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SATURN S-IB STAGE AND SATURN IB PROGRAM

SPACE DIVISION CHRYSLER CORPORATION

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SATURN AS-202 POSTFLIGHT TRAJECTORY

OCTOBER 1966

AEROSPACE PHYSICS BRANCH
CHRYSLER CORPORATION SPACE DIVISION

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ABSTRACT

The third Saturn IB vehicle, AS-202, was launched from KSC pad 34 at 12:15:32 EST on August 25, 1966. This report presents the AS-202 postflight trajectory from guidance reference release (approximately 5 sec prior to vehicle first motion) to S-IVB/CSM separation. The trajectory is presented in the earth-fixed plumbline, space-fixed ephemeris, and geographic coordinate systems. A complete time history of trajectory parameters is given, in tabular form, at 1 sec intervals through S-IB powered flight and 5 sec intervals through S-IVB powered flight to S-IVB/CSM separation. Also included are tabulations of the S-IB and S-IVB stages ballistic trajectories. Some special trajectory dependent parameters are presented in graphic form.

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SUMMARY

This report presents the AS-202 postflight trajectory. The powered flight trajectory was established from the data provided by external electrical tracking systems and the onboard telemetry system. External tracking data were available from ODOP, GLOTRAC Station I, GLOTRAC, and C-Band radar tracking systems. The onboard data consisted of telemetered guidance information obtained from the ST-124M platform. The ODOP and GLOTRAC Station I data were used to construct the S-IB portion of the powered flight trajectory. Telemetered guidance information, reduced to inertial velocities, was used in conjunction with C-Band radar tracking data to produce a best estimate trajectory for the S-IVB powered flight. The trajectory is presented from guidance reference release (4.468 sec prior to the established Range Zero time of 12:15:32 EST) to S-IVB/CSM separation (598.7 sec after Range Zero). An error analysis of the trajectory is included. Tables and figures present the data in both the metric and English units of measure.

1.0 INTRODUCTION

The AS-202 vehicle was launched from KSC on August 25, 1966, at 12:15:32 EST. After approximately 9 min and 48 sec of powered flight and 10 sec of free flight the S-IVB stage and Apollo spacecraft separated. After separation the Apollo spacecraft was put through a series of tests.

The AS-202 vehicle was the third flight test of the Saturn IB series and the thirteenth of the Saturn family of vehicles. This was the second flight test of the Apollo spacecraft.

This report presents the postflight mass point reference trajectory and associated information from guidance reference release to S-IVB/CSM separation, in Tables VI through XI. Also presented are detailed discussions of data sources and their utilization, an error analysis along with the estimated uncertainty of the trajectory, and free flight trajectories for the S-IB and S-IVB stages. Several trajectory dependent illustrations are included. A few points from the spacecraft trajectory as determined by MSC are included in Appendix A.

Times listed in this report are referenced to Range Zero (12:15:32 EST) unless otherwise specified. The times of guidance reference release and first motion were defined as 4.468 sec before and 0.73 sec after Range Zero, respectively.

Acknowledgement is given to the Dynamics Programming Unit of CCSD Computer Services for their invaluable assistance in processing the data presented in this report.

2.0 COORDINATE SYSTEMS AND TRAJECTORY PARAMETERS

The translational motion of the vehicle's center of gravity is tabulated in three coordinate systems: earth-fixed plumbline, space-fixed ephemeris, and geographic. An initial displacement of 32.0 m (105.0 ft) locates the center of gravity of the vehicle in the earth-fixed plumbline system whose origin is located on the reference earth model. The above coordinate systems are defined in Appendix A and graphically illustrated in Figure 3.

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

The geographic coordinates and gravity data for launch pad 34 at Cape Kennedy are:

Geodetic Latitude	28.521963 deg N
Longitude	80.561141 deg W
Acceleration of Gravity	9.818 m/s^2 (32.21 ft/s^2)

Elevations above the reference ellipsoid are:

Base of Launch Pedestal	5.7 m (18.7 ft)
C.G. at First Motion	32.0 m (105.0 ft)

Azimuth alignments are:

Launch Azimuth	100.0 deg E of N
Flight Azimuth	105.0 deg E of N
ST-124M Platform Azimuth	105.0 deg E of N

3.0 POWERED FLIGHT TRAJECTORY ANALYSIS

3.1 Data Sources

Tracking data were available from first motion through S-IVB/CSM separation. The tracking coverage of each tracking system is itemized in Table I and shown in Figure 1. The vehicle ground track relative to the tracking stations is shown in Figure 2. Figure 4 shows the vehicle station location of each antenna for the various tracking systems and the vehicle's center of gravity versus time. Comparison of each individual tracking system with the reference postflight trajectory is discussed below. The metric comparisons are shown in Figures 11 through 13. The measured parameter comparisons are shown in Figures 14 through 16.

3.1.1 ODOP

The ODOP tracking data were used in establishing the reference trajectory from first motion through 125 sec. The ODOP data were processed in the Final Launch Phase program to produce the initial portion of the trajectory, from first motion to 29 sec. The data from the Final Launch Phase program were then merged at 29 sec with the regularly processed ODOP data. The ODOP tracking system furnished continuous data from 0 to 132 sec as shown in Figure 1.

3.1.2 GLOTRAC Station I (Mark II AZUSA)

GLOTRAC Station I furnished an independent set of tracking data. These data were received from 15 to 234 sec and were incorporated

in the reference trajectory from 125 to 160 sec. Comparison of these data with the reference trajectory reveals deviations of less than 16 m (52 ft), 11 m (36 ft), and 7 m (23 ft) in the XE, YE, and ZE position components, respectively.

3.1.3 GLOTRAC

GLOTRAC data were received from 20 sec through the remaining powered flight. These data were the only high precision data received after 235 sec. However, these data were not incorporated into the reference trajectory due to late arrival and a close correlation with the reference trajectory. Comparisons between GLOTRAC and the reference trajectory revealed deviations of less than 45 m (148 ft) in the position components.

3.1.4 Radar

Grand Bahama (3.18) radar tracking covered the major portion of the powered flight. The data received started at 90 sec and continued beyond S-IVB/CSM separation. The angle measurements displayed deviations of less than 0.01 and 0.03 deg in azimuth and elevation, respectively. The range measurement had a maximum deviation of approximately 28 m (92 ft).

The tracking data from the Grand Turk (7.18) radar were received from 217 sec through the remaining powered flight with one gap from 478.2 to 480.5 sec. The maximum angle deviations were 0.007 and 0.013 deg in azimuth and elevation, respectively. The maximum range deviation was 12 m (39 ft) from the reference trajectory.

Merritt Island (19.18) radar tracked from 14 to 468 sec of the flight. The azimuth, elevation and range measurements revealed

errors of 0.01 deg, 0.03 deg and 30 m (98 ft), respectively, from the reference trajectory.

Patrick (0.18) radar furnished data until 568 sec of flight. These data displayed maximum deviations of 0.01 deg, 0.017 deg and 21 m (69 ft) in azimuth, elevation and range, respectively, with respect to the reference trajectory.

Antigua (91.18) radar provided data from 483 sec to beyond S-IVB/CSM separation. The angle measurements had a maximum deviation of 0.01 deg in azimuth and 0.014 deg in elevation. The range measurement revealed a deviation of 60 m (197 ft).

The Grand Bahama (3.16) radar furnished reliable tracking data from 88 to 611 sec of the AS-202 flight. These data revealed deviations of less than 0.007 deg, 0.012 deg and 32 m (105 ft), respectively, in azimuth, elevation and range with one data gap from 98 to 110.1 sec.

The Cape Kennedy (1.16) radar data were received from 13 to 210 sec. These data had two short gaps occurring from 35.8 to 41 sec and 53.7 to 58 sec. The maximum deviations in azimuth, elevation and range were 0.026 deg, 0.005 deg and 14 m (46 ft), respectively.

3.2 Trajectory Composition

External tracking systems provided data which were used in conjunction with telemetered guidance velocities in establishing the reference trajectory. The trajectory was constructed in the following manner.

Interval (sec)	Description
0.0 - 29.0	ODOP data were used in a least squares curve fit. (Reference 1 discusses in detail the method used to establish this portion of the trajectory.)
29.0 - 125.0	ODOP data processed by the Smoothing and Differentiation program, which is discussed below.
125.0 - 160.0	GLOTRAC Station I data processed by the Smoothing and Differentiation program. The S-IB cutoff area was adjusted to the guidance velocity and acceleration profiles using telemetered data.
160.0 - 598.7	A best estimate type trajectory, as generated by the MARLOCK program, using C-Band radar and telemetered guidance data. The technique is discussed below.

The initial portion of the reference trajectory was established with the Final Launch Phase program. The program utilized ODOP data in a least squares curve fit. The differences between the resulting curve and the actual data were negligible. The remaining powered flight portion of the S-IB trajectory was established using ODOP and GLOTRAC Station I data. The S-IVB powered portion of flight to S-IVB/CSM separation is a best estimate type trajectory from all tracking systems.

The best estimate trajectory is established through utilization of the MARLOCK program. The MARLOCK program uses telemetered guidance velocities as a generating parameter to compute a trajectory which will best fit the tracking data yet retain the smoothness of the guidance data. The guidance data can vary only in accordance with an eighteen term error model and the variances assigned to each error coefficient. The error coefficients are determined using the Kalman linear filtering technique and the error terms are applied to the guidance data to produce the final

smooth and continuous trajectory (See Reference 2 for a theoretical discussion of the MARLOCK program).

The ODOP, GLOTRAC Station I data and computed trajectory were smoothed over a 10 sec span using coefficients which are the average of fourth-degree and second-degree smoothing coefficients. The averaged coefficients provide a more desirable frequency response for tracking data filtering. The velocity and acceleration data were derived using fourth-degree coefficients because significant bias could be induced if averaged coefficients were used. Reference 3 presents a detailed discussion of the Smoothing and Differentiation program.

All observed data were transformed from the point of track (antenna locations on vehicle) to the vehicle's center of gravity to provide a common point of reference for all of the tracking systems.

Since several data sources were used to construct the trajectory, it was necessary to provide a merging or blending process to compensate for the small biases that may have existed between the data sources. A merging program (a least squares technique) was used to connect the different data sources in order to create a smooth transition.

3.3 Powered Flight Trajectory

A comparison of actual and nominal times at significant vehicle events is presented in Table II. Altitude and surface range are shown in Figures 5 and 6, respectively, for the entire powered flight. Figure 7 is an illustration of the total inertial acceleration profiles for the S-IB and S-IVB stages. The earth-fixed velocity magnitude, along with the angle between the earth-fixed velocity vector and the local horizontal plane, is shown in Figure 8. The magnitude of the space-fixed velocity

vector and the angle between the space-fixed velocity vector and the local horizontal plane is shown in Figure 9. Mach number and dynamic pressure are shown for the S-IB powered flight in Figure 10. These parameters were calculated using measured meteorological data to an altitude of 83 km (45 nm). Above this altitude the U.S. Standard Reference Atmosphere was used.

Various trajectory parameters are given at significant event times in Table III. Apex, loss of telemetry, and impact are included for the discarded S-IB stage. Only the apex and loss of telemetry are included for the S-IVB stage. Several trajectory parameters are given at inboard engine cutoff (IECO), outboard engine cutoff (OECO) and S-IVB cutoff (S-IVB CO) in Table IV and at S-IB/S-IVB and S-IVB/CSM separations in Table V. The velocity gain between OECO and separation due to thrust decay was 4.6 m/s (15.1 ft/s). The velocity gain from S-IVB CO to end of thrust decay was 6.2 m/s (20.3 ft/s).

The actual powered flight trajectory is presented in the metric system of units in Tables VI through VIII, and the English system of units in Tables IX through XI.

3.4 Error Analysis of the Reference Trajectory

During the S-IB powered flight, excellent coverage was provided by ODOP and GLOTRAC Station I. These two sets of data were used to establish the reference trajectory during this portion of the flight.

Data from the ODOP, GLOTRAC Station I, and GLOTRAC systems are compared to the reference trajectory in the earth-fixed plumbline coordinate system in Figures 11 through 13. All data were smoothed, differentiated and transferred from the point of track (vehicle antenna locations) to a common point, the vehicle's center of gravity. The

earth-fixed plumbline comparisons show negligible differences between the high precision systems during the first stage portion of the flight and less than 45 m (148 ft) deviation through the entire powered flight. Comparisons of radar measured parameters (azimuth, elevation, and range) with the reference trajectory are presented in Figures 14 through 16. This comparison reveals maximum deviations of 60 m (197 ft) in the range measurements for any system. Maximum deviations for azimuth and elevation are 0.026 deg and 0.03 deg, respectively. All range and angle measurements appear to be biased or show systematic trends with respect to the reference trajectory. The dispersion of the various data gives an indication of the accuracy of the reference trajectory. The comparison curves show only the trend of the data relative to the reference trajectory.

A statistical analysis of ten different MARLOCK trajectory solutions was performed in an effort to determine trajectory accuracies. From this analysis the standard deviations at S-IVB/CSM separation were:

XE	YE	ZE
28.6 m (93.8 ft)	102.4 m (336.0 ft)	8.9 m (29.2 ft)
DXE	DYE	DZE
0.09 m/s (0.30 ft/s)	0.87 m/s (2.85 ft/s)	0.24 m/s (0.79 ft/s)

An estimate of the probable total uncertainty in the powered flight reference trajectory is presented in Figure 17. At OECO the position components are probably accurate to 30 m (98 ft) and the velocity components to 0.3 m/s (1.0 ft/s). By S-IVB CO the velocity uncertainties have increased to about 1.0 m/s (3.3 ft/s) in the DYE component and 0.5 m/s

(1.6 ft/s) in the DXE and DYE components. The uncertainties in position components at S-IVB CO are 200 m (656 ft) in the YE component and 100 m (328 ft) in the XE and ZE components.

4.0 S-IB AND S-IVB STAGE FREE FLIGHT TRAJECTORIES

A theoretical free flight trajectory was computed for the discarded S-IB stage using initial conditions following outboard engine thrust decay and retro-rocket cutoff. The initial conditions were computed by assuming nominal retro-rocket performance and outboard engine thrust decay after S-IB/S-IVB separation. Radar tracking data were not available to confirm the results obtained.

A nominal tumbling drag was assumed following the retro-rocket cutoff. In addition, nominal coefficients of drag were used assuming the booster (1) stabilized at 90 deg angle of attack and (2) stabilized at 0 deg angle of attack. These provide the following dispersions:

Drag Conditions	Impact Range	Impact Time
0 deg Angle of Attack	460.1 km (248.4 nm)	476.3 sec
Tumbling	450.0 km (243.0 nm)	536.8 sec
90 deg Angle of Attack	443.4 km (239.4 nm)	578.2 sec

A theoretical free flight trajectory was computed for the discarded S-IVB stage using initial conditions from the reference trajectory. This trajectory was computed to the loss of telemetry signal which occurred simultaneously with the termination of the common bulkhead pressure test at 941.2 sec. At loss of telemetry, the S-IVB stage was at an altitude of 246.1 km (132.9 nm) and surface range of 3708.2 km (2002.3 nm).

Since the S-IVB stage had not re-entered the Earth's atmosphere at the time of loss of telemetry, the various coefficients of drag would result in negligible variations in the free flight trajectory. Therefore, only the tumbling drag coefficient was used to compute the free flight trajectory for the S-IVB stage.

The theoretical free flight trajectory utilizing the tumbling drag coefficient data will be considered as the actual trajectory for the S-IB stage. The S-IB stage trajectory is presented in tabular form in Tables XII (metric units) and XIV (English units). The S-IVB stage trajectory is presented in tabular form in Tables XIII (metric units) and XV (English units). The ground track of the trajectories are shown in Figure 2.

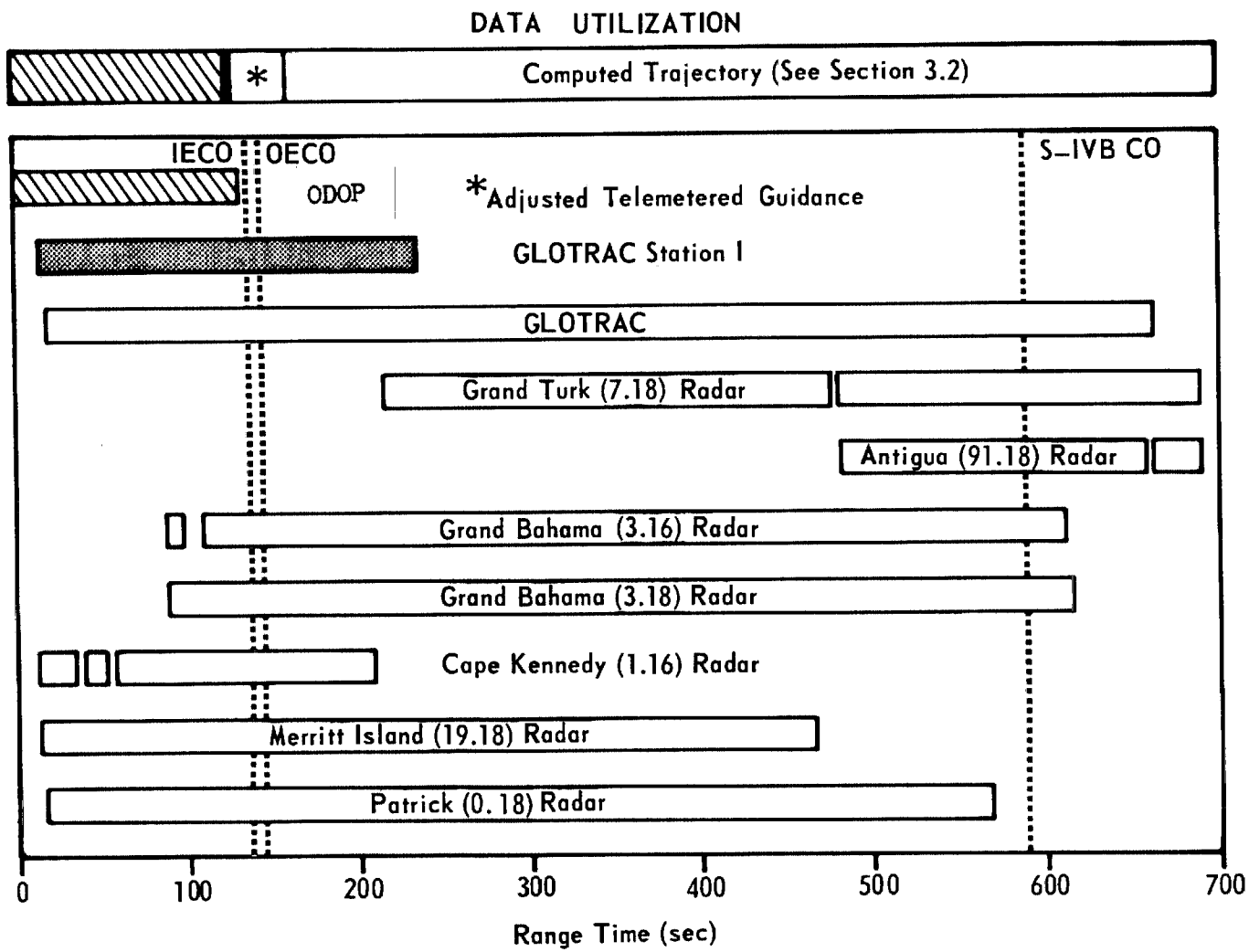


Figure 1 Available Final Tracking Data (Powered Flight)

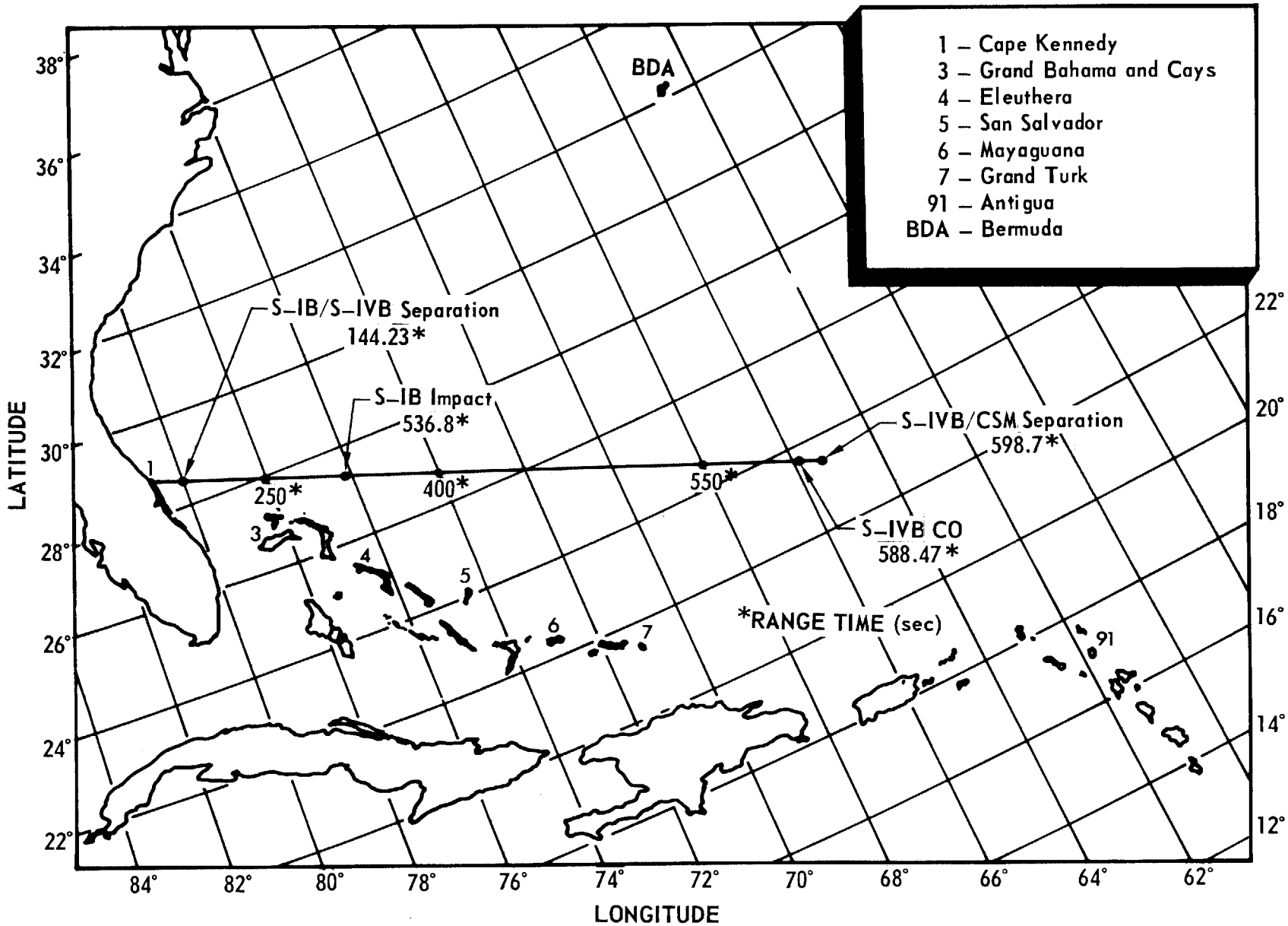


Figure 2 Vehicle Ground Track and Tracking Stations

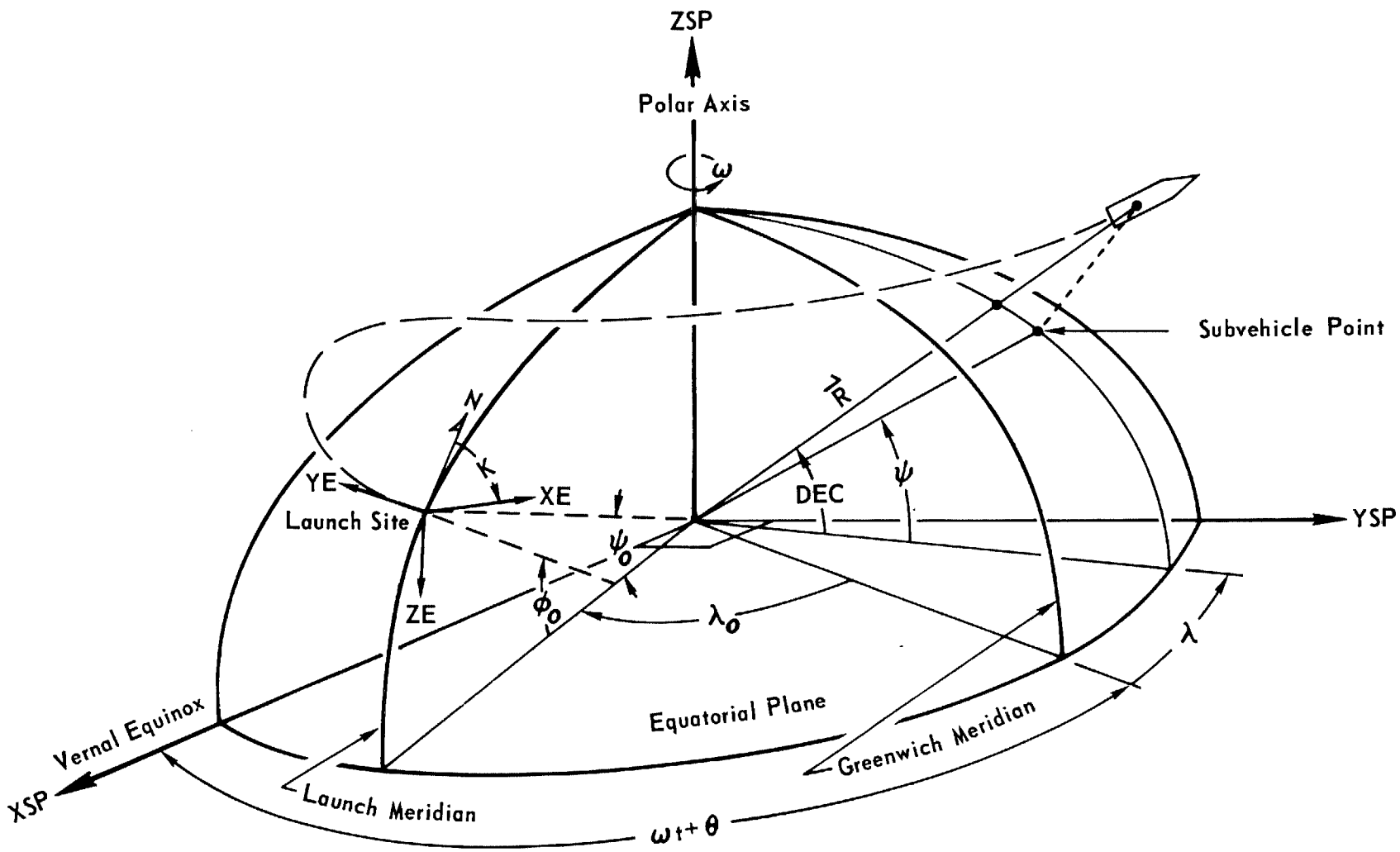


Figure 3 Trajectory Coordinate Systems

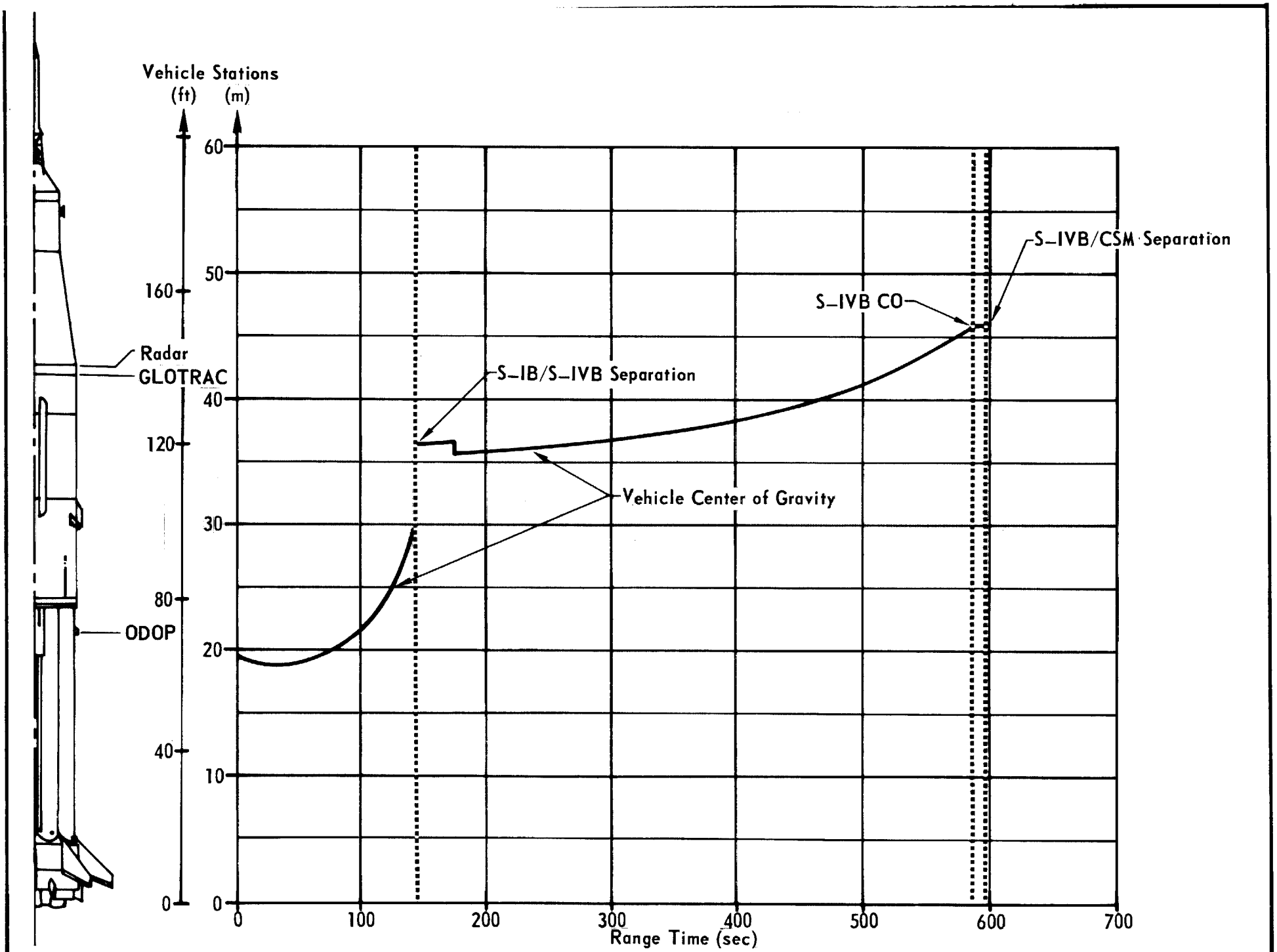


Figure 4 — Antenna Locations and Vehicle Center of Gravity

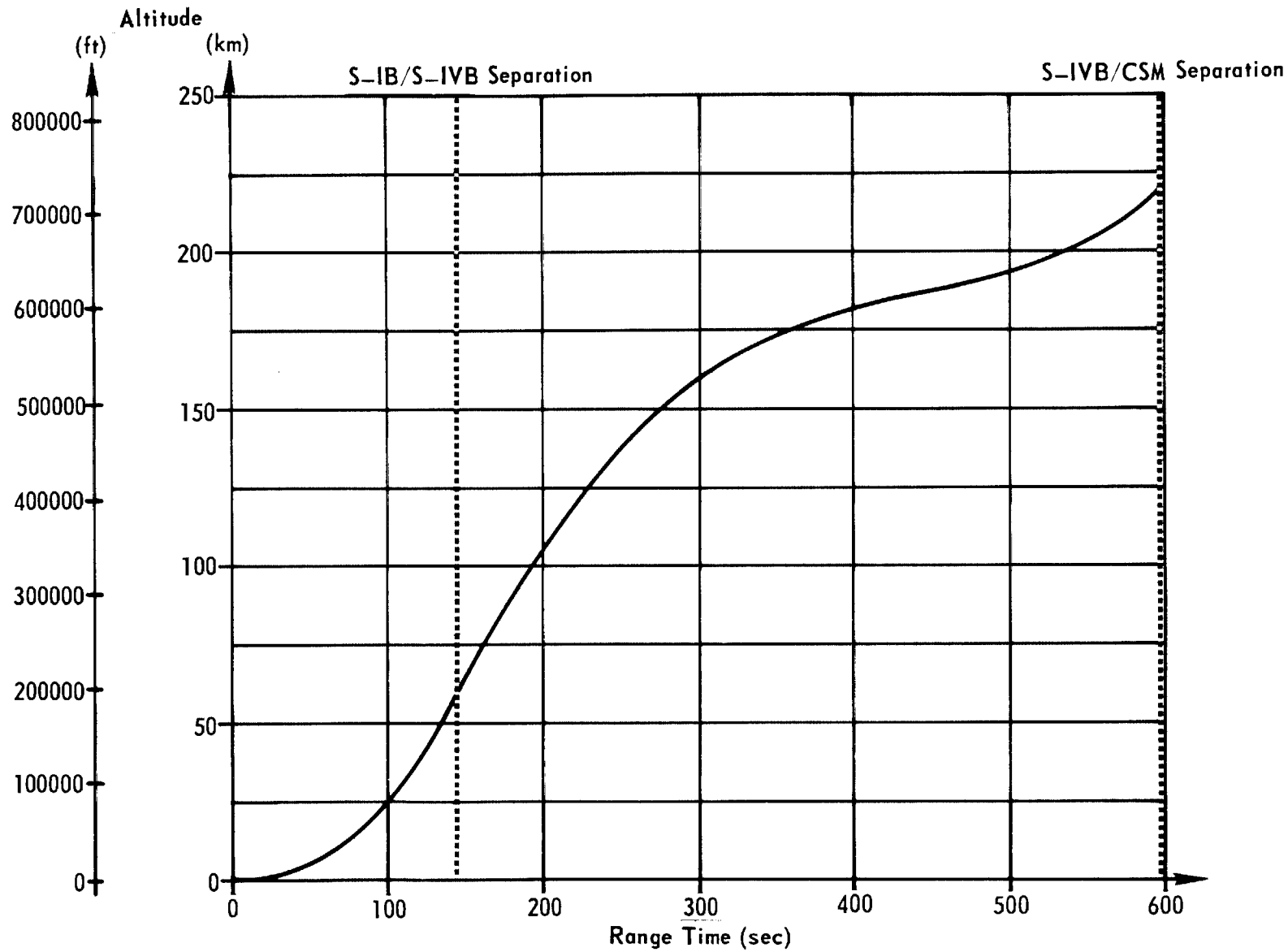


Figure 5 Altitude

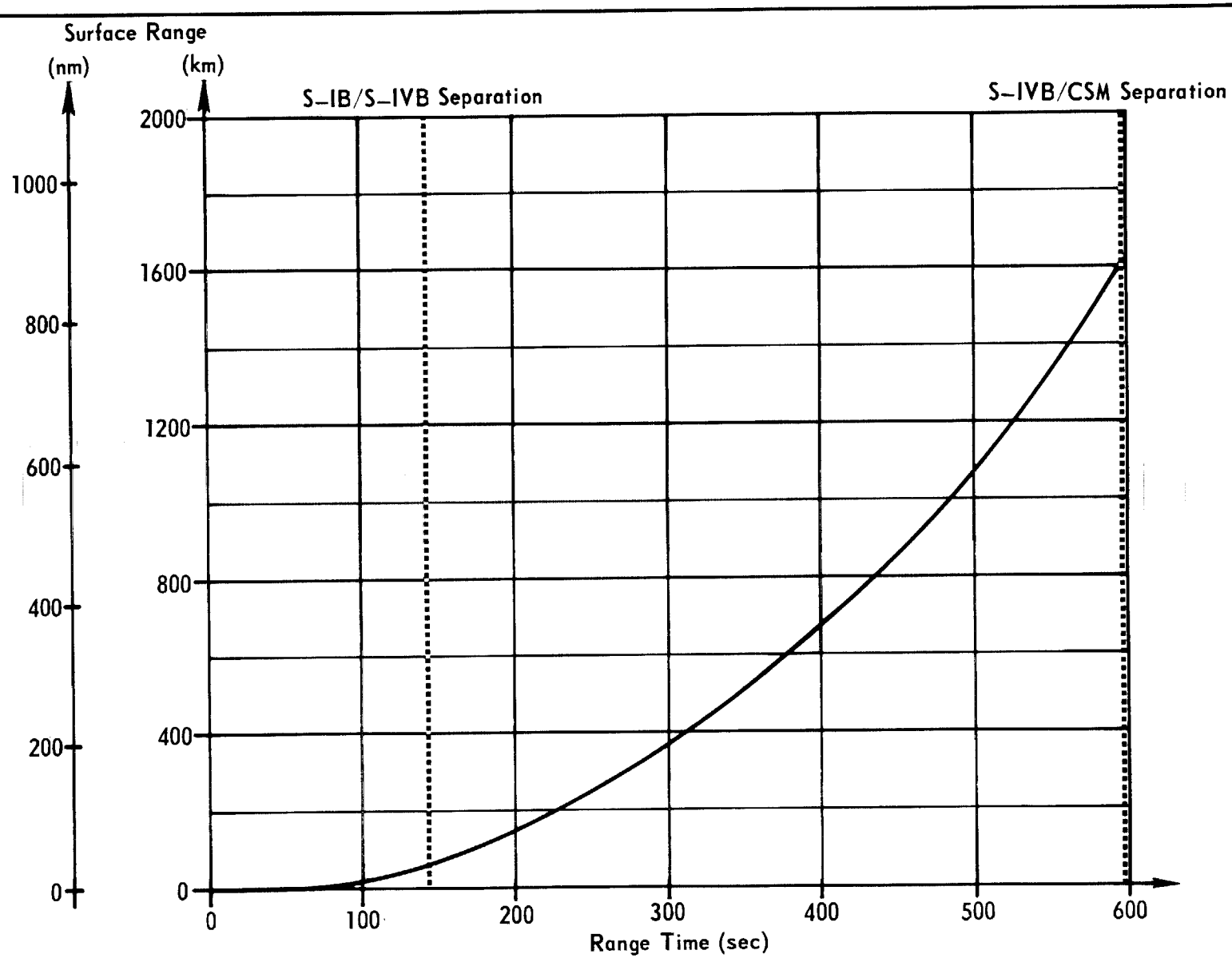
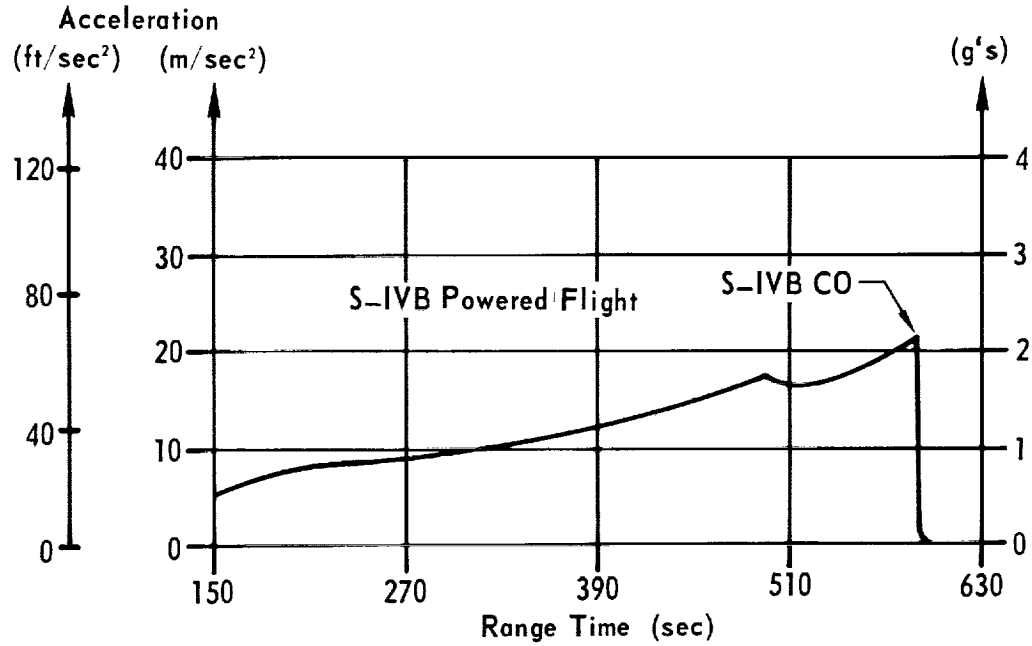


Figure 6 Surface Range



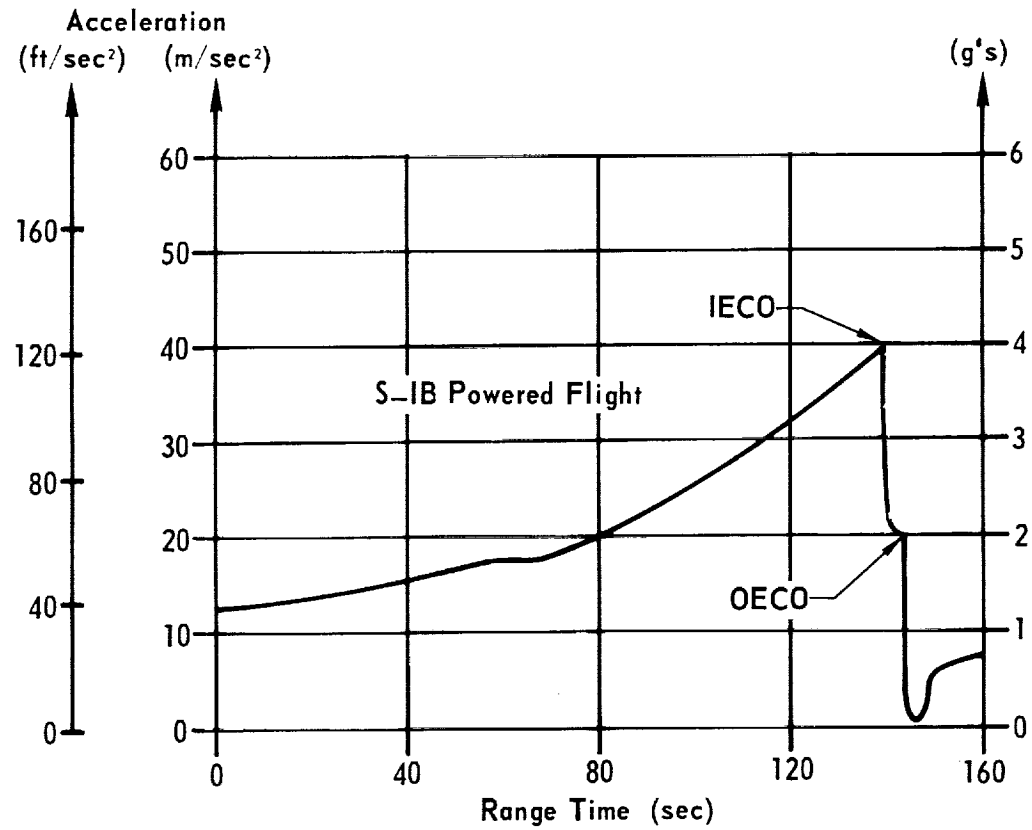


Figure 7 Total Inertial Acceleration

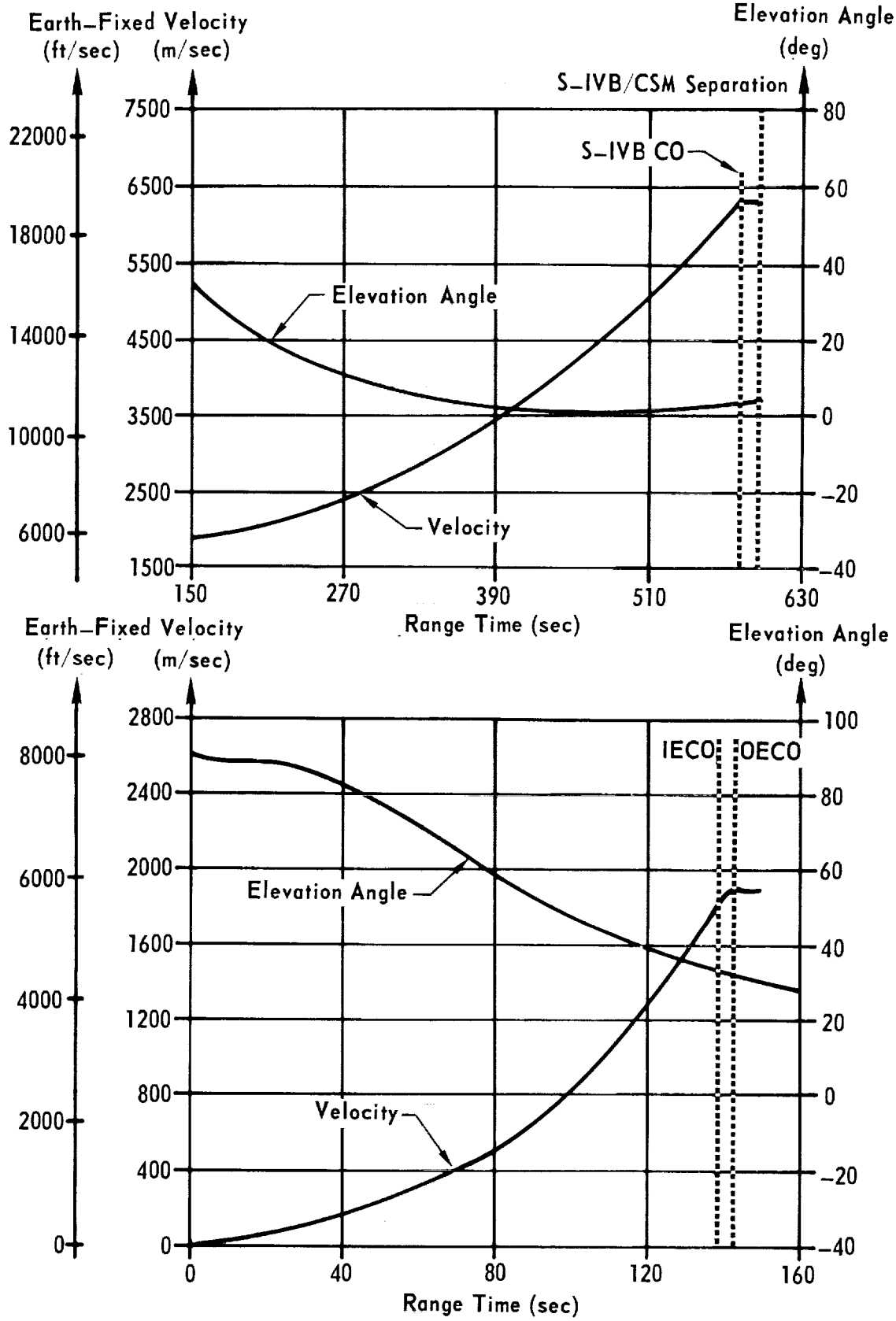


Figure 8 Earth-Fixed Velocity and Elevation Above Local Horizontal

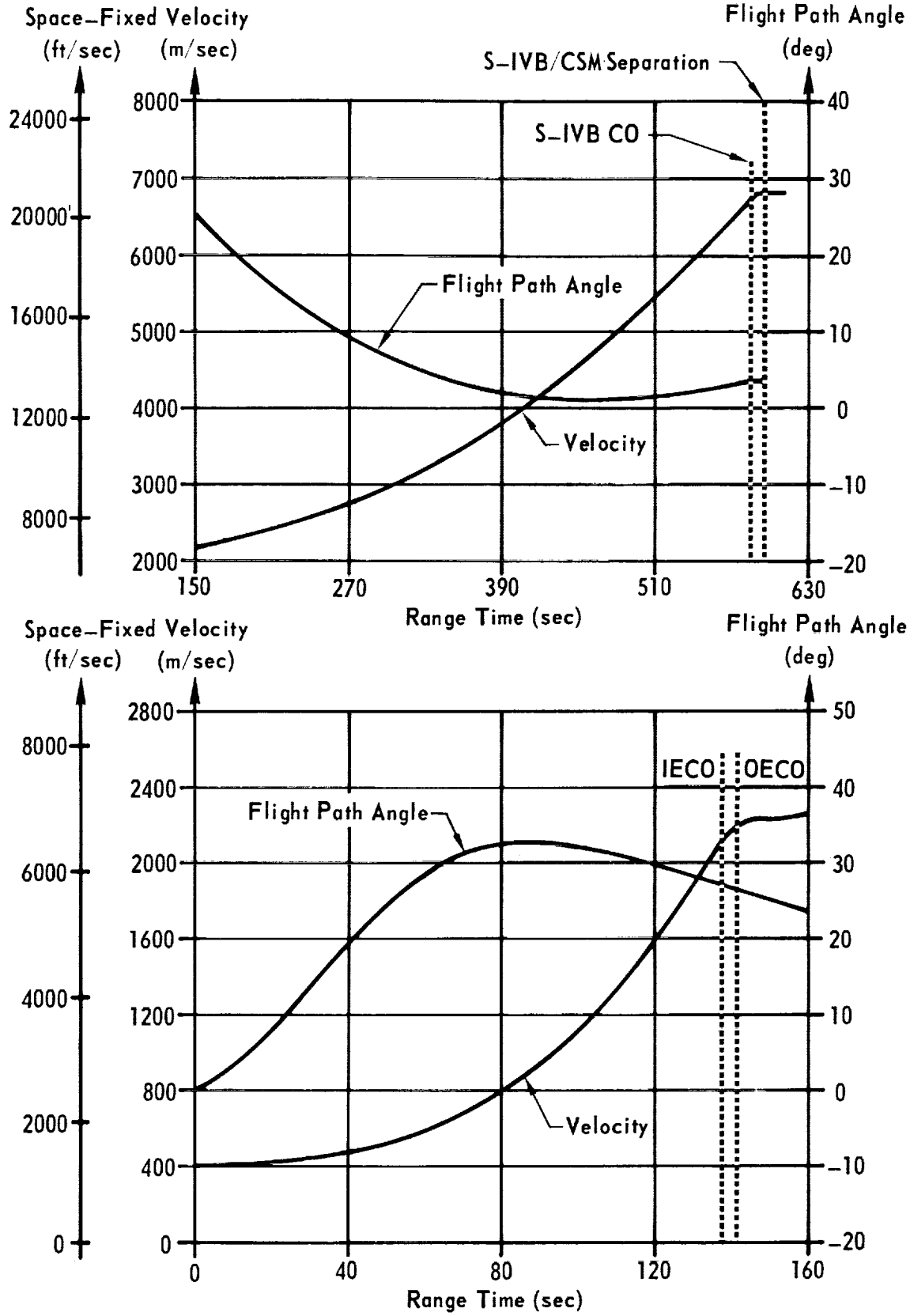


Figure 9 Space-Fixed Velocity and Flight Path Angle

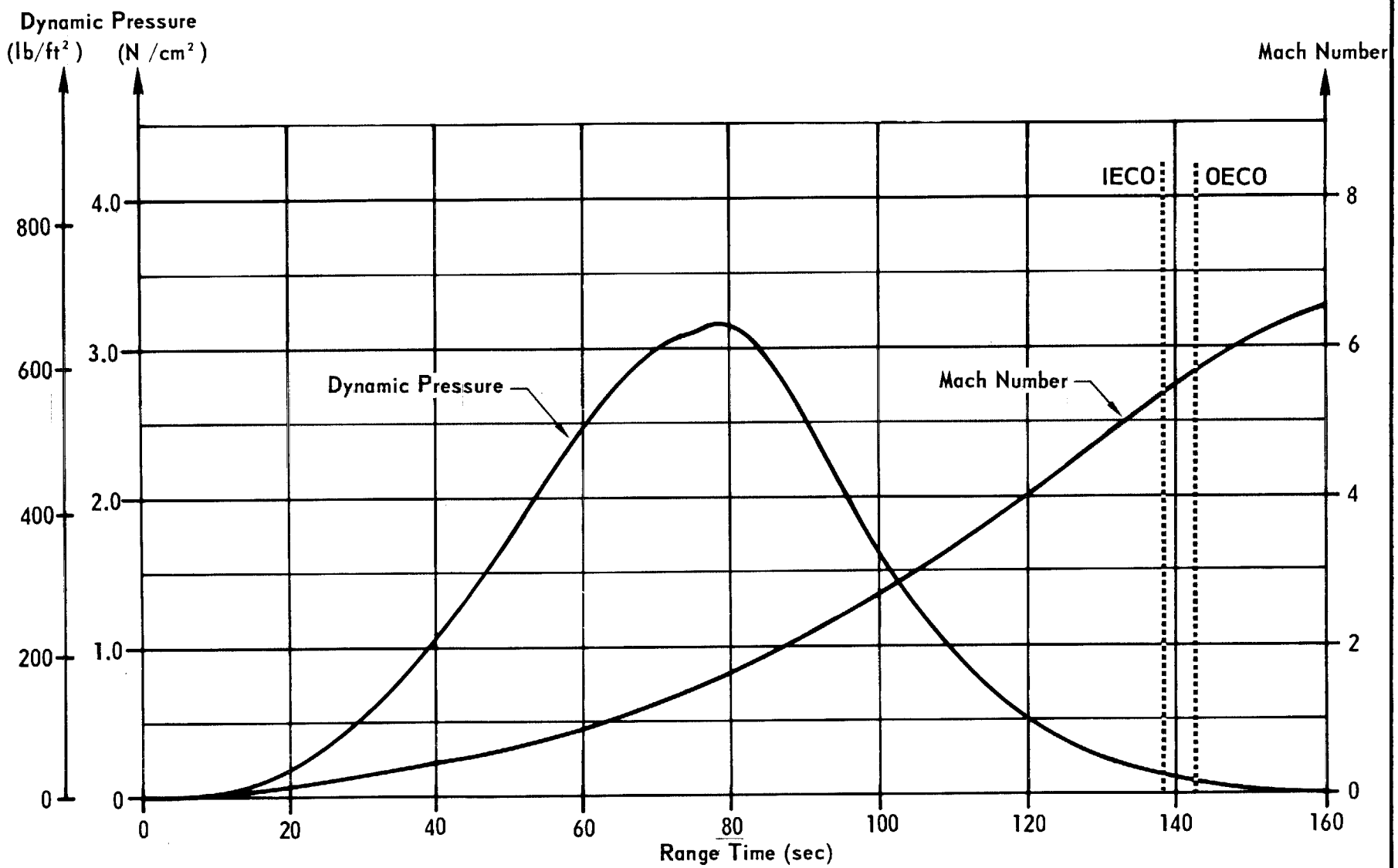


Figure 10 Mach Number and Dynamic Pressure

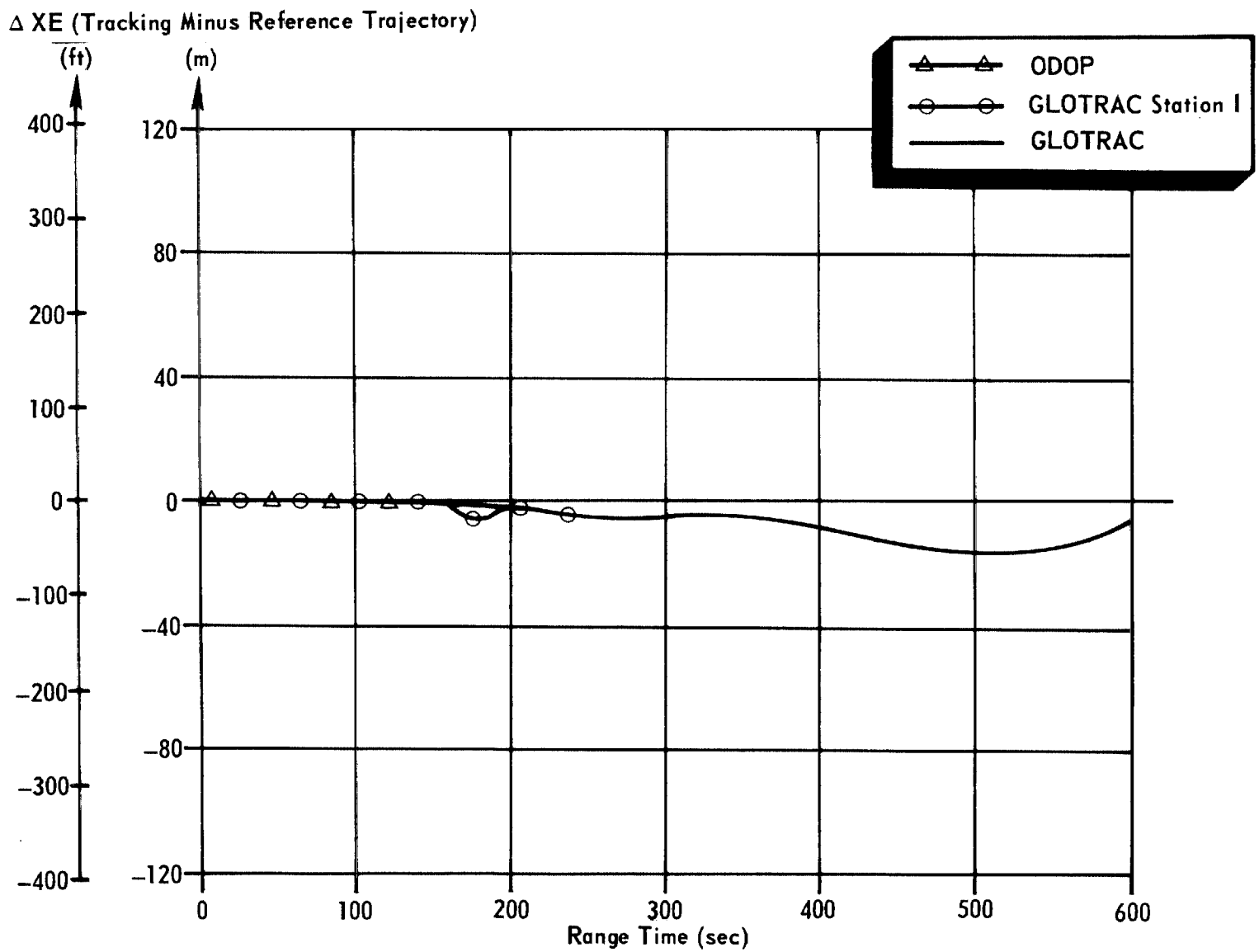


Figure 11 Metric Tracking Comparisons (XE)

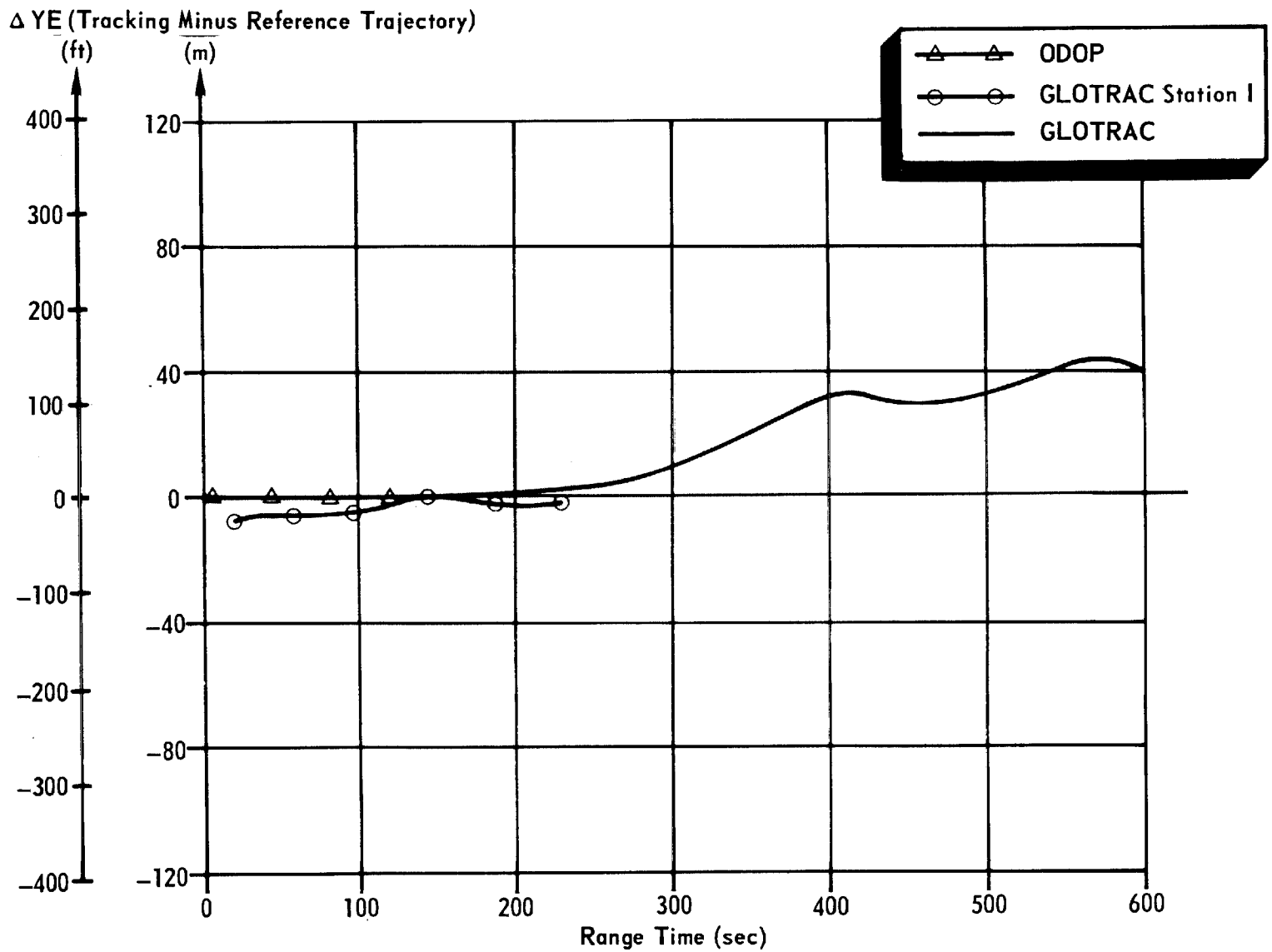


Figure 12 Metric Tracking Comparisons (YE)

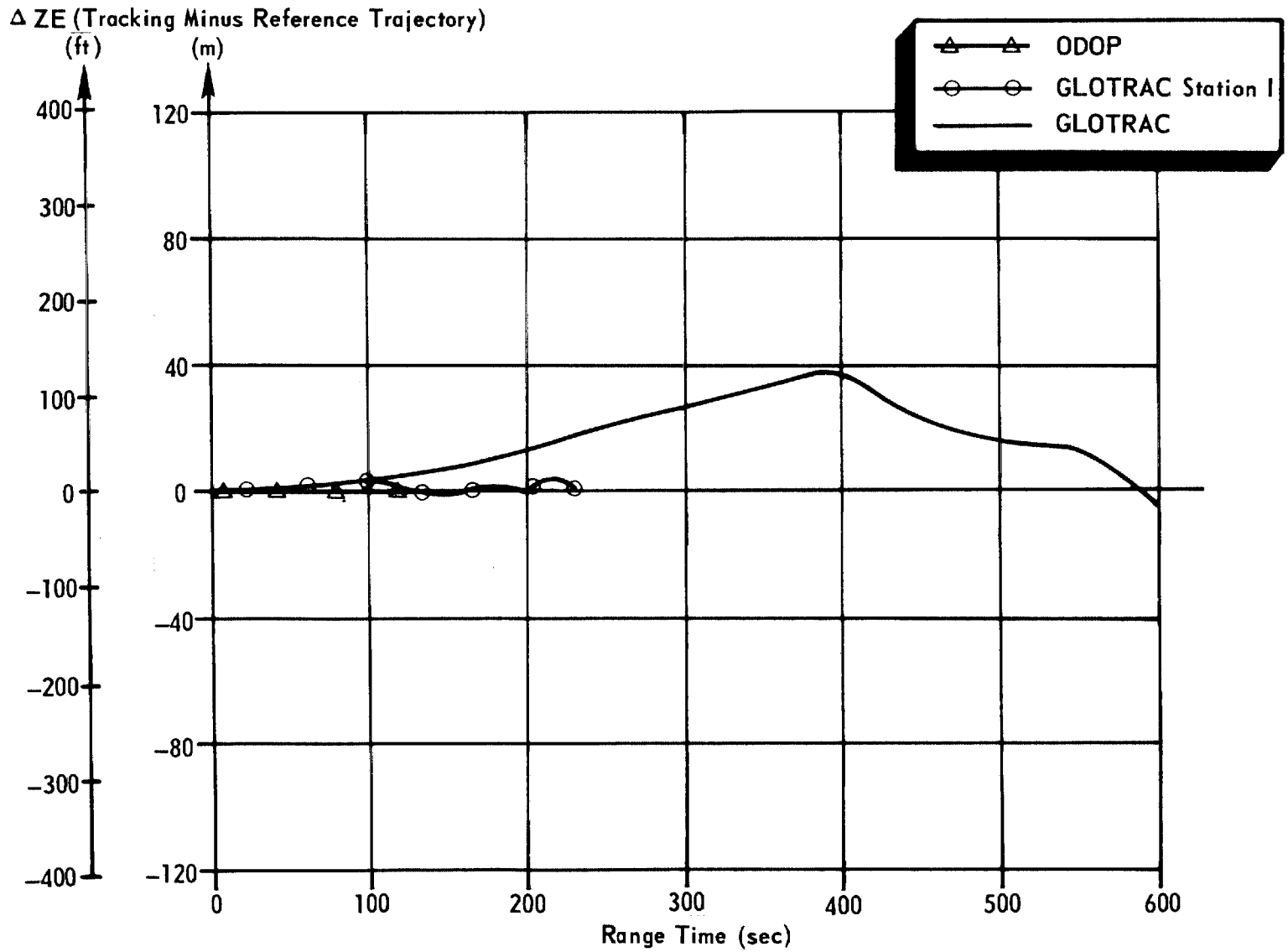


Figure 13 Metric Tracking Comparisons (ZE)

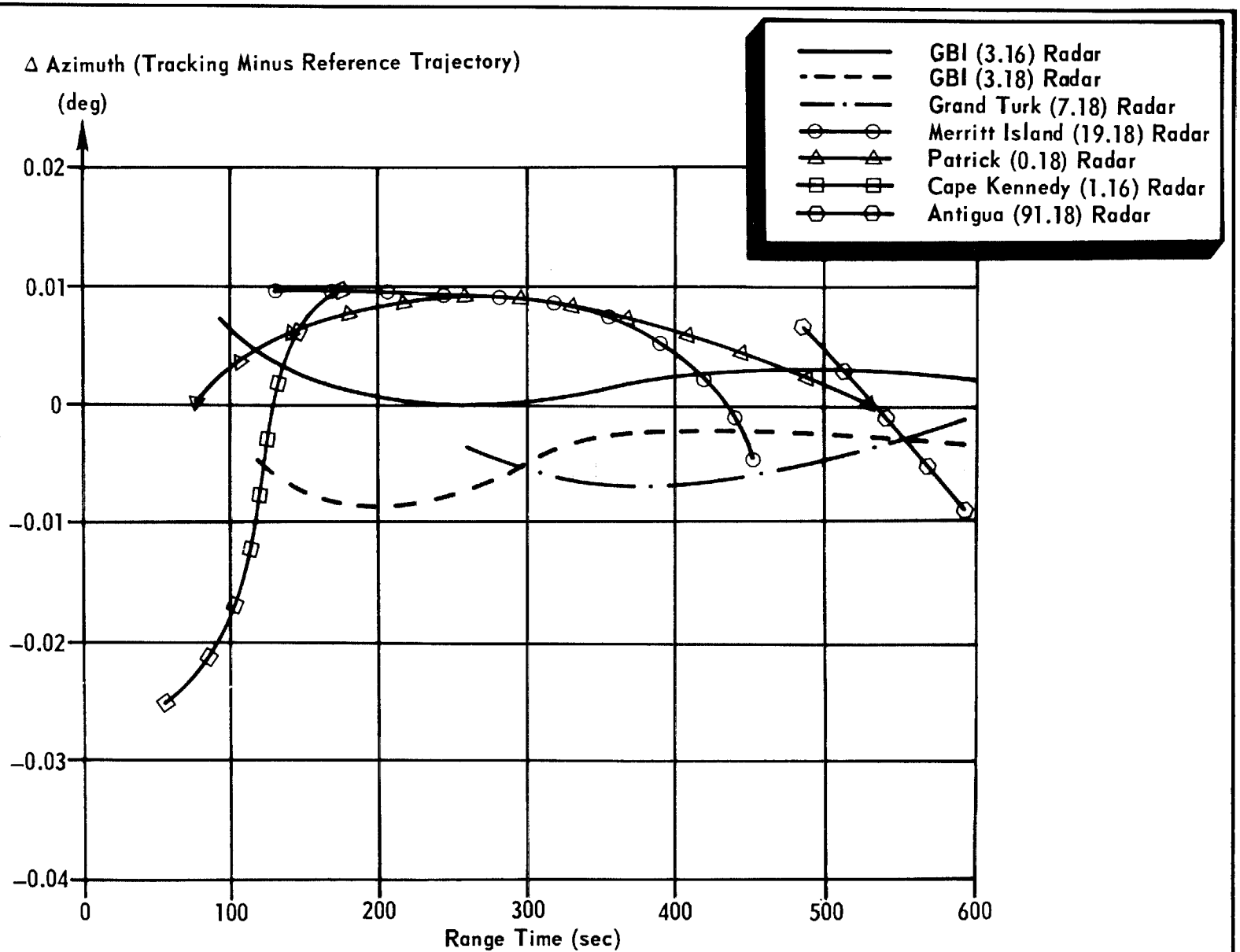


Figure 14 Measured Parameter Tracking Comparison (Azimuth)

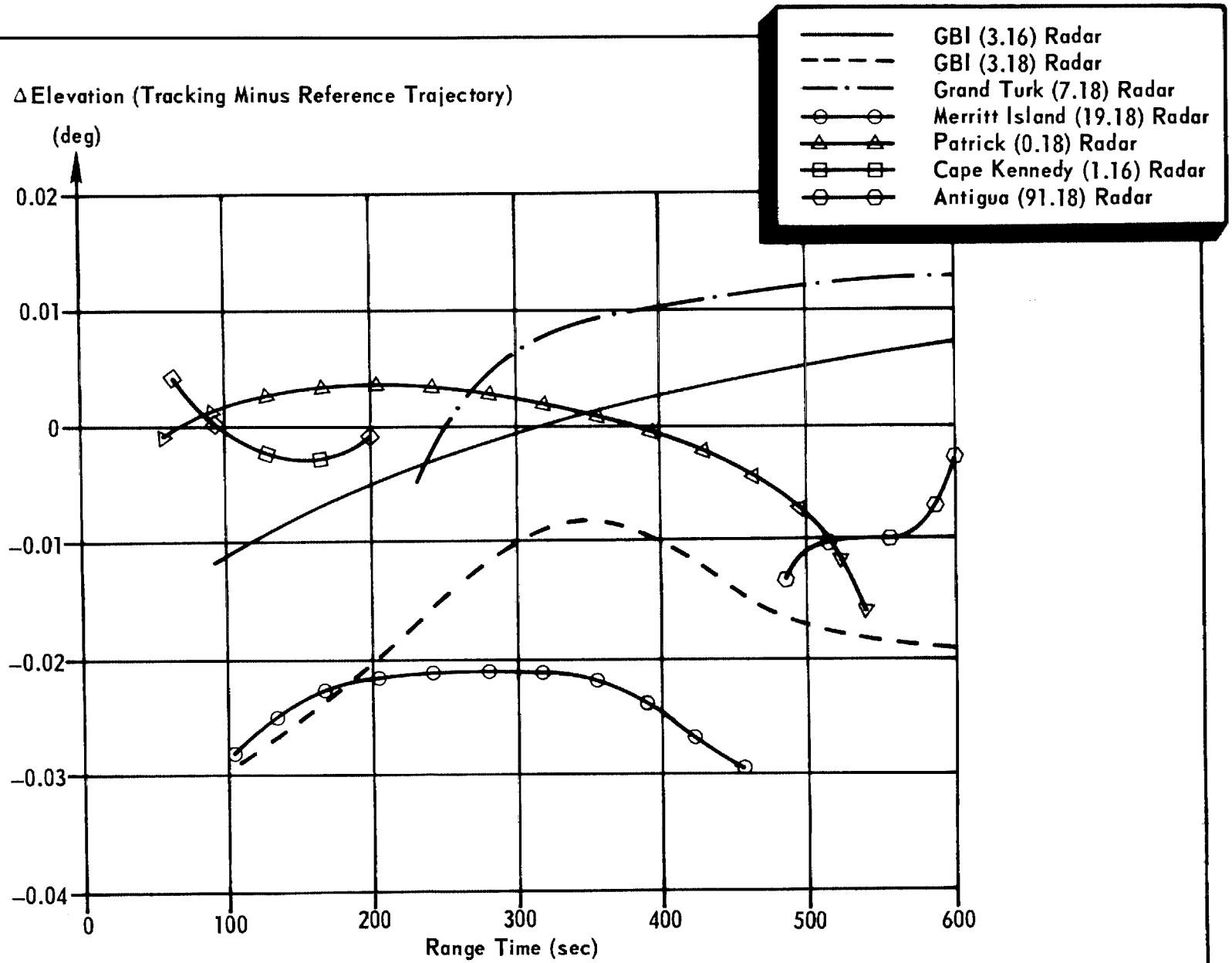


Figure 15 Measured Parameter Tracking Comparison (Elevation)

