	3.06	30215.9	61.99	2.93	31535.0	683378
9450.0	3555.936	153.5562	-17.0349	60.61	3.12	30280.3	61.95	2.99	31599.6	686585
9452.0	3556.485	153.7024	-16.9560	60.56	3.18	30345.0	61.90	3.05	31664.3	689864
9454.0	3557.045	153.8488	-16.8769	60.52	3.25	30409.9	61.86	3.11	31729.4	693217
9456.0	3557.619	153.9953	-16.7976	60.47	3.31	30475.1	61.81	3.17	31794.8	696646
9458.0	3558.204	154.1420	-16.7179	60.43	3.38	30540.6	61.77	3.24	31860.3	700150
9460.0	3558.803	154.2888	-16.6380	60.38	3.44	30606.3	61.72	3.30	31926.1	703732
9462.0	3559.414	154.4357	-16.5579	60.34	3.51	30672.3	61.68	3.36	31992.2	707392
9464.0	3560.038	154.5829	-16.4775	60.29	3.57	30738.6	61.63	3.43	32058.6	711131
9466.0	3560.675	154.7302	-16.3968	60.25	3.64	30805.2	61.59	3.49	32125.4	714950
9468.0	3561.326	154.8776	-16.3159	60.20	3.71	30872.0	61.55	3.56	32192.4	718850
9470.0	3561.990	155.0252	-16.2347	60.16	3.78	30939.1	61.50	3.62	32259.6	722832
9472.0	3562.668	155.1729	-16.1532	60.12	3.85	31006.5	61.46	3.69	32327.1	726896
9474.0	3563.360	155.3208	-16.0715	60.07	3.92	31074.3	61.41	3.76	32395.0	731045
9476.0	3564.065	155.4689	-15.9895	60.03	3.99	31142.4	61.37	3.82	32463.2	735279
9478.0	3564.785	155.6171	-15.9072	59.98	4.06	31210.8	61.33	3.89	32531.8	739599
9480.0	3565.519	155.7655	-15.8247	59.94	4.13	31279.6	61.28	3.96	32600.7	744006
9482.0	3566.268	155.9140	-15.7419	59.90	4.20	31348.7	61.24	4.03	32670.0	748501
9484.0	3567.031	156.0627	-15.6589	59.86	4.27	31418.2	61.20	4.10	32739.6	753085
9486.0	3567.809	156.2116	-15.5755	59.81	4.35	31488.0	61.15	4.17	32809.6	757759
9488.0	3568.602	156.3606	-15.4920	59.77	4.42	31558.1	61.11	4.24	32879.8	762525
9490.0	3569.410	156.5097	-15.4081	59.73	4.49	31628.4	61.07	4.31	32950.2	767383
9492.0	3570.234	156.6591	-15.3240	59.68	4.57	31699.0	61.03	4.39	33021.0	772334
9494.0	3571.073	156.8085	-15.2396	59.64	4.64	31770.0	60.98	4.46	33092.1	777379
9496.0	3571.927	156.9582	-15.1549	59.60	4.72	31841.3	60.94	4.53	33163.6	782518
9498.0	3572.798	157.1080	-15.0700	59.56	4.80	31913.0	60.90	4.61	33235.5	787754
9500.0	3573.684	157.2579	-14.9848	59.52	4.87	31985.1	60.86	4.68	33307.7	793088
9502.0	3574.587	157.4081	-14.8994	59.47	4.95	32057.5	60.81	4.75	33380.3	798519
9504.0	3575.505	157.5583	-14.8137	59.43	5.03	32130.3	60.77	4.83	33453.2	804050
9506.0	3576.441	157.7088	-14.7277	59.39	5.11	32203.3	60.73	4.90	33526.4	809680
9508.0	3577.393	157.8594	-14.6414	59.35	5.19	32276.8	60.69	4.98	33600.0	815412
9510.0	3578.361	158.0101	-14.5549	59.31	5.27	32350.6	60.65	5.06	33674.1	821246
9512.0	3579.347	158.1611	-14.4681	59.27	5.34	32424.9	60.61	5.13	33748.5	827184
9514.0	3580.350	158.3121	-14.3811	59.23	5.43	32499.6	60.57	5.21	33823.4	833225

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
9516.0	3581.370	158.4634	-14.2937	59.19	5.51	32574.6	60.53	5.29	33898.6	839372
9518.0	3582.407	158.6148	-14.2062	59.15	5.59	32649.9	60.48	5.37	33974.1	845624
9520.0	3583.462	158.7664	-14.1183	59.11	5.67	32725.7	60.44	5.45	34050.0	851984
9522.0	3584.535	158.9181	-14.0302	59.07	5.75	32801.9	60.40	5.53	34126.4	858451
9524.0	3585.626	159.0700	-13.9418	59.03	5.83	32878.5	60.36	5.61	34203.1	865028
9526.0	3586.735	159.2221	-13.8531	58.99	5.91	32955.4	60.32	5.69	34280.3	871714
9528.0	3587.862	159.3743	-13.7642	58.95	6.00	33032.7	60.28	5.77	34357.8	878511
9530.0	3589.007	159.5267	-13.6750	58.91	6.08	33110.4	60.24	5.85	34435.6	885420
9532.0	3590.171	159.6793	-13.5855	58.87	6.16	33188.5	60.20	5.93	34513.9	892440
9534.0	3591.353	159.8320	-13.4957	58.83	6.24	33266.9	60.16	6.00	34592.6	899573
9536.0	3592.553	159.9849	-13.4057	58.79	6.33	33345.8	60.13	6.08	34671.7	906815
9538.0	3593.771	160.1380	-13.3154	58.75	6.41	33425.2	60.09	6.16	34751.2	914168
9540.0	3595.008	160.2912	-13.2249	58.71	6.49	33505.0	60.05	6.24	34831.3	921632
9542.0	3596.263	160.4446	-13.1340	58.68	6.57	33585.3	60.01	6.32	34911.9	929209
9544.0	3597.537	160.5981	-13.0429	58.64	6.65	33666.1	59.97	6.40	34992.8	936902
9546.0	3598.831	160.7519	-12.9516	58.60	6.74	33747.3	59.93	6.48	35074.3	944710
9548.0	3600.143	160.9058	-12.8599	58.56	6.82	33829.1	59.89	6.56	35156.2	952637
9550.0	3601.476	161.0599	-12.7680	58.52	6.91	33911.3	59.85	6.65	35238.7	960684
9552.0	3602.828	161.2141	-12.6758	58.49	6.99	33994.1	59.82	6.73	35321.7	968853
9554.0	3604.201	161.3685	-12.5834	58.45	7.08	34077.1	59.78	6.82	35404.9	977145
9556.0	3605.594	161.5231	-12.4907	58.41	7.17	34160.6	59.74	6.90	35488.6	985563
9558.0	3607.008	161.6779	-12.3977	58.38	7.26	34244.9	59.70	6.99	35573.2	994108
S-IVB 2ND BURN ENGINE CUTOFF (ENGINE SOLENOID)										
9558.42	3607.308	161.7104	-12.3781	58.37	7.28	34261.9	59.70	7.01	35590.2	995918
9560.0	3608.443	161.8327	-12.3045	58.34	7.35	34269.1	59.67	7.08	35597.6	1002777
9562.0	3609.896	161.9873	-12.2112	58.30	7.45	34261.2	59.63	7.17	35589.9	1011559
9564.0	3611.367	162.1417	-12.1179	58.26	7.54	34253.6	59.60	7.26	35582.6	1020451
9566.0	3612.857	162.2958	-12.0246	58.23	7.64	34246.0	59.57	7.35	35575.2	1029453
9568.0	3614.364	162.4497	-11.9313	58.19	7.73	34238.2	59.53	7.44	35567.7	1038566
TRANSLUNAR INJECTION										
9568.42	3614.683	162.4820	-11.9117	58.18	7.75	34236.6	59.52	7.46	35566.1	1040493
9600.0	3640.916	164.8780	-10.4377	57.64	9.23	34102.6	59.03	8.88	35436.3	1199196
9650.0	3691.320	168.5433	-8.1138	56.94	11.53	33848.7	58.41	11.09	35190.5	1504552
9700.0	3752.068	172.0507	-5.8241	56.41	13.77	33549.0	57.96	13.22	34900.7	1872986
9750.0	3822.488	175.4016	-3.5900	56.04	15.93	33209.8	57.66	15.29	34573.0	2300411
9800.0	3901.857	178.5991	-1.4286	55.81	18.02	32838.1	57.51	17.27	34214.2	2782434
9850.0	3989.433	-178.3523	0.6471	55.71	20.03	32440.3	57.49	19.17	33830.6	3314522
9900.0	4084.473	-175.4470	2.6281	55.71	21.96	32022.8	57.58	20.99	33428.3	3892136
9950.0	4186.250	-172.6792	4.5087	55.81	23.80	31591.0	57.77	22.72	33012.6	4510836

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN AND TRANSLUNAR PHASES (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
10000.0	4294.070	-170.0425	6.2861	55.99	25.57	31150.0	58.03	24.36	32588.4	5166367
10050.0	4407.274	-167.5308	7.9602	56.24	27.25	30704.0	58.37	25.92	32159.8	5854715
10100.0	4525.252	-165.1377	9.5321	56.55	28.86	30256.6	58.77	27.40	31730.3	6572145
10150.0	4647.441	-162.8570	11.0049	56.91	30.40	29810.8	59.21	28.81	31302.7	7315216
10200.0	4773.327	-160.6829	12.3821	57.30	31.86	29369.1	59.70	30.14	30879.3	8080788
10250.0	4902.444	-158.6097	13.6684	57.73	33.26	28933.3	60.21	31.40	30462.1	8866013
10300.0	5034.372	-156.6319	14.8685	58.18	34.60	28505.1	60.75	32.59	30052.4	9668326
10350.0	5168.733	-154.7445	15.9874	58.65	35.88	28085.4	61.31	33.72	29651.3	10485423
10400.0	5305.189	-152.9425	17.0302	59.13	37.11	27675.2	61.88	34.80	29259.6	11315247
10450.0	5443.441	-151.2214	18.0019	59.62	38.28	27275.0	62.46	35.82	28877.7	12155964
10500.0	5583.219	-149.5768	18.9072	60.12	39.41	26885.2	63.05	36.78	28506.0	13005942
10550.0	5724.287	-148.0046	19.7509	60.63	40.49	26506.0	63.64	37.70	28144.8	13863732
10600.0	5866.432	-146.5011	20.5374	61.13	41.54	26137.5	64.23	38.58	27793.9	14728050
10650.0	6009.469	-145.0626	21.2707	61.63	42.54	25779.6	64.82	39.41	27453.4	15597758
10700.0	6153.231	-143.6856	21.9548	62.13	43.51	25432.3	65.40	40.20	27123.1	16471850
10750.0	6297.572	-142.3671	22.5932	62.63	44.44	25095.3	65.98	40.96	26802.9	17349434
10800.0	6442.363	-141.1041	23.1894	63.12	45.34	24768.5	66.56	41.68	26492.5	18229724
10850.0	6587.489	-139.8936	23.7465	63.60	46.21	24451.6	67.12	42.37	26191.6	19112023
10900.0	6732.847	-138.7331	24.2672	64.08	47.06	24144.3	67.68	43.03	25899.9	19995716
10950.0	6878.350	-137.6201	24.7544	64.55	47.88	23846.3	68.23	43.67	25617.2	20880259
11000.0	7023.917	-136.5522	25.2103	65.01	48.67	23557.3	68.77	44.27	25343.1	21765172
11050.0	7169.480	-135.5273	25.6374	65.46	49.45	23277.1	69.30	44.85	25077.4	22650032
	CSM SEPARATION									
11099.0	7312.063	-134.5625	26.0299	65.90	50.19	23010.6	69.81	45.40	24824.8	23516759

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