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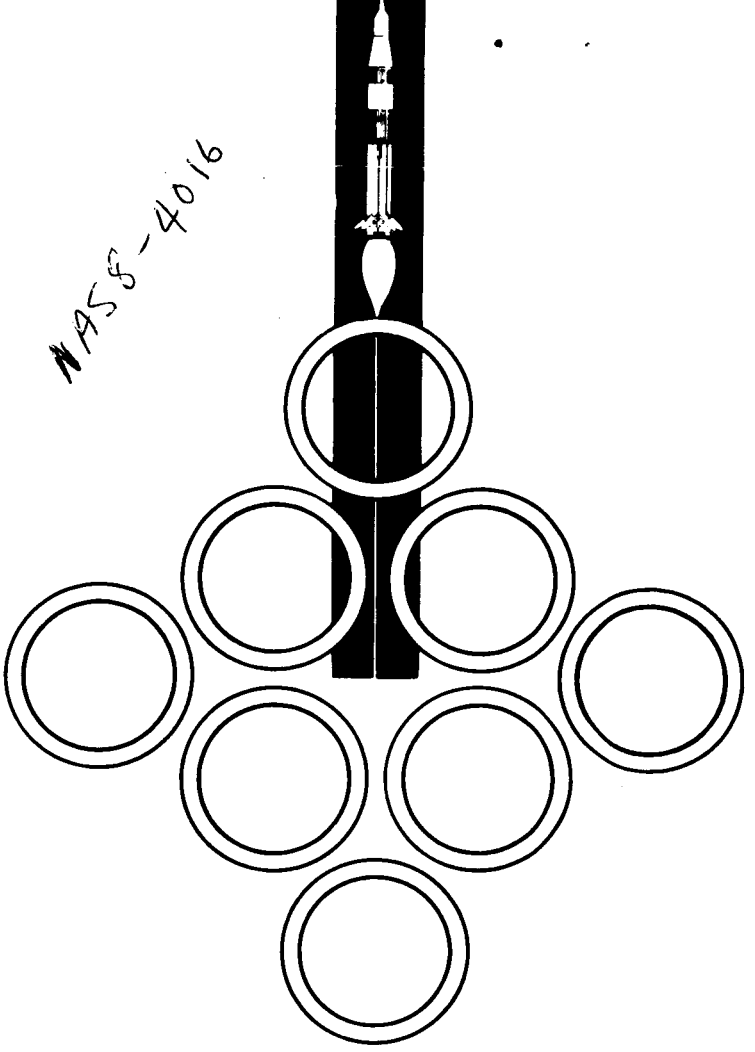

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AS-206A LAUNCH VEHICLE OPERATIONAL FLIGHT TRAJECTORY DISPERSION ANALYSIS

29 DECEMBER 1966

by

AEROSPACE PHYSICS BRANCH

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FOREWORD

This report documents the AS-206A Launch Vehicle Operational Flight Trajectory Dispersion Analysis. The data presented herein is intended primarily for establishing trajectory parameter envelopes about the predicted S-IB and S-IVB stage end conditions of flight and confirmation of the flight performance reserve requirement. The analysis documented herein was performed by the Aerospace Physics Branch, Chrysler Corporation Space Division, under NAS8-4016, Modification MSFC-1, Amendments 19 and 21, as called out in BB Item 3.1.3-12.

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DEFINITIONS AND SYMBOLS

Aerodynamic Heating Indicator	$\int \frac{qV_r}{\pi/2-\lvert\alpha_t\rvert}\, dt$ q = dynamic pressure V_r = relative velocity α_t = total angle of attack
Aerodynamic Load Indicator	Product of dynamic pressure and angle of attack
Altitude	Vehicle altitude above the referenced ellipsoid measured along the geocentric position vector
Angle of Attack	Angle between the relative velocity vector and the longitudinal axis of the vehicle measured positive nose up
Earth Fixed Cross Range	Y_e component of PASCS 10 position vector
Earth Fixed Flight Path Angle	Angle between the earth fixed velocity vector and the earth fixed position vector (PASCS 10). Measured positive downrange from position vector
Earth Fixed Position X_e, Y_e, Z_e	Position vector components in an earth-fixed launch centered plumbline coordinate system. The X_e axis is coincident with the reference ellipsoid normal positive upward. The Z_e axis is parallel to the earth-fixed aiming azimuth and is positive downrange. The Y_e axis completes a right handed system. (PASCS 10.)
Earth Fixed Velocity $\dot{X}_e$, $\dot{Y}_e$, $\dot{Z}_e$	Velocity vector components in PASCS 10.
Earth Fixed Velocity Magnitude	$\sqrt{\dot{X}_e^2 + \dot{Y}_e^2 + \dot{Z}_e^2}$
Flight Azimuth	Angle defining orientation of the space fixed coordinate system downrange axis, Z_s, at Guidance Reference Release. Measured positive east of North in plane normal to the space fixed X_s axis at Guidance Reference Release
Geodetic Latitude	Geodetic latitude of the vehicle position measured positive north of the equator
Ground Range	Surface range measured from launch site to the sub vehicle point
Longitude	Angle between the Greenwich meridian plane and the projection of the geocentric position vector in the equatorial plane (Positive west of (Greenwich.)