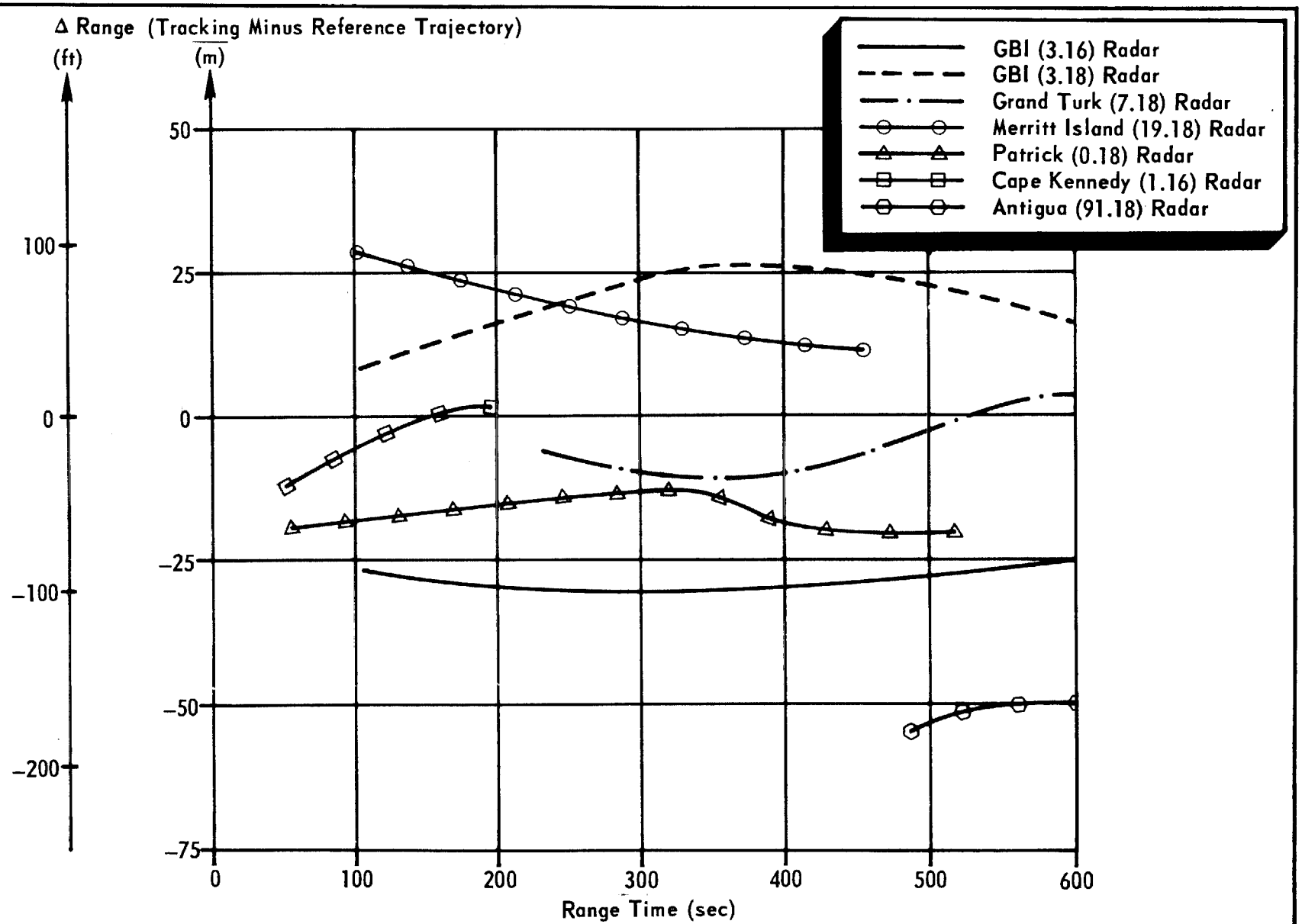


Figure 16 Measured Parameter Tracking Comparison (Range)

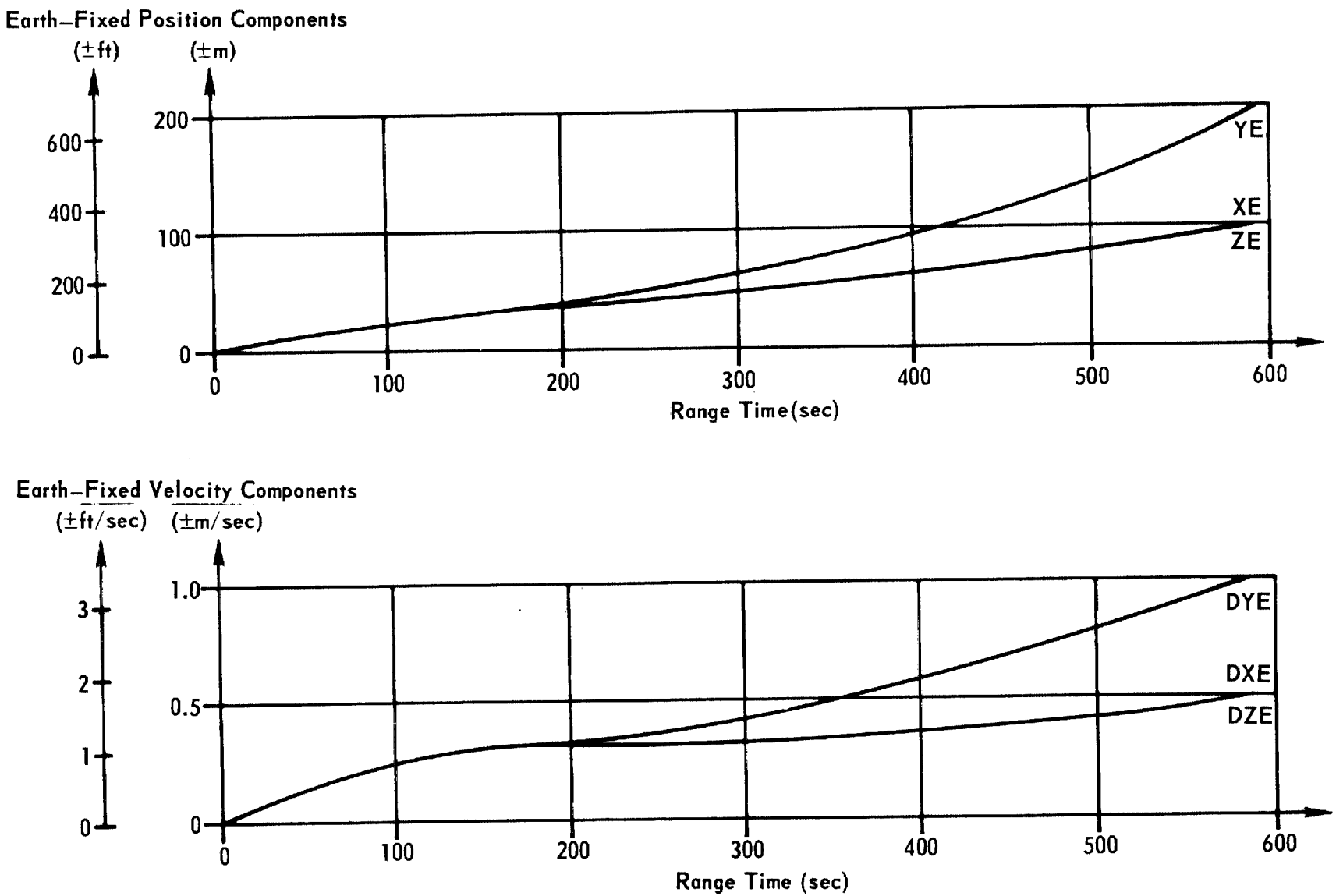


Figure 17 Estimated Uncertainty of Reference Trajectory

TABLE I

TRACKING DATA SOURCES AVAILABLE DURING POWERED FLIGHT

Data Source	Interval
ODOP	0.0 - 132.4
GLOTRAC Station I (Mark II AZUSA)	15.0 - 234.7
GLOTRAC	20.0 - 598.7
Grand Turk (7.18) Radar (TPQ-18)	217.0 - 478.2 480.5 - 598.7
Antigua (91.18) Radar (FPQ-6)	483.0 - 598.7 662.5 - 598.7
Grand Bahama (3.16) Radar (FPS-16)	88.0 - 98.0 110.1 - 598.7
Grand Bahama (3.18) Radar (TPQ-18)	90.0 - 598.7
Cape Kennedy (1.16) Radar (FPS-16)	13.0 - 35.8 41.0 - 53.7 58.0 - 210.7
Merritt Island (19.18) Radar (TPQ-18)	14.0 - 467.9
Patrick (0.18) Radar (FPQ-6)	18.0 - 568.4

TABLE II

TIMES OF EVENTS

Event	Actual	Nominal	Act-Nom
Guidance Reference Release	- 4.468	- 4.270	- 0.198
First Motion	0.73	0.73	0.00
L.O. Signal (Umb. Disc.)	0.93	0.93	0.00
Mach One	63.69	65.73	- 2.04
Maximum Dynamic Pressure	79.50	79.73	- 0.23
IECO	139.57	141.60	- 2.03
OECO	143.47	144.60	- 1.13
S-IB/S-IVB Separation	144.23	145.40	- 1.17
Guidance Initiation (IGM)	172.40	173.48	- 1.08
S-IVB CO	588.47	602.28	- 13.81
S-IVB/CSM Separation	598.70	612.52	- 13.82

Note: Actual times are referenced to Range Zero (12:15:32 EST). Nominal times are obtained from Reference 4 and adjusted to the actual 0.73 sec first motion time.

TABLE III

SIGNIFICANT TRAJECTORY PARAMETERS

Event	Parameter	Actual Value
First Motion	Range Time	0.73 sec
	Total Inertial Acceleration	12.19 m/s^2 (39.99 ft/s^2)
Mach 1	Range Time	63.69 sec
	Altitude	7.83 km (4.23 nm)
Maximum Dynamic Pressure	Range Time	79.5 sec
	Altitude	13.43 km (7.25 nm)
	Dynamic Pressure	3.20 N/cm^2 (668.33 lb/ft^2)
Maximum Total Inertial Acceleration (S-IB Stage)	Range Time	139.67 sec
	Acceleration	40.00 m/s^2 (131.23 ft/s^2)
Maximum Earth-Fixed Velocity (S-IB Stage)	Range Time	143.9 sec
	Velocity	1880.1 m/s (6168.3 ft/s)
Apex (S-IB Stage)	Range Time	253.01 sec
	Altitude	111.79 km (60.36 nm)
	Surface Range	224.59 km (121.27 nm)
	Earth-Fixed Velocity	1552.71 m/s (5094.20 ft/s)
Loss of Telemetry (S-IB Stage)	Range Time	385.0 sec
	Altitude	35.17 km (18.99 nm)
	Surface Range	426.37 km (230.22 nm)
	Total Earth-Fixed Acceleration	-30.01 m/s^2 (-98.44 ft/s^2)
	Elevation Angle From Pad	2.74 deg

TABLE III (CONT'D)

SIGNIFICANT TRAJECTORY PARAMETERS

Event	Parameter	Actual Value
Impact (S-IB Stage)	Range Time	536.78 sec
	Surface Range	449.96 km (242.96 nm)
	Cross Range	0.66 km (0.36 nm)
	Geodetic Latitude	27.39 deg
	Longitude	76.17 deg
Maximum Total Inertial Acceleration (S-IVB Stage)	Range Time	588.568 sec
	Acceleration	21.615 m/s^2 (70.915 ft/s^2)
Maximum Earth-Fixed Velocity (S-IVB Stage)	Range Time	589.4 sec
	Velocity	6400.5 m/s (20999.0 ft/s)
Apex (S-IVB Stage)	Range Time	802.04 sec
	Altitude	267.45 km (144.41 nm)
	Surface Range	2861.01 km (1544.82 nm)
	Earth-Fixed Velocity	6329.52 m/s (20820.80 ft/s)
Loss of Telemetry (S-IVB Stage)	Range Time	941.20 sec
	Altitude	246.14 km (132.90 nm)
	Surface Range	3708.22 km (2002.28 nm)
	Total Earth-Fixed Acceleration	- 8.30 m/s^2 (-27.22 ft/s^2)
	Cross Range	123.96 km (66.93 nm)
	Geodetic Latitude	14.91 deg
	Longitude	47.64 deg

TABLE IV

CUTOFF CONDITIONS

Parameter	Units	IECO	OECO	S-IVB CO
Range Time	sec	139.57	143.47	588.47
Altitude	km	54.4	58.2	217.2
	nm	29.4	31.4	117.3
Range	km	50.2	56.2	1557.0
	nm	27.1	30.3	840.7
Cross Range, ZE	km	- 0.94	- 0.97	36.98
	nm	- 0.51	- 0.52	19.97
Cross Range Velocity, DZE	m/s	- 8.6	- 8.5	201.0
	ft/s	- 28.3	- 27.8	659.4
Earth-Fixed Velocity	m/s	1814.9	1878.8	6394.6
	ft/s	5954.4	6163.9	20979.8
Earth-Fixed Velocity Vector Elevation	deg	32.88	31.90	4.24
Earth-Fixed Velocity Vector Azimuth	deg	104.82	104.87	113.32
Space-Fixed Velocity	m/s	2163.6	2230.3	6800.2
	ft/s	7098.3	7317.4	22310.4
Total Inertial Acceleration	m/s^2	39.95	20.33	21.61
	ft/s^2	131.07	66.70	70.90

Earth-Fixed Velocity Accuracy

OECO ±0.3 m/s (±1.0 ft/s)
S-IVB CO ±0.5 m/s (±1.6 ft/s)

Altitude Accuracy

OECO ± 30 m (± 98 ft)
S-IVB CO ±200 m (±656 ft)

TABLE V

SEPARATION CONDITIONS

Parameter	Units	S-IB/S-IVB Separation	S-IVB/CSM Separation
Range Time	sec	144.23	598.70
Altitude	km	58.99	221.92
	nm	31.85	119.83
Range	km	57.42	1620.09
	nm	31.00	874.78
Cross Range, ZE	km	- 0.98	39.06
	nm	- 0.53	21.09
Cross Range Velocity, DZE	m/s	- 8.4	204.5
	ft/s	- 27.6	670.9
Heading Angle	deg	101.839	112.089
Flight Path Angle	deg	26.317	3.822
Space-Fixed Velocity	m/s	2231.5	6800.2
	ft/s	7321.2	22310.5

TABLE VI

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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									
-4.468	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
-4.0	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
-3.0	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
-2.0	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
-1.0	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
0.0	0	32	0	0.0	0.0	0.0	0.00	0.00	0.00
FIRST MOTION									
0.730	0	32	0	0.0	0.0	0.0	0.00	2.39	0.02
LIFTOFF SIGNAL									
0.930	0	32	0	0.0	0.5	0.0	0.00	2.39	0.01
1.0	0	32	0	0.0	0.6	0.0	0.00	2.39	0.00
2.0	0	34	0	0.0	3.0	-0.0	0.00	2.40	-0.03
3.0	0	38	0	0.0	5.5	-0.1	-0.00	2.45	-0.05
4.0	0	45	0	-0.0	8.0	-0.1	-0.01	2.53	-0.07
5.0	0	54	0	-0.0	10.5	-0.2	-0.01	2.61	-0.08
6.0	0	66	-0	-0.0	13.2	-0.3	-0.02	2.69	-0.08
7.0	0	80	-0	-0.0	15.9	-0.4	-0.02	2.76	-0.08
8.0	0	98	-0	-0.1	18.7	-0.4	-0.03	2.84	-0.08
9.0	0	118	-1	-0.1	21.6	-0.5	-0.03	2.90	-0.08
10.0	0	141	-1	-0.1	24.5	-0.6	-0.03	2.96	-0.09
11.0	0	167	-2	-0.2	27.5	-0.7	-0.02	3.02	-0.09
12.0	-0	196	-3	-0.2	30.5	-0.8	-0.01	3.08	-0.09
13.0	-0	228	-3	-0.2	33.6	-0.9	0.00	3.14	-0.10
14.0	-0	263	-4	-0.2	36.8	-1.0	0.02	3.21	-0.10
15.0	-0	301	-5	-0.1	40.1	-1.1	0.04	3.28	-0.11
16.0	-0	343	-7	-0.1	43.4	-1.2	0.07	3.37	-0.11
17.0	-0	388	-8	-0.0	46.8	-1.3	0.09	3.46	-0.12
18.0	-0	437	-9	0.1	50.3	-1.4	0.13	3.55	-0.13
19.0	-0	489	-11	0.3	53.9	-1.6	0.16	3.65	-0.13
20.0	-0	545	-12	0.4	57.6	-1.7	0.20	3.76	-0.14
21.0	0	604	-14	0.7	61.4	-1.8	0.25	3.86	-0.14
22.0	1	667	-16	0.9	65.3	-2.0	0.29	3.97	-0.14
23.0	2	735	-18	1.3	69.4	-2.1	0.34	4.07	-0.15
24.0	3	806	-20	1.6	73.5	-2.3	0.40	4.16	-0.15

TABLE VI

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
25.0	5	882	-23	2.1	77.7	-2.4	0.46	4.24	-0.15
26.0	7	962	-25	2.5	81.9	-2.6	0.52	4.31	-0.15
27.0	10	1046	-28	3.1	86.3	-2.7	0.59	4.36	-0.16
28.0	14	1134	-30	3.7	90.7	-2.9	0.66	4.41	-0.16
29.0	18	1227	-33	4.4	95.1	-3.0	0.74	4.51	-0.16
30.0	22	1324	-37	5.2	99.6	-3.2	0.84	4.60	-0.18
31.0	28	1426	-40	6.1	104.3	-3.4	0.95	4.65	-0.21
32.0	35	1533	-43	7.1	109.0	-3.6	1.06	4.72	-0.24
33.0	42	1644	-47	8.2	113.7	-3.9	1.18	4.82	-0.26
34.0	51	1760	-51	9.5	118.6	-4.1	1.31	4.94	-0.27
35.0	61	1882	-55	10.8	123.6	-4.4	1.43	5.04	-0.27
36.0	73	2008	-60	12.3	128.7	-4.7	1.53	5.13	-0.27
37.0	86	2139	-65	13.9	133.8	-4.9	1.62	5.21	-0.27
38.0	101	2275	-70	15.6	139.1	-5.2	1.72	5.29	-0.29
39.0	117	2417	-75	17.3	144.4	-5.5	1.83	5.37	-0.32
40.0	135	2564	-81	19.2	149.8	-5.9	1.96	5.46	-0.33
41.0	156	2717	-87	21.3	155.4	-6.2	2.11	5.56	-0.32
42.0	178	2875	-93	23.4	161.0	-6.5	2.25	5.65	-0.28
43.0	202	3039	-100	25.7	166.7	-6.7	2.38	5.75	-0.23
44.0	229	3209	-107	28.2	172.5	-7.0	2.51	5.84	-0.21
45.0	259	3384	-114	30.8	178.3	-7.2	2.64	5.92	-0.20
46.0	291	3565	-121	33.5	184.3	-7.4	2.79	6.01	-0.20
47.0	326	3753	-128	36.4	190.4	-7.6	2.97	6.09	-0.20
48.0	364	3946	-136	39.4	196.5	-7.8	3.17	6.16	-0.21
49.0	405	4146	-144	42.7	202.7	-8.0	3.38	6.22	-0.21
50.0	449	4351	-152	46.2	208.9	-8.2	3.57	6.28	-0.23
51.0	497	4564	-160	49.8	215.2	-8.4	3.76	6.35	-0.23
52.0	549	4782	-169	53.7	221.6	-8.6	3.95	6.43	-0.22
53.0	605	5007	-178	57.8	228.1	-8.8	4.15	6.51	-0.2[illegible]
54.0	664	5238	-187	62.0	234.6	-9.0	4.36	6.58	-0.17
55.0	729	5476	-196	66.5	241.2	-9.2	4.56	6.65	-0.15
56.0	797	5721	-205	71.1	247.9	-9.3	4.76	6.71	-0.12
57.0	871	5972	-214	76.0	254.7	-9.4	4.94	6.78	-0.08
58.0	949	6230	-224	81.0	261.5	-9.5	5.12	6.83	-0.03
59.0	1033	6495	-233	86.2	268.3	-9.5	5.32	6.87	0.00
60.0	1122	6767	-243	91.7	275.2	-9.5	5.54	6.88	0.01
61.0	1216	7046	-252	97.3	282.0	-9.5	5.77	6.83	-0.01
62.0	1317	7331	-262	103.2	288.8	-9.5	5.96	6.76	-0.05
63.0	1423	7623	-271	109.2	295.6	-9.6	6.12	6.68	-0.08
MACH ONE									
63.690	1499	7829	-278	113.5	300.2	-9.6	6.22	6.62	-0.11

TABLE VI
EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
64.0	1535	7922	-281	115.4	302.2	-9.7	6.28	6.60	-0.12
65.0	1654	8228	-291	121.8	308.8	-9.8	6.46	6.55	-0.12
66.0	1779	8540	-300	128.4	315.3	-9.9	6.70	6.53	-0.11
67.0	1910	8859	-310	135.2	321.9	-10.0	6.97	6.57	-0.08
68.0	2049	9184	-320	142.3	328.5	-10.1	7.24	6.66	-0.06
69.0	2195	9516	-331	149.7	335.2	-10.1	7.50	6.76	-0.05
70.0	2348	9854	-341	157.3	342.0	-10.2	7.78	6.85	-0.06
71.0	2510	10200	-351	165.3	348.9	-10.3	8.09	6.93	-0.07
72.0	2679	10552	-361	173.5	355.9	-10.3	8.42	7.01	-0.05
73.0	2857	10912	-372	182.1	362.9	-10.3	8.75	7.09	-0.03
74.0	3043	11278	-382	191.0	370.0	-10.4	9.06	7.16	-0.02
75.0	3239	11652	-392	200.2	377.2	-10.4	9.38	7.23	-0.03
76.0	3444	12033	-403	209.7	384.5	-10.4	9.68	7.30	-0.03
77.0	3658	12421	-413	219.5	391.8	-10.4	9.93	7.40	0.04
78.0	3883	12817	-424	229.6	399.3	-10.3	10.15	7.53	0.15
79.0	4118	13220	-434	239.8	406.9	-10.1	10.35	7.67	0.25
MAXIMUM DYNAMIC PRESSURE									
79.500	4239	13424	-439	245.0	410.8	-10.0	10.47	7.75	0.26
80.0	4363	13630	-444	250.3	414.6	-9.9	10.59	7.81	0.26
81.0	4618	14049	-454	261.1	422.5	-9.7	10.88	7.91	0.16
82.0	4885	14476	-463	272.1	430.5	-9.6	11.23	7.99	0.03
83.0	5163	14910	-473	283.5	438.5	-9.6	11.63	8.04	-0.04
84.0	5452	15353	-482	295.4	446.5	-9.6	12.02	8.08	-0.02
85.0	5753	15803	-492	307.6	454.6	-9.6	12.41	8.12	0.02
86.0	6067	16262	-502	320.2	462.8	-9.6	12.78	8.18	0.08
87.0	6394	16729	-511	333.1	471.0	-9.5	13.08	8.28	0.15
88.0	6733	17204	-521	346.3	479.4	-9.3	13.33	8.39	0.19
89.0	7086	17688	-530	359.7	487.8	-9.1	13.59	8.48	0.18
90.0	7453	18180	-539	373.5	496.3	-8.9	13.89	8.54	0.16
91.0	7833	18681	-548	387.6	504.9	-8.8	14.24	8.58	0.13
92.0	8228	19190	-556	402.0	513.5	-8.6	14.62	8.62	0.15
93.0	8638	19708	-565	416.8	522.1	-8.6	14.99	8.61	-0.01
94.0	9062	20234	-573	431.9	530.7	-8.7	15.33	8.64	-0.14
95.0	9501	20769	-582	447.5	539.4	-8.8	15.71	8.70	-0.18
96.0	9957	21313	-591	463.4	548.1	-8.9	16.12	8.78	-0.08
97.0	10428	21866	-600	479.7	557.0	-8.9	16.50	8.89	0.08
98.0	10916	22427	-609	496.4	565.9	-8.8	16.85	8.98	0.18
99.0	11421	22998	-617	513.4	574.9	-8.7	17.15	9.02	0.15
100.0	11943	23577	-626	530.7	583.9	-8.5	17.44	9.03	0.03
101.0	12483	24166	-635	548.3	593.0	-8.5	17.78	9.10	0.05
102.0	13040	24763	-643	566.2	602.1	-8.4	18.16	9.16	0.07

TABLE VI

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
103.0	13615	25370	-651	584.6	611.3	-8.4	18.55	9.19	0.04
104.0	14209	25986	-660	603.3	620.5	-8.4	18.93	9.20	-0.01
105.0	14822	26611	-668	622.4	629.7	-8.4	19.31	9.23	-0.01
106.0	15454	27245	-677	641.9	639.0	-8.4	19.67	9.27	0.01
107.0	16106	27889	-685	661.8	648.3	-8.4	20.03	9.33	0.03
108.0	16778	28542	-693	682.0	657.6	-8.3	20.39	9.38	0.06
109.0	17470	29204	-702	702.6	667.0	-8.3	20.76	9.42	0.08
110.0	18183	29876	-710	723.5	676.4	-8.2	21.15	9.43	0.08
111.0	18917	30557	-718	744.9	685.9	-8.1	21.51	9.47	0.09
112.0	19673	31248	-726	766.6	695.4	-8.0	21.89	9.50	0.08
113.0	20450	31948	-734	788.6	704.9	-7.9	22.28	9.54	0.07
114.0	21250	32658	-742	811.1	714.4	-7.9	22.67	9.58	0.07
115.0	22073	33377	-750	834.0	724.1	-7.8	23.06	9.63	0.09
116.0	22918	34106	-757	857.2	733.7	-7.7	23.47	9.68	0.12
117.0	23787	34845	-765	880.9	743.4	-7.6	23.87	9.73	0.11
118.0	24680	35593	-773	905.0	753.2	-7.5	24.25	9.78	0.09
119.0	25598	36351	-780	929.4	763.0	-7.4	24.66	9.83	0.08
120.0	26539	37119	-787	954.3	772.8	-7.3	25.07	9.87	0.10
121.0	27506	37897	-794	979.6	782.7	-7.2	25.50	9.90	0.11
122.0	28499	38684	-802	1005.3	792.6	-7.1	26.02	9.86	0.09
123.0	29517	39482	-809	1031.6	802.4	-7.0	26.53	9.83	0.03
124.0	30567	40291	-816	1058.4	812.3	-7.0	26.94	9.89	-0.07
125.0	31638	41109	-823	1085.3	822.3	-7.4	27.38	9.97	-0.03
126.0	32731	41934	-830	1112.6	832.4	-7.7	27.95	9.98	0.12
127.0	33858	42772	-838	1140.8	842.4	-7.6	28.28	10.07	0.02
128.0	35013	43620	-846	1169.3	852.5	-7.6	28.60	10.18	-0.05
129.0	36197	44477	-853	1198.1	862.7	-7.6	29.05	10.25	0.03
130.0	37410	45345	-861	1227.4	872.9	-7.5	29.69	10.20	-0.07
131.0	38653	46223	-869	1257.2	883.2	-7.6	30.06	10.28	-0.11
132.0	39926	47112	-876	1287.6	893.5	-7.8	30.56	10.26	-0.12
133.0	41229	48011	-884	1318.4	903.8	-7.9	31.01	10.30	-0.16
134.0	42564	48920	-893	1349.7	913.9	-8.1	31.60	10.30	-0.10
135.0	43930	49840	-901	1381.5	924.3	-8.2	32.10	10.36	-0.10
136.0	45328	50770	-909	1413.9	934.9	-8.3	32.60	10.40	-0.10
137.0	46759	51710	-918	1446.8	945.3	-8.4	33.10	10.42	-0.09
138.0	48224	52661	-926	1479.9	955.7	-8.5	33.60	10.45	-0.12
139.0	49721	53622	-935	1514.0	965.9	-8.5	34.15	10.49	-0.15
IECO									
139.570	50590	54175	-940	1532.6	972.1	-8.6	34.42	10.51	-0.13
140.0	51252	54594	-944	1546.6	975.7	-8.7	25.10	4.80	-0.07
141.0	52809	55570	-952	1563.7	976.7	-8.7	17.30	0.75	-0.03

TABLE VI
EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
142.0	54382	56547	-961	1580.8	977.4	-8.6	17.10	0.62	0.03
143.0	55972	57525	-970	1598.1	978.3	-8.5	17.20	0.68	0.08
OECO									
143.470	56725	57985	-974	1604.4	977.6	-8.5	17.40	0.75	0.10
144.0	57577	58503	-978	1607.3	975.3	-8.4	4.00	-5.55	0.12
S-IB/S-IVB SEPARATION									
144.230	57947	58727	-980	1607.5	973.8	-8.4	2.80	-6.68	0.13
145.0	59186	59475	-987	1608.1	967.9	-8.3	0.70	-8.80	0.17
146.0	60795	60438	-995	1608.9	958.3	-8.1	0.40	-9.45	0.17
147.0	62404	61392	-1003	1609.6	948.1	-8.0	0.60	-9.45	0.13
148.0	64015	62335	-1011	1610.3	939.0	-7.9	1.89	-8.15	0.07
149.0	65627	63271	-1019	1613.7	931.8	-7.8	4.29	-6.72	0.05
150.0	67243	64199	-1027	1618.4	925.3	-7.8	4.86	-6.34	0.05
155.0	75402	68749	-1064	1644.7	894.8	-6.8	5.72	-5.88	0.19
160.0	83700	73151	-1097	1673.7	865.9	-6.2	5.83	-5.71	0.13
165.0	92144	77409	-1126	1703.1	837.3	-5.3	5.93	-5.72	0.16
170.0	100734	81524	-1150	1733.1	809.0	-4.6	6.13	-5.58	0.14
GUIDANCE INITIATION									
172.400	104911	83449	-1161	1748.0	795.7	-4.2	6.21	-5.53	0.13
175.0	109476	85500	-1171	1764.1	781.3	-3.8	6.20	-5.47	0.18
180.0	118373	89340	-1187	1794.5	755.4	-2.2	5.90	-4.90	0.40
185.0	127418	93058	-1193	1823.2	732.4	-0.3	5.55	-4.41	0.38
190.0	136602	96663	-1190	1850.6	709.8	1.5	5.71	-4.44	0.38
195.0	145929	100159	-1178	1880.3	688.5	3.5	5.96	-4.28	0.39
200.0	155404	103547	-1156	1909.8	666.4	5.4	5.98	-4.45	0.41
205.0	165028	106823	-1124	1939.9	644.1	7.5	6.09	-4.45	0.45
210.0	174804	109988	-1080	1970.6	621.8	9.7	6.16	-4.49	0.43
215.0	184734	113041	-1026	2001.6	599.3	11.9	6.27	-4.48	0.44
220.0	194821	115981	-962	2033.2	576.8	14.1	6.37	-4.50	0.44
225.0	205067	118809	-885	2065.3	554.4	16.3	6.47	-4.48	0.42
230.0	215475	121525	-799	2097.9	532.0	18.5	6.56	-4.44	0.45
235.0	226047	124129	-701	2130.9	509.7	20.7	6.66	-4.49	0.44
240.0	236786	126622	-591	2164.5	487.2	22.9	6.76	-4.51	0.45
245.0	247693	129001	-471	2198.5	464.5	25.1	6.87	-4.54	0.44
250.0	258772	131267	-340	2233.1	441.9	27.4	6.96	-4.48	0.45

TABLE VI

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
255.0	270025	133421	-197	2268.2	419.4	29.7	7.07	-4.49	0.45
260.0	281455	135462	-43	2303.8	397.1	31.9	7.18	-4.47	0.46
265.0	293064	137391	121	2339.9	374.6	34.2	7.30	-4.51	0.44
270.0	304855	139208	297	2376.7	352.1	36.4	7.38	-4.53	0.46
275.0	316831	140912	485	2414.0	329.4	38.7	7.57	-4.50	0.46
280.0	328993	142500	684	2451.0	306.2	41.0	7.80	-4.43	0.45
285.0	341343	143975	894	2489.2	283.6	43.2	7.98	-4.34	0.47
290.0	353889	145338	1116	2528.8	261.5	45.5	7.78	-4.52	0.47
295.0	366631	146589	1350	2568.1	239.0	47.9	7.95	-4.50	0.46
300.0	379572	147728	1595	2608.2	216.5	50.2	8.09	-4.51	0.46
305.0	392715	148754	1852	2648.9	193.9	52.6	8.19	-4.52	0.57
310.0	406062	149667	2121	2690.2	171.2	54.9	8.31	-4.54	0.40
315.0	419617	150467	2401	2732.0	148.5	57.2	8.44	-4.54	0.47
320.0	433384	151152	2693	2774.5	125.7	59.5	8.52	-4.53	0.47
325.0	447363	151724	2997	2817.5	103.1	61.9	8.67	-4.55	0.47
330.0	461559	152183	3312	2861.1	80.5	64.3	8.78	-4.51	0.48
335.0	475975	152529	3639	2905.3	57.9	66.6	8.92	-4.51	0.47
340.0	490614	152763	3978	2950.3	35.4	69.0	9.04	-4.49	0.49
345.0	505479	152883	4329	2996.1	12.9	71.4	9.26	-4.53	0.48
350.0	520576	152892	4693	3042.7	-9.7	73.9	9.38	-4.51	0.48
355.0	535907	152787	5068	3089.9	-32.3	76.3	9.53	-4.54	0.47
360.0	551477	152569	5456	3138.0	-55.0	78.7	9.75	-4.55	0.49
365.0	567288	152237	5855	3186.6	-77.7	81.1	9.59	-4.55	0.48
370.0	583343	151792	6267	3235.9	-100.4	83.6	10.10	-4.52	0.49
375.0	599649	151234	6691	3286.3	-123.0	86.1	10.12	-4.54	0.49
380.0	616207	150563	7128	3337.2	-144.7	88.6	10.27	-3.96	0.51
385.0	633022	149784	7577	3389.0	-167.9	91.0	10.45	-4.88	0.50
390.0	650099	148887	8038	3441.7	-190.7	93.6	10.61	-4.50	0.51
395.0	667441	147877	8512	3495.2	-213.2	96.0	10.80	-4.50	0.51
400.0	685053	146755	8999	3549.7	-235.6	98.6	11.01	-4.48	0.51
405.0	702940	145521	9498	3605.2	-258.0	101.1	11.19	-4.49	0.50
410.0	721107	144176	10010	3661.7	-280.4	103.7	11.43	-4.47	0.51
415.0	739559	142718	10535	3719.4	-302.8	106.3	11.65	-4.50	0.51
420.0	758302	141148	11073	3777.8	-325.3	108.9	11.80	-4.52	0.52
425.0	777339	139466	11624	3837.3	-347.5	111.5	11.98	-4.48	0.53
430.0	796677	137672	12188	3897.8	-370.1	114.1	12.21	-4.46	0.53
435.0	816319	135765	12765	3959.3	-392.4	116.7	12.41	-4.44	0.51
440.0	836271	133748	13355	4021.9	-414.6	119.3	12.65	-4.44	0.54
445.0	856540	131620	13958	4085.7	-436.7	122.0	12.88	-4.42	0.53
450.0	877131	129381	14575	4150.6	-458.8	124.7	13.10	-4.42	0.54
455.0	898049	127032	15205	4216.7	-480.9	127.4	13.35	-4.41	0.53
460.0	919300	124573	15849	4284.1	-502.8	130.0	13.58	-4.38	0.53
465.0	940892	122004	16505	4352.7	-524.7	132.8	13.88	-4.36	0.55
470.0	962830	119326	17176	4422.9	-546.4	135.5	14.21	-4.34	0.55

TABLE VI
EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
475.0	985124	116540	17860	4494.6	-568.0	138.2	14.48	-4.31	0.55
480.0	1007780	113646	18558	4568.2	-589.9	141.0	14.86	-4.45	0.55
485.0	1030808	110640	19270	4643.4	-612.6	143.8	15.25	-4.60	0.55
490.0	1054218	107519	19996	4720.5	-635.9	146.4	15.59	-4.72	0.55
495.0	1078016	104280	20734	4798.9	-659.7	149.1	15.67	-4.81	0.53
500.0	1102206	100921	21486	4876.8	-684.1	151.7	15.46	-4.94	0.52
505.0	1126781	97438	22252	4952.8	-709.3	154.3	14.97	-5.14	0.52
510.0	1151731	93827	23030	5027.0	-735.2	156.9	14.75	-5.15	0.51
515.0	1177050	90087	23820	5100.2	-760.7	159.4	14.54	-5.01	0.48
520.0	1202732	86222	24623	5172.8	-784.9	161.8	14.51	-4.65	0.51
525.0	1228778	82241	25439	5245.5	-807.2	164.4	14.55	-4.25	0.51
530.0	1255188	78153	26267	5318.6	-827.9	166.9	14.75	-4.09	0.50
535.0	1281967	73961	27108	5393.4	-849.9	169.5	15.16	-4.89	0.55
540.0	1309127	69647	27962	5471.1	-876.1	172.3	15.97	-5.38	0.56
545.0	1336678	65197	28830	5548.9	-903.7	175.0	15.63	-5.46	0.54
550.0	1364621	60614	29712	5628.4	-928.7	177.7	15.96	-4.54	0.57
555.0	1392964	55915	30607	5708.9	-950.9	180.5	16.28	-4.39	0.56
560.0	1421713	51106	31517	5791.2	-972.7	183.4	16.64	-4.35	0.57
565.0	1450879	46188	32441	5875.4	-994.2	186.3	17.04	-4.26	0.59
570.0	1480471	41165	33380	5961.6	-1015.1	189.3	17.44	-4.14	0.61
575.0	1510499	36038	34334	6049.9	-1035.7	192.3	17.88	-4.07	0.62
580.0	1540960	30806	35304	6140.5	-1055.6	195.6	18.30	-3.97	0.63
585.0	1571893	25479	36290	6233.2	-1075.1	198.6	18.75	-3.85	0.67
S-IVB GUIDANCE CUTOFF									
588.468	1593624	21727	36983	6298.1	-1088.5	201.0	19.07	-3.74	0.70
590.0	1603280	20052	37291	6301.3	-1099.6	201.6	-2.05	-8.15	0.30
595.0	1634761	14454	38303	6291.0	-1140.0	203.2	-2.11	-8.08	0.34
S-IVB/CSM SEPARATION									
598.700	1658023	10180	39058	6283.1	-1169.9	204.5	-2.16	-8.07	0.34
600.0	1666189	8653	39325	6280.3	-1180.4	204.9	-2.17	-8.07	0.34

TABLE VII
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
	GUIDANCE REFERENCE RELEASE								
-4.468	-4943.793	2648.181	3027.487	-193.1	-360.5	0.0	0.02	-0.02	0.00
-4.0	-4943.884	2648.012	3027.487	-193.1	-360.5	0.0	0.02	-0.02	0.00
-3.0	-4944.077	2647.652	3027.487	-193.1	-360.5	0.0	0.02	-0.02	0.00
-2.0	-4944.270	2647.291	3027.487	-193.0	-360.5	0.0	0.02	-0.02	0.00
-1.0	-4944.463	2646.931	3027.487	-193.0	-360.6	0.0	0.02	-0.02	0.00
0.0	-4944.656	2646.570	3027.487	-193.0	-360.6	0.0	0.02	-0.02	0.00
	FIRST MOTION								
0.730	-4944.797	2646.307	3027.487	-193.0	-360.6	0.0	-1.84	0.98	1.13
	LIFTOFF SIGNAL								
0.930	-4944.835	2646.235	3027.487	-193.3	-360.4	0.2	-1.83	0.97	1.14
1.0	-4944.849	2646.210	3027.487	-193.5	-360.3	0.3	-1.83	0.97	1.14
2.0	-4945.043	2645.850	3027.488	-195.3	-359.3	1.5	-1.83	0.96	1.17
3.0	-4945.239	2645.491	3027.490	-197.1	-358.4	2.7	-1.86	0.97	1.22
4.0	-4945.437	2645.133	3027.493	-199.0	-357.4	3.9	-1.91	1.00	1.27
5.0	-4945.637	2644.776	3027.497	-200.9	-356.4	5.2	-1.97	1.03	1.31
6.0	-4945.839	2644.420	3027.503	-202.9	-355.3	6.5	-2.03	1.07	1.36
7.0	-4946.043	2644.065	3027.510	-205.0	-354.2	7.9	-2.08	1.10	1.40
8.0	-4946.249	2643.712	3027.519	-207.1	-353.1	9.3	-2.14	1.14	1.43
9.0	-4946.457	2643.359	3027.529	-209.3	-351.9	10.8	-2.19	1.16	1.46
10.0	-4946.668	2643.008	3027.541	-211.5	-350.7	12.2	-2.24	1.19	1.49
11.0	-4946.880	2642.658	3027.553	-213.7	-349.5	13.7	-2.29	1.20	1.52
12.0	-4947.095	2642.309	3027.568	-216.0	-348.3	15.3	-2.34	1.22	1.55
13.0	-4947.313	2641.961	3027.584	-218.4	-347.1	16.8	-2.39	1.23	1.58
14.0	-4947.532	2641.614	3027.602	-220.8	-345.8	18.4	-2.45	1.24	1.62
15.0	-4947.754	2641.269	3027.621	-223.3	-344.6	20.1	-2.52	1.25	1.65
16.0	-4947.979	2640.925	3027.642	-225.8	-343.3	21.8	-2.59	1.26	1.69
17.0	-4948.206	2640.582	3027.664	-228.5	-342.0	23.5	-2.68	1.28	1.73
18.0	-4948.435	2640.241	3027.689	-231.2	-340.8	25.2	-2.77	1.29	1.77
19.0	-4948.668	2639.901	3027.715	-234.0	-339.5	27.0	-2.87	1.30	1.82
20.0	-4948.904	2639.562	3027.743	-236.9	-338.2	28.9	-2.97	1.30	1.86
21.0	-4949.142	2639.225	3027.773	-239.9	-336.8	30.7	-3.08	1.31	1.91
22.0	-4949.383	2638.889	3027.804	-243.1	-335.5	32.7	-3.18	1.31	1.95
23.0	-4949.628	2638.554	3027.838	-246.3	-334.2	34.6	-3.29	1.31	1.99
24.0	-4949.876	2638.220	3027.874	-249.6	-332.9	36.6	-3.39	1.31	2.02

TABLE VII
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
25.0	-4950.127	2637.888	3027.911	-253.1	-331.6	38.7	-3.48	1.29	2.05
26.0	-4950.382	2637.557	3027.951	-256.6	-330.3	40.7	-3.57	1.27	2.07
27.0	-4950.641	2637.227	3027.993	-260.2	-329.0	42.8	-3.65	1.24	2.08
28.0	-4950.902	2636.899	3028.036	-263.9	-327.8	44.9	-3.73	1.20	2.09
29.0	-4951.168	2636.572	3028.082	-267.6	-326.6	47.0	-3.85	1.17	2.12
30.0	-4951.438	2636.246	3028.130	-271.5	-325.5	49.1	-3.97	1.12	2.16
31.0	-4951.711	2635.921	3028.181	-275.5	-324.4	51.3	-4.07	1.05	2.18
32.0	-4951.989	2635.597	3028.233	-279.7	-323.4	53.5	-4.17	0.97	2.21
33.0	-4952.271	2635.274	3028.288	-283.9	-322.4	55.7	-4.31	0.90	2.25
34.0	-4952.557	2634.952	3028.345	-288.3	-321.6	58.0	-4.47	0.84	2.29
35.0	-4952.847	2634.631	3028.404	-292.8	-320.7	60.3	-4.62	0.79	2.31
36.0	-4953.142	2634.311	3028.465	-297.5	-320.0	62.6	-4.75	0.74	2.33
37.0	-4953.443	2633.991	3028.529	-302.3	-319.2	65.0	-4.86	0.70	2.35
38.0	-4953.747	2633.672	3028.595	-307.2	-318.5	67.3	-4.97	0.65	2.38
39.0	-4954.057	2633.354	3028.664	-312.3	-317.9	69.7	-5.09	0.58	2.42
40.0	-4954.372	2633.036	3028.735	-317.4	-317.4	72.2	-5.23	0.51	2.44
41.0	-4954.692	2632.719	3028.808	-322.7	-316.9	74.6	-5.39	0.44	2.44
42.0	-4955.017	2632.403	3028.884	-328.2	-316.5	77.0	-5.56	0.38	2.42
43.0	-4955.348	2632.086	3028.962	-333.8	-316.1	79.4	-5.72	0.33	2.40
44.0	-4955.685	2631.770	3029.043	-339.6	-315.8	81.8	-5.87	0.28	2.39
45.0	-4956.027	2631.455	3029.126	-345.5	-315.6	84.2	-6.01	0.21	2.39
46.0	-4956.376	2631.139	3029.211	-351.6	-315.4	86.6	-6.16	0.12	2.40
47.0	-4956.731	2630.824	3029.299	-357.8	-315.3	89.0	-6.32	0.01	2.41
48.0	-4957.092	2630.508	3029.389	-364.2	-315.4	91.4	-6.49	-0.12	2.39
49.0	-4957.459	2630.193	3029.482	-370.8	-315.5	93.8	-6.65	-0.27	2.38
50.0	-4957.834	2629.877	3029.577	-377.5	-315.9	96.2	-6.80	-0.40	2.38
51.0	-4958.215	2629.561	3029.674	-384.4	-316.3	98.6	-6.96	-0.53	2.37
52.0	-4958.602	2629.245	3029.774	-391.4	-316.9	100.9	-7.13	-0.64	2.36
53.0	-4958.997	2628.928	3029.876	-398.7	-317.6	103.3	-7.31	-0.76	2.33
54.0	-4959.400	2628.610	3029.981	-406.1	-318.4	105.6	-7.49	-0.88	2.30
55.0	-4959.810	2628.290	3030.087	-413.6	-319.4	107.9	-7.66	-1.01	2.26
56.0	-4960.227	2627.971	3030.196	-421.4	-320.4	110.1	-7.83	-1.13	2.22
57.0	-4960.653	2627.650	3030.308	-429.3	-321.6	112.3	-8.00	-1.23	2.18
58.0	-4961.086	2627.327	3030.421	-437.4	-322.9	114.5	-8.16	-1.33	2.12
59.0	-4961.527	2627.004	3030.537	-445.6	-324.3	116.6	-8.31	-1.46	2.07
60.0	-4961.977	2626.679	3030.654	-454.0	-325.8	118.6	-8.43	-1.64	2.02
61.0	-4962.435	2626.352	3030.774	-462.4	-327.6	120.6	-8.52	-1.84	1.96
62.0	-4962.902	2626.024	3030.896	-471.0	-329.5	122.5	-8.57	-2.05	1.91
63.0	-4963.377	2625.694	3031.019	-479.5	-331.6	124.4	-8.58	-2.23	1.87
	MACH ONE								
63.690	-4963.710	2625.464	3031.105	-485.4	-333.2	125.7	-8.59	-2.34	1.84

TABLE VII
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
64.0	-4963.861	2625.361	3031.144	-488.1	-333.9	126.3	-8.59	-2.40	1.82
65.0	-4964.354	2625.025	3031.272	-496.7	-336.4	128.1	-8.65	-2.57	1.76
66.0	-4964.855	2624.688	3031.401	-505.5	-339.1	129.8	-8.78	-2.76	1.69
67.0	-4965.365	2624.348	3031.531	-514.3	-341.9	131.4	-8.97	-2.95	1.62
68.0	-4965.884	2624.004	3031.663	-523.4	-344.9	133.0	-9.20	-3.13	1.58
69.0	-4966.411	2623.658	3031.797	-532.7	-348.1	134.6	-9.42	-3.29	1.56
70.0	-4966.949	2623.308	3031.933	-542.2	-351.5	136.2	-9.65	-3.48	1.55
71.0	-4967.496	2622.954	3032.070	-552.0	-355.1	137.7	-9.88	-3.70	1.53
72.0	-4968.053	2622.597	3032.208	-562.0	-358.9	139.2	-10.13	-3.92	1.48
73.0	-4968.620	2622.237	3032.348	-572.2	-362.9	140.7	-10.38	-4.14	1.42
74.0	-4969.198	2621.872	3032.490	-582.7	-367.2	142.1	-10.61	-4.37	1.38
75.0	-4969.786	2621.502	3032.632	-593.4	-371.7	143.4	-10.84	-4.59	1.35
76.0	-4970.385	2621.129	3032.776	-604.4	-376.4	144.8	-11.06	-4.81	1.31
77.0	-4970.995	2620.750	3032.922	-615.6	-381.2	146.0	-11.30	-4.94	1.24
78.0	-4971.616	2620.366	3033.068	-627.0	-386.2	147.2	-11.55	-5.02	1.16
79.0	-4972.249	2619.978	3033.216	-638.7	-391.2	148.4	-11.81	-5.08	1.10
MAXIMUM DYNAMIC PRESSURE									
79.500	-4972.570	2619.781	3033.291	-644.6	-393.8	148.9	-11.93	-5.13	1.09
80.0	-4972.893	2619.584	3033.365	-650.6	-396.4	149.5	-12.05	-5.20	1.11
81.0	-4973.550	2619.185	3033.515	-662.7	-401.7	150.6	-12.26	-5.44	1.17
82.0	-4974.219	2618.780	3033.667	-675.1	-407.3	151.8	-12.48	-5.75	1.23
83.0	-4974.900	2618.370	3033.819	-687.7	-413.2	153.0	-12.72	-6.08	1.22
84.0	-4975.595	2617.954	3033.973	-700.6	-419.4	154.2	-12.98	-6.37	1.14
85.0	-4976.302	2617.531	3034.127	-713.6	-425.9	155.3	-13.23	-6.64	1.04
86.0	-4977.022	2617.102	3034.283	-727.0	-432.7	156.3	-13.50	-6.89	0.93
87.0	-4977.756	2616.666	3034.440	-740.6	-439.6	157.2	-13.77	-7.07	0.85
88.0	-4978.504	2616.223	3034.598	-754.5	-446.7	158.[illegible]	-14.01	-7.21	0.82
89.0	-4979.265	2615.772	3034.756	-768.6	-454.0	158.8	-14.22	-7.38	0.81
90.0	-4980.041	2615.315	3034.915	-782.9	-461.5	159.6	-14.42	-7.61	0.78
91.0	-4980.831	2614.849	3035.075	-797.5	-469.3	160.4	-14.63	-7.88	0.74
92.0	-4981.636	2614.376	3035.236	-812.3	-477.3	161.1	-14.89	-8.17	0.67
93.0	-4982.456	2613.895	3035.398	-827.2	-485.6	161.8	-15.04	-8.54	0.71
94.0	-4983.291	2613.405	3035.560	-842.3	-494.3	162.5	-15.21	-8.87	0.76
95.0	-4984.141	2612.906	3035.723	-857.6	-503.3	163.2	-15.46	-9.16	0.73
96.0	-4985.006	2612.398	3035.886	-873.3	-512.6	163.9	-15.78	-9.41	0.6[illegible]
97.0	-4985.887	2611.881	3036.051	-889.2	-522.1	164.4	-16.12	-9.61	0.43
98.0	-4986.785	2611.354	3036.215	-905.4	-531.8	164.8	-16.40	-9.81	0.3[illegible]
99.0	-4987.698	2610.817	3036.380	-921.9	-541.7	165.1	-16.59	-10.04	0.28
100.0	-4988.629	2610.271	3036.546	-938.6	-551.9	165.4	-16.73	-10.33	0.32
101.0	-4989.576	2609.713	3036.711	-955.4	-562.4	165.7	-16.98	-10.56	0.26
102.0	-4990.540	2609.146	3036.877	-972.5	-573.1	165.9	-17.24	-10.84	0.19

TABLE VII
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
103.0	-4991.521	2608.567	3037.043	-989.9	-584.0	166.1	-17.47	-11.15	0.13
104.0	-4992.520	2607.978	3037.209	-1007.5	-595.4	166.2	-17.68	-11.48	0.09
105.0	-4993.536	2607.376	3037.375	-1025.3	-607.0	166.2	-17.90	-11.77	0.03
106.0	-4994.570	2606.763	3037.542	-1043.3	-618.9	166.2	-18.14	-12.04	-0.05
107.0	-4995.623	2606.139	3037.708	-1061.5	-631.0	166.1	-18.39	-12.30	-0.13
108.0	-4996.694	2605.501	3037.874	-1080.0	-643.5	166.0	-18.64	-12.56	-0.21
109.0	-4997.783	2604.852	3038.040	-1098.8	-656.2	165.7	-18.88	-12.83	-0.29
110.0	-4998.891	2604.189	3038.205	-1117.8	-669.1	165.4	-19.10	-13.14	-0.38
111.0	-5000.019	2603.513	3038.371	-1137.0	-682.4	165.0	-19.33	-13.42	-0.45
112.0	-5001.165	2602.824	3038.535	-1156.4	-696.0	164.5	-19.57	-13.72	-0.51
113.0	-5002.332	2602.121	3038.700	-1176.1	-709.8	164.0	-19.81	-14.01	-0.57
114.0	-5003.518	2601.405	3038.863	-1196.1	-724.0	163.4	-20.06	-14.31	-0.64
115.0	-5004.724	2600.674	3039.026	-1216.2	-738.4	162.7	-20.32	-14.60	-0.73
116.0	-5005.951	2599.927	3039.189	-1236.7	-753.2	161.9	-20.59	-14.90	-0.81
117.0	-5007.197	2599.167	3039.350	-1257.4	-768.2	161.1	-20.84	-15.20	-0.88
118.0	-5008.465	2598.391	3039.511	-1278.3	-783.6	160.2	-21.09	-15.51	-0.92
119.0	-5009.754	2597.600	3039.671	-1299.6	-799.2	159.2	-21.34	-15.82	-0.98
120.0	-5011.064	2596.793	3039.829	-1321.0	-815.2	158.2	-21.61	-16.13	-1.07
121.0	-5012.396	2595.970	3039.987	-1342.8	-831.4	157.1	-21.87	-16.46	-1.16
122.0	-5013.750	2595.130	3040.143	-1364.7	-848.2	155.8	-22.12	-16.91	-1.29
123.0	-5015.126	2594.273	3040.299	-1387.0	-865.3	154.5	-22.36	-17.36	-1.37
124.0	-5016.529	2593.396	3040.452	-1409.5	-882.9	153.2	-22.60	-17.70	-1.35
125.0	-5017.949	2592.505	3040.605	-1432.1	-900.6	152.1	-22.91	-18.01	-1.44
126.0	-5019.388	2591.599	3040.757	-1454.9	-918.6	151.0	-23.28	-18.40	-1.69
127.0	-5020.855	2590.672	3040.907	-1478.4	-937.2	149.2	-23.50	-18.68	-1.64
128.0	-5022.345	2589.725	3041.056	-1502.0	-956.0	147.6	-23.74	-18.93	-1.60
129.0	-5023.860	2588.759	3041.203	-1525.9	-975.1	145.9	-24.07	-19.23	-1.74
130.0	-5025.397	2587.774	3041.347	-1550.1	-994.5	144.1	-24.35	-19.81	-1.82
131.0	-5026.960	2586.770	3041.491	-1574.5	-1014.4	142.3	-24.60	-20.09	-1.83
132.0	-5028.548	2585.744	3041.632	-1599.3	-1034.7	140.4	-24.86	-20.51	-1.95
133.0	-5030.160	2584.699	3041.772	-1624.3	-1055.4	138.5	-25.13	-20.88	-2.[illegible]
134.0	-5031.797	2583.633	3041.910	-1649.4	-1076.6	136.3	-25.47	-21.33	-2.18
135.0	-5033.460	2582.545	3042.045	-1675.2	-1098.1	134.1	-25.79	-21.71	-2.27
136.0	-5035.149	2581.435	3042.178	-1701.2	-1119.9	131.9	-26.09	-22.10	-2.36
137.0	-5036.864	2580.304	3042.309	-1727.5	-1142.2	129.5	-26.38	-22.49	-2.48
138.0	-5038.606	2579.150	3042.437	-1753.8	-1164.8	127.0	-26.67	-22.90	-2.55
139.0	-5040.373	2577.973	3042.563	-1780.7	-1188.1	124.1	-27.00	-23.34	-2.63
IECO									
139.570	-5041.393	2577.292	3042.633	-1795.7	-1200.6	123.0	-27.17	-23.54	-2.7[illegible]
140.0	-5042.168	2576.773	3042.686	-1806.2	-1210.5	121.6	-17.55	-18.39	-3.36
141.0	-5043.980	2575.555	3042.806	-1816.4	-1224.0	118.2	-10.06	-13.79	-3.55

TABLE VII

SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
142.0	-5045.801	2574.323	3042.922	-1826.4	-1237.6	114.5	-9.86	-13.66	-3.62
143.0	-5047.633	2573.078	3043.035	-1836.5	-1251.3	110.9	-9.97	-13.69	-3.65
OECO									
143.470	-5048.497	2572.489	3043.087	-1839.4	-1256.7	109.1	-10.14	-13.82	-3.68
144.0	-5049.473	2571.822	3043.144	-1839.1	-1260.1	107.3	2.21	-5.66	-3.66
S-IB/S-IVB SEPARATION									
144.230	-5049.896	2571.531	3043.168	-1838.0	-1260.9	106.5	3.75	-5.16	-3.94
145.0	-5051.310	2570.559	3043.249	-1833.7	-1263.9	103.5	6.57	-4.32	-4.51
146.0	-5053.141	2569.292	3043.351	-1826.5	-1268.6	98.6	7.24	-4.34	-4.75
147.0	-5054.964	2568.021	3043.447	-1818.9	-1273.5	93.4	7.14	-4.52	-4.76
148.0	-5056.780	2566.745	3043.538	-1812.1	-1277.9	88.9	5.43	-5.05	-4.38
149.0	-5058.590	2565.464	3043.625	-1808.2	-1283.8	84.6	2.99	-6.39	-4.23
150.0	-5060.398	2564.176	3043.707	-1805.6	-1290.4	80.4	2.38	-6.69	-4.17
155.0	-5069.401	2557.638	3044.056	-1795.9	-1324.7	59.0	1.51	-7.13	-4.27
160.0	-5078.365	2550.922	3044.298	-1788.8	-1360.6	38.1	1.34	-7.18	-4.16
165.0	-5087.293	2544.029	3044.436	-1782.3	-1396.6	17.0	1.29	-7.24	-4.22
170.0	-5096.189	2536.955	3044.468	-1776.2	-1432.9	-4.0	1.08	-7.35	-4.18
GUIDANCE INITIATION									
172.400	-5100.448	2533.495	3044.446	-1773.7	-1450.6	-14.0	1.01	-7.40	-4.16
175.0	-5105.056	2529.699	3044.396	-1771.1	-1469.8	-24.8	0.96	-7.35	-4.17
180.0	-5113.901	2522.260	3044.220	-1767.2	-1505.1	-45.5	0.62	-6.78	-4.02
185.0	-5122.730	2514.652	3043.943	-1764.8	-1537.8	-64.6	0.45	-6.31	-3.69
190.0	-5131.546	2506.884	3043.574	-1761.8	-1569.2	-83.2	0.38	-6.45	-3.74
195.0	-5140.354	2498.956	3043.112	-1761.2	-1602.0	-101.8	0.13	-6.58	-3.73
200.0	-5149.156	2490.864	3042.556	-1759.8	-1634.9	-120.7	0.25	-6.66	-3.83
205.0	-5157.953	2482.606	3041.905	-1758.6	-1668.4	-140.0	0.19	-6.72	-3.89
210.0	-5166.743	2474.180	3041.156	-1757.7	-1702.2	-159.5	0.19	-6.81	-3.91
215.0	-5175.529	2465.583	3040.310	-1756.7	-1736.4	-179.1	0.13	-6.89	-3.94
220.0	-5184.311	2456.815	3039.365	-1756.2	-1771.0	-198.9	0.10	-6.97	-3.97
225.0	-5193.092	2447.873	3038.321	-1755.8	-1806.0	-218.8	0.04	-7.05	-3.96
230.0	-5201.870	2438.755	3037.177	-1755.8	-1841.4	-238.7	-0.04	-7.10	-4.0
235.0	-5210.650	2429.458	3035.933	-1756.0	-1877.1	-258.8	-0.05	-7.20	-4.04
240.0	-5219.430	2419.982	3034.589	-1756.3	-1913.4	-279.1	-0.08	-7.29	-4.07
245.0	-5228.212	2410.324	3033.142	-1756.6	-1950.0	-299.5	-0.10	-7.39	-4.1[illegible]
250.0	-5236.997	2400.482	3031.594	-1757.4	-1987.1	-320.0	-0.20	-7.44	-4.11

TABLE VII
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
255.0	-5245.787	2390.453	3029.942	-1758.4	-2024.5	-340.7	-0.25	-7.53	-4.14
260.0	-5254.583	2380.236	3028.187	-1759.8	-2062.3	-361.4	-0.32	-7.61	-4.16
265.0	-5263.385	2369.829	3026.328	-1761.4	-2100.5	-382.2	-0.34	-7.73	-4.19
270.0	-5272.197	2359.230	3024.364	-1763.2	-2139.3	-403.3	-0.36	-7.80	-4.23
275.0	-5281.017	2348.435	3022.295	-1765.2	-2178.6	-424.5	-0.48	-7.94	-4.26
280.0	-5289.846	2337.444	3020.119	-1766.5	-2217.8	-445.9	-0.65	-8.10	-4.27
285.0	-5298.684	2326.256	3017.836	-1768.9	-2257.9	-467.3	-0.82	-8.20	-4.29
290.0	-5307.539	2314.864	3015.445	-1772.4	-2298.7	-488.8	-0.56	-8.11	-4.32
295.0	-5316.408	2303.268	3012.947	-1775.5	-2339.5	-510.5	-0.66	-8.25	-4.35
300.0	-5325.295	2291.467	3010.340	-1778.9	-2381.0	-532.4	-0.71	-8.36	-4.39
305.0	-5334.198	2279.457	3007.623	-1782.6	-2422.9	-554.4	-0.78	-8.40	-4.51
310.0	-5343.121	2267.237	3004.795	-1786.4	-2465.4	-576.6	-0.77	-8.58	-4.40
315.0	-5352.063	2254.803	3001.857	-1790.5	-2508.4	-598.9	-0.86	-8.65	-4.49
320.0	-5361.027	2242.152	2998.806	-1794.8	-2551.9	-621.4	-0.90	-8.72	-4.50
325.0	-5370.012	2229.283	2995.642	-1799.5	-2595.7	-644.0	-0.95	-8.85	-4.54
330.0	-5379.022	2216.193	2992.365	-1804.5	-2640.1	-666.7	-1.05	-8.92	-4.55
335.0	-5388.058	2202.881	2988.975	-1809.8	-2684.9	-689.6	-1.11	-9.03	-4.58
340.0	-5397.121	2189.343	2985.469	-1815.6	-2730.3	-712.6	-1.19	-9.12	-4.61
345.0	-5406.214	2175.577	2981.848	-1821.7	-2776.4	-735.8	-1.26	-9.32	-4.68
350.0	-5415.339	2161.578	2978.111	-1828.2	-2823.1	-759.3	-1.33	-9.41	-4.70
355.0	-5424.496	2147.344	2974.256	-1834.9	-2870.4	-782.8	-1.37	-9.54	-4.74
360.0	-5433.688	2132.873	2970.282	-1842.0	-2918.4	-806.6	-1.48	-9.72	-4.80
365.0	-5442.917	2118.159	2966.189	-1849.2	-2966.8	-830.6	-1.38	-9.60	-4.76
370.0	-5452.181	2103.204	2961.976	-1857.0	-3015.9	-854.7	-1.68	-9.99	-4.87
375.0	-5461.487	2088.000	2957.642	-1865.2	-3065.7	-879.1	-1.66	-10.02	-4.89
380.0	-5470.835	2072.547	2953.185	-1874.4	-3115.6	-903.2	-2.19	-9.91	-4.66
385.0	-5480.230	2056.841	2948.608	-1882.9	-3166.9	-928.1	-1.55	-10.43	-5.13
390.0	-5489.666	2040.878	2943.905	-1892.1	-3218.6	-953.1	-1.93	-10.41	-4.99
395.0	-5499.151	2024.654	2939.077	-1901.9	-3271.0	-978.1	-2.02	-10.55	-5.04
400.0	-5508.686	2008.166	2934.123	-1912.3	-3324.1	-1003.4	-2.14	-10.72	-5.08
405.0	-5518.275	1991.411	2929.043	-1923.2	-3378.1	-1028.9	-2.22	-10.88	-5.11
410.0	-5527.919	1974.384	2923.834	-1934.6	-3432.8	-1054.6	-2.35	-11.06	-5.17
415.0	-5537.622	1957.081	2918.496	-1946.5	-3488.6	-1080.6	-2.43	-11.25	-5.23
420.0	-5547.385	1939.497	2913.028	-1958.7	-3544.9	-1106.8	-2.49	-11.38	-5.28
425.0	-5557.211	1921.631	2907.428	-1971.7	-3602.0	-1133.1	-2.61	-11.52	-5.32
430.0	-5567.102	1903.476	2901.695	-1984.8	-3660.1	-1159.9	-2.73	-11.69	-5.35
435.0	-5577.060	1885.029	2895.828	-1998.7	-3718.9	-1186.8	-2.85	-11.86	-5.38
440.0	-5587.090	1866.285	2889.827	-2013.2	-3778.6	-1213.9	-2.96	-12.04	-5.46
445.0	-5597.193	1847.241	2883.689	-2028.3	-3839.2	-1241.2	-3.09	-12.23	-5.49
450.0	-5607.374	1827.891	2877.415	-2044.0	-3900.8	-1268.8	-3.20	-12.41	-5.55
455.0	-5617.634	1808.231	2871.001	-2060.3	-3963.2	-1296.6	-3.32	-12.62	-5.59
460.0	-5627.978	1788.256	2864.448	-2077.2	-4026.8	-1324.7	-3.46	-12.80	-5.63
465.0	-5638.408	1767.961	2857.754	-2094.9	-4091.3	-1353.0	-3.63	-13.03	-5.70
470.0	-5648.929	1747.341	2850.917	-2113.5	-4157.0	-1381.7	-3.81	-13.29	-5.76

TABLE VII

SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
475.0	-5659.545	1726.389	2843.937	-2132.9	-4223.9	-1410.7	-3.96	-13.51	-5.82
480.0	-5670.259	1705.099	2836.810	-2152.9	-4292.5	-1440.2	-4.04	-13.88	-5.97
485.0	-5681.075	1683.461	2829.534	-2173.3	-4362.7	-1470.4	-4.11	-14.25	-6.13
490.0	-5691.992	1661.469	2822.104	-2193.9	-4434.8	-1501.4	-4.18	-14.58	-6.27
495.0	-5703.015	1639.111	2814.519	-2214.9	-4508.1	-1532.8	-4.13	-14.69	-6.32
500.0	-5714.140	1616.387	2806.776	-2235.0	-4581.4	-1564.5	-3.90	-14.58	-6.32
505.0	-5725.362	1593.299	2798.875	-2253.3	-4653.4	-1596.0	-3.47	-14.27	-6.30
510.0	-5736.671	1569.855	2790.816	-2270.2	-4724.2	-1627.4	-3.32	-14.11	-6.25
515.0	-5748.063	1546.059	2782.602	-2286.5	-4794.1	-1658.3	-3.30	-13.89	-6.11
520.0	-5759.537	1521.915	2774.234	-2303.6	-4863.1	-1688.5	-3.56	-13.72	-5.95
525.0	-5771.101	1497.428	2765.719	-2322.2	-4931.4	-1717.8	-3.88	-13.60	-5.77
530.0	-5782.762	1472.601	2757.058	-2342.2	-4999.5	-1746.4	-4.10	-13.71	-5.73
535.0	-5794.523	1447.430	2748.253	-2362.0	-5069.5	-1776.2	-3.69	-14.34	-6.25
540.0	-5806.378	1421.899	2739.291	-2379.9	-5143.3	-1808.7	-3.72	-15.18	-6.67
545.0	-5818.320	1395.996	2730.165	-2396.7	-5217.9	-1841.9	-3.45	-14.95	-6.61
550.0	-5830.352	1369.719	2720.874	-2416.5	-5292.7	-1874.2	-4.34	-14.86	-6.28
555.0	-5842.490	1343.069	2711.424	-2438.9	-5367.4	-1905.5	-4.61	-15.07	-6.28
560.0	-5854.743	1316.042	2701.818	-2462.5	-5443.5	-1937.1	-4.83	-15.35	-6.35
565.0	-5867.117	1288.632	2692.053	-2487.3	-5520.8	-1968.9	-5.10	-15.64	-6.41
570.0	-5879.619	1260.831	2682.128	-2513.6	-5599.7	-2001.1	-5.39	-15.92	-6.46
575.0	-5892.256	1232.632	2672.042	-2541.2	-5680.1	-2033.6	-5.67	-16.26	-6.53
580.0	-5905.025	1204.038	2661.793	-2570.5	-5762.0	-2066.5	-5.96	-16.56	-6.59
585.0	-5917.953	1175.020	2651.379	-2601.1	-5845.8	-2099.4	-6.28	-16.87	-6.67
	S-IVB GUIDANCE CUTOFF								
588.468	-5927.012	1154.644	2644.057	-2622.8	-5904.1	-2122.6	-6.53	-17.08	-6.72
590.0	-5931.027	1145.590	2640.800	-2614.6	-5911.2	-2129.1	8.27	-1.68	-3.68
595.0	-5943.998	1116.014	2630.109	-2573.5	-5919.4	-2147.4	8.24	-1.58	-3.67
	S-IVB/CSM SEPARATION								
598.700	-5953.463	1094.101	2622.138	-2542.9	-5925.1	-2161.0	8.26	-1.53	-3.65
600.0	-5956.763	1086.398	2619.325	-2532.2	-5927.1	-2165.7	8.27	-1.52	-3.65

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
GUIDANCE REFERENCE RELEASE											
-4.468	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
-4.0	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
-3.0	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
-2.0	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
-1.0	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
0.0	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
FIRST MOTION											
0.730	6373.353	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	409.0	0	32
LIFTOFF SIGNAL											
0.930	6373.353	-80.5611	28.3608	198.10	89.90	0.5	90.00	0.07	409.0	0	32
1.0	6373.353	-80.5611	28.3608	198.58	89.94	0.6	90.00	0.09	409.0	0	32
2.0	6373.355	-80.5611	28.3608	15.19	89.61	3.0	90.00	0.43	409.0	0	34
3.0	6373.359	-80.5611	28.3608	13.61	89.26	5.5	89.99	0.77	409.0	0	38
4.0	6373.366	-80.5611	28.3608	11.82	88.99	8.0	89.98	1.11	409.1	0	45
5.0	6373.375	-80.5611	28.3608	9.96	88.80	10.5	89.97	1.47	409.1	0	54
6.0	6373.387	-80.5611	28.3608	8.11	88.67	13.2	89.96	1.84	409.2	0	66
7.0	6373.401	-80.5611	28.3608	6.36	88.57	15.9	89.94	2.22	409.3	1	8[illegible]
8.0	6373.419	-80.5611	28.3608	4.81	88.49	18.7	89.93	2.62	409.4	1	98
9.0	6373.439	-80.5611	28.3608	3.57	88.44	21.6	89.92	3.02	409.6	1	118
10.0	6373.462	-80.5611	28.3608	2.74	88.40	24.5	89.90	3.43	409.7	2	141
11.0	6373.488	-80.5611	28.3608	2.40	88.37	27.5	89.89	3.84	409.9	3	167
12.0	6373.517	-80.5611	28.3609	2.64	88.34	30.5	89.88	4.27	410.2	3	196
13.0	6373.549	-80.5611	28.3609	3.49	88.32	33.7	89.86	4.70	410.4	4	228
14.0	6373.584	-80.5611	28.3609	5.01	88.30	36.8	89.85	5.14	410.7	5	263
15.0	6373.622	-80.5611	28.3609	7.20	88.29	40.1	89.83	5.59	411.1	6	301
16.0	6373.664	-80.5611	28.3609	10.06	88.27	43.4	89.82	6.05	411.5	7	343
17.0	6373.709	-80.5611	28.3609	13.55	88.24	46.8	89.80	6.52	412.0	9	388
18.0	6373.758	-80.5611	28.3609	17.62	88.21	50.3	89.79	7.00	412.6	10	437
19.0	6373.810	-80.5611	28.3609	22.16	88.17	53.9	89.78	7.50	413.2	11	489
20.0	6373.866	-80.5611	28.3609	27.06	88.12	57.6	89.76	8.00	413.9	13	545
21.0	6373.925	-80.5611	28.3609	32.17	88.05	61.5	89.75	8.52	414.7	15	604
22.0	6373.988	-80.5611	28.3610	37.37	87.96	65.4	89.74	9.05	415.6	17	667
23.0	6374.056	-80.5611	28.3610	42.51	87.85	69.4	89.73	9.58	416.6	19	735
24.0	6374.127	-80.5611	28.3610	47.48	87.72	73.5	89.72	10.13	417.7	21	806

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
25.0	6374.203	-80.5610	28.3610	52.20	87.57	77.7	89.72	10.69	418.9	24	882
26.0	6374.283	-80.5610	28.3610	56.61	87.39	82.0	89.71	11.24	420.2	27	962
27.0	6374.367	-80.5610	28.3610	60.68	87.19	86.4	89.71	11.81	421.6	30	1046
28.0	6374.455	-80.5609	28.3611	64.39	86.97	90.8	89.71	12.37	423.2	34	1134
29.0	6374.548	-80.5609	28.3611	67.75	86.72	95.3	89.71	12.93	424.9	39	1227
30.0	6374.645	-80.5608	28.3611	70.80	86.44	99.8	89.72	13.50	426.7	44	1324
31.0	6374.747	-80.5608	28.3611	73.48	86.13	104.5	89.72	14.08	428.7	49	1426
32.0	6374.854	-80.5607	28.3611	75.79	85.78	109.3	89.73	14.65	430.9	56	1533
33.0	6374.965	-80.5606	28.3611	77.80	85.40	114.1	89.74	15.22	433.2	64	1644
34.0	6375.081	-80.5605	28.3612	79.58	85.00	119.1	89.74	15.80	435.7	73	176[illegible]
35.0	6375.203	-80.5604	28.3612	81.20	84.57	124.2	89.76	16.37	438.5	83	1882
36.0	6375.329	-80.5603	28.3612	82.67	84.14	129.4	89.77	16.95	441.4	95	20[illegible]8
37.0	6375.460	-80.5601	28.3612	83.95	83.70	134.7	89.79	17.53	444.4	108	2139
38.0	6375.596	-80.5600	28.3612	85.07	83.26	140.1	89.81	18.10	447.7	123	2275
39.0	6375.738	-80.5598	28.3612	86.02	82.81	145.6	89.83	18.68	451.0	139	2417
40.0	6375.885	-80.5596	28.3612	86.86	82.35	151.2	89.85	19.24	454.6	158	2564
41.0	6376.038	-80.5594	28.3612	87.67	81.89	156.9	89.88	19.81	458.4	178	2717
42.0	6376.196	-80.5591	28.3612	88.50	81.41	162.8	89.92	20.37	462.4	201	2875
43.0	6376.360	-80.5589	28.3612	89.35	80.93	168.8	89.96	20.93	466.6	226	3039
44.0	6376.529	-80.5586	28.3612	90.19	80.45	174.9	90.01	21.48	470.9	253	3208
45.0	6376.705	-80.5583	28.3612	91.00	79.96	181.1	90.07	22.03	475.5	283	3384
46.0	6376.886	-80.5579	28.3612	91.75	79.47	187.5	90.14	22.57	480.2	315	3565
47.0	6377.074	-80.5576	28.3612	92.45	78.97	193.9	90.20	23.10	485.2	350	3753
48.0	6377.267	-80.5572	28.3612	93.09	78.45	200.5	90.28	23.62	490.4	388	3946
49.0	6377.467	-80.5568	28.3611	93.69	77.92	207.3	90.35	24.13	495.9	430	4146
50.0	6377.672	-80.5563	28.3611	94.23	77.36	214.1	90.43	24.62	501.6	474	4351
51.0	6377.885	-80.5558	28.3611	94.74	76.80	221.1	90.52	25.10	507.5	522	4564
52.0	6378.103	-80.5553	28.3610	95.21	76.23	228.2	90.61	25.56	513.7	574	4782
53.0	6378.328	-80.5547	28.3610	95.67	75.65	235.4	90.71	26.01	520.1	630	50[illegible]7
54.0	6378.559	-80.5541	28.3609	96.12	75.07	242.8	90.81	26.46	526.7	690	5238
55.0	6378.797	-80.5534	28.3608	96.55	74.48	250.4	90.92	26.88	533.6	754	5476
56.0	6379.042	-80.5527	28.3608	96.99	73.89	258.1	91.04	27.30	540.7	823	5721
57.0	6379.293	-80.5520	28.3607	97.41	73.30	265.9	91.16	27.70	548.0	896	5972
58.0	6379.552	-80.5512	28.3606	97.83	72.71	273.9	91.30	28.08	555.5	975	623[illegible]
59.0	6379.816	-80.5503	28.3604	98.24	72.12	282.0	91.44	28.45	563.3	1058	6495
60.0	6380.088	-80.5494	28.3603	98.63	71.52	290.2	91.58	28.81	571.2	1147	6767
61.0	6380.367	-80.5485	28.3602	98.98	70.92	298.5	91.73	29.14	579.4	1241	7046
62.0	6380.653	-80.5475	28.3600	99.30	70.30	306.9	91.87	29.45	587.7	1341	7331
63.0	6380.945	-80.5464	28.3599	99.57	69.69	315.2	92.01	29.73	596.2	1447	7624
	MACH ONE										
63.690	6381.151	-80.5456	28.3598	99.73	69.26	321.0	92.11	29.91	602.1	1523	7829

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
64.0	6381.244	-80.5453	28.3597	99.80	69.07	323.6	92.15	29.99	604.7	1559	7923
65.0	6381.550	-80.5441	28.3595	100.01	68.45	332.1	92.29	30.23	613.4	1677	8228
66.0	6381.862	-80.5428	28.3593	100.21	67.83	340.6	92.43	30.45	622.3	1801	8540
67.0	6382.181	-80.5415	28.3591	100.40	67.21	349.3	92.58	30.66	631.4	1933	8859
68.0	6382.506	-80.5401	28.3588	100.60	66.57	358.1	92.73	30.85	640.8	2071	9184
69.0	6382.838	-80.5386	28.3586	100.79	65.94	367.2	92.88	31.03	650.5	2217	9516
70.0	6383.177	-80.5371	28.3583	100.97	65.30	376.6	93.04	31.20	660.4	2369	9855
71.0	6383.522	-80.5355	28.3580	101.13	64.67	386.2	93.19	31.36	670.6	2530	10200
72.0	6383.875	-80.5338	28.3577	101.29	64.02	396.0	93.35	31.51	681.2	2699	10553
73.0	6384.234	-80.5320	28.3574	101.45	63.38	406.2	93.52	31.64	692.1	2876	10912
74.0	6384.601	-80.5302	28.3571	101.60	62.72	416.5	93.68	31.77	703.3	3062	11279
75.0	6384.975	-80.5282	28.3567	101.75	62.07	427.2	93.85	31.87	714.8	3257	11653
76.0	6385.356	-80.5262	28.3563	101.88	61.42	438.1	94.01	31.97	726.6	3461	12034
77.0	6385.745	-80.5240	28.3559	102.02	60.78	449.3	94.19	32.06	738.6	3675	12422
78.0	6386.140	-80.5218	28.3555	102.18	60.15	460.7	94.36	32.15	751.0	3898	12818
79.0	6386.544	-80.5194	28.3550	102.34	59.53	472.4	94.55	32.23	763.5	4132	13221
MAXIMUM DYNAMIC PRESSURE											
79.500	6386.748	-80.5182	28.3548	102.42	59.23	478.4	94.64	32.27	769.9	4253	13426
80.0	6386.955	-80.5170	28.3545	102.50	58.94	484.4	94.73	32.31	776.4	4376	13632
81.0	6387.374	-80.5145	28.3540	102.65	58.35	496.7	94.91	32.39	789.5	4630	14051
82.0	6387.801	-80.5118	28.3535	102.76	57.77	509.3	95.08	32.45	802.9	4896	14478
83.0	6388.236	-80.5091	28.3529	102.85	57.18	522.2	95.24	32.50	816.7	5172	14912
84.0	6388.679	-80.5062	28.3523	102.93	56.59	535.5	95.40	32.54	830.9	5460	15355
85.0	6389.130	-80.5032	28.3517	103.01	56.00	549.0	95.57	32.57	845.5	5760	15806
86.0	6389.589	-80.5001	28.3511	103.09	55.40	562.8	95.73	32.58	860.3	6072	16265
87.0	6390.056	-80.4969	28.3504	103.19	54.82	577.0	95.90	32.59	875.5	6397	16732
88.0	6390.532	-80.4935	28.3497	103.28	54.24	591.4	96.07	32.59	891.0	6735	17208
89.0	6391.017	-80.4900	28.3490	103.38	53.68	606.2	96.24	32.59	906.7	7086	17692
90.0	6391.509	-80.4864	28.3482	103.46	53.13	621.2	96.41	32.59	922.8	7451	18184
91.0	6392.011	-80.4826	28.3474	103.54	52.59	636.5	96.57	32.57	939.1	7830	18685
92.0	6392.521	-80.4787	28.3465	103.62	52.05	652.2	96.73	32.55	955.8	8222	19195
93.0	6393.039	-80.4747	28.3457	103.67	51.51	668.1	96.88	32.52	972.7	8629	19714
94.0	6393.567	-80.4705	28.3447	103.71	50.97	684.3	97.02	32.48	990.1	9051	20241
95.0	6394.103	-80.4662	28.3438	103.74	50.44	700.9	97.16	32.43	1007.7	9488	20776
96.0	6394.648	-80.4617	28.3428	103.77	49.91	717.8	97.30	32.37	1025.8	9941	21321
97.0	6395.201	-80.4570	28.3418	103.81	49.39	735.1	97.44	32.31	1044.2	10410	21874
98.0	6395.764	-80.4522	28.3407	103.86	48.88	752.8	97.58	32.24	1062.9	10895	22436
99.0	6396.335	-80.4472	28.3396	103.92	48.37	770.8	97.73	32.17	1082.0	11397	23008
100.0	6396.916	-80.4421	28.3385	103.97	47.88	789.1	97.87	32.10	1101.3	11916	23588
101.0	6397.506	-80.4368	28.3373	104.01	47.39	807.7	98.00	32.02	1121.0	12452	24178
102.0	6398.105	-80.4313	28.3361	104.05	46.91	826.6	98.14	31.94	1140.9	13005	24777

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
103.0	6398.713	-80.4256	28.3348	104.08	46.44	845.9	98.27	31.86	1161.3	13577	25384
104.0	6399.331	-80.4198	28.3335	104.11	45.97	865.5	98.39	31.76	1182.0	14167	26032
105.0	6399.958	-80.4138	28.3322	104.15	45.50	885.5	98.52	31.67	1203.0	14775	26628
106.0	6400.594	-80.4075	28.3308	104.17	45.04	905.8	98.64	31.57	1224.4	15403	27264
107.0	6401.240	-80.4011	28.3293	104.20	44.59	926.4	98.76	31.46	1246.1	16050	27909
108.0	6401.895	-80.3945	28.3279	104.23	44.14	947.4	98.88	31.36	1268.1	16717	28564
109.0	6402.560	-80.3877	28.3263	104.27	43.71	968.8	99.00	31.25	1290.5	17404	29228
110.0	6403.234	-80.3807	28.3247	104.30	43.27	990.5	99.12	31.13	1313.2	18112	29902
111.0	6403.918	-80.3735	28.3231	104.33	42.85	1012.6	99.23	31.02	1336.3	18841	30585
112.0	6404.611	-80.3661	28.3214	104.36	42.43	1035.0	99.34	30.90	1359.7	19590	31278
113.0	6405.315	-80.3585	28.3197	104.39	42.01	1057.8	99.45	30.78	1383.5	20362	31981
114.0	6406.027	-80.3506	28.3179	104.41	41.60	1080.9	99.56	30.65	1407.6	21155	32693
115.0	6406.750	-80.3426	28.3160	104.44	41.20	1104.5	99.67	30.53	1432.1	21971	33415
116.0	6407.482	-80.3343	28.3141	104.47	40.80	1128.4	99.78	30.40	1457.0	22809	34147
117.0	6408.225	-80.3258	28.3122	104.49	40.41	1152.7	99.88	30.28	1482.3	23670	34889
118.0	6408.977	-80.3170	28.3102	104.52	40.03	1177.4	99.98	30.15	1507.9	24555	35640
119.0	6409.740	-80.3080	28.3081	104.54	39.65	1202.5	100.08	30.02	1533.9	25464	36402
120.0	6410.512	-80.2988	28.3060	104.57	39.28	1228.0	100.18	29.88	1560.3	26397	37174
121.0	6411.295	-80.2894	28.3038	104.59	38.91	1253.9	100.27	29.75	1587.1	27355	37956
122.0	6412.087	-80.2797	28.3015	104.61	38.54	1280.2	100.37	29.61	1614.4	28338	38748
123.0	6412.890	-80.2697	28.2992	104.63	38.18	1307.0	100.46	29.47	1642.0	29346	39550
124.0	6413.705	-80.2594	28.2969	104.65	37.82	1334.2	100.55	29.33	1670.2	30385	40364
125.0	6414.528	-80.2490	28.2944	104.64	37.47	1361.7	100.62	29.19	1698.6	31445	41187
126.0	6415.360	-80.2383	28.2920	104.64	37.13	1389.5	100.69	29.05	1727.3	32527	42018
127.0	6416.205	-80.2273	28.2894	104.67	36.78	1418.1	100.78	28.91	1756.8	33642	42861
128.0	6417.059	-80.2160	28.2868	104.68	36.45	1447.1	100.86	28.76	1786.5	34785	43715
129.0	6417.924	-80.2044	28.2841	104.70	36.12	1476.4	100.94	28.62	1816.7	35956	44580
130.0	6418.800	-80.1926	28.2813	104.72	35.79	1506.2	101.02	28.48	1847.3	37155	45454
131.0	6419.686	-80.1805	28.2785	104.73	35.47	1536.4	101.09	28.34	1878.4	38384	46340
132.0	6420.584	-80.1681	28.2756	104.74	35.15	1567.2	101.16	28.19	1910.0	39642	47236
133.0	6421.492	-80.1553	28.2726	104.75	34.84	1598.4	101.23	28.05	1942.0	40930	48143
134.0	6422.411	-80.1423	28.2696	104.76	34.52	1630.0	101.30	27.90	1974.4	42249	49061
135.0	6423.340	-80.1290	28.2665	104.77	34.22	1662.3	101.37	27.75	2007.5	43598	49990
136.0	6424.281	-80.1154	28.2633	104.78	33.92	1695.0	101.44	27.61	2041.0	44979	50930
137.0	6425.232	-80.1015	28.2600	104.79	33.62	1728.3	101.51	27.46	2075.0	46391	51880
138.0	6426.195	-80.0872	28.2567	104.80	33.32	1761.7	101.57	27.31	2109.2	47837	52842
139.0	6427.169	-80.0726	28.2533	104.82	33.02	1795.9	101.64	27.16	2144.3	49315	53814
	IECO										
139.570	6427.729	-80.0642	28.2513	104.82	32.88	1814.9	101.68	27.09	2163.6	50171	54374
140.0	6428.153	-80.0577	28.2498	104.82	32.74	1828.7	101.70	27.01	2177.7	50825	54798
141.0	6429.144	-80.0426	28.2462	104.83	32.50	1843.7	101.74	26.85	2193.5	52360	55787

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
142.0	6430.134	-80.0273	28.2426	104.85	32.25	1858.6	101.78	26.68	2209.1	53911	56777
143.0	6431.127	-80.0118	28.2390	104.86	32.01	1873.8	101.81	26.51	2225.0	55479	57768
	OECO										
143.470	6431.594	-80.0045	28.2373	104.87	31.90	1878.8	101.83	26.43	2230.3	56221	58235
144.0	6432.120	-79.9962	28.2353	104.88	31.80	1880.1	101.84	26.35	2232.0	57060	58760
	S-IB/S-IVB SEPARATION										
144.230	6432.348	-79.9927	28.2345	104.88	31.76	1879.5	101.84	26.32	2231.5	57425	58988
145.0	6433.108	-79.9806	28.2317	104.89	31.61	1876.9	101.85	26.18	2229.5	58645	59747
146.0	6434.088	-79.9650	28.2280	104.90	31.36	1872.6	101.86	25.96	2226.0	60230	60725
147.0	6435.057	-79.9494	28.2243	104.92	31.09	1868.1	101.87	25.73	2222.3	61816	61694
148.0	6436.018	-79.9337	28.2206	104.93	30.86	1864.1	101.88	25.52	2219.2	63401	62654
149.0	6436.971	-79.9181	28.2169	104.94	30.63	1863.4	101.89	25.33	2219.2	64988	63605
150.0	6437.917	-79.9024	28.2132	104.95	30.40	1864.3	101.91	25.14	2220.8	66579	64550
155.0	6442.563	-79.8234	28.1944	105.03	29.26	1872.4	102.01	24.20	2232.4	74602	69190
160.0	6447.073	-79.7431	28.1753	105.10	28.14	1884.4	102.10	23.29	2247.8	82754	73694
165.0	6451.451	-79.6616	28.1557	105.17	27.04	1897.8	102.20	22.40	2264.3	91040	78067
170.0	6455.700	-79.5788	28.1358	105.25	25.96	1912.6	102.30	21.52	2282.1	99461	82310
	GUIDANCE INITIATION										
172.400	6457.695	-79.5386	28.1260	105.28	25.45	1920.5	102.34	21.11	2291.4	103553	84301
175.0	6459.824	-79.4946	28.1154	105.31	24.90	1929.4	102.39	20.67	2301.7	108024	86427
180.0	6463.826	-79.4091	28.0946	105.41	23.92	1947.0	102.51	19.88	2321.7	116731	90423
185.0	6467.722	-79.3222	28.0733	105.52	23.06	1964.8	102.63	19.18	2341.7	125576	94312
190.0	6471.521	-79.2342	28.0515	105.62	22.24	1982.0	102.75	18.52	2360.8	134549	98104
195.0	6475.226	-79.1449	28.0293	105.72	21.44	2002.4	102.87	17.89	2383.0	143654	101802
200.0	6478.840	-79.0544	28.0067	105.82	20.65	2022.7	102.99	17.26	2405.1	152897	105409
205.0	6482.360	-78.9625	27.9835	105.93	19.87	2044.1	103.11	16.62	2428.1	162279	108922
210.0	6485.787	-78.8693	27.9599	106.04	19.10	2066.4	103.23	16.01	2452.0	171804	112342
215.0	6489.121	-78.7748	27.9357	106.14	18.34	2089.4	103.35	15.40	2476.5	181472	115668
220.0	6492.362	-78.6789	27.9110	106.25	17.60	2113.5	103.47	14.80	2502.0	191288	118902
225.0	6495.512	-78.5816	27.8858	106.35	16.88	2138.5	103.60	14.21	2528.3	201254	122044
230.0	6498.571	-78.4829	27.8600	106.45	16.17	2164.4	103.71	13.64	2555.5	211372	125095
235.0	6501.540	-78.3828	27.8338	106.55	15.49	2191.1	103.83	13.09	2583.4	221645	128056
240.0	6504.421	-78.2812	27.8069	106.65	14.81	2218.8	103.95	12.54	2612.1	232076	130929
245.0	6507.213	-78.1781	27.7795	106.75	14.15	2247.2	104.07	12.01	2641.6	242667	133712
250.0	6509.916	-78.0735	27.7515	106.85	13.51	2276.6	104.18	11.48	2672.0	253422	136407

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
255.0	6512.533	-77.9674	27.7229	106.95	12.89	2306.9	104.30	10.98	2703.1	264343	139015
260.0	6515.065	-77.8597	27.6937	107.04	12.30	2338.0	104.42	10.49	2735.1	275432	141538
265.0	6517.513	-77.7505	27.6639	107.14	11.72	2369.9	104.53	10.01	2767.7	286693	143977
270.0	6519.878	-77.6396	27.6334	107.23	11.15	2402.9	104.64	9.55	2801.5	298128	146332
275.0	6522.159	-77.5271	27.6024	107.33	10.60	2436.7	104.76	9.09	2835.9	309742	148604
280.0	6524.357	-77.4130	27.5707	107.42	10.05	2470.4	104.87	8.64	2870.2	321534	150792
285.0	6526.473	-77.2972	27.5383	107.51	9.54	2505.7	104.98	8.22	2906.1	333508	152898
290.0	6528.512	-77.1796	27.5053	107.61	9.05	2542.6	105.10	7.81	2943.6	345670	154927
295.0	6530.474	-77.0603	27.4716	107.70	8.58	2579.7	105.21	7.42	2981.0	358023	156879
300.0	6532.360	-76.9393	27.4372	107.79	8.12	2617.7	105.32	7.03	3019.5	370568	158754
305.0	6534.171	-76.8165	27.4020	107.88	7.68	2656.5	105.43	6.66	3058.7	383309	160555
310.0	6535.909	-76.6918	27.3662	107.97	7.25	2696.2	105.54	6.30	3098.7	396250	162281
315.0	6537.573	-76.5653	27.3296	108.06	6.83	2736.7	105.65	5.95	3139.5	409393	163934
320.0	6539.165	-76.4370	27.2923	108.15	6.44	2778.0	105.76	5.62	3181.1	422742	165515
325.0	6540.689	-76.3067	27.2542	108.24	6.06	2820.0	105.87	5.30	3223.5	436300	167027
330.0	6542.144	-76.1745	27.2153	108.33	5.70	2862.9	105.98	4.99	3266.6	450070	168470
335.0	6543.533	-76.0404	27.1757	108.42	5.36	2906.6	106.09	4.70	3310.5	464055	169847
340.0	6544.858	-75.9042	27.1352	108.51	5.03	2951.3	106.20	4.42	3355.4	478259	171160
345.0	6546.122	-75.7661	27.0939	108.60	4.72	2997.0	106.31	4.16	3401.2	492687	172411
350.0	6547.325	-75.6259	27.0517	108.69	4.42	3043.6	106.42	3.90	3448.0	507341	173601
355.0	6548.469	-75.4836	27.0087	108.78	4.14	3091.0	106.53	3.66	3495.6	522228	174733
360.0	6549.557	-75.3392	26.9649	108.87	3.87	3139.4	106.64	3.43	3544.1	537349	175807
365.0	6550.589	-75.1927	26.9201	108.96	3.62	3188.5	106.75	3.21	3593.3	552710	176826
370.0	6551.569	-75.0440	26.8744	109.05	3.38	3238.5	106.85	3.00	3643.4	568312	177792
375.0	6552.498	-74.8930	26.8278	109.13	3.15	3289.7	106.96	2.81	3694.6	584162	178707
380.0	6553.380	-74.7399	26.7802	109.22	2.96	3341.5	107.07	2.64	3746.5	600263	179575
385.0	6554.220	-74.5844	26.7317	109.31	2.75	3394.4	107.18	2.46	3799.4	616619	180401
390.0	6555.013	-74.4267	26.6822	109.40	2.57	3448.2	107.29	2.30	3853.3	633235	181178
395.0	6555.765	-74.2666	26.6316	109.49	2.40	3503.0	107.40	2.15	3908.1	650114	181916
400.0	6556.480	-74.1041	26.5801	109.58	2.25	3558.9	107.51	2.02	3964.0	667263	182615
405.0	6557.161	-73.9391	26.5274	109.67	2.11	3615.9	107.62	1.89	4021.0	684685	18328[illegible]
410.0	6557.811	-73.7717	26.4738	109.76	1.98	3673.9	107.73	1.78	4079.1	702387	183914
415.0	6558.433	-73.6018	26.4190	109.85	1.87	3733.3	107.84	1.68	4138.5	720373	184519
420.0	6559.029	-73.4294	26.3630	109.94	1.77	3793.4	107.95	1.59	4198.6	738649	185099
425.0	6559.603	-73.2543	26.3060	110.03	1.68	3854.6	108.06	1.52	4259.8	757219	185656
430.0	6560.158	-73.0766	26.2477	110.13	1.60	3916.9	108.17	1.45	4322.2	776088	186194
435.0	6560.698	-72.8963	26.1883	110.22	1.54	3980.4	108.28	1.39	4385.6	795262	186716
440.0	6561.226	-72.7132	26.1276	110.31	1.49	4045.0	108.39	1.35	4450.2	814745	187226
445.0	6561.748	-72.5274	26.0657	110.40	1.45	4110.8	108.50	1.32	4516.0	834544	18773[illegible]
450.0	6562.266	-72.3388	26.0025	110.50	1.42	4177.8	108.61	1.30	4583.0	854665	188229
455.0	6562.786	-72.1473	25.9380	110.59	1.41	4245.9	108.72	1.29	4651.1	875111	188730
460.0	6563.311	-71.9530	25.8722	110.68	1.41	4315.4	108.84	1.29	4720.7	895891	189236
465.0	6563.847	-71.7557	25.8050	110.78	1.42	4386.3	108.95	1.30	4791.5	917010	189752
470.0	6564.398	-71.5555	25.7364	110.87	1.44	4458.6	109.06	1.32	4863.8	938473	190283

TABLE VIII
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST KM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
475.0	6564.971	-71.3521	25.6664	110.97	1.48	4532.5	109.17	1.36	4937.7	960291	190835
480.0	6565.568	-71.1457	25.5949	111.06	1.52	4608.2	109.29	1.40	5013.4	982468	191412
485.0	6566.195	-70.9361	25.5219	111.16	1.57	4685.9	109.40	1.44	5091.1	1005015	192017
490.0	6566.851	-70.7233	25.4473	111.25	1.62	4765.4	109.52	1.49	5170.6	1027941	192651
495.0	6567.540	-70.5071	25.3712	111.35	1.67	4846.3	109.63	1.54	5251.5	1051254	193318
500.0	6568.264	-70.2877	25.2934	111.45	1.73	4926.9	109.74	1.59	5332.1	1074956	194020
505.0	6569.023	-70.0649	25.2141	111.54	1.78	5005.7	109.86	1.64	5411.0	1099042	194756
510.0	6569.817	-69.8390	25.1332	111.64	1.83	5082.9	109.97	1.69	5488.2	1123503	195526
515.0	6570.646	-69.6100	25.0507	111.74	1.89	5159.0	110.09	1.75	5564.3	1148331	196332
520.0	6571.520	-69.3780	24.9666	111.84	1.97	5234.5	110.20	1.83	5639.8	1173523	197182
525.0	6572.450	-69.1430	24.8810	111.94	2.08	5309.7	110.31	1.93	5715.1	1199075	198088
530.0	6573.451	-68.9050	24.7937	112.05	2.21	5385.2	110.43	2.06	5790.6	1224986	199063
535.0	6574.530	-68.6641	24.7049	112.15	2.34	5462.6	110.55	2.18	5868.0	1251261	200117
540.0	6575.678	-68.4200	24.6143	112.26	2.44	5543.5	110.66	2.27	5948.9	1277911	201239
545.0	6576.888	-68.1728	24.5221	112.36	2.53	5624.8	110.78	2.36	6030.2	1304951	202423
550.0	6578.167	-67.9224	24.4281	112.47	2.66	5707.2	110.90	2.48	6112.7	1332379	203676
555.0	6579.540	-67.6688	24.3323	112.57	2.82	5790.4	111.02	2.63	6195.8	1360198	205021
560.0	6581.018	-67.4120	24.2347	112.68	2.99	5875.2	111.14	2.80	6280.7	1388414	206473
565.0	6582.613	-67.1519	24.1352	112.79	3.18	5961.8	111.26	2.98	6367.3	1417033	208039
570.0	6584.332	-66.8885	24.0339	112.90	3.38	6050.4	111.38	3.17	6455.9	1446063	209730
575.0	6586.188	-66.6217	23.9307	113.01	3.60	6140.9	111.51	3.38	6546.5	1475512	211557
580.0	6588.184	-66.3517	23.8254	113.13	3.83	6233.6	111.63	3.59	6639.1	1505375	213524
585.0	6590.345	-66.0780	23.7182	113.24	4.07	6328.4	111.76	3.82	6734.0	1535685	215656
	S-IVB GUIDANCE CUTOFF										
588.468	6591.943	-65.8861	23.6426	113.32	4.24	6394.7	111.84	3.99	6800.2	1556970	217233
590.0	6592.669	-65.8010	23.6089	113.35	4.23	6399.6	111.88	3.98	6805.3	1566425	217951
595.0	6595.003	-65.5234	23.4987	113.48	4.14	6396.7	112.00	3.89	6802.5	1597272	220254
	S-IVB/CSM SEPARATION										
598.700	6596.695	-65.3185	23.4168	113.58	4.07	6394.3	112.09	3.82	6800.2	1620085	221923
600.0	6597.283	-65.2466	23.3880	113.61	4.04	6393.5	112.12	3.80	6799.4	1628097	222503

TABLE IX
EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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									
-4.468	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
-4.0	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
-3.0	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
-2.0	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
-1.0	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
0.0	0	105	0	0.0	0.0	0.0	0.00	0.00	0.00
FIRST MOTION									
0.730	0	105	0	0.0	0.0	0.0	0.00	7.85	0.05
LIFTOFF SIGNAL									
0.930	0	105	0	0.0	1.6	0.0	0.01	7.84	0.02
1.0	0	105	0	0.0	2.1	0.0	0.01	7.84	0.01
2.0	0	111	0	0.0	10.0	-0.0	0.00	7.88	-0.10
3.0	0	125	0	0.0	17.9	-0.2	-0.01	8.05	-0.18
4.0	0	147	0	-0.0	26.1	-0.4	-0.02	8.28	-0.22
5.0	0	177	-0	-0.0	34.5	-0.6	-0.04	8.55	-0.25
6.0	0	216	-1	-0.1	43.2	-0.9	-0.06	8.81	-0.26
7.0	0	264	-2	-0.2	52.1	-1.1	-0.08	9.07	-0.27
8.0	0	320	-3	-0.2	61.3	-1.4	-0.09	9.30	-0.27
9.0	-0	386	-5	-0.3	70.7	-1.7	-0.09	9.52	-0.28
10.0	-0	462	-6	-0.4	80.3	-2.0	-0.08	9.72	-0.28
11.0	-0	547	-8	-0.5	90.2	-2.3	-0.07	9.92	-0.29
12.0	-1	642	-11	-0.5	100.2	-2.6	-0.04	10.11	-0.30
13.0	-1	747	-14	-0.6	110.4	-2.9	0.01	10.31	-0.32
14.0	-2	863	-17	-0.5	120.8	-3.2	0.06	10.53	-0.34
15.0	-2	989	-20	-0.4	131.5	-3.5	0.13	10.78	-0.35
16.0	-3	1125	-24	-0.3	142.4	-3.9	0.21	11.04	-0.38
17.0	-3	1273	-28	-0.0	153.6	-4.3	0.31	11.34	-0.40
18.0	-2	1433	-32	0.4	165.1	-4.7	0.42	11.65	-0.42
19.0	-2	1604	-37	0.8	176.9	-5.1	0.54	11.99	-0.43
20.0	-1	1786	-42	1.4	189.0	-5.6	0.67	12.33	-0.45
21.0	0	1982	-48	2.2	201.5	-6.0	0.81	12.68	-0.46
22.0	3	2190	-55	3.1	214.4	-6.5	0.97	13.02	-0.47
23.0	6	2411	-61	4.1	227.6	-7.0	1.13	13.34	-0.48
24.0	11	2645	-68	5.3	241.1	-7.4	1.31	13.64	-0.49

TABLE IX
EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
25.0	17	2893	-76	6.7	254.8	-7.9	1.50	13.90	-0.49
26.0	24	3155	-84	8.3	268.8	-8.4	1.70	14.13	-0.50
27.0	34	3431	-93	10.1	283.1	-8.9	1.92	14.32	-0.51
28.0	45	3721	-102	12.2	297.5	-9.4	2.16	14.48	-0.53
29.0	58	4025	-112	14.5	312.0	-10.0	2.43	14.79	-0.54
30.0	74	4345	-122	17.0	326.9	-10.5	2.75	15.11	-0.59
31.0	92	4679	-133	20.0	342.1	-11.2	3.10	15.27	-0.68
32.0	114	5029	-145	23.3	357.5	-11.9	3.49	15.48	-0.77
33.0	139	5394	-157	27.0	373.2	-12.7	3.89	15.80	-0.84
34.0	168	5776	-170	31.1	389.2	-13.6	4.29	16.20	-0.88
35.0	201	6173	-184	35.5	405.5	-14.4	4.69	16.53	-0.89
36.0	239	6587	-199	40.4	422.2	-15.3	5.02	16.82	-0.87
37.0	282	7018	-215	45.6	439.1	-16.2	5.32	17.09	-0.89
38.0	330	7465	-231	51.0	456.4	-17.2	5.63	17.35	-0.96
39.0	384	7930	-249	56.9	473.9	-18.2	6.00	17.62	-1.04
40.0	444	8413	-268	63.1	491.6	-19.2	6.42	17.92	-1.09
41.0	510	8914	-287	69.8	509.7	-20.3	6.91	18.23	-1.04
42.0	583	9433	-308	76.9	528.1	-21.2	7.39	18.54	-0.91
43.0	664	9970	-330	84.5	546.8	-22.1	7.82	18.85	-0.77
44.0	752	10527	-352	92.5	565.8	-22.8	8.22	19.15	-0.67
45.0	849	11102	-375	100.9	585.1	-23.5	8.66	19.44	-0.64
46.0	954	11697	-399	109.9	604.7	-24.1	9.16	19.71	-0.65
47.0	1069	12312	-424	119.3	624.5	-24.8	9.75	19.98	-0.67
48.0	1193	12946	-449	129.4	644.6	-25.4	10.40	20.20	-0.68
49.0	1328	13601	-475	140.1	664.9	-26.1	11.08	20.40	-0.70
50.0	1474	14276	-501	151.5	685.4	-26.9	11.72	20.60	-0.74
51.0	1631	14972	-528	163.5	706.1	-27.6	12.34	20.83	-0.75
52.0	1801	15689	-556	176.2	727.1	-28.3	12.96	21.08	-0.72
53.0	1983	16427	-585	189.5	748.3	-29.0	13.62	21.35	-0.64
54.0	2180	17186	-614	203.4	769.8	-29.6	14.29	21.59	-0.56
55.0	2390	17967	-644	218.1	791.5	-30.2	14.97	21.80	-0.48
56.0	2616	18769	-675	233.3	813.4	-30.6	15.60	22.02	-0.39
57.0	2857	19594	-705	249.3	835.5	-30.9	16.21	22.23	-0.25
58.0	3115	20440	-736	265.8	857.8	-31.1	16.81	22.42	-0.10
59.0	3389	21310	-767	282.9	880.3	-31.1	17.46	22.54	0.01
60.0	3681	22201	-799	300.7	902.9	-31.1	18.18	22.56	0.03
61.0	3991	23116	-830	319.3	925.4	-31.1	18.92	22.42	-0.04
62.0	4319	24052	-861	338.5	947.7	-31.2	19.57	22.19	-0.15
63.0	4668	25011	-892	358.3	969.7	-31.4	20.09	21.91	-0.28
MACH ONE									
63.690	4920	25686	-914	372.3	984.8	-31.7	20.42	21.72	-0.35

TABLE IX

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
64.0	5036	25992	-924	378.6	991.5	-31.8	20.59	21.64	-0.38
65.0	5425	26994	-956	399.6	1013.0	-32.1	21.20	21.48	-0.40
66.0	5835	28018	-988	421.2	1034.5	-32.5	21.98	21.44	-0.36
67.0	6267	29064	-1021	443.6	1056.0	-32.8	22.86	21.57	-0.27
68.0	6723	30131	-1054	466.9	1077.7	-33.1	23.77	21.83	-0.19
69.0	7201	31219	-1087	491.1	1099.7	-33.2	24.62	22.16	-0.16
70.0	7705	32330	-1120	516.1	1122.0	-33.4	25.53	22.48	-0.20
71.0	8234	33464	-1154	542.2	1144.6	-33.6	26.53	22.74	-0.22
72.0	8789	34620	-1187	569.3	1167.5	-33.8	27.61	22.99	-0.17
73.0	9373	35799	-1221	597.4	1190.6	-33.9	28.69	23.25	-0.09
74.0	9984	37002	-1255	626.6	1214.0	-34.0	29.73	23.49	-0.07
75.0	10626	38228	-1289	656.9	1237.6	-34.2	30.77	23.73	-0.10
76.0	11298	39477	-1324	688.1	1261.4	-34.3	31.75	23.96	-0.11
77.0	12003	40751	-1358	720.3	1285.6	-34.2	32.59	24.29	0.12
78.0	12739	42049	-1392	753.2	1310.1	-33.8	33.31	24.69	0.49
79.0	13509	43372	-1425	786.9	1335.0	-33.2	33.97	25.18	0.82
MAXIMUM DYNAMIC PRESSURE									
79.500	13907	44042	-1442	803.9	1347.6	-32.8	34.34	25.41	0.87
80.0	14313	44719	-1458	821.2	1360.4	-32.5	34.74	25.63	0.84
81.0	15152	46093	-1490	856.5	1386.2	-31.8	35.70	25.96	0.52
82.0	16026	47492	-1522	892.7	1412.3	-31.5	36.85	26.21	0.10
83.0	16937	48918	-1553	930.2	1438.6	-31.4	38.14	26.37	-0.12
84.0	17887	50370	-1585	969.0	1465.0	-31.5	39.44	26.51	-0.07
85.0	18876	51848	-1616	1009.1	1491.6	-31.6	40.70	26.65	0.06
86.0	19905	53353	-1648	1050.4	1518.3	-31.4	41.91	26.84	0.26
87.0	20977	54885	-1679	1092.8	1545.4	-31.0	42.93	27.17	0.51
88.0	22091	56445	-1710	1136.1	1572.7	-30.5	43.75	27.54	0.61
89.0	23249	58031	-1740	1180.3	1600.4	-29.9	44.59	27.84	0.59
90.0	24452	59646	-1770	1225.4	1628.3	-29.4	45.56	28.02	0.53
91.0	25700	61288	-1799	1271.5	1656.4	-28.8	46.70	28.13	0.44
92.0	26995	62959	-1827	1318.9	1684.7	-28.2	47.97	28.29	0.49
93.0	28338	64658	-1855	1367.4	1712.9	-28.2	49.17	28.26	-0.02
94.0	29730	66385	-1884	1417.1	1741.2	-28.4	50.30	28.34	-0.47
95.0	31173	68141	-1912	1468.1	1769.6	-28.8	51.54	28.54	-0.57
96.0	32667	69925	-1941	1520.3	1798.4	-29.1	52.89	28.82	-0.28
97.0	34214	71738	-1970	1573.8	1827.3	-29.2	54.14	29.17	0.25
98.0	35815	73580	-1999	1628.5	1856.6	-28.9	55.27	29.45	0.59
99.0	37471	75451	-2028	1684.2	1886.1	-28.4	56.26	29.58	0.50
100.0	39184	77352	-2056	1741.0	1915.8	-28.0	57.22	29.61	0.09
101.0	40953	79283	-2084	1798.8	1945.5	-27.9	58.33	29.86	0.17
102.0	42782	81244	-2112	1857.7	1975.4	-27.7	59.57	30.07	0.22

TABLE IX

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
103.0	44669	83235	-2140	1918.0	2005.5	-27.5	60.85	30.15	0.14
104.0	46618	85255	-2167	1979.4	2035.7	-27.5	62.12	30.19	-0.02
105.0	48628	87306	-2195	2042.1	2065.9	-27.5	63.34	30.28	-0.05
106.0	50702	89388	-2222	2106.1	2096.3	-27.5	64.54	30.42	0.02
107.0	52841	91499	-2250	2171.2	2126.8	-27.4	65.71	30.60	0.10
108.0	55045	93642	-2277	2237.5	2157.5	-27.3	66.90	30.78	0.19
109.0	57316	95815	-2304	2305.0	2188.3	-27.1	68.12	30.90	0.27
110.0	59656	98019	-2331	2373.8	2219.3	-26.8	69.38	30.94	0.27
111.0	62064	100253	-2358	2443.7	2250.3	-26.5	70.58	31.06	0.30
112.0	64544	102519	-2384	2515.0	2281.4	-26.3	71.83	31.17	0.25
113.0	67095	104817	-2410	2587.4	2312.6	-26.0	73.09	31.30	0.23
114.0	69719	107145	-2436	2661.1	2344.0	-25.8	74.37	31.44	0.24
115.0	72417	109505	-2462	2736.2	2375.5	-25.5	75.67	31.61	0.31
116.0	75192	111896	-2487	2812.5	2407.2	-25.2	76.99	31.77	0.39
117.0	78043	114320	-2512	2890.1	2439.0	-24.8	78.30	31.91	0.37
118.0	80972	116775	-2537	2969.1	2471.0	-24.5	79.57	32.09	0.29
119.0	83981	119262	-2561	3049.3	2503.2	-24.2	80.90	32.24	0.26
120.0	87071	121781	-2585	3130.9	2535.5	-23.9	82.25	32.38	0.32
121.0	90243	124333	-2609	3213.8	2568.0	-23.5	83.67	32.47	0.35
122.0	93499	126918	-2632	3298.4	2600.3	-23.2	85.38	32.34	0.30
123.0	96841	129534	-2655	3384.6	2632.6	-23.0	87.05	32.24	0.09
124.0	100285	132190	-2678	3472.5	2665.0	-23.1	88.37	32.44	-0.22
125.0	103798	134871	-2702	3560.8	2697.9	-24.3	89.83	32.70	-0.11
126.0	107384	137580	-2726	3650.3	2730.9	-25.3	91.69	32.74	0.38
127.0	111083	140328	-2752	3742.8	2763.7	-24.9	92.79	33.03	0.06
128.0	114872	143109	-2776	3836.2	2796.9	-24.8	93.84	33.39	-0.16
129.0	118756	145923	-2801	3930.7	2830.4	-24.9	95.32	33.62	0.11
130.0	122735	148769	-2826	4027.0	2864.0	-24.7	97.41	33.46	-0.23
131.0	126813	151652	-2852	4124.8	2897.5	-25.0	98.62	33.73	-0.36
132.0	130990	154567	-2878	4224.3	2931.3	-25.5	100.26	33.66	-0.39
133.0	135266	157517	-2904	4325.3	2965.2	-26.0	101.74	33.79	-0.52
134.0	139645	160499	-2931	4428.1	2998.3	-26.4	103.67	33.79	-0.33
135.0	144127	163515	-2958	4532.6	3032.6	-26.8	105.31	33.99	-0.33
136.0	148715	166567	-2985	4638.7	3067.3	-27.2	106.96	34.12	-0.33
137.0	153409	169652	-3013	4746.7	3101.5	-27.5	108.60	34.19	-0.30
138.0	158214	172772	-3041	4855.3	3135.3	-27.9	110.24	34.28	-0.39
139.0	163127	175926	-3069	4967.3	3169.1	-27.7	112.04	34.42	-0.49
IECO									
139.570	165976	177738	-3085	5028.1	3189.3	-28.3	112.93	34.48	-0.43
140.0	168150	179113	-3098	5074.1	3201.1	-28.6	82.35	15.75	-0.23
141.0	173257	182317	-3127	5130.3	3204.4	-28.5	56.76	2.46	-0.10

TABLE IX

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
142.0	178418	185521	-3156	5186.5	3206.8	-28.2	56.10	2.03	0.10
143.0	183635	188730	-3184	5243.2	3209.6	-28.0	56.43	2.23	0.26
OECO									
143.470	186105	190238	-3198	5263.7	3207.3	-27.8	57.08	2.45	0.32
144.0	188901	191937	-3212	5273.3	3199.7	-27.7	13.12	-18.21	0.39
S-IB/S-IVB SEPARATION									
144.230	190114	192672	-3219	5274.0	3194.7	-27.6	9.20	-21.91	0.44
145.0	194178	195127	-3240	5275.8	3175.6	-27.2	2.30	-28.87	0.56
146.0	199457	198288	-3267	5278.4	3143.9	-26.6	1.31	-31.00	0.56
147.0	204739	201416	-3294	5280.8	3110.4	-26.1	1.97	-31.00	0.43
148.0	210022	204512	-3320	5283.1	3080.8	-25.8	6.20	-26.74	0.23
149.0	215311	207581	-3346	5294.2	3057.0	-25.6	14.07	-22.05	0.16
150.0	220615	210628	-3372	5309.7	3035.9	-25.5	15.94	-20.80	0.16
155.0	247380	225554	-3493	5396.1	2935.7	-22.4	18.77	-19.29	0.62
160.0	274606	239997	-3601	5491.2	2840.8	-20.3	19.13	-18.73	0.43
165.0	302308	253967	-3695	5587.8	2746.9	-17.4	19.45	-18.76	0.53
170.0	330491	267468	-3776	5686.1	2654.1	-14.9	20.12	-18.29	0.47
GUIDANCE INITIATION									
172.400	344195	273784	-3810	5734.8	2610.4	-13.9	20.36	-18.14	0.43
175.0	359173	280510	-3844	5787.7	2563.4	-12.6	20.34	-17.94	0.58
180.0	388363	293109	-3896	5887.4	2478.3	-7.2	19.36	-16.07	1.30
185.0	418039	305307	-3916	5981.6	2402.8	-1.1	18.22	-14.47	1.24
190.0	448170	317136	-3907	6071.4	2328.8	4.9	18.75	-14.55	1.23
195.0	478769	328605	-3866	6169.0	2258.9	11.4	19.56	-14.04	1.27
200.0	509856	339720	-3794	6265.7	2186.5	17.7	19.63	-14.60	1.33
205.0	541431	350469	-3688	6364.7	2113.3	24.7	19.97	-14.59	1.48
210.0	573505	360853	-3547	6465.1	2040.0	31.9	20.22	-14.72	1.42
215.0	606084	370868	-3370	6566.8	1966.1	38.9	20.58	-14.70	1.43
220.0	639177	380515	-3157	6670.7	1892.5	46.2	20.89	-14.76	1.46
225.0	672793	389793	-2907	6776.0	1818.8	53.6	21.22	-14.69	1.37
230.0	706940	398704	-2622	6882.9	1745.5	60.6	21.53	-14.57	1.49
235.0	741624	407249	-2301	6991.3	1672.2	68.0	21.84	-14.74	1.46
240.0	776856	415425	-1942	7101.4	1598.3	75.3	22.17	-14.79	1.47
245.0	812641	423232	-1548	7212.9	1524.1	82.5	22.53	-14.91	1.44
250.0	848989	430666	-1118	7326.5	1450.0	89.8	22.84	-14.71	1.49

TABLE IX

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
255.0	885908	437732	-650	7441.6	1376.0	97.3	23.19	-14.73	1.49
260.0	923408	444429	-145	7558.5	1302.7	104.7	23.57	-14.68	1.52
265.0	961495	450759	396	7676.7	1229.1	112.1	23.96	-14.80	1.46
270.0	1000180	456719	975	7797.6	1155.0	119.5	24.21	-14.87	1.50
275.0	1039473	462308	1591	7920.1	1080.7	127.0	24.83	-14.77	1.50
280.0	1079374	467521	2244	8041.2	1004.7	134.4	25.61	-14.54	1.49
285.0	1119893	472358	2935	8166.8	930.4	141.8	26.18	-14.25	1.56
290.0	1161054	476831	3663	8296.5	857.9	149.4	25.53	-14.82	1.54
295.0	1202858	480936	4429	8425.6	784.2	157.0	26.09	-14.75	1.51
300.0	1245314	484673	5233	8557.2	710.2	164.6	26.53	-14.80	1.52
305.0	1288434	488039	6075	8690.7	636.2	172.6	26.88	-14.84	1.87
310.0	1332225	491034	6958	8826.0	561.8	180.2	27.27	-14.90	1.30
315.0	1376697	493657	7878	8963.3	487.1	187.7	27.69	-14.90	1.54
320.0	1421862	495906	8835	9102.6	412.5	195.4	27.94	-14.87	1.54
325.0	1467727	497783	9831	9243.7	338.3	203.0	28.44	-14.93	1.53
330.0	1514302	499289	10866	9386.7	264.0	210.8	28.82	-14.79	1.56
335.0	1561598	500424	11940	9531.8	190.0	218.6	29.27	-14.79	1.56
340.0	1609625	501189	13052	9679.5	116.1	226.5	29.67	-14.72	1.61
345.0	1658397	501586	14204	9829.8	42.4	234.4	30.39	-14.85	1.59
350.0	1707927	501613	15396	9982.5	-31.7	242.4	30.78	-14.80	1.58
355.0	1758226	501269	16628	10137.5	-105.9	250.2	31.26	-14.91	1.55
360.0	1809306	500554	17899	10295.1	-180.4	258.2	31.99	-14.91	1.59
365.0	1861182	499466	19210	10454.6	-255.0	266.2	31.47	-14.93	1.57
370.0	1913856	498005	20561	10616.5	-329.3	274.3	33.14	-14.82	1.62
375.0	1967352	496174	21952	10781.7	-403.4	282.3	33.20	-14.88	1.62
380.0	2021677	493974	23385	10948.8	-474.7	290.6	33.68	-12.99	1.66
385.0	2076845	491418	24858	11118.9	-550.8	298.7	34.30	-16.02	1.63
390.0	2132871	488475	26372	11291.6	-625.6	306.9	34.83	-14.78	1.66
395.0	2189767	485162	27927	11467.1	-699.5	315.1	35.42	-14.76	1.68
400.0	2247548	481481	29523	11646.0	-773.0	323.6	36.11	-14.70	1.68
405.0	2306232	477433	31162	11828.2	-846.4	331.8	36.71	-14.72	1.63
410.0	2365835	473017	32842	12013.5	-919.8	340.3	37.49	-14.67	1.68
415.0	2426375	468234	34565	12202.9	-993.4	348.7	38.21	-14.76	1.68
420.0	2487867	463083	36330	12394.4	-1067.2	357.2	38.71	-14.82	1.70
425.0	2550326	457565	38137	12589.5	-1140.1	365.7	39.32	-14.71	1.73
430.0	2613768	451679	39986	12787.9	-1214.4	374.3	40.05	-14.64	1.73
435.0	2678211	445424	41880	12989.8	-1287.4	382.9	40.73	-14.55	1.68
440.0	2743673	438806	43815	13195.4	-1360.2	391.5	41.49	-14.58	1.77
445.0	2810171	431823	45795	13404.6	-1432.8	400.3	42.24	-14.50	1.74
450.0	2877725	424478	47818	13617.5	-1505.3	409.0	42.97	-14.50	1.78
455.0	2946354	416771	49886	13834.3	-1577.7	417.9	43.79	-14.48	1.72
460.0	3016077	408703	51997	14055.4	-1649.7	426.5	44.56	-14.38	1.73
465.0	3086915	400275	54152	14280.6	-1721.3	435.5	45.54	-14.30	1.80
470.0	3158892	391490	56352	14511.0	-1792.7	444.5	46.60	-14.22	1.79

TABLE IX

EARTH-FIXED PLUMBLINE POSITIONS, VELOCITIES AND ACCELERATIONS

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
475.0	3232033	382349	58597	14746.2	-1863.6	453.5	47.52	-14.14	1.82
480.0	3306365	372853	60887	14987.4	-1935.4	462.6	48.75	-14.61	1.79
485.0	3381917	362991	63222	15234.3	-2009.7	471.6	50.02	-15.09	1.80
490.0	3458719	352752	65602	15487.3	-2086.4	480.4	51.15	-15.50	1.80
495.0	3536798	342126	68026	15744.3	-2164.3	489.1	51.40	-15.80	1.75
500.0	3616160	331105	70493	16000.0	-2244.5	497.8	50.72	-16.22	1.70
505.0	3696788	319678	73004	16249.3	-2327.2	506.3	49.13	-16.87	1.70
510.0	3778645	307830	75556	16492.9	-2412.0	514.8	48.41	-16.91	1.66
515.0	3861711	295560	78151	16732.8	-2495.7	522.9	47.71	-16.44	1.58
520.0	3945972	282881	80785	16971.1	-2575.0	531.0	47.60	-15.25	1.66
525.0	4031423	269820	83460	17209.5	-2648.2	539.2	47.74	-13.95	1.67
530.0	4118070	256409	86177	17449.4	-2716.1	547.5	48.40	-13.43	1.64
535.0	4205929	242653	88936	17695.0	-2788.3	556.1	49.74	-16.03	1.81
540.0	4295035	228500	91739	17949.9	-2874.5	565.2	52.38	-17.64	1.83
545.0	4385426	213902	94587	18205.2	-2965.1	574.0	51.27	-17.90	1.76
550.0	4477103	198866	97479	18465.8	-3046.9	583.1	52.35	-14.90	1.86
555.0	4570091	183449	100418	18730.0	-3119.8	592.3	53.40	-14.41	1.84
560.0	4664414	167671	103402	19000.1	-3191.4	601.6	54.60	-14.27	1.87
565.0	4760103	151537	106434	19276.2	-3261.9	611.1	55.89	-13.97	1.94
570.0	4857189	135055	109514	19559.1	-3330.5	621.0	57.23	-13.58	1.99
575.0	4955707	118234	112644	19848.8	-3397.9	631.0	58.67	-13.35	2.02
580.0	5055643	101070	115828	20145.8	-3463.3	641.8	60.04	-13.02	2.07
585.0	5157128	83592	119061	20450.3	-3527.4	651.6	61.52	-12.63	2.19
	S-IVB GUIDANCE CUTOFF								
588.468	5228427	71284	121334	20663.1	-3571.3	659.4	62.56	-12.27	2.30
590.0	5260104	65788	122346	20673.4	-3607.6	661.4	-6.73	-26.74	0.99
595.0	5363389	47420	125666	20639.8	-3740.1	666.7	-6.92	-26.51	1.12
	S-IVB/CSM SEPARATION								
598.700	5439708	33399	128142	20613.8	-3838.2	670.9	-7.09	-26.48	1.12
600.0	5466501	28388	129019	20604.6	-3872.6	672.3	-7.12	-26.48	1.12

TABLE X
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
	GUIDANCE REFERENCE RELEASE								
-4.468	-2669.435	1429.903	1634.712	-633.6	-1182.8	0.0	0.07	-0.07	0.00
-4.0	-2669.484	1429.812	1634.712	-633.5	-1182.8	0.0	0.07	-0.07	0.00
-3.0	-2669.588	1429.618	1634.712	-633.4	-1182.8	0.0	0.07	-0.07	0.00
-2.0	-2669.692	1429.423	1634.712	-633.3	-1182.9	0.0	0.07	-0.07	0.00
-1.0	-2669.796	1429.228	1634.712	-633.3	-1182.9	0.0	0.07	-0.07	0.00
0.0	-2669.901	1429.033	1634.712	-633.2	-1183.0	0.0	0.07	-0.07	0.00
	FIRST MOTION								
0.730	-2669.977	1428.891	1634.712	-633.1	-1183.0	0.0	-6.03	3.21	3.71
	LIFTOFF SIGNAL								
0.930	-2669.997	1428.853	1634.712	-634.3	-1182.4	0.7	-6.01	3.19	3.72
1.0	-2670.005	1428.839	1634.712	-634.7	-1182.1	1.0	-6.01	3.18	3.73
2.0	-2670.110	1428.645	1634.713	-640.7	-1179.0	4.8	-6.01	3.15	3.85
3.0	-2670.216	1428.451	1634.714	-646.8	-1175.8	8.7	-6.11	3.19	4.00
4.0	-2670.322	1428.258	1634.715	-652.9	-1172.5	12.8	-6.27	3.28	4.15
5.0	-2670.431	1428.065	1634.718	-659.3	-1169.2	17.0	-6.46	3.39	4.30
6.0	-2670.540	1427.873	1634.721	-665.8	-1165.7	21.4	-6.65	3.51	4.45
7.0	-2670.650	1427.681	1634.725	-672.5	-1162.1	25.9	-6.84	3.62	4.58
8.0	-2670.761	1427.490	1634.730	-679.5	-1158.4	30.5	-7.01	3.73	4.69
9.0	-2670.873	1427.300	1634.735	-686.5	-1154.6	35.3	-7.18	3.82	4.80
10.0	-2670.987	1427.110	1634.741	-693.8	-1150.7	40.1	-7.34	3.89	4.90
11.0	-2671.102	1426.921	1634.748	-701.2	-1146.8	45.1	-7.50	3.95	5.00
12.0	-2671.218	1426.733	1634.756	-708.8	-1142.8	50.1	-7.66	4.00	5.09
13.0	-2671.335	1426.545	1634.765	-716.5	-1138.7	55.3	-7.84	4.04	5.19
14.0	-2671.454	1426.358	1634.774	-724.4	-1134.7	60.5	-8.04	4.08	5.30
15.0	-2671.573	1426.171	1634.785	-732.5	-1130.5	65.9	-8.26	4.12	5.42
16.0	-2671.695	1425.986	1634.796	-740.9	-1126.4	71.4	-8.51	4.15	5.54
17.0	-2671.817	1425.800	1634.808	-749.5	-1122.2	77.0	-8.79	4.18	5.68
18.0	-2671.941	1425.616	1634.821	-758.5	-1118.0	82.7	-9.09	4.22	5.82
19.0	-2672.067	1425.433	1634.835	-767.7	-1113.7	88.6	-9.41	4.25	5.97
20.0	-2672.194	1425.250	1634.850	-777.3	-1109.4	94.7	-9.75	4.28	6.12
21.0	-2672.323	1425.068	1634.866	-787.2	-1105.1	100.8	-10.10	4.30	6.26
22.0	-2672.453	1424.886	1634.883	-797.4	-1100.8	107.2	-10.45	4.31	6.40
23.0	-2672.585	1424.705	1634.902	-808.0	-1096.5	113.6	-10.79	4.31	6.52
24.0	-2672.719	1424.525	1634.921	-819.0	-1092.1	120.2	-11.11	4.29	6.63

TABLE X
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
25.0	-2672.855	1424.346	1634.941	-830.2	-1087.9	126.9	-11.42	4.24	6.71
26.0	-2672.993	1424.167	1634.963	-841.8	-1083.6	133.6	-11.71	4.17	6.78
27.0	-2673.132	1423.989	1634.985	-853.6	-1079.5	140.4	-11.98	4.06	6.83
28.0	-2673.273	1423.812	1635.009	-865.7	-1075.5	147.3	-12.24	3.93	6.87
29.0	-2673.417	1423.635	1635.034	-878.1	-1071.6	154.2	-12.63	3.83	6.97
30.0	-2673.563	1423.459	1635.060	-890.8	-1067.8	161.2	-13.04	3.69	7.09
31.0	-2673.710	1423.283	1635.087	-904.0	-1064.2	168.3	-13.34	3.43	7.16
32.0	-2673.860	1423.109	1635.115	-917.6	-1060.9	175.5	-13.70	3.17	7.25
33.0	-2674.012	1422.934	1635.145	-931.5	-1057.8	182.8	-14.15	2.94	7.38
34.0	-2674.167	1422.760	1635.175	-945.9	-1055.0	190.3	-14.68	2.77	7.51
35.0	-2674.324	1422.587	1635.207	-960.8	-1052.3	197.8	-15.15	2.58	7.58
36.0	-2674.483	1422.414	1635.240	-976.1	-1049.7	205.4	-15.57	2.44	7.63
37.0	-2674.645	1422.241	1635.275	-991.8	-1047.3	213.1	-15.95	2.31	7.70
38.0	-2674.809	1422.069	1635.311	-1007.9	-1045.1	220.9	-16.31	2.13	7.82
39.0	-2674.977	1421.897	1635.348	-1024.4	-1043.1	228.7	-16.70	1.91	7.94
40.0	-2675.147	1421.726	1635.386	-1041.4	-1041.3	236.7	-17.15	1.67	8.02
41.0	-2675.320	1421.555	1635.425	-1058.8	-1039.7	244.7	-17.69	1.43	8.02
42.0	-2675.495	1421.384	1635.466	-1076.7	-1038.3	252.7	-18.23	1.24	7.95
43.0	-2675.674	1421.213	1635.509	-1095.2	-1037.1	260.6	-18.75	1.08	7.88
44.0	-2675.856	1421.042	1635.552	-1114.2	-1036.1	268.5	-19.24	0.92	7.85
45.0	-2676.041	1420.872	1635.597	-1133.6	-1035.3	276.4	-19.72	0.70	7.86
46.0	-2676.229	1420.702	1635.643	-1153.6	-1034.7	284.2	-20.21	0.40	7.88
47.0	-2676.421	1420.531	1635.691	-1174.0	-1034.5	292.1	-20.74	0.03	7.89
48.0	-2676.616	1420.361	1635.739	-1195.0	-1034.6	300.0	-21.28	-0.40	7.86
49.0	-2676.814	1420.191	1635.789	-1216.6	-1035.3	307.8	-21.81	-0.87	7.82
50.0	-2677.016	1420.020	1635.841	-1238.6	-1036.3	315.6	-22.32	-1.32	7.80
51.0	-2677.222	1419.849	1635.893	-1261.2	-1037.8	323.4	-22.84	-1.73	7.78
52.0	-2677.431	1419.679	1635.947	-1284.3	-1039.7	331.2	-23.39	-2.12	7.73
53.0	-2677.644	1419.507	1636.002	-1308.0	-1042.0	338.8	-23.98	-2.50	7.64
54.0	-2677.862	1419.336	1636.059	-1332.2	-1044.7	346.4	-24.58	-2.90	7.53
55.0	-2678.083	1419.163	1636.116	-1357.0	-1047.8	353.9	-25.14	-3.32	7.42
56.0	-2678.308	1418.991	1636.175	-1382.5	-1051.3	361.3	-25.69	-3.70	7.29
57.0	-2678.538	1418.817	1636.235	-1408.4	-1055.1	368.5	-26.23	-4.04	7.14
58.0	-2678.772	1418.643	1636.297	-1434.9	-1059.3	375.5	-26.76	-4.38	6.97
59.0	-2679.010	1418.469	1636.359	-1461.9	-1063.9	382.4	-27.25	-4.80	6.79
60.0	-2679.253	1418.293	1636.422	-1489.3	-1069.0	389.1	-27.67	-5.37	6.61
61.0	-2679.501	1418.117	1636.487	-1517.1	-1074.7	395.6	-27.96	-6.05	6.44
62.0	-2679.753	1417.940	1636.553	-1545.2	-1081.0	402.0	-28.12	-6.72	6.28
63.0	-2680.009	1417.761	1636.619	-1573.3	-1088.0	408.2	-28.15	-7.31	6.13
	MACH ONE								
63.690	-2680.189	1417.637	1636.666	-1592.7	-1093.1	412.4	-28.17	-7.69	6.02

TABLE X

SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
64.0	-2680.271	1417.581	1636.687	-1601.4	-1095.6	414.3	-28.19	-7.87	5.97
65.0	-2680.537	1417.400	1636.756	-1629.7	-1103.7	420.1	-28.40	-8.44	5.77
66.0	-2680.807	1417.218	1636.825	-1658.3	-1112.5	425.8	-28.82	-9.06	5.54
67.0	-2681.082	1417.034	1636.896	-1687.4	-1121.8	431.2	-29.44	-9.68	5.33
68.0	-2681.363	1416.849	1636.967	-1717.2	-1131.7	436.5	-30.17	-10.26	5.18
69.0	-2681.648	1416.662	1637.040	-1747.7	-1142.2	441.6	-30.91	-10.80	5.12
70.0	-2681.938	1416.473	1637.113	-1779.0	-1153.3	446.8	-31.65	-11.42	5.10
71.0	-2682.233	1416.282	1637.187	-1811.0	-1165.1	451.8	-32.41	-12.12	5.01
72.0	-2682.534	1416.089	1637.261	-1843.8	-1177.5	456.7	-33.22	-12.86	4.84
73.0	-2682.840	1415.895	1637.337	-1877.4	-1190.7	461.5	-34.05	-13.59	4.65
74.0	-2683.152	1415.697	1637.413	-1911.8	-1204.7	466.1	-34.82	-14.32	4.52
75.0	-2683.470	1415.498	1637.490	-1947.0	-1219.4	470.6	-35.57	-15.07	4.42
76.0	-2683.793	1415.296	1637.568	-1982.9	-1234.8	474.9	-36.30	-15.76	4.31
77.0	-2684.122	1415.092	1637.647	-2019.6	-1250.7	479.1	-37.09	-16.21	4.08
78.0	-2684.458	1414.884	1637.726	-2057.1	-1267.0	483.0	-37.91	-16.46	3.80
79.0	-2684.800	1414.675	1637.806	-2095.4	-1283.5	486.7	-38.74	-16.65	3.60
	MAXIMUM DYNAMIC PRESSURE								
79.500	-2684.973	1414.569	1637.846	-2114.9	-1291.9	488.6	-39.15	-16.83	3.59
80.0	-2685.148	1414.462	1637.886	-2134.5	-1300.4	490.4	-39.53	-17.08	3.63
81.0	-2685.502	1414.247	1637.967	-2174.4	-1317.9	494.1	-40.23	-17.85	3.84
82.0	-2685.864	1414.028	1638.049	-2214.9	-1336.2	498.1	-40.93	-18.87	4.05
83.0	-2686.231	1413.807	1638.131	-2256.3	-1355.6	502.1	-41.72	-19.94	4.02
84.0	-2686.606	1413.582	1638.214	-2298.4	-1376.0	505.9	-42.57	-20.90	3.75
85.0	-2686.988	1413.354	1638.298	-2341.4	-1397.3	509.5	-43.42	-21.80	3.42
86.0	-2687.377	1413.122	1638.382	-2385.2	-1419.5	512.8	-44.29	-22.61	3.07
87.0	-2687.773	1412.887	1638.467	-2429.9	-1442.3	515.7	-45.18	-23.18	2.78
88.0	-2688.177	1412.647	1638.552	-2475.5	-1465.7	518.5	-45.96	-23.65	2.69
89.0	-2688.588	1412.404	1638.637	-2521.7	-1489.6	521.1	-46.65	-24.22	2.65
90.0	-2689.007	1412.157	1638.723	-2568.7	-1514.3	523.7	-47.31	-24.95	2.57
91.0	-2689.434	1411.906	1638.810	-2616.4	-1539.6	526.2	-48.01	-25.87	2.44
92.0	-2689.868	1411.650	1638.896	-2664.9	-1565.8	528.4	-48.85	-26.80	2.18
93.0	-2690.311	1411.390	1638.984	-2713.8	-1593.3	530.8	-49.33	-28.01	2.33
94.0	-2690.762	1411.126	1639.071	-2763.4	-1621.8	533.3	-49.90	-29.09	2.49
95.0	-2691.221	1410.856	1639.159	-2813.8	-1651.3	535.6	-50.71	-30.05	2.40
96.0	-2691.688	1410.582	1639.248	-2865.1	-1681.7	537.7	-51.76	-30.89	1.97
97.0	-2692.164	1410.303	1639.336	-2917.4	-1712.9	539.4	-52.88	-31.52	1.41
98.0	-2692.648	1410.018	1639.425	-2970.6	-1744.8	540.7	-53.82	-32.17	0.99
99.0	-2693.142	1409.728	1639.514	-3024.7	-1777.4	541.7	-54.44	-32.95	0.91
100.0	-2693.644	1409.433	1639.603	-3079.4	-1810.7	542.6	-54.88	-33.90	1.05
101.0	-2694.155	1409.133	1639.693	-3134.7	-1845.0	543.5	-55.71	-34.66	0.85
102.0	-2694.676	1408.826	1639.782	-3190.8	-1880.1	544.3	-56.57	-35.55	0.62

TABLE X
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
103.0	-2695.206	1408.514	1639.872	-3247.7	-1916.1	544.8	-57.32	-36.59	0.44
104.0	-2695.745	1408.195	1639.962	-3305.3	-1953.3	545.2	-58.00	-37.67	0.31
105.0	-2696.294	1407.871	1640.051	-3363.7	-1991.4	545.4	-58.74	-38.63	0.09
106.0	-2696.852	1407.540	1640.141	-3422.8	-2030.4	545.4	-59.53	-39.51	-0.17
107.0	-2697.420	1407.202	1640.231	-3482.7	-2070.3	545.1	-60.34	-40.35	-0.41
108.0	-2697.999	1406.858	1640.321	-3543.5	-2111.1	544.6	-61.15	-41.20	-0.68
109.0	-2698.587	1406.507	1640.410	-3605.0	-2152.7	543.7	-61.94	-42.11	-0.96
110.0	-2699.185	1406.150	1640.500	-3667.3	-2195.3	542.6	-62.67	-43.10	-1.23
111.0	-2699.794	1405.785	1640.589	-3730.3	-2238.8	541.3	-63.43	-44.02	-1.47
112.0	-2700.413	1405.413	1640.678	-3794.1	-2283.3	539.7	-64.19	-45.01	-1.66
113.0	-2701.043	1405.033	1640.767	-3858.7	-2328.8	537.9	-64.98	-45.98	-1.87
114.0	-2701.683	1404.646	1640.855	-3924.1	-2375.2	535.9	-65.80	-46.96	-2.10
115.0	-2702.335	1404.251	1640.943	-3990.3	-2422.6	533.7	-66.66	-47.91	-2.38
116.0	-2702.997	1403.849	1641.031	-4057.4	-2471.0	531.2	-67.54	-48.87	-2.67
117.0	-2703.670	1403.438	1641.118	-4125.3	-2520.4	528.4	-68.37	-49.88	-2.88
118.0	-2704.355	1403.019	1641.205	-4194.0	-2570.7	525.5	-69.18	-50.88	-3.02
119.0	-2705.051	1402.592	1641.291	-4263.6	-2622.0	522.4	-70.02	-51.90	-3.22
120.0	-2705.758	1402.156	1641.377	-4334.1	-2674.4	519.0	-70.89	-52.92	-3.52
121.0	-2706.478	1401.711	1641.462	-4405.4	-2727.8	515.3	-71.75	-54.01	-3.82
122.0	-2707.209	1401.258	1641.546	-4477.5	-2782.7	511.3	-72.56	-55.47	-4.23
123.0	-2707.952	1400.795	1641.630	-4550.4	-2838.9	506.9	-73.35	-56.95	-4.48
124.0	-2708.709	1400.322	1641.713	-4624.4	-2896.5	502.5	-74.14	-58.08	-4.42
125.0	-2709.476	1399.841	1641.795	-4698.5	-2954.7	499.1	-75.18	-59.10	-4.72
126.0	-2710.253	1399.352	1641.878	-4773.4	-3013.9	495.4	-76.37	-60.38	-5.54
127.0	-2711.045	1398.851	1641.959	-4850.3	-3074.8	489.6	-77.10	-61.29	-5.38
128.0	-2711.850	1398.340	1642.039	-4927.9	-3136.4	484.2	-77.89	-62.09	-5.26
129.0	-2712.667	1397.818	1642.118	-5006.2	-3199.1	478.7	-78.96	-63.08	-5.72
130.0	-2713.498	1397.286	1642.196	-5085.7	-3262.8	472.8	-79.89	-64.98	-5.98
131.0	-2714.341	1396.744	1642.274	-5165.8	-3328.1	466.8	-80.72	-65.92	-6.02
132.0	-2715.199	1396.190	1642.350	-5247.0	-3394.7	460.7	-81.56	-67.29	-6.39
133.0	-2716.069	1395.626	1642.426	-5329.1	-3462.6	454.3	-82.43	-68.49	-6.55
134.0	-2716.953	1395.050	1642.500	-5411.6	-3532.2	447.1	-83.55	-69.97	-7.16
135.0	-2717.851	1394.463	1642.573	-5496.0	-3602.6	440.0	-84.60	-71.22	-7.44
136.0	-2718.763	1393.864	1642.645	-5581.5	-3674.1	432.8	-85.60	-72.49	-7.75
137.0	-2719.689	1393.253	1642.715	-5667.7	-3747.4	424.8	-86.56	-73.78	-8.12
138.0	-2720.629	1392.630	1642.785	-5754.0	-3821.4	416.6	-87.51	-75.12	-8.36
139.0	-2721.584	1391.994	1642.853	-5842.2	-3897.9	407.2	-88.57	-76.57	-8.63
	IECO								
139.570	-2722.134	1391.626	1642.891	-5891.4	-3939.0	403.5	-89.12	-77.23	-8.85
140.0	-2722.553	1391.346	1642.919	-5925.9	-3971.4	398.9	-57.56	-60.34	-11.01
141.0	-2723.531	1390.689	1642.984	-5959.2	-4015.8	387.6	-33.00	-45.24	-11.65

TABLE X

SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
142.0	-2724.515	1390.023	1643.046	-5992.0	-4060.3	375.7	-32.35	-44.81	-11.87
143.0	-2725.504	1389.351	1643.107	-6025.3	-4105.3	363.9	-32.72	-44.93	-11.99
	OECO								
143.470	-2725.971	1389.033	1643.135	-6034.6	-4122.9	358.1	-33.26	-45.33	-12.09
144.0	-2726.497	1388.673	1643.166	-6033.9	-4134.1	352.1	7.27	-18.57	-12.01
	S-IB/S-IVB SEPARATION								
144.230	-2726.726	1388.516	1643.180	-6030.3	-4136.8	349.5	12.32	-16.92	-12.92
145.0	-2727.490	1387.991	1643.223	-6016.1	-4146.5	339.6	21.55	-14.18	-14.78
146.0	-2728.478	1387.307	1643.278	-5992.5	-4162.0	323.4	23.76	-14.25	-15.58
147.0	-2729.462	1386.620	1643.330	-5967.4	-4178.1	306.5	23.44	-14.83	-15.61
148.0	-2730.443	1385.931	1643.379	-5945.2	-4192.7	291.5	17.82	-16.56	-14.37
149.0	-2731.420	1385.240	1643.426	-5932.3	-4212.0	277.5	9.81	-20.98	-13.87
150.0	-2732.396	1384.544	1643.470	-5924.0	-4233.7	263.8	7.81	-21.96	-13.70
155.0	-2737.258	1381.014	1643.659	-5892.2	-4346.2	193.7	4.95	-23.40	-14.01
160.0	-2742.098	1377.388	1643.790	-5868.9	-4463.9	125.0	4.40	-23.54	-13.66
165.0	-2746.918	1373.666	1643.864	-5847.3	-4581.9	55.7	4.23	-23.76	-13.83
170.0	-2751.722	1369.846	1643.881	-5827.3	-4701.2	-13.1	3.54	-24.13	-13.71
	GUIDANCE INITIATION								
172.400	-2754.022	1367.978	1643.870	-5819.1	-4759.3	-45.9	3.31	-24.28	-13.66
175.0	-2756.510	1365.928	1643.842	-5810.6	-4822.2	-81.4	3.14	-24.11	-13.68
180.0	-2761.285	1361.911	1643.747	-5798.0	-4938.1	-149.4	2.04	-22.25	-13.18
185.0	-2766.053	1357.803	1643.598	-5789.9	-5045.3	-212.0	1.47	-20.71	-12.11
190.0	-2770.813	1353.609	1643.399	-5780.3	-5148.4	-272.8	1.26	-21.17	-12.26
195.0	-2775.569	1349.328	1643.149	-5778.4	-5256.0	-333.9	0.42	-21.60	-12.23
200.0	-2780.322	1344.959	1642.849	-5773.7	-5363.9	-395.9	0.83	-21.86	-12.57
205.0	-2785.072	1340.500	1642.497	-5769.8	-5473.7	-459.2	0.61	-22.06	-12.76
210.0	-2789.818	1335.950	1642.093	-5766.6	-5584.6	-523.2	0.62	-22.34	-12.83
215.0	-2794.562	1331.309	1641.636	-5763.5	-5696.7	-587.6	0.42	-22.62	-12.92
220.0	-2799.304	1326.574	1641.126	-5761.7	-5810.4	-652.5	0.32	-22.88	-13.04
225.0	-2804.045	1321.746	1640.562	-5760.6	-5925.3	-717.9	0.13	-23.14	-13.00
230.0	-2808.785	1316.822	1639.944	-5760.4	-6041.4	-783.2	-0.14	-23.30	-13.12
235.0	-2813.526	1311.802	1639.273	-5761.0	-6158.6	-849.1	-0.15	-23.63	-13.24
240.0	-2818.267	1306.686	1638.547	-5762.0	-6277.4	-915.6	-0.27	-23.91	-13.35
245.0	-2823.009	1301.471	1637.766	-5763.3	-6397.5	-982.5	-0.34	-24.26	-13.46
250.0	-2827.752	1296.156	1636.930	-5765.8	-6519.3	-1050.0	-0.66	-24.41	-13.48

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SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
255.0	-2832.498	1290.741	1636.038	-5769.1	-6642.1	-1117.8	-0.81	-24.70	-13.57
260.0	-2837.248	1285.224	1635.090	-5773.7	-6766.0	-1185.7	-1.04	-24.97	-13.65
265.0	-2842.001	1279.605	1634.086	-5778.7	-6891.3	-1254.0	-1.11	-25.36	-13.75
270.0	-2846.759	1273.882	1633.026	-5784.7	-7018.8	-1323.1	-1.18	-25.58	-13.88
275.0	-2851.521	1268.054	1631.909	-5791.2	-7147.8	-1392.8	-1.57	-26.04	-13.97
280.0	-2856.288	1262.119	1630.734	-5795.6	-7276.3	-1462.9	-2.15	-26.58	-14.02
285.0	-2861.061	1256.078	1629.501	-5803.6	-7407.7	-1533.3	-2.68	-26.89	-14.08
290.0	-2865.842	1249.926	1628.210	-5815.1	-7541.7	-1603.8	-1.84	-26.61	-14.19
295.0	-2870.631	1243.665	1626.861	-5825.3	-7675.7	-1674.9	-2.16	-27.05	-14.26
300.0	-2875.429	1237.293	1625.454	-5836.4	-7811.8	-1746.6	-2.34	-27.43	-14.39
305.0	-2880.237	1230.809	1623.987	-5848.5	-7949.3	-1819.0	-2.57	-27.57	-14.79
310.0	-2885.055	1224.210	1622.460	-5861.0	-8088.6	-1891.8	-2.54	-28.16	-14.42
315.0	-2889.883	1217.496	1620.873	-5874.2	-8229.7	-1965.0	-2.81	-28.40	-14.72
320.0	-2894.723	1210.665	1619.226	-5888.5	-8372.3	-2038.8	-2.94	-28.60	-14.76
325.0	-2899.575	1203.717	1617.517	-5903.9	-8516.2	-2112.9	-3.13	-29.03	-14.89
330.0	-2904.440	1196.649	1615.748	-5920.2	-8661.7	-2187.5	-3.43	-29.27	-14.94
335.0	-2909.319	1189.461	1613.917	-5937.7	-8808.8	-2262.4	-3.65	-29.64	-15.04
340.0	-2914.212	1182.151	1612.024	-5956.5	-8957.8	-2338.0	-3.90	-29.92	-15.14
345.0	-2919.122	1174.717	1610.069	-5976.7	-9109.0	-2414.0	-4.15	-30.57	-15.35
350.0	-2924.049	1167.159	1608.051	-5997.9	-9262.2	-2491.0	-4.37	-30.87	-15.41
355.0	-2928.994	1159.473	1605.970	-6020.0	-9417.4	-2568.3	-4.50	-31.31	-15.55
360.0	-2933.957	1151.659	1603.824	-6043.1	-9574.8	-2646.4	-4.87	-31.89	-15.75
365.0	-2938.940	1143.715	1601.614	-6067.0	-9733.7	-2725.1	-4.53	-31.50	-15.62
370.0	-2943.942	1135.639	1599.339	-6092.4	-9894.6	-2804.3	-5.51	-32.79	-15.99
375.0	-2948.967	1127.430	1596.999	-6119.4	-10058.0	-2884.1	-5.45	-32.87	-16.03
380.0	-2954.014	1119.086	1594.593	-6149.6	-10221.8	-2963.1	-7.18	-32.50	-15.27
385.0	-2959.087	1110.605	1592.121	-6177.5	-10390.0	-3045.0	-5.09	-34.21	-16.83
390.0	-2964.183	1101.986	1589.582	-6207.6	-10559.8	-3127.0	-6.32	-34.15	-16.38
395.0	-2969.304	1093.226	1586.975	-6239.7	-10731.6	-3209.1	-6.63	-34.62	-16.53
400.0	-2974.453	1084.323	1584.300	-6273.9	-10905.9	-3292.1	-7.01	-35.16	-16.66
405.0	-2979.630	1075.276	1581.556	-6309.7	-11082.9	-3375.6	-7.27	-35.69	-16.76
410.0	-2984.838	1066.082	1578.744	-6347.1	-11262.5	-3460.0	-7.70	-36.28	-16.96
415.0	-2990.077	1056.739	1575.862	-6386.3	-11445.4	-3545.3	-7.98	-36.91	-17.17
420.0	-2995.348	1047.245	1572.909	-6426.3	-11630.2	-3631.3	-8.17	-37.34	-17.33
425.0	-3000.654	1037.598	1569.885	-6468.7	-11817.6	-3717.7	-8.55	-37.79	-17.44
430.0	-3005.994	1027.795	1566.790	-6511.7	-12008.2	-3805.6	-8.97	-38.37	-17.56
435.0	-3011.372	1017.834	1563.622	-6557.4	-12201.2	-3893.7	-9.34	-38.91	-17.64
440.0	-3016.787	1007.713	1560.382	-6605.0	-12397.1	-3982.5	-9.72	-39.52	-17.90
445.0	-3022.243	997.430	1557.068	-6654.5	-12595.9	-4072.2	-10.13	-40.12	-18.01
450.0	-3027.740	986.982	1553.680	-6705.9	-12797.8	-4162.7	-10.49	-40.71	-18.20
455.0	-3033.280	976.367	1550.217	-6759.4	-13002.8	-4254.0	-10.89	-41.40	-18.33
460.0	-3038.865	965.581	1546.678	-6815.0	-13211.2	-4346.0	-11.34	-42.00	-18.47
465.0	-3044.497	954.623	1543.064	-6873.2	-13422.8	-4439.1	-11.90	-42.74	-18.71
470.0	-3050.177	943.489	1539.372	-6934.0	-13638.5	-4533.2	-12.49	-43.60	-18.91

TABLE X
SPACE-FIXED EPHEMERIS POSITIONS, VELOCITIES AND ACCELERATIONS

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
475.0	-3055.910	932.176	1535.603	-6997.6	-13858.1	-4628.1	-13.01	-44.31	-19.10
480.0	-3061.695	920.680	1531.755	-7063.5	-14082.9	-4725.0	-13.24	-45.52	-19.58
485.0	-3067.535	908.996	1527.826	-7130.2	-14313.4	-4824.3	-13.49	-46.75	-20.10
490.0	-3073.430	897.121	1523.814	-7198.0	-14549.9	-4925.8	-13.73	-47.85	-20.56
495.0	-3079.382	885.049	1519.719	-7266.7	-14790.4	-5029.0	-13.56	-48.20	-20.72
500.0	-3085.389	872.779	1515.538	-7332.6	-15030.7	-5132.7	-12.80	-47.85	-20.72
505.0	-3091.448	860.313	1511.271	-7392.8	-15267.0	-5236.1	-11.38	-46.81	-20.67
510.0	-3097.554	847.654	1506.920	-7448.0	-15499.5	-5339.2	-10.89	-46.28	-20.49
515.0	-3103.706	834.805	1502.485	-7501.7	-15728.8	-5440.6	-10.82	-45.58	-20.03
520.0	-3109.901	821.769	1497.967	-7557.8	-15955.1	-5539.5	-11.68	-45.01	-19.51
525.0	-3116.146	808.547	1493.369	-7618.7	-16179.2	-5635.7	-12.73	-44.63	-18.93
530.0	-3122.442	795.141	1488.692	-7684.2	-16402.6	-5729.7	-13.44	-44.99	-18.81
535.0	-3128.792	781.550	1483.938	-7749.2	-16632.2	-5827.3	-12.10	-47.04	-20.50
540.0	-3135.193	767.764	1479.099	-7808.1	-16874.5	-5934.2	-12.19	-49.81	-21.89
545.0	-3141.642	753.777	1474.171	-7863.3	-17119.1	-6043.0	-11.32	-49.04	-21.70
550.0	-3148.138	739.589	1469.154	-7928.2	-17364.6	-6149.0	-14.24	-48.75	-20.60
555.0	-3154.692	725.199	1464.052	-8001.7	-17609.6	-6251.7	-15.13	-49.44	-20.59
560.0	-3161.308	710.606	1458.865	-8079.1	-17859.1	-6355.2	-15.84	-50.37	-20.82
565.0	-3167.990	695.806	1453.592	-8160.5	-18113.0	-6459.8	-16.73	-51.30	-21.03
570.0	-3174.740	680.794	1448.233	-8246.7	-18371.7	-6565.2	-17.70	-52.24	-21.19
575.0	-3181.564	665.568	1442.787	-8337.4	-18635.4	-6671.8	-18.60	-53.34	-21.43
580.0	-3188.458	650.129	1437.253	-8433.4	-18904.2	-6779.7	-19.54	-54.34	-21.63
585.0	-3195.439	634.460	1431.630	-8533.8	-19179.0	-6887.8	-20.61	-55.36	-21.88
	S-IVB GUIDANCE CUTOFF								
588.468	-3200.331	623.458	1427.677	-8604.9	-19370.5	-6963.8	-21.44	-56.05	-22.04
590.0	-3202.498	618.569	1425.918	-8578.0	-19393.7	-6985.2	27.15	-5.53	-12.08
595.0	-3209.502	602.599	1420.145	-8443.2	-19420.5	-7045.4	27.04	-5.20	-12.03
	S-IVB/CSM SEPARATION								
598.700	-3214.613	590.767	1415.841	-8343.0	-19439.3	-7089.8	27.10	-5.03	-11.98
600.0	-3216.395	586.608	1414.322	-8307.7	-19445.8	-7105.4	27.12	-5.00	-11.97

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
GUIDANCE REFERENCE RELEASE											
-4.468	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
-4.0	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
-3.0	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
-2.0	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
-1.0	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
0.0	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
FIRST MOTION											
0.730	3441.335	-80.5611	28.3608	0.00	90.00	0.0	90.00	-0.00	1341.8	0.000	105
LIFTOFF SIGNAL											
0.930	3441.335	-80.5611	28.3608	198.10	89.90	1.6	90.00	0.07	1341.8	0.000	105
1.0	3441.335	-80.5611	28.3608	198.58	89.94	2.1	90.00	0.09	1341.8	0.000	105
2.0	3441.336	-80.5611	28.3608	15.19	89.61	10.0	90.00	0.43	1341.8	0.000	111
3.0	3441.339	-80.5611	28.3608	13.61	89.26	17.9	89.99	0.77	1341.9	-0.000	125
4.0	3441.342	-80.5611	28.3608	11.82	88.99	26.1	89.98	1.11	1342.1	0.000	147
5.0	3441.347	-80.5611	28.3608	9.96	88.80	34.5	89.97	1.47	1342.3	0.000	177
6.0	3441.354	-80.5611	28.3608	8.11	88.67	43.2	89.96	1.84	1342.6	0.000	216
7.0	3441.362	-80.5611	28.3608	6.36	88.57	52.1	89.94	2.22	1342.9	0.000	263
8.0	3441.371	-80.5611	28.3608	4.81	88.49	61.3	89.93	2.62	1343.3	0.001	320
9.0	3441.382	-80.5611	28.3608	3.57	88.44	70.7	89.92	3.02	1343.8	0.001	386
10.0	3441.394	-80.5611	28.3608	2.74	88.40	80.4	89.90	3.43	1344.3	0.001	462
11.0	3441.408	-80.5611	28.3608	2.40	88.37	90.2	89.89	3.84	1344.9	0.001	547
12.0	3441.424	-80.5611	28.3609	2.64	88.34	100.2	89.88	4.27	1345.7	0.002	642
13.0	3441.441	-80.5611	28.3609	3.49	88.32	110.4	89.86	4.70	1346.5	0.002	747
14.0	3441.460	-80.5611	28.3609	5.01	88.30	120.9	89.85	5.14	1347.6	0.003	862
15.0	3441.481	-80.5611	28.3609	7.20	88.29	131.5	89.83	5.59	1348.7	0.003	988
16.0	3441.503	-80.5611	28.3609	10.06	88.27	142.4	89.82	6.05	1350.1	0.004	1125
17.0	3441.528	-80.5611	28.3609	13.55	88.24	153.6	89.80	6.52	1351.7	0.005	1273
18.0	3441.554	-80.5611	28.3609	17.62	88.21	165.1	89.79	7.00	1353.5	0.005	1432
19.0	3441.582	-80.5611	28.3609	22.16	88.17	176.9	89.78	7.50	1355.6	0.006	1604
20.0	3441.612	-80.5611	28.3609	27.06	88.12	189.1	89.76	8.00	1357.9	0.007	1787
21.0	3441.644	-80.5611	28.3609	32.17	88.05	201.6	89.75	8.52	1360.6	0.008	1982
22.0	3441.678	-80.5611	28.3610	37.37	87.96	214.5	89.74	9.05	1363.5	0.009	219[illegible]
23.0	3441.715	-80.5611	28.3610	42.51	87.85	227.7	89.73	9.58	1366.8	0.010	241[illegible]
24.0	3441.753	-80.5611	28.3610	47.48	87.72	241.2	89.72	10.13	1370.4	0.011	2645

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
25.0	3441.794	-80.5610	28.3610	52.20	87.57	255.0	89.72	10.69	1374.3	0.013	2893
26.0	3441.837	-80.5610	28.3610	56.61	87.39	269.1	89.71	11.24	1378.7	0.014	3155
27.0	3441.883	-80.5610	28.3610	60.68	87.19	283.4	89.71	11.81	1383.4	0.016	3431
28.0	3441.930	-80.5609	28.3611	64.39	86.97	297.9	89.71	12.37	1388.5	0.018	3721
29.0	3441.981	-80.5609	28.3611	67.75	86.72	312.5	89.71	12.93	1394.0	0.021	4026
30.0	3442.033	-80.5608	28.3611	70.80	86.44	327.5	89.72	13.50	1399.9	0.024	4345
31.0	3442.088	-80.5608	28.3611	73.48	86.13	342.9	89.72	14.08	1406.5	0.027	4679
32.0	3442.146	-80.5607	28.3611	75.79	85.78	358.5	89.73	14.65	1413.6	0.030	5029
33.0	3442.206	-80.5606	28.3611	77.80	85.40	374.4	89.74	15.22	1421.3	0.035	5395
34.0	3442.269	-80.5605	28.3612	79.58	85.00	390.6	89.74	15.80	1429.6	0.039	5776
35.0	3442.334	-80.5604	28.3612	81.20	84.57	407.3	89.76	16.37	1438.6	0.045	6173
36.0	3442.402	-80.5603	28.3612	82.67	84.14	424.4	89.77	16.95	1448.1	0.051	6587
37.0	3442.473	-80.5601	28.3612	83.95	83.70	441.8	89.79	17.53	1458.1	0.058	7018
38.0	3442.547	-80.5600	28.3612	85.07	83.26	459.5	89.81	18.10	1468.7	0.066	7465
39.0	3442.623	-80.5598	28.3612	86.02	82.81	477.6	89.83	18.68	1479.8	0.075	7931
40.0	3442.703	-80.5596	28.3612	86.86	82.35	496.0	89.85	19.24	1491.5	0.085	8413
41.0	3442.785	-80.5594	28.3612	87.67	81.89	514.9	89.88	19.81	1503.9	0.096	8914
42.0	3442.870	-80.5591	28.3612	88.50	81.41	534.1	89.92	20.37	1517.0	0.109	9433
43.0	3442.959	-80.5589	28.3612	89.35	80.93	553.7	89.96	20.93	1530.7	0.122	9973
44.0	3443.051	-80.5586	28.3612	90.19	80.45	573.8	90.01	21.48	1545.0	0.137	10527
45.0	3443.145	-80.5583	28.3612	91.00	79.96	594.2	90.07	22.03	1559.9	0.153	11102
46.0	3443.243	-80.5579	28.3612	91.75	79.47	615.0	90.14	22.57	1575.5	0.170	11697
47.0	3443.344	-80.5576	28.3612	92.45	78.97	636.3	90.20	23.10	1591.8	0.189	12312
48.0	3443.449	-80.5572	28.3612	93.09	78.45	657.9	90.28	23.62	1608.9	0.210	12947
49.0	3443.557	-80.5568	28.3611	93.69	77.92	680.0	90.35	24.13	1626.8	0.232	13601
50.0	3443.668	-80.5563	28.3611	94.23	77.36	702.5	90.43	24.62	1645.5	0.256	14277
51.0	3443.782	-80.5558	28.3611	94.74	76.80	725.3	90.52	25.10	1665.0	0.282	14973
52.0	3443.900	-80.5553	28.3610	95.21	76.23	748.7	90.61	25.56	1685.3	0.310	15689
53.0	3444.022	-80.5547	28.3610	95.67	75.65	772.5	90.71	26.01	1706.3	0.340	16427
54.0	3444.147	-80.5541	28.3609	96.12	75.07	796.7	90.81	26.46	1728.1	0.372	17186
55.0	3444.275	-80.5534	28.3608	96.55	74.48	821.5	90.92	26.88	1750.6	0.407	17967
56.0	3444.407	-80.5527	28.3608	96.99	73.89	846.7	91.04	27.30	1773.9	0.444	18769
57.0	3444.543	-80.5520	28.3607	97.41	73.30	872.4	91.16	27.70	1798.0	0.484	19594
58.0	3444.682	-80.5512	28.3606	97.83	72.71	898.6	91.30	28.08	1822.7	0.526	20441
59.0	3444.825	-80.5503	28.3604	98.24	72.12	925.2	91.44	28.45	1848.0	0.571	21310
60.0	3444.972	-80.5494	28.3603	98.63	71.52	952.1	91.58	28.81	1874.1	0.619	22202
61.0	3445.123	-80.5485	28.3602	98.98	70.92	979.4	91.73	29.14	1900.8	0.670	23116
62.0	3445.277	-80.5475	28.3600	99.30	70.30	1006.8	91.87	29.45	1928.1	0.724	24053
63.0	3445.435	-80.5464	28.3599	99.57	69.69	1034.3	92.01	29.73	1955.9	0.781	25012
	MACH ONE										
63.690	3445.546	-80.5456	28.3598	99.73	69.26	1053.3	92.11	29.91	1975.3	0.822	25687

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
64.0	3445.596	-80.5453	28.3597	99.80	69.07	1061.8	92.15	29.99	1984.0	0.842	25993
65.0	3445.761	-80.5441	28.3595	100.01	68.45	1089.5	92.29	30.23	2012.6	0.905	26995
66.0	3445.930	-80.5428	28.3593	100.21	67.83	1117.4	92.43	30.45	2041.8	0.973	28019
67.0	3446.102	-80.5415	28.3591	100.40	67.21	1145.9	92.58	30.66	2071.6	1.044	29065
68.0	3446.277	-80.5401	28.3588	100.60	66.57	1175.0	92.73	30.85	2102.4	1.118	30132
69.0	3446.457	-80.5386	28.3586	100.79	65.94	1204.8	92.88	31.03	2134.1	1.197	31221
70.0	3446.640	-80.5371	28.3583	100.97	65.30	1235.5	93.04	31.20	2166.7	1.279	32332
71.0	3446.826	-80.5355	28.3580	101.13	64.67	1267.0	93.19	31.36	2200.3	1.366	33466
72.0	3447.017	-80.5338	28.3577	101.29	64.02	1299.3	93.35	31.51	2234.9	1.457	34622
73.0	3447.211	-80.5320	28.3574	101.45	63.38	1332.5	93.52	31.64	2270.6	1.553	35802
74.0	3447.409	-80.5302	28.3571	101.60	62.72	1366.6	93.68	31.77	2307.3	1.653	37004
75.0	3447.611	-80.5282	28.3567	101.75	62.07	1401.5	93.85	31.87	2345.0	1.758	38230
76.0	3447.817	-80.5262	28.3563	101.88	61.42	1437.3	94.01	31.97	2383.7	1.869	39481
77.0	3448.026	-80.5240	28.3559	102.02	60.78	1474.0	94.19	32.06	2423.4	1.984	40754
78.0	3448.240	-80.5218	28.3555	102.18	60.15	1511.5	94.36	32.15	2463.8	2.105	42053
79.0	3448.458	-80.5194	28.3550	102.34	59.53	1550.0	94.55	32.23	2505.0	2.231	43376
MAXIMUM DYNAMIC PRESSURE											
79.500	3448.568	-80.5182	28.3548	102.42	59.23	1569.6	94.64	32.27	2525.9	2.296	44047
80.0	3448.680	-80.5170	28.3545	102.50	58.94	1589.4	94.73	32.31	2547.1	2.363	44724
81.0	3448.906	-80.5145	28.3540	102.65	58.35	1629.7	94.91	32.39	2590.2	2.500	46099
82.0	3449.137	-80.5118	28.3535	102.76	57.77	1671.1	95.08	32.45	2634.3	2.643	47499
83.0	3449.371	-80.5091	28.3529	102.85	57.18	1713.4	95.24	32.50	2679.6	2.793	48925
84.0	3449.611	-80.5062	28.3523	102.93	56.59	1756.8	95.40	32.54	2726.1	2.948	50378
85.0	3449.854	-80.5032	28.3517	103.01	56.00	1801.1	95.57	32.57	2773.8	3.110	51857
86.0	3450.102	-80.5001	28.3511	103.09	55.40	1846.5	95.73	32.58	2822.6	3.279	53363
87.0	3450.354	-80.4969	28.3504	103.19	54.82	1892.9	95.90	32.59	2872.4	3.454	54896
88.0	3450.611	-80.4935	28.3497	103.28	54.24	1940.4	96.07	32.59	2923.2	3.637	56456
89.0	3450.873	-80.4900	28.3490	103.38	53.68	1988.8	96.24	32.59	2974.9	3.826	58044
90.0	3451.139	-80.4864	28.3482	103.46	53.13	2038.1	96.41	32.59	3027.4	4.023	59667
91.0	3451.410	-80.4826	28.3474	103.54	52.59	2088.3	96.57	32.57	3081.0	4.228	61324
92.0	3451.685	-80.4787	28.3465	103.62	52.05	2139.7	96.73	32.55	3135.7	4.440	62977
93.0	3451.965	-80.4747	28.3457	103.67	51.51	2191.9	96.88	32.52	3191.4	4.659	64678
94.0	3452.250	-80.4705	28.3447	103.71	50.97	2245.2	97.02	32.48	3248.3	4.887	66406
95.0	3452.539	-80.4662	28.3438	103.74	50.44	2299.5	97.16	32.43	3306.2	5.123	68164
96.0	3452.833	-80.4617	28.3428	103.77	49.91	2355.1	97.30	32.37	3365.4	5.368	69951
97.0	3453.132	-80.4570	28.3418	103.81	49.39	2411.8	97.44	32.31	3425.8	5.621	71766
98.0	3453.436	-80.4522	28.3407	103.86	48.88	2469.8	97.58	32.24	3487.3	5.883	73611
99.0	3453.745	-80.4472	28.3396	103.92	48.37	2528.8	97.73	32.17	3549.8	6.154	75485
100.0	3454.058	-80.4421	28.3385	103.97	47.88	2588.8	97.87	32.10	3613.3	6.434	77389
101.0	3454.377	-80.4368	28.3373	104.01	47.39	2649.8	98.00	32.02	3677.7	6.723	79324
102.0	3454.700	-80.4313	28.3361	104.05	46.91	2711.9	98.14	31.94	3743.3	7.022	81288

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
103.0	3455.029	-80.4256	28.3348	104.08	46.44	2775.1	98.27	31.86	3810.0	7.331	83282
104.0	3455.362	-80.4198	28.3335	104.11	45.97	2839.5	98.39	31.76	3877.8	7.649	85307
105.0	3455.701	-80.4138	28.3322	104.15	45.50	2905.0	98.52	31.67	3946.8	7.978	87363
106.0	3456.045	-80.4075	28.3308	104.17	45.04	2971.7	98.64	31.57	4016.9	8.317	89449
107.0	3456.393	-80.4011	28.3293	104.20	44.59	3039.5	98.76	31.46	4088.1	8.666	91566
108.0	3456.747	-80.3945	28.3279	104.23	44.14	3108.4	98.88	31.36	4160.4	9.027	93714
109.0	3457.106	-80.3877	28.3263	104.27	43.71	3178.5	99.00	31.25	4233.9	9.398	95893
110.0	3457.470	-80.3807	28.3247	104.30	43.27	3249.7	99.12	31.13	4308.4	9.780	98103
111.0	3457.839	-80.3735	28.3231	104.33	42.85	3322.1	99.23	31.02	4384.1	10.173	100346
112.0	3458.214	-80.3661	28.3214	104.36	42.43	3395.6	99.34	30.90	4461.0	10.578	102619
113.0	3458.593	-80.3585	28.3197	104.39	42.01	3470.4	99.45	30.78	4539.0	10.994	104924
114.0	3458.978	-80.3506	28.3179	104.41	41.60	3546.3	99.56	30.65	4618.1	11.423	107261
115.0	3459.368	-80.3426	28.3160	104.44	41.20	3623.6	99.67	30.53	4698.6	11.863	109630
116.0	3459.764	-80.3343	28.3141	104.47	40.80	3702.1	99.78	30.40	4780.2	12.316	112031
117.0	3460.165	-80.3258	28.3122	104.49	40.41	3781.8	99.88	30.28	4863.1	12.781	114465
118.0	3460.571	-80.3170	28.3102	104.52	40.03	3862.9	99.98	30.15	4947.2	13.259	116931
119.0	3460.983	-80.3080	28.3081	104.54	39.65	3945.2	100.08	30.02	5032.6	13.750	119430
120.0	3461.400	-80.2988	28.3060	104.57	39.28	4028.9	100.18	29.88	5119.2	14.253	121962
121.0	3461.822	-80.2894	28.3038	104.59	38.91	4113.8	100.27	29.75	5207.1	14.771	124528
122.0	3462.250	-80.2797	28.3015	104.61	38.54	4200.2	100.37	29.61	5296.5	15.301	127126
123.0	3462.684	-80.2697	28.2992	104.63	38.18	4288.0	100.46	29.47	5387.3	15.846	129757
124.0	3463.124	-80.2594	28.2969	104.65	37.82	4377.4	100.55	29.33	5479.7	16.407	132429
125.0	3463.568	-80.2490	28.2944	104.64	37.47	4467.5	100.62	29.19	5572.7	16.979	135127
126.0	3464.017	-80.2383	28.2920	104.64	37.13	4558.9	100.69	29.05	5667.0	17.563	137854
127.0	3464.473	-80.2273	28.2894	104.67	36.78	4652.6	100.78	28.91	5763.6	18.165	140622
128.0	3464.935	-80.2160	28.2868	104.68	36.45	4747.6	100.86	28.76	5861.3	18.782	143423
129.0	3465.402	-80.2044	28.2841	104.70	36.12	4843.8	100.94	28.62	5960.3	19.415	146258
130.0	3465.875	-80.1926	28.2813	104.72	35.79	4941.6	101.02	28.48	6060.8	20.062	149127
131.0	3466.353	-80.1805	28.2785	104.73	35.47	5040.8	101.09	28.34	6162.8	20.726	152034
132.0	3466.838	-80.1681	28.2756	104.74	35.15	5141.8	101.16	28.19	6266.4	21.405	154975
133.0	3467.328	-80.1553	28.2726	104.75	34.84	5244.1	101.23	28.05	6371.4	22.101	157951
134.0	3467.824	-80.1423	28.2696	104.76	34.52	5347.8	101.30	27.90	6477.8	22.812	160962
135.0	3468.326	-80.1290	28.2665	104.77	34.22	5453.6	101.37	27.75	6586.2	23.541	164009
136.0	3468.834	-80.1154	28.2633	104.78	33.92	5561.1	101.44	27.61	6696.3	24.287	167092
137.0	3469.348	-80.1015	28.2600	104.79	33.62	5670.2	101.51	27.46	6807.9	25.049	170211
138.0	3469.868	-80.0872	28.2567	104.80	33.32	5779.7	101.57	27.31	6919.9	25.830	173366
139.0	3470.393	-80.0726	28.2533	104.82	33.02	5892.2	101.64	27.16	7035.0	26.628	176556
	IECO										
139.570	3470.696	-80.0642	28.2513	104.82	32.88	5954.4	101.68	27.09	7098.3	27.090	178391
140.0	3470.925	-80.0577	28.2498	104.82	32.74	5999.5	101.70	27.01	7144.7	27.443	179783
141.0	3471.460	-80.0426	28.2462	104.83	32.50	6048.9	101.74	26.85	7196.5	28.272	183029

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
142.0	3471.995	-80.0273	28.2426	104.85	32.25	6097.9	101.78	26.68	7247.9	29.110	186275
143.0	3472.531	-80.0118	28.2390	104.86	32.01	6147.6	101.81	26.51	7300.0	29.956	189529
	OECO										
143.470	3472.783	-80.0045	28.2373	104.87	31.90	6163.9	101.83	26.43	7317.4	30.357	191059
144.0	3473.067	-79.9962	28.2353	104.88	31.80	6168.2	101.84	26.35	7322.7	30.810	192783
	S-IB/S-IVB SEPARATION										
144.230	3473.190	-79.9927	28.2345	104.88	31.76	6166.2	101.84	26.32	7321.2	31.007	193529
145.0	3473.600	-79.9806	28.2317	104.89	31.61	6157.9	101.85	26.18	7314.5	31.666	196020
146.0	3474.129	-79.9650	28.2280	104.90	31.36	6143.8	101.86	25.96	7303.3	32.522	199230
147.0	3474.653	-79.9494	28.2243	104.92	31.09	6128.8	101.87	25.73	7291.1	33.378	202408
148.0	3475.172	-79.9337	28.2206	104.93	30.86	6115.9	101.88	25.52	7280.7	34.234	205556
149.0	3475.686	-79.9181	28.2169	104.94	30.63	6113.4	101.89	25.33	7280.8	35.091	208678
150.0	3476.197	-79.9024	28.2132	104.95	30.40	6116.4	101.91	25.14	7286.1	35.950	211779
155.0	3478.706	-79.8234	28.1944	105.03	29.26	6143.0	102.01	24.20	7324.3	40.282	227002
160.0	3481.141	-79.7431	28.1753	105.10	28.14	6182.6	102.10	23.29	7374.7	44.683	241779
165.0	3483.505	-79.6616	28.1557	105.17	27.04	6226.5	102.20	22.40	7428.9	49.157	256124
170.0	3485.799	-79.5788	28.1358	105.25	25.96	6275.1	102.30	21.52	7487.2	53.705	270045
	GUIDANCE INITIATION										
172.400	3486.876	-79.5386	28.1260	105.28	25.45	6300.9	102.34	21.11	7517.6	55.914	276578
175.0	3488.026	-79.4946	28.1154	105.31	24.90	6330.0	102.39	20.67	7551.4	58.328	283552
180.0	3490.187	-79.4091	28.0946	105.41	23.92	6387.8	102.51	19.88	7617.3	63.030	296662
185.0	3492.290	-79.3222	28.0733	105.52	23.06	6446.2	102.63	19.18	7682.6	67.805	309422
190.0	3494.342	-79.2342	28.0515	105.62	22.24	6502.7	102.75	18.52	7745.5	72.650	321863
195.0	3496.342	-79.1449	28.0293	105.72	21.44	6569.6	102.87	17.89	7818.3	77.567	333996
200.0	3498.294	-79.0544	28.0067	105.82	20.65	6636.2	102.99	17.26	7890.7	82.558	345837
205.0	3500.194	-78.9625	27.9835	105.93	19.87	6706.4	103.11	16.62	7966.4	87.624	357356
210.0	3502.045	-78.8693	27.9599	106.04	19.10	6779.4	103.23	16.01	8044.6	92.767	368576
215.0	3503.845	-78.7748	27.9357	106.14	18.34	6854.9	103.35	15.40	8125.0	97.987	379489
220.0	3505.595	-78.6789	27.9110	106.25	17.60	6934.1	103.47	14.80	8208.8	103.287	390098
225.0	3507.296	-78.5816	27.8858	106.35	16.88	7016.0	103.60	14.21	8295.1	108.668	400406
230.0	3508.947	-78.4829	27.8600	106.45	16.17	7101.0	103.71	13.64	8384.2	114.132	410416
235.0	3510.551	-78.3828	27.8338	106.55	15.49	7188.8	103.83	13.09	8475.8	119.679	420132
240.0	3512.106	-78.2812	27.8069	106.65	14.81	7279.4	103.95	12.54	8570.0	125.311	429556
245.0	3513.614	-78.1781	27.7795	106.75	14.15	7372.6	104.07	12.01	8666.6	131.030	438688
250.0	3515.074	-78.0735	27.7515	106.85	13.51	7469.2	104.18	11.48	8766.3	136.837	447537

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
255.0	3516.487	-77.9674	27.7229	106.95	12.89	7568.4	104.30	10.98	8868.4	142.734	456087
260.0	3517.854	-77.8597	27.6937	107.04	12.30	7670.6	104.42	10.49	8973.4	148.721	464364
265.0	3519.176	-77.7505	27.6639	107.14	11.72	7775.3	104.53	10.01	9080.5	154.802	472365
270.0	3520.452	-77.6396	27.6334	107.23	11.15	7883.6	104.64	9.55	9191.2	160.976	480091
275.0	3521.684	-77.5271	27.6024	107.33	10.60	7994.5	104.76	9.09	9304.2	167.247	487546
280.0	3522.871	-77.4130	27.5707	107.42	10.05	8104.9	104.87	8.64	9416.7	173.614	494725
285.0	3524.014	-77.2972	27.5383	107.51	9.54	8220.9	104.98	8.22	9534.5	180.080	501635
290.0	3525.115	-77.1796	27.5053	107.61	9.05	8342.0	105.10	7.81	9657.3	186.647	508292
295.0	3526.174	-77.0603	27.4716	107.70	8.58	8463.5	105.21	7.42	9780.3	193.317	514695
300.0	3527.192	-76.9393	27.4372	107.79	8.12	8588.2	105.32	7.03	9906.5	200.091	520848
305.0	3528.170	-76.8165	27.4020	107.88	7.68	8715.7	105.43	6.66	10035.2	206.971	526755
310.0	3529.108	-76.6918	27.3662	107.97	7.25	8845.7	105.54	6.30	10166.4	213.958	532418
315.0	3530.007	-76.5653	27.3296	108.06	6.83	8978.5	105.65	5.95	10300.3	221.055	537841
320.0	3530.867	-76.4370	27.2923	108.15	6.44	9114.1	105.76	5.62	10436.8	228.263	543030
325.0	3531.689	-76.3067	27.2542	108.24	6.06	9252.1	105.87	5.30	10575.7	235.583	547988
330.0	3532.475	-76.1745	27.2153	108.33	5.70	9392.8	105.98	4.99	10717.2	243.018	552724
335.0	3533.225	-76.0404	27.1757	108.42	5.36	9536.2	106.09	4.70	10861.4	250.570	557242
340.0	3533.941	-75.9042	27.1352	108.51	5.03	9682.8	106.20	4.42	11008.6	258.239	561549
345.0	3534.623	-75.7661	27.0939	108.60	4.72	9832.6	106.31	4.16	11158.9	266.029	565654
350.0	3535.272	-75.6259	27.0517	108.69	4.42	9985.5	106.42	3.90	11312.3	273.942	569558
355.0	3535.890	-75.4836	27.0087	108.78	4.14	10141.2	106.53	3.66	11468.4	281.980	573271
360.0	3536.478	-75.3392	26.9649	108.87	3.87	10299.9	106.64	3.43	11627.5	290.145	576795
365.0	3537.035	-75.1927	26.9201	108.96	3.62	10461.1	106.75	3.21	11789.0	298.440	580139
370.0	3537.564	-75.0440	26.8744	109.05	3.38	10625.2	106.85	3.00	11953.4	306.864	583306
375.0	3538.066	-74.8930	26.8278	109.13	3.15	10792.9	106.96	2.81	12121.4	315.422	586309
380.0	3538.542	-74.7399	26.7802	109.22	2.96	10963.0	107.07	2.64	12291.6	324.116	589156
385.0	3538.996	-74.5844	26.7317	109.31	2.75	11136.5	107.18	2.46	12465.4	332.948	591865
390.0	3539.424	-74.4267	26.6822	109.40	2.57	11313.1	107.29	2.30	12642.1	341.919	594417
395.0	3539.830	-74.2666	26.6316	109.49	2.40	11492.7	107.40	2.15	12821.8	351.034	596836
400.0	3540.216	-74.1041	26.5801	109.58	2.25	11676.1	107.51	2.02	13005.3	360.293	599131
405.0	3540.584	-73.9391	26.5274	109.67	2.11	11863.1	107.62	1.89	13192.3	369.700	601313
410.0	3540.935	-73.7717	26.4738	109.76	1.98	12053.5	107.73	1.78	13382.8	379.259	603393
415.0	3541.271	-73.6018	26.4190	109.85	1.87	12248.2	107.84	1.68	13577.6	388.970	605379
420.0	3541.592	-73.4294	26.3630	109.94	1.77	12445.4	107.95	1.59	13774.8	398.839	607280
425.0	3541.902	-73.2543	26.3060	110.03	1.68	12646.3	108.06	1.52	13975.7	408.865	609108
430.0	3542.202	-73.0766	26.2477	110.13	1.60	12850.9	108.17	1.45	14180.3	419.054	610872
435.0	3542.493	-72.8963	26.1883	110.22	1.54	13059.0	108.28	1.39	14388.5	429.407	612584
440.0	3542.779	-72.7132	26.1276	110.31	1.49	13271.0	108.39	1.35	14600.5	439.927	614263
445.0	3543.060	-72.5274	26.0657	110.40	1.45	13486.9	108.50	1.32	14816.3	450.618	615911
450.0	3543.340	-72.3388	26.0025	110.50	1.42	13706.6	108.61	1.30	15036.0	461.482	617551
455.0	3543.621	-72.1473	25.9380	110.59	1.41	13930.2	108.72	1.29	15259.7	472.522	619194
460.0	3543.905	-71.9530	25.8722	110.68	1.41	14158.3	108.84	1.29	15487.7	483.742	620854
465.0	3544.194	-71.7557	25.8050	110.78	1.42	14390.6	108.95	1.30	15720.0	495.146	622546
470.0	3544.492	-71.5555	25.7364	110.87	1.44	14628.0	109.06	1.32	15957.4	506.735	624288

TABLE XI
GEOGRAPHIC COORDINATES

TIME SEC	EC DIST NM	LONG DEG	GC LAT DEG	VEL-AZ DEG	VEL-ELEV DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
475.0	3544.801	-71.3521	25.6664	110.97	1.48	14870.4	109.17	1.36	16199.8	518.515	626099
480.0	3545.123	-71.1457	25.5949	111.06	1.52	15118.9	109.29	1.40	16448.3	530.490	627992
485.0	3545.461	-70.9361	25.5219	111.16	1.57	15373.6	109.40	1.44	16703.0	542.665	629976
490.0	3545.816	-70.7233	25.4473	111.25	1.62	15634.5	109.52	1.49	16964.0	555.044	632058
495.0	3546.188	-70.5071	25.3712	111.35	1.67	15899.9	109.63	1.54	17229.4	567.632	634246
500.0	3546.579	-70.2877	25.2934	111.45	1.73	16164.3	109.74	1.59	17493.9	580.430	636548
505.0	3546.989	-70.0649	25.2141	111.54	1.78	16422.9	109.86	1.64	17752.5	593.435	638965
510.0	3547.417	-69.8390	25.1332	111.64	1.83	16676.3	109.97	1.69	18005.9	606.643	641491
515.0	3547.865	-69.6100	25.0507	111.74	1.89	16926.0	110.09	1.75	18255.7	620.049	644135
520.0	3548.337	-69.3780	24.9666	111.84	1.97	17173.5	110.20	1.83	18503.3	633.652	646922
525.0	3548.839	-69.1430	24.8810	111.94	2.08	17420.4	110.31	1.93	18750.2	647.449	649894
530.0	3549.380	-68.9050	24.7937	112.05	2.21	17668.0	110.43	2.06	18997.9	661.440	653095
535.0	3549.962	-68.6641	24.7049	112.15	2.34	17922.0	110.55	2.18	19251.9	675.627	656553
540.0	3550.582	-68.4200	24.6143	112.26	2.44	18187.4	110.66	2.27	19517.4	690.017	660234
545.0	3551.235	-68.1728	24.5221	112.36	2.53	18454.0	110.78	2.36	19784.2	704.617	664118
550.0	3551.926	-67.9224	24.4281	112.47	2.66	18724.6	110.90	2.48	20054.8	719.427	668228
555.0	3552.667	-67.6688	24.3323	112.57	2.82	18997.3	111.02	2.63	20327.6	734.448	672642
560.0	3553.466	-67.4120	24.2347	112.68	2.99	19275.7	111.14	2.80	20606.0	749.683	677414
565.0	3554.326	-67.1519	24.1352	112.79	3.18	19559.8	111.26	2.98	20890.2	765.137	682543
570.0	3555.255	-66.8885	24.0339	112.90	3.38	19850.4	111.38	3.17	21180.9	780.812	688092
575.0	3556.257	-66.6217	23.9307	113.01	3.60	20147.5	111.51	3.38	21478.0	796.713	694086
580.0	3557.335	-66.3517	23.8254	113.13	3.83	20451.4	111.63	3.59	21782.0	812.837	700538
585.0	3558.502	-66.0780	23.7182	113.24	4.07	20762.5	111.76	3.82	22093.0	829.204	707532
	S-IVB GUIDANCE CUTOFF										
588.468	3559.365	-65.8861	23.6426	113.32	4.24	20979.8	111.84	3.99	22310.4	840.696	712708
590.0	3559.757	-65.8010	23.6089	113.35	4.23	20996.2	111.88	3.98	22326.9	845.802	715058
595.0	3561.017	-65.5234	23.4987	113.48	4.14	20986.5	112.00	3.89	22317.8	862.458	722617
	S-IVB/CSM SEPARATION										
598.700	3561.930	-65.3185	23.4168	113.58	4.07	20978.8	112.09	3.82	22310.5	874.776	728094
600.0	3562.248	-65.2466	23.3880	113.61	4.04	20976.1	112.12	3.80	22307.9	879.102	729997

TABLE XII
S-IB STAGE FREE FLIGHT TRAJECTORY

	EARTH-FIXED PLUMBLINE POSITIONS			EARTH-FIXED PLUMBLINE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	ALTITUDE M	RANGE M	LONG DEG	LAT DEG
160.0	82948	72721	-1094	1579.1	810.8	-6.0	73255	82018	79.7504	28.3393
170.0	98720	80358	-1147	1575.5	716.6	-4.7	81112	97498	79.5982	28.3028
180.0	114462	87056	-1187	1572.8	623.1	-3.3	88069	112926	79.4465	28.2661
190.0	130176	92820	-1214	1570.2	529.8	-2.0	94129	128314	79.2955	28.2292
200.0	145865	97653	-1227	1567.5	436.8	-0.7	99296	143669	79.1449	28.1922
210.0	161526	101556	-1229	1564.8	343.9	0.5	103569	158995	78.9947	28.1548
220.0	177160	104531	-1218	1561.9	251.1	1.7	106951	174300	78.8449	28.1173
230.0	192764	106579	-1195	1559.0	158.4	2.9	109443	189588	78.6953	28.0795
240.0	208339	107700	-1160	1555.9	65.8	4.0	111045	204864	78.5461	28.0414
250.0	223882	107895	-1114	1552.7	-26.8	5.1	111757	220134	78.3970	28.0031
260.0	239393	107164	-1057	1549.4	-119.4	6.2	111580	235403	78.2481	27.9645
270.0	254870	105507	-990	1546.0	-212.0	7.2	110514	250677	78.0993	27.9257
280.0	270313	102925	-913	1542.5	-304.6	8.3	108558	265960	77.9506	27.8865
290.0	285720	99415	-825	1538.9	-397.3	9.2	105712	281258	77.8018	27.8471
300.0	301090	94979	-728	1535.1	-490.1	10.2	101975	296576	77.6530	27.8073
310.0	316422	89613	-622	1531.2	-583.0	11.1	97347	311919	77.5041	27.7672
320.0	331714	83319	-507	1527.2	-676.0	11.9	91825	327293	77.3550	27.7268
330.0	346965	76093	-384	1522.9	-769.1	12.7	85409	342703	77.2057	27.6860
340.0	362171	67936	-252	1518.1	-862.3	13.5	78099	358151	77.0562	27.6449
350.0	377323	58850	-113	1511.8	-954.7	14.3	69896	373635	76.9065	27.6034
360.0	392392	48852	32	1500.6	-1044.1	14.9	60815	389132	76.7568	27.5617
370.0	407284	38005	184	1473.5	-1121.8	15.4	50915	404552	76.6080	27.5199
380.0	421690	26556	337	1391.2	-1154.2	15.1	40419	419576	76.4631	27.4790
390.0	434467	15493	479	1114.2	-1011.5	12.6	30233	433007	76.3337	27.4422
400.0	443065	7275	578	596.3	-614.0	7.0	22622	442121	76.2460	27.4171
410.0	447047	2782	626	246.3	-322.2	3.0	18417	446399	76.2049	27.4053
420.0	448714	186	646	110.5	-219.9	1.4	15945	448241	76.1871	27.4002
430.0	449511	-1853	657	55.1	-192.6	0.7	13965	449179	76.1781	27.3976
440.0	449896	-3695	662	24.8	-176.3	0.4	12155	449694	76.1732	27.3961
450.0	450052	-5385	665	8.0	-161.9	0.1	10480	449969	76.1705	27.3953
460.0	450082	-6941	665	-0.8	-149.4	0.0	8931	450110	76.1692	27.3949
470.0	450050	-8376	665	-5.1	-138.0	-0.0	7496	450180	76.1685	27.3947
480.0	449989	-9705	665	-6.9	-128.1	-0.1	6166	450214	76.1682	27.3946
490.0	449917	-10944	664	-7.4	-119.8	-0.1	4926	450230	76.1681	27.3945
500.0	449842	-12105	663	-7.4	-112.6	-0.1	3763	450239	76.1680	27.3945
510.0	449768	-13199	663	-7.2	-106.4	-0.1	2666	450243	76.1680	27.3944
520.0	449697	-14235	662	-6.9	-100.9	-0.1	1628	450246	76.1679	27.3944
530.0	449630	-15218	661	-6.6	-96.0	-0.1	642	450249	76.1679	27.3944
	IMPACT									
536.8	449585	-15858	661	-6.4	-93.0	-0.1	0	450250	76.1679	27.3944

TABLE XIII
S-IVB STAGE FREE FLIGHT TRAJECTORY

	EARTH-FIXED PLUMBLINE POSITIONS			EARTH-FIXED PLUMBLINE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	ALTITUDE M	RANGE M	LONG DEG	LAT DEG
600.0	1666189	8652	39324	6280.3	-1180.4	204.9	222502	1628945	65.2466	23.5332
610.0	1728882	-3554	41390	6258.2	-1260.9	208.3	226837	1690565	64.6951	23.3094
620.0	1791350	-16565	43489	6235.3	-1341.1	211.6	230952	1752101	64.1462	23.0836
630.0	1853586	-30375	45622	6211.8	-1421.0	214.8	234848	1813558	63.6001	22.8558
640.0	1915584	-44984	47786	6187.6	-1500.6	218.0	238525	1874940	63.0566	22.6262
650.0	1977335	-60387	49981	6162.6	-1579.9	221.1	241983	1936252	62.5157	22.3947
660.0	2038833	-76581	52207	6136.9	-1658.8	224.1	245220	1997498	61.9773	22.1613
670.0	2100071	-93563	54463	6110.5	-1737.5	227.0	248238	2058683	61.4414	21.9261
680.0	2161042	-111329	56747	6083.5	-1815.8	229.9	251037	2119810	60.9078	21.6891
690.0	2221738	-129877	59060	6055.7	-1893.8	232.7	253615	2180885	60.3767	21.4503
700.0	2282153	-149204	61400	6027.2	-1971.5	235.4	255973	2241912	59.8478	21.2097
710.0	2342280	-169305	63767	5998.0	-2048.8	238.0	258111	2302894	59.3212	20.9674
720.0	2402111	-190179	66159	5968.2	-2125.8	240.5	260029	2363837	58.7967	20.7233
730.0	2461641	-211821	68577	5937.6	-2202.6	243.0	261727	2424745	58.2744	20.4775
740.0	2520861	-234229	71019	5906.4	-2279.0	245.4	263205	2485622	57.7541	20.23[illegible]
750.0	2579766	-257399	73484	5874.4	-2355.0	247.7	264462	2546472	57.2358	19.9808
760.0	2638347	-281328	75972	5841.8	-2430.8	249.9	265499	2607300	56.7196	19.7299
770.0	2696599	-306013	78481	5808.5	-2506.2	252.0	266316	2668110	56.2052	19.4773
780.0	2754515	-331451	81012	5774.5	-2581.3	254.1	266913	2728906	55.6926	19.2231
790.0	2812087	-357638	83562	5739.8	-2656.0	256.0	267289	2789693	55.1818	18.9673
800.0	2869309	-384571	86132	5704.5	-2730.5	257.9	267444	2850474	54.6728	18.7098
810.0	2926174	-412246	88720	5668.4	-2804.6	259.7	267380	2911255	54.1655	18.4508
820.0	2982675	-440661	91325	5631.7	-2878.4	261.4	267095	2972039	53.6597	18.1901
830.0	3038806	-469813	93947	5594.3	-2951.8	263.0	266590	3032831	53.1556	17.9278
840.0	3094559	-499696	96585	5556.2	-3024.9	264.5	265864	3093635	52.6529	17.664[illegible]
850.0	3149928	-530310	99238	5517.4	-3097.7	266.0	264919	3154455	52.1517	17.3985
860.0	3204906	-561650	101904	5478.0	-3170.2	267.3	263753	3215295	51.6519	17.1316
870.0	3259485	-593712	104584	5437.9	-3242.3	268.6	262367	3276161	51.1534	16.8630
880.0	3313661	-626494	107275	5397.1	-3314.1	269.7	260761	3337055	50.6562	16.593[illegible]
890.0	3367425	-659992	109978	5355.6	-3385.5	270.8	258935	3397983	50.1602	16.3214
900.0	3420770	-694203	112691	5313.4	-3456.6	271.8	256889	3458949	49.6655	16.0482
910.0	3473690	-729123	115414	5270.6	-3527.3	272.7	254623	3519957	49.1718	15.7736
920.0	3526179	-764748	118144	5227.0	-3597.7	273.5	252138	3581012	48.6792	15.4974
930.0	3578228	-801076	120882	5182.8	-3667.8	274.1	249432	3642117	48.1876	15.2197
940.0	3629832	-838103	123627	5137.9	-3737.5	274.7	246508	3703277	47.6969	14.9405
	LOSS OF TELEMETRY									
941.2	3635994	-842593	123957	5132.5	-3745.8	274.8	246142	3710620	47.6381	14.9069

TABLE XIV
S-IB STAGE FREE FLIGHT TRAJECTORY

	EARTH-FIXED PLUMBLINE POSITIONS			EARTH-FIXED PLUMBLINE VELOCITIES						
TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	ALTITUDE FT	RANGE NM	LONG DEG	LAT DEG
160.0	272140	238586	-3590	5180.7	2660.3	-19.8	240337	44.258	79.7504	28.3393
170.0	323885	263641	-3766	5169.1	2351.1	-15.3	266116	52.610	79.5982	28.3028
180.0	375530	285616	-3896	5160.0	2044.2	-10.9	288940	60.936	79.4465	28.2661
190.0	427087	304528	-3984	5151.5	1738.3	-6.6	308823	69.239	79.2955	28.2292
200.0	478559	320384	-4029	5142.8	1433.0	-2.4	325773	77.525	79.1449	28.1922
210.0	529942	333190	-4033	5133.8	1128.3	1.6	339794	85.795	78.9947	28.1548
220.0	581233	342950	-3997	5124.4	823.9	5.6	350890	94.054	78.8449	28.1173
230.0	632428	349668	-3921	5114.7	519.8	9.5	359064	102.303	78.6953	28.0795
240.0	683525	353346	-3808	5104.7	215.9	13.2	364319	110.546	78.5461	28.0414
250.0	734520	353986	-3658	5094.2	-87.9	16.8	366656	118.786	78.3970	28.0031
260.0	785409	351588	-3472	5083.4	-391.6	20.4	366076	127.025	78.2481	27.9645
270.0	836188	346153	-3251	5072.3	-695.4	23.8	362577	135.267	78.0993	27.9257
280.0	886853	337679	-2996	5060.7	-999.3	27.1	356161	143.514	77.9506	27.8865
290.0	937401	326166	-2710	5048.8	-1303.4	30.3	346823	151.769	77.8018	27.8471
300.0	987828	311609	-2391	5036.5	-1607.9	33.3	334564	160.034	77.6530	27.8073
310.0	1038130	294007	-2043	5023.8	-1912.6	36.3	319378	168.314	77.5041	27.7672
320.0	1088302	273355	-1666	5010.5	-2217.9	39.1	301263	176.610	77.3550	27.7268
330.0	1138338	249649	-1261	4996.5	-2523.4	41.8	280214	184.925	77.2057	27.6860
340.0	1188227	222886	-830	4980.8	-2828.9	44.4	256229	193.261	77.0562	27.6449
350.0	1237937	193077	-374	4960.0	-3132.2	46.8	229317	201.616	76.9065	27.6034
360.0	1287375	160274	105	4923.1	-3425.4	49.0	199524	209.978	76.7568	27.5617
370.0	1336233	124689	602	4834.3	-3680.4	50.4	167043	218.299	76.6080	27.5199
380.0	1383496	87126	1106	4564.3	-3786.6	49.7	132607	226.406	76.4631	27.4790
390.0	1425418	50831	1571	3655.6	-3318.6	41.4	99189	233.653	76.3337	27.4422
400.0	1453624	23867	1896	1956.5	-2014.6	23.0	74220	238.572	76.2460	27.4171
410.0	1466690	9127	2053	808.1	-1057.2	9.9	60424	240.880	76.2049	27.4053
420.0	1472158	611	2121	362.5	-721.4	4.6	52312	241.874	76.1871	27.4002
430.0	1474772	-6082	2156	180.9	-631.9	2.4	45818	242.380	76.1781	27.3976
440.0	1476038	-12126	2173	81.5	-578.3	1.2	39878	242.658	76.1732	27.3961
450.0	1476547	-17670	2181	26.1	-531.3	0.5	34384	242.807	76.1705	27.3953
460.0	1476647	-22774	2183	-2.8	-490.2	0.1	29300	242.883	76.1692	27.3949
470.0	1476541	-27484	2183	-16.6	-452.6	-0.1	24594	242.921	76.1685	27.3947
480.0	1476341	-31844	2181	-22.5	-420.2	-0.2	20231	242.939	76.1682	27.3946
490.0	1476104	-35906	2179	-24.4	-392.9	-0.2	16162	242.948	76.1681	27.3945
500.0	1475859	-39715	2177	-24.4	-369.5	-0.2	12345	242.952	76.1680	27.3945
510.0	1475618	-43305	2174	-23.7	-349.0	-0.2	8746	242.955	76.1680	27.3944
520.0	1475385	-46703	2172	-22.8	-331.0	-0.2	5341	242.956	76.1679	27.3944
530.0	1475163	-49931	2170	-21.8	-314.9	-0.2	2105	242.957	76.1679	27.3944
	IMPACT									
536.8	1475017	-52031	2169	-21.1	-305.1	-0.2	0	242.958	76.1679	27.3944

TABLE XV
S-IVB STAGE FREE FLIGHT TRAJECTORY

	EARTH-FIXED PLUMBLINE POSITIONS			EARTH-FIXED PLUMBLINE VELOCITIES						
TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	ALTITUDE FT	RANGE NM	LONG DEG	LAT DEG
600.0	5466500	28385	129015	20604.6	-3872.6	672.3	729994	878.991	65.2466	23.5332
610.0	5672185	-11662	135794	20532.0	-4136.8	683.4	744215	912.241	64.6951	23.3094
620.0	5877132	-54348	142682	20457.2	-4400.0	694.2	757717	945.446	64.1462	23.0836
630.0	6081320	-99659	149678	20380.0	-4662.2	704.8	770500	978.609	63.6001	22.8558
640.0	6284723	-147588	156778	20300.4	-4923.3	715.2	782563	1011.731	63.0566	22.6262
650.0	6487320	-198121	163981	20218.5	-5183.4	725.3	793906	1044.816	62.5157	22.3947
660.0	6689085	-251251	171283	20134.3	-5442.4	735.2	804529	1077.864	61.9773	22.1613
670.0	6889997	-306966	178683	20047.7	-5700.4	744.8	814430	1110.880	61.4414	21.9261
680.0	7090032	-365255	186179	19958.9	-5957.3	754.2	823611	1143.865	60.9078	21.6891
690.0	7289167	-426108	193766	19867.7	-6213.2	763.3	832070	1176.821	60.3767	21.4503
700.0	7487379	-489516	201443	19774.3	-6468.0	772.2	839806	1209.752	59.8478	21.2097
710.0	7684645	-555466	209208	19678.6	-6721.8	780.8	846822	1242.658	59.3212	20.9674
720.0	7880943	-623949	217058	19580.6	-6974.6	789.1	853115	1275.543	58.7967	20.7233
730.0	8076249	-694954	224990	19480.4	-7226.2	797.2	858685	1308.410	58.2744	20.4775
740.0	8270542	-768470	233001	19377.8	-7476.9	805.0	863533	1341.259	57.7541	20.2300
750.0	8463798	-844488	241089	19273.1	-7726.4	812.5	867659	1374.095	57.2358	19.9808
760.0	8655995	-922995	249251	19166.0	-7974.9	819.8	871061	1406.918	56.7196	19.7299
770.0	8847111	-1003983	257484	19056.7	-8222.4	826.8	873741	1439.731	56.2052	19.4773
780.0	9037123	-1087439	265786	18945.2	-8468.7	833.5	875698	1472.537	55.6926	19.2231
790.0	9226008	-1173354	274154	18831.4	-8714.0	840.0	876931	1505.338	55.1818	18.9673
800.0	9413744	-1261717	282584	18715.4	-8958.3	846.1	877442	1538.136	54.6728	18.7098
810.0	9600309	-1352516	291075	18597.2	-9201.4	852.0	877231	1570.934	54.1655	18.4508
820.0	9785680	-1445742	299624	18476.7	-9443.5	857.6	876296	1603.734	53.6597	18.1901
830.0	9969835	-1541382	308226	18354.0	-9684.4	862.9	874638	1636.537	53.1556	17.9278
840.0	10152753	-1639426	316881	18229.0	-9924.3	867.9	872258	1669.347	52.6529	17.6640
850.0	10334409	-1739865	325583	18101.9	-10163.1	872.6	869155	1702.166	52.1517	17.3985
860.0	10514782	-1842685	334332	17972.5	-10400.8	877.0	865330	1734.996	51.6519	17.1316
870.0	10693850	-1947877	343123	17840.8	-10637.4	881.1	860783	1767.840	51.1534	16.8630
880.0	10871591	-2055430	351954	17706.9	-10872.9	885.0	855514	1800.699	50.6562	16.5930
890.0	11047981	-2165331	360821	17570.8	-11107.2	888.5	849523	1833.576	50.1602	16.3214
900.0	11222999	-2277571	369722	17432.5	-11340.5	891.7	842811	1866.474	49.6655	16.0482
910.0	11396622	-2392137	378654	17291.9	-11572.6	894.6	835377	1899.394	49.1718	15.7736
920.0	11568828	-2509018	387613	17149.0	-11803.6	897.2	827223	1932.340	48.6792	15.4974
930.0	11739594	-2628204	396596	17004.0	-12033.4	899.4	818348	1965.312	48.1876	15.2197
940.0	11908899	-2749682	405600	16856.6	-12262.1	901.4	808753	1998.315	47.6969	14.9405
	LOSS OF TELEMETRY									
941.2	11929116	-2764413	406682	16838.8	-12289.5	901.6	807553	2002.277	47.6381	14.9069

APPENDIX A

SPACECRAFT TRAJECTORY*

Event	Time (sec)	Geodetic Latitude (deg)	Longitude (deg)	Altitude (ft)	Space - Fixed Velocity (ft/s)	Flight Path Angle (deg)
First SPS Ignition	609.7	23.317	-64.717	744311	22297	3.58
First SPS Cutoff	826.4	17.700	-52.533	1110106	25501	5.71
Apogee	2474.0	-26.583	26.467	3749571	22664	0.00
Second SPS Ignition	3956.1	-18.617	112.200	1500586	25071	-5.84
Second SPS Cutoff	4045.3	-15.917	117.467	1226211	27443	-7.35
Third SPS Ignition	4054.5	-15.650	117.950	1198083	27477	-7.27
Third SPS Cutoff	4058.3	-15.517	118.183	1184059	27576	-7.29
Fourth SPS Ignition	4067.5	-15.183	118.800	1149105	27624	-7.18
Fourth SPS Cutoff	4071.3	-15.067	119.050	1135166	27719	-7.19
CM/SM Separation	4264.0	- 8.133	130.817	571949	28315	-4.71
Entry	4348.0	- 4.833	136.000	400000	28512	-3.53
Command Module Impact	5582.0	16.083	168.650	0		

*These parameters were furnished by MSC.

APPENDIX B

DEFINITIONS OF SYMBOLS

Symbol	Definitions
XE, YE, ZE DXE, DYE, DZE DDXE, DDYE, DDZE	Position, velocity and acceleration components in the Earth-Fixed Cartesian Coordinate System. The origin of this system is the projection of the center of gravity of the complete vehicle at first motion onto the Fischer Ellipsoid of 1960. The X-Z plane is tangent to the reference ellipsoid at the origin of the coordinate system. The positive X-axis is oriented in the flight azimuth direction, 105 deg E of N. The Y-axis is normal to the X-Z plane and is positive above the origin. The Z-axis is normal to the X-Y plane and is in a right hand relation to the X-Y axes with the positive direction 195 deg E of N. The origin of this earth-fixed system rotates with an angular velocity identical to that of the earth. The earth-fixed coordinate system is shown in Figure 3.
XSP, YSP, ZSP DXSP, DYSP, DZSP DDXSP, DDYSP, DDZSP	Position, velocity and acceleration components in the Space-Fixed Ephemeris Coordinate System. The origin of this system is located at the geocentric center of the earth. The Z-axis points north along the earth's axis of rotation (through the north pole). The X-Y plane is coincident with the equatorial plane. The X-axis points through the vernal equinox. The reference equinox and equator are the mean equinox and equator of date for the epoch of midnight or zero hours on the day of launch. The Y-axis is normal to the X-Z plane and in a right hand relation to the X-, Z-axes. The direction of the coordinate axes remain fixed in space although the origin continues to move with the center of the earth. The space-fixed ephemeris coordinate system is shown in Figure 3.
E. C. DIST LONG G.C. LAT	Position of vehicle in the Geographic Coordinate System. Position in this system is defined by the radius vector from the vehicle to the geocentric center of the earth (E.C.DIST), geocentric latitude (G.C. LAT) and longitude (LONG). Geocentric latitude is the angle between the radius vector and the equatorial plane, positive north of the equator. Longitude is the angle between the projection of the radius vector into the equatorial plane and the Greenwich meridian, measured positive east of the Greenwich meridian.

DEFINITIONS OF SYMBOLS (CONT'D)

Symbols	Definitions
E.F. VEL VEL-AZ VEL-ELEV	Earth-fixed velocity of the vehicle in the Geographic Coordinate System. Velocity in this system is given in terms of azimuth (VEL-AZ), elevation (VEL-ELEV), and magnitude of the velocity vector (E.F.VEL). Azimuth is the angle between the projection of the velocity vector into the local horizontal plane and the north direction in this plane. Elevation is the angle between the velocity vector and the local horizontal plane. The local horizontal plane is defined as the plane perpendicular to the radius vector from the vehicle to the geocentric center of the earth. The geographic coordinate system is shown in Figure 3.
S.F. VEL FLT-PATH HEAD	Space-fixed velocity of vehicle in the Geographic Coordinate System. Velocity is given in terms of flight-path angle (FLT-PATH), heading angle (HEAD), and magnitude of the velocity vector (S.F.VEL). The flight-path angle is the angle between the space fixed velocity vector and the plane normal to the radius vector from the vehicle to the geocentric center of the earth, measured positive upward from this plane. The heading angle is measured positive clockwise from north to the projection of the space-fixed velocity vector in the plane normal to the radius vector.
LAT	Geodetic latitude of vehicle.
MACH	Mach number.
DYN PRES	Dynamic Pressure.
ALTITUDE	Distance from the reference ellipsoid to the center of gravity of the vehicle measured along the radius vector from the vehicle to the geocentric center of the earth.
RANGE	Surface range measured along a spherical earth from the launch site to the subvehicle point. The subvehicle point is defined as the intersection of the reference ellipsoid and the reference ellipsoid normal passing through the vehicle.
DEC	The Declination angle is the angle between the radius vector from the center of the earth to the vehicle and the equatorial plane, positive north of the equator (Synonymous with G.C. LAT).

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