Longitudinal Acceleration	That part of the total measurable acceleration directed along the longitudinal axis of the vehicle
Pitch, Yaw, Roll	Eulerian angles of vehicle attitude measured with respect to the space fixed coordinate system. Vehicle attitude is defined by the ordered rotation of pitch, yaw and roll, respectively.
Space Fixed Cross Range	Y_e component of PASCS 11 position vector
Space Fixed Flight Path Angle	Angle between the space-fixed velocity vector and the radius vector (PASCS 11) measured positive downrange from radius vector
Space Fixed Position X_s, Y_s, Z_s	Position vector components in a space fixed, earth centered, plumbline coordinate system. The X_s axis is parallel to the reference ellipsoid normal, passing through the launch site. The Z_s axis is parallel to, and positive in the same direction as the earth-fixed firing azimuth. The Y_s axis completes the right handed system. This is Project Apollo Standard Coordinate System 11. (PASCS 11.)
Space Fixed Velocity $\dot{X}_s$, $\dot{Y}_s$, $\dot{Z}_s$	Velocity vector components in PASCS 11.
Space Fixed Velocity Magnitude	$\sqrt{\dot{X}_s^2 + \dot{Y}_s^2 + \dot{Z}_s^2}$
Time	Instantaneous flight time referenced to first motion
Weight	Weight of the vehicle

SUMMARY

This report presents the AS-206A Launch Vehicle Operational Flight Trajectory three sigma flight envelope. Statistical combinations of perturbation effects were accomplished by the root-sum-square (RSS) technique. Concise summaries of pertinent trajectory parameter dispersions at S-IB/S-IVB physical separation and J-2 engine cutoff signal follow:

S-IB/S-IVB SEPARATION

	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	EARTH FIXED CROSS RANGE (M)
RSS (+)	3.63	2141.	39.70	2.173	5016.	3350.
RSS (-)	2.43	2113.	38.08	1.965	3514.	2664.

J-2 ENGINE CUTOFF SIGNAL

	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)
RSS (+)	17.33	602.	1.60	0.026	63388.
RSS (-)	16.17	601.	1.60	0.026	65313.

S-IB and S-IVB propulsion system perturbations produce deviations in J-2 engine mixture ratio (EMR) shift time. Dispersion envelopes for each propulsion group and the total envelope are presented below.

J-2 EMR SHIFT TIME DEVIATION

	S-IB PROPULSION	S-IVB PROPULSION	TOTAL
RSS (+)	6.17	38.78	39.27
RSS (-)	2.24	36.33	36.40

The results of this dispersion analysis reveal that the maximum expected variations in the establishment of the LVDC time bases are

	TB2	TB3	TB4
RSS (+)	1.75	3.63	17.33
RSS (-)	2.05	2.43	16.17

The S-IVB stage flight performance reserve (FPR) for the AS-206A Mission, as determined from the dispersion analysis discussed herein, is 1307 pounds. This FPR is well within the SA-206A Launch Vehicle capability presented in Reference 11.

SECTION 1

INTRODUCTION

Launch vehicle performance is predictable only within certain tolerances. Therefore, deviations from a predicted launch vehicle trajectory are expected. In order to establish realistic deviation limits for the AS-206A Launch Vehicle Operational Trajectory, a dispersion analysis has been conducted and is documented in this report.

The predicted nominal trajectory employed for the dispersion analysis was the Preliminary Launch Vehicle Operational Trajectory presented in Reference 11. However, the resulting flight envelope is deemed applicable to the operational trajectory to be presented in Reference 13.

The error sources considered for the dispersion analysis are those associated with predictions of vehicle characteristics, vehicle systems performances and flight environment. The nominal vehicle and trajectory, error sources, the analytic procedures utilized and the results are discussed in the following sections.

SECTION 2

DISCUSSION

2.1 MISSION DESCRIPTION: The basic purpose of the Apollo-Saturn 206A Mission is to launch and test a complete, fully loaded LM for verification of LM subsystems operation and LM staging fire-in-the-hole abort capability. The primary objective of the SA-206 Launch Vehicle is to insert the S-IVB/IU/Payload configuration in a near earth 85/120 nautical mile elliptical orbit. The payload consists of a Lunar Module (LM), Spacecraft LM Adapter (SLA), and a 25° Nose Cone.

2.1.1 Flight Sequence of Events: The nominal flight sequence of events, for this analysis, is presented in Table 1. Off nominal propulsion system performances produce significant changes in this nominal sequence of events. Of primary interest are the events which establish LVDC time bases and thus the subsequent events dependent on these time bases. A discussion of pertinent time bases and associated events follows:

1) Time Base 2 (TB2): Established by S-IB stage propellant level sensor actuation or by a back-up LVDC signal initiated 1.75 seconds after the precalculated time, if a significant downrange velocity appears. The dependent events are inboard engine cutoff signal (IECO), which occurs at TB2 + 3.2 seconds, interconnection of thrust O.K. switches and fuel depletion probe arming.

2) Time Base 3 (TB3): Established at outboard engine cutoff (OECO) by actuation of propellant depletion probes or by a backup LVDC signal initiated 4.00 seconds after the precalculated time. Pertinent dependent events are ullage rocket firing, S-IB retro-rocket firing, S-IB/S-IVB separation signal, J-2 engine start signal, and IGM guidance initiation.

3) Time Base 4 (TB4): TB4 is initiated at approximately 0.2 seconds after Guidance Cutoff Signal (GCS). GCS is initiated when the S-IVB stage obtains a predetermined space fixed velocity magnitude. The significant events subsequent to TB4 are the preplanned orbital maneuvers and S-IVB stage venting.

It should be noted that TB2 and TB3 establishments are nominally dependent upon propellant level sensor actuations. Therefore, establishment of these time bases is very sensitive to propulsion system perturbations which affect propellant flowrate and thus tank level histories.

2.1.2 Launch Vehicle and Flight Environment: The nominal SA-206 Launch Vehicle mass characteristics, propulsion system characteristics, and vehicle aerodynamic properties used in this analysis are those presented in Reference 11. Table 2 presents the nominal vehicle weight breakdown.

The 1963 Patrick Reference Atmosphere model and the April wind profiles presented in Reference 4 define the atmospheric properties used in this analysis.

The guidance and control modes defined in Reference 11 were incorporated in each trajectory simulation discussed herein.

2.2 ERROR SOURCES: Vehicle manufacturing tolerances, predicted system performance inaccuracies and flight environment anomalies are sources of errors which significantly affect trajectory predictions. To facilitate statistical analyses of such error effects, three sigma deviations have been established. The three sigma deviations considered in this analysis, with corresponding references, are displayed in Table 3.

2.3 TRAJECTORY DISPERSIONS: The perturbations investigated in this analysis are assumed to be random, independent and normally distributed. These assumptions allow application of the root-sum-square (RSS) statistical combination method to produce a reasonable trajectory dispersion envelope.

Dispersed AS-206 trajectories were generated with each of the three sigma deviations listed in Table 3. Effects on pertinent trajectory parameters at S-IB/S-IVB stage separation and S-IVB stage guidance cutoff were determined and combined as follows:

$$+RSS = \sqrt{\Sigma(+\Delta P)^2}$$

$$-RSS = \sqrt{\Sigma(-\Delta P)^2} \quad \text{, where}$$

$$\Delta P = \text{perturbed parameter} - \text{nominal parameter.}$$

These RSS values define a reasonable three sigma flight envelope for the AS-206A Launch Vehicle Operational Trajectory. In a similar manner, utilizing trajectory dispersion data, the S-IVB flight performance reserve (FPR) required to offset the combined three sigma deviations was determined. This FPR and other trajectory dispersion results are presented in Section 3.

SECTION 3

RESULTS

3.1 TRAJECTORY DISPERSION ENVELOPE: Trajectory dispersion results are presented for two events, S-IB/S-IVB stage separation and J-2 guidance cutoff. Tables 4-7 and 9-12 present, for each event, three sigma envelopes for the following error source groups:

1. S-IB Stage Propulsion
2. S-IB Stage Non-Propulsion
3. S-IVB Stage Propulsion
4. S-IVB Stage Non-Propulsion

In the cases where both $\pm$ 3 sigma deviations produced effects with like algebraic signs, only the larger effect was included in the RSS.

Tables 8 and 13 display combined S-IB and S-IVB three sigma deviation envelopes for S-IB/S-IVB separation and J-2 cutoff, respectively.

Analysis results show that the expected extreme deviations for TB2 are -2.05 and +1.75 seconds. The +1.75 seconds deviation is restricted by the LVDC backup signal criteria. Analysis also reveals that the maximum deviations expected for TB3 are -2.43 seconds and +3.63 seconds. Since S-IB/S-IVB stage separation, J-2 ignition, and IGM initiation times are dependent on TB3, the maximum expected deviations for these events are the same as that of TB3. This fact is reflected in Table 8 for S-IB/S-IVB stage separation.

Engine mixture ratio (EMR) shift time was found to have maximum expected deviations of +39.27 seconds and -36.40 seconds. These deviations are produced by S-IB and S-IVB propulsion dispersions, with the major contributors being S-IVB propellant loading errors. It is found that the maximum expected variations in TB4 are +17.33 seconds and -16.17 seconds as shown in Table 13. These variations are primarily due to S-IVB propulsion perturbations.

The error sources prescribed for this analysis, Table 3, do not include conditions and tolerances which contribute to a realistic vehicle attitude rate envelope determination at S-IB/S-IVB physical separation. Therefore, the total attitude rate envelope at S-IB/S-IVB stage separation has not been included in Table 8. Analyses are in progress to evaluate this problem area. The results of this study will be documented in an addendum to this report.

During S-IVB stage flight, roll control is maintained by the Auxillary Propulsion System (APS). Essentially, this system independently corrects roll attitude errors when the error signal exceeds one degree. Since this criteria limits the roll attitude deviations and no APS errors were considered, the RSS technique is not applicable. This is indicated in Table 13.

A comprehensive flight envelope of pertinent design parameters during S-IB stage flight is presented in Table 14.

To enhance cursory evaluations of future vehicle systems change effects, pertinent S-IB stage performance trade-off factors are provided in Table 15. This table of trade-off factors is applicable at S-IB/S-IVB separation.

3.2 S-IVB STAGE FLIGHT PERFORMANCE RESERVE: Table 16 presents the derivation of the 1307 pound S-IVB stage propellant reserve required to offset the effects of the three sigma deviations shown in Table 3. This table includes individual perturbation effects on S-IVB stage propellant consumed and the readily applicable trade-off factors. Utilizing the proper algebraic sign, these trade-off factors provide quick estimates of vehicle systems change effects on S-IVB propellant consumed.

SECTION 4

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5. "Density Profiles for Saturn IB Design," TB-AE-65-235, 9 July 1965.

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12. "ST-124M Platform Hardware Errors to be Used in Performing a Hardware Error Analysis of the Saturn IB and Saturn V Launch Vehicle," R-ASTR-NG-168-66, 12 December 1966 (C).

13. "AS-206A L/V Operational Flight Trajectory" TN-AP-67-159, (To be published at a later date).

14. "Project Apollo Coordinate System Standards," SE008-001-1, June 1965.

TABLE 1

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
NOMINAL FLIGHT SEQUENCE OF EVENTS

NOMINAL FLIGHT TIME (MIN:SEC)	(SEC)	PROGRAM TIME (SEC)	EVENT
- 0:05.0	- 5.00	------	Guidance Reference Release (GRR).
- 0:03.1	- 3.10	------	Initiate S-IB Mainstage Ignition Sequence.
0:00.0	0.00	------	First Motion.
0:00.2	0.20	$(0.0)_1$	Lift-off Signal. Initiate Time Base 1.
0:10.2	10.20	$(10.0)_1$	Initiate Pitch and Roll Maneuvers.
2:13.8	133.76	$(133.56)_1$	Enable S-IB Propellant Level Sensors.
2:15.8	135.76	$(0.0)_2$	Level Sensor Activation. Initiate Time Base 2.
2:19.0	138.96	$(3.2)_2$	Inboard Engine Cutoff (IECO).
2:22.0	141.96	$(0.0)_3$	Outboard Engine Cutoff (OECO). Initiate Time Base 3.
2:23.3	143.26	$(1.3)_3$	Separation Signal.
2:24.7	144.66	$(2.7)_3$	J-2 Engine Start Command.
2:29.1	149.06	$(7.1)_3$	Activate PU System.
2:35.7	155.69	$(13.7)_3$	Jettison Ullage Rocket Motors.
2:39.0	158.96	$(17.0)_3$	Initiate Active Guidance.
9:40.5	580.46	------	Guidance Cutoff Signal (GCS).
9:40.7	580.66	$(0.0)_4$	Initiate Time Base 4.
9:50.7	590.66	------	Orbit Insertion.

TABLE 2

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
NOMINAL VEHICLE WEIGHT BREAKDOWN

Spacecraft	37,313	
Instrument Unit	4,200	
S-IVB Stage Inert	23,213	
Useable Reserve Propellant (Includes FPR)	6,857	
Injection Weight		71,583
J-2 Thrust Decay Propellant Consumed	153	
S-IVB Cutoff Weight		71,736
S-IVB Mass Depleted	221,485	
Ullage Cases	220	
S-IVB "90% Thrust" Weight		293,441
S-IVB Thrust Buildup Prpt. Consumed	445	
S-IVB GH_2 Start Tank	4	
Ullage Propellant Consumed	182	
S-IVB Stage Weight at Separation		294,072
S-IVB Aft Frame Hardware	30	
S-IVB Separation and Ullage Components	4	
S-IB/S-IVB Interstage	6,411	
S-IB Dry Weight	83,777	
S-IB Residuals and Reserves	10,813	
S-IVB Frost Consumed	100	
S-IB Frost Consumed	1,000	
S-IB Seal Purge Consumed	5	
S-IB Lubricant (Oronite)	26	
S-IB Gearbox Lubricant Consumed	713	
Inboard Engine Thrust Decay Prpt. Consumed	2,182	
Outboard Engine Thrust Decay Prpt. Consumed To Separation	1,768	
S-IB Mainstage Propellant Consumed	883,271	
Vehicle Liftoff Weight		1,284,172

TABLE 3

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE SIGMA DEVIATIONS

GROUP	ITEM	DEVIATION	REFERENCE
S-IB Stage Non-Propulsion	Non-Propellant Mass	± 310 Pounds	1
	Thrust Misalignment (Pitch)	± 0.62 Degrees	1
	Thrust Misalignment (Yaw)	± 0.62 Degrees	1
	Thrust Misalignment (Roll)	± 0.62 Degrees	1
	Axial Force Coefficient	Maximum	2
	Axial Force Coefficient	Minimum	2
	Center of Gravity Offset (y)	± 0.05 Meters	3
	Center of Gravity Offset (z)	± 0.05 Meters	3
Environment	Headwind	April Maximum	4
	Tailwind	April Maximum	4
	Right Cross Wind	April Maximum	4
	Left Cross Wind	April Maximum	4
	Atmosphere	Maximum Profile	5
	Atmosphere	Minimum Profile	5
S-IB Stage Propulsion	High Surface Winds	+ 3σ Lox Density	6
	Low Surface Winds	- 3σ Lox Density	7
	High Surface Temperature	+ 3σ Fuel Density	8
	Low Surface Temperature	- 3σ Fuel Density	9
	Propellant Mass	± 0.35% Lox, ± 0.35% Fuel	1
	Thrust and Flow Rate	± 1.5%	1
	I_{SP} and Flow Rate	± 0.9 Seconds	1
	Engine Mixture Ratio	+ 2920 Pound Lox Bias	1
	Engine Mixture Ratio	+ 1290 Pound Fuel Bias	1
S-IVB Stage Non-Propulsion	Non-Propellant Mass	± 200 Pounds	1
	Center of Gravity Offset (y)	± 0.05 Meters	1
	Center of Gravity Offset (z)	± 0.05 Meters	1
	Thrust Misalignment (Pitch)	± 1.24 Degrees	1
	Thrust Misalignment (Yaw)	± 1.24 Degrees	1
S-IVB Stage Propulsion	Propellant Mass	± 1%	10
	Thrust and Flow Rate	± 3%	10
	I_{SP} and Flow Rate	± 3.12 Seconds	10
	LH_2 Mass	± 1%	10
	LOX Mass	± 1%	10
Instrument Unit	Inertial Measurement Units	----	12

TABLE 4

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	143.34	61175.	2452.50	66.348	69972.	35424.	395107.
HIGH SURF. WIND +LOX(ρ)	0.83	-135.	6.23	0.304	942.	100.	-1274.
LOW SURF. WIND -LOX(ρ)	-0.48	107.	-4.64	-0.184	-530.	-58.	613.
HIGH AMB. TEMP. +FUEL(ρ)	-0.84	425.	-2.60	-0.373	-768.	-101.	-172.
LOW AMB. TEMP. -FUEL(ρ)	2.35	-755.	4.63	0.923	2398.	283.	-5.
PRPT. LOADING MASS + LOX	0.52	144.	10.97	0.142	738.	61.	-968.
PRPT. LOADING MASS - LOX	-0.52	-146.	-10.97	-0.144	-735.	-61.	969.
PRPT. LOADING MASS + FUEL	0.00	-175.	-4.54	0.037	-120.	0.	982.
PRPT. LOADING MASS - FUEL	0.00	176.	4.55	-0.037	121.	-0.	-982.
THRUST AND FLOWRATE (+)	-2.10	1246.	2.93	-1.001	-1752.	-254.	-1.
THRUST AND FLOWRATE (-)	2.54	-957.	-4.69	1.038	2431.	307.	-0.
ISP AND FLOWRATE (+,-)	0.45	255.	9.20	0.107	684.	54.	-1.
ISP AND FLOWRATE (-,+)	-0.45	-255.	-9.22	-0.108	-680.	-54.	-0.
E.M.R. LOX BIAS	-0.32	-329.	-12.76	-0.037	-613.	-37.	1920.
E.M.R. FUEL BIAS	-0.21	-222.	-8.60	-0.025	-413.	-25.	1290.
POSITIVE RSS	3.63	1364.	17.16	1.434	3684.	437.	2442.
NEGATIVE RSS	-2.43	-1315.	-20.95	-1.100	-2309.	-293.	-1886.

TABLE 4 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	143.34	-63.649	-0.109	-0.005	-0.000	0.010	-0.002
HIGH SURF. WIND +LOX(ρ)	0.83	0.003	-0.002	0.003	0.002	-0.003	0.001
LOW SURF. WIND -LOX(ρ)	-0.48	-0.001	0.000	-0.002	-0.001	-0.000	-0.003
HIGH AMB. TEMP. +FUEL(ρ)	-0.84	-0.004	-0.000	-0.004	-0.003	-0.000	-0.004
LOW AMB. TEMP. -FUEL(ρ)	2.35	0.008	-0.005	0.009	0.005	-0.007	0.005
PRPT. LOADING MASS + LOX	0.52	0.002	0.095	0.007	0.001	0.059	0.005
PRPT. LOADING MASS - LOX	-0.52	-0.001	0.000	-0.002	-0.001	-0.000	-0.003
PRPT. LOADING MASS + FUEL	0.00	0.000	-0.000	0.000	0.000	-0.000	0.000
PRPT. LOADING MASS - FUEL	0.00	-0.000	0.000	-0.000	-0.000	0.000	-0.000
THRUST AND FLOWRATE (+)	-2.10	-0.009	0.000	-0.008	-0.008	0.000	-0.007
THRUST AND FLOWRATE (-)	2.54	0.008	-0.007	0.010	0.004	-0.009	0.005
ISP AND FLOWRATE (+,-)	0.45	0.001	0.000	0.001	0.001	-0.000	0.000
ISP AND FLOWRATE (-,+)	-0.45	-0.001	-0.000	-0.002	-0.001	-0.000	-0.002
E.M.R. LOX BIAS	-0.32	0.000	0.000	-0.001	-0.000	-0.000	-0.002
E.M.R. FUEL BIAS	-0.21	0.000	0.000	-0.001	-0.000	-0.000	-0.001
POSITIVE RSS	3.63	0.012	0.095	0.015	0.007	0.059	0.009
NEGATIVE RSS	-2.43	-0.010	-0.009	-0.010	-0.009	-0.012	-0.010

TABLE 4 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	6433153.	35424.	123333.	943.90	116.90	2271.41
HIGH SURF. WIND +LOX(ρ)	0.83	-160.	100.	1275.	-10.19	-0.09	10.95
LOW SURF. WIND -LOX(ρ)	-0.48	122.	-58.	-722.	5.74	0.07	-7.43
HIGH AMB. TEMP. +FUEL(ρ)	-0.84	447.	-101.	-1097.	14.15	0.11	-8.77
LOW AMB. TEMP. -FUEL(ρ)	2.35	-823.	283.	3330.	-36.26	-0.23	19.73
PRPT. LOADING MASS + LOX	0.52	125.	61.	952.	-1.79	-0.10	12.63
PRPT. LOADING MASS - LOX	-0.52	-127.	-61.	-948.	1.81	0.10	-12.66
PRPT. LOADING MASS + FUEL	0.00	-173.	0.	-125.	-3.16	0.01	+3.61
PRPT. LOADING MASS - FUEL	0.00	173.	-0.	125.	3.17	-0.01	3.62
THRUST AND FLOWRATE (+)	-2.10	1298.	-254.	-2570.	41.65	0.23	-14.57
THRUST AND FLOWRATE (-)	2.54	-1028.	307.	3434.	-44.32	-0.20	12.88
ISP AND FLOWRATE (+,-)	0.45	237.	54.	873.	-1.04	-0.08	10.41
ISP AND FLOWRATE (-,+)	-0.45	-238.	-54.	-870.	1.05	0.08	-10.44
E.M.R. LOX BIAS	-0.32	-314.	-37.	-749.	-3.17	0.08	-12.52
E.M.R. FUEL BIAS	-0.21	-212.	-25.	-505.	-2.13	0.06	-8.44
POSITIVE RSS	3.63	1414.	437.	5118.	44.53	0.32	30.92
NEGATIVE RSS	-2.43	-1400.	-293.	-3250.	-58.37	-0.30	-27.99

TABLE 4 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	60788.	-35.	70589.	969.05	0.69	1869.54
HIGH SURF. WIND +LOX(ρ)	0.83	-145.	3.	950.	-9.92	0.08	11.00
LOW SURF. WIND -LOX(ρ)	-0.48	113.	-2.	-534.	5.57	-0.03	-7.46
HIGH AMB. TEMP. +FUEL(ρ)	-0.84	433.	-3.	-771.	13.91	-0.06	-8.87
LOW AMB. TEMP. -FUEL(ρ)	2.35	-782.	9.	2413.	-35.60	0.22	19.97
PRPT. LOADING MASS + LOX	0.52	136.	1.	747.	-1.56	0.03	12.60
PRPT. LOADING MASS - LOX	-0.52	-138.	-1.	-744.	1.58	-0.02	-12.63
PRPT. LOADING MASS + FUEL	0.00	-174.	0.	-123.	-3.20	0.00	-3.57
PRPT. LOADING MASS - FUEL	0.00	174.	-0.	124.	3.21	-0.00	3.58
THRUST AND FLOWRATE (+)	-2.10	1265.	-9.	-1756.	41.12	-0.18	-14.89
THRUST AND FLOWRATE (-)	2.54	-984.	10.	2444.	-43.69	0.26	13.18
ISP AND FLOWRATE (+,-)	0.45	247.	1.	693.	-0.84	0.02	10.37
ISP AND FLOWRATE (-,+)	-0.45	-248.	-1.	-689.	0.85	-0.02	-10.41
E.M.R. LOX BIAS	-0.32	-322.	-0.	-622.	-3.36	-0.01	-12.45
E.M.R. FUEL BIAS	-0.21	-217.	-0.	-420.	-2.27	-0.00	-8.39
POSITIVE RSS	3.63	1382.	14.	3708.	43.92	0.35	31.19
NEGATIVE RSS	-2.43	-1347.	-9.	-2322.	-57.44	-0.19	-28.14

TABLE 4 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	143.34	28.727	79.884	2105.76	62.022	-35.
HIGH SURF. WIND +LOX(ρ)	0.83	0.003	-0.009	5.25	0.368	3.
LOW SURF. WIND -LOX(ρ)	-0.48	-0.001	0.005	-4.04	-0.224	-2.
HIGH AMB. TEMP. +FUEL(ρ)	-0.84	-0.002	0.008	-1.41	-0.441	-3.
LOW AMB. TEMP. -FUEL(ρ)	2.35	0.006	-0.023	1.74	1.088	9.
PRPT. LOADING MASS + LOX	0.52	0.002	-0.007	10.49	0.188	1.
PRPT. LOADING MASS - LOX	-0.52	-0.002	0.007	-10.48	-0.191	-1.
PRPT. LOADING MASS + FUEL	0.00	-0.000	0.001	-4.64	0.034	0.
PRPT. LOADING MASS - FUEL	0.00	0.000	-0.001	4.66	-0.034	-0.
THRUST AND FLOWRATE (+)	-2.10	-0.005	0.017	6.15	-1.161	-9.
THRUST AND FLOWRATE (-)	2.54	0.007	-0.024	-7.92	1.203	10.
ISP AND FLOWRATE (+,-)	0.45	0.002	-0.007	8.83	0.143	1.
ISP AND FLOWRATE (-,+)	-0.45	-0.002	0.007	-8.84	-0.145	-1.
E.M.R. LOX BIAS	-0.32	-0.002	0.006	-12.60	-0.070	-0.
E.M.R. FUEL BIAS	-0.21	-0.001	0.004	-8.49	-0.047	-0.
POSITIVE RSS	3.63	0.010	0.023	16.67	1.680	14.
NEGATIVE RSS	-2.43	-0.006	-0.036	-21.20	-1.287	-9.

TABLE 5

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	143.34	61175.	2462.50	66.348	69972.	35424.	395107.
NON-PROPELLANT MASS (+)	0.00	-55.	-1.44	0.012	-38.	0.	310.
NON-PROPELLANT MASS (-)	0.00	55.	1.44	-0.012	38.	-0.	-310.
THRUST MIS. + PITCH	0.00	-1290.	15.63	1.549	1603.	4.	0.
THRUST MIS. - PITCH	0.00	1243.	-16.75	-1.551	-1645.	-4.	0.
THRUST MIS. + YAW	0.00	-29.	-4.05	-0.007	28.	-2194.	0.
THRUST MIS. - YAW	0.00	-12.	3.13	0.038	-5.	2194.	0.
THRUST MIS. + ROLL	0.00	-30.	0.18	0.030	39.	-173.	0.
THRUST MIS. - ROLL	0.00	23.	-0.11	-0.025	-32.	174.	0.
AXIAL FORCE COEF. (+)	0.00	-777.	-14.41	0.160	-511.	2.	0.
AXIAL FORCE COEF. (-)	0.00	786.	14.15	-0.161	508.	-2.	0.
C.G. OFFSET (-Z)	0.00	-337.	4.94	0.405	544.	12.	0.
C.G. OFFSET (+Z)	0.00	331.	-5.04	-0.406	-549.	-12.	0.
C.G. OFFSET (-Y)	0.00	9.	0.71	0.001	-39.	726.	0.
C.G. OFFSET (+Y)	0.00	-14.	-0.78	0.002	41.	-724.	0.
HEADWIND	0.00	161.	-15.17	-0.174	-1776.	17.	0.
TAILWIND	0.00	-194.	24.02	0.245	2877.	-30.	0.
RIGHT CROSS WIND	0.00	38.	-6.88	-0.057	-664.	-1312.	0.
LEFT CROSS WIND	0.00	42.	-5.00	-0.043	-634.	2423.	0.
MAXIMUM ATMOSPHERE	0.00	-148.	-2.79	0.039	-108.	1.	0.
MINIMUM ATMOSPHERE	0.00	355.	5.21	-0.080	215.	-1.	0.
POSITIVE RSS	0.00	1559.	32.95	1.629	3384.	3353.	310.
NEGATIVE RSS	-0.00	-1564.	-28.60	-1.624	-2623.	-2662.	-310.

TABLE 5 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	143.34	-63.649	-0.109	-0.005	-0.000	0.010	-0.002
NON-PROPELLANT MASS (+)	0.00	0.000	-0.000	0.000	0.000	-0.000	0.000
NON-PROPELLANT MASS (-)	0.00	-0.000	0.000	-0.000	-0.000	0.000	-0.000
THRUST MIS. + PITCH	0.00	-2.102	0.002	0.014	0.067	0.002	0.009
THRUST MIS. - PITCH	0.00	2.101	-0.002	-0.015	-0.067	-0.002	-0.009
THRUST MIS. + YAW	0.00	-0.001	-2.102	-0.006	-0.001	0.065	-0.002
THRUST MIS. - YAW	0.00	0.001	2.102	0.006	0.001	-0.065	0.003
THRUST MIS. + ROLL	0.00	0.027	0.033	-5.762	0.022	0.015	0.002
THRUST MIS. - ROLL	0.00	-0.031	-0.027	5.762	-0.019	-0.017	-0.002
AXIAL FORCE COEF. (+)	0.00	0.002	0.001	0.000	0.001	0.000	0.000
AXIAL FORCE COEF. (-)	0.00	-0.002	-0.001	-0.000	-0.001	-0.000	-0.000
C.G. OFFSET (-Z)	0.00	-0.260	-0.000	0.001	0.024	-0.000	0.000
C.G. OFFSET (+Z)	0.00	0.260	0.000	-0.000	-0.024	0.000	-0.000
C.G. OFFSET (-Y)	0.00	0.002	0.261	0.014	-0.000	-0.025	0.006
C.G. OFFSET (+Y)	0.00	-0.002	-0.261	-0.014	0.000	0.025	-0.006
HEADWIND	0.00	-0.000	0.000	-0.001	-0.001	-0.000	-0.001
TAILWIND	0.00	-0.002	-0.000	-0.004	-0.002	-0.000	-0.003
RIGHT CROSS WIND	0.00	0.000	-0.003	0.001	-0.000	-0.003	0.001
LEFT CROSS WIND	0.00	-0.000	0.004	-0.001	-0.000	0.003	-0.001
MAXIMUM ATMOSPHERE	0.00	-0.001	-0.000	-0.001	-0.000	0.000	-0.000
MINIMUM ATMOSPHERE	0.00	0.001	0.000	0.001	0.000	-0.000	0.000
POSITIVE RSS	0.00	2.117	2.119	5.762	0.074	0.071	0.011
NEGATIVE RSS	-0.00	-2.118	-2.119	-5.762	-0.074	-0.072	-0.012

TABLE 5 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	6433153.	35424.	123333.	943.90	116.90	2271.41
NON-PROPELLANT MASS (+)	0.00	-55.	0.	-39.	-1.00	0.00	-1.14
NON-PROPELLANT MASS (-)	0.00	55.	-0.	40.	1.00	-0.00	1.14
THRUST MIS. + PITCH	0.00	-1322.	4.	1593.	-56.80	-0.01	39.55
THRUST MIS. - PITCH	0.00	1275.	-4.	-1638.	54.93	0.01	-41.98
THRUST MIS. + YAW	0.00	-23.	-2194.	-24.	-0.92	-70.61	-1.47
THRUST MIS. - YAW	0.00	-18.	2194.	-21.	-0.67	70.62	-1.05
THRUST MIS. + ROLL	0.00	-30.	-173.	37.	-1.12	-3.72	0.85
THRUST MIS. - ROLL	0.00	23.	174.	-31.	0.95	3.73	-0.71
AXIAL FORCE COEF. (+)	0.00	-767.	2.	-530.	-11.67	0.06	-10.79
AXIAL FORCE COEF. (-)	0.00	775.	-2.	527.	11.66	-0.05	10.49
C.G. OFFSET (-Z)	0.00	-348.	12.	543.	-14.45	0.04	11.29
C.G. OFFSET (+Z)	0.00	342.	-12.	-548.	14.32	-0.03	-11.48
C.G. OFFSET (-Y)	0.00	7.	726.	-37.	0.16	19.40	-0.38
C.G. OFFSET (+Y)	0.00	-12.	-724.	32.	-0.28	-19.38	0.18
HEADWIND	0.00	197.	17.	-1789.	1.68	0.18	-17.17
TAILWIND	0.00	-252.	-30.	2900.	-1.66	-0.30	26.71
RIGHT CROSS WIND	0.00	56.	-1312.	-692.	-0.07	-12.00	-6.84
LEFT CROSS WIND	0.00	48.	2423.	-651.	-0.14	21.29	-6.55
MAXIMUM ATMOSPHERE	0.00	-146.	1.	-112.	-2.59	-0.00	-1.95
MINIMUM ATMOSPHERE	0.00	352.	-1.	224.	5.09	-0.01	3.53
POSITIVE RSS	0.00	1585.	3353.	3402.	58.22	76.36	50.30
NEGATIVE RSS	-0.00	-1596.	-2662.	-2638.	-59.87	-74.29	-48.58

TABLE 5 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	60788.	-35.	70589.	969.05	0.69	1869.54
NON-PROPELLANT MASS (+)	0.00	-55.	0.	-39.	-1.01	0.00	-1.13
NON-PROPELLANT MASS (-)	0.00	55.	-0.	39.	1.01	-0.00	1.13
THRUST MIS. + PITCH	0.00	-1307.	16.	1605.	-56.34	0.44	40.14
THRUST MIS. - PITCH	0.00	1261.	-16.	-1649.	54.45	-0.45	-42.55
THRUST MIS. + YAW	0.00	-30.	-2194.	-12.	-1.18	-70.61	-1.02
THRUST MIS. - YAW	0.00	-12.	2194.	-33.	-0.43	70.61	-1.49
THRUST MIS. + ROLL	0.00	-31.	-173.	38.	-1.13	-3.71	0.89
THRUST MIS. - ROLL	0.00	24.	174.	-32.	0.96	3.73	-0.75
AXIAL FORCE COEF. (+)	0.00	-772.	2.	-523.	-11.80	0.03	-10.63
AXIAL FORCE COEF. (-)	0.00	780.	-2.	520.	11.79	-0.03	10.34
C.G. OFFSET (-Z)	0.00	-343.	16.	546.	-14.31	0.17	11.44
C.G. OFFSET (+Z)	0.00	337.	-16.	-551.	14.18	-0.16	-11.53
C.G. OFFSET (-Y)	0.00	9.	725.	-41.	0.23	19.39	-0.50
C.G. OFFSET (+Y)	0.00	-14.	-724.	35.	-0.35	-19.37	0.31
HEADWIND	0.00	181.	8.	-1791.	1.42	0.02	-17.20
TAILWIND	0.00	-225.	-15.	2902.	-1.24	-0.05	25.74
RIGHT CROSS WIND	0.00	46.	-1315.	-686.	-0.23	-12.06	-6.74
LEFT CROSS WIND	0.00	49.	2419.	-674.	-0.13	21.23	-6.76
MAXIMUM ATMOSPHERE	0.00	-146.	0.	-110.	-2.62	-0.01	-1.91
MINIMUM ATMOSPHERE	0.00	354.	-1.	221.	5.14	-0.00	3.45
POSITIVE RSS	0.00	1574.	3350.	3409.	57.75	76.34	50.78
NEGATIVE RSS	-0.00	-1581.	-2664.	-2644.	-59.42	-74.30	-49.07

TABLE 5 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	143.34	28.727	79.884	2105.76	62.022	-35.
NON-PROPELLANT MASS (+)	0.00	-0.000	0.000	-1.47	0.011	0.
NON-PROPELLANT MASS (-)	0.00	0.000	-0.000	1.47	-0.011	-0.
THRUST MIS. + PITCH	0.00	0.004	-0.016	10.82	1.840	16.
THRUST MIS. - PITCH	0.00	-0.004	0.016	-11.62	-1.844	-16.
THRUST MIS. + YAW	0.00	0.019	0.007	-0.29	0.038	-2194.
THRUST MIS. - YAW	0.00	-0.019	-0.006	-0.31	0.003	2194.
THRUST MIS. + ROLL	0.00	0.002	0.000	0.27	0.038	-173.
THRUST MIS. - ROLL	0.00	-0.002	-0.000	-0.22	-0.032	174.
AXIAL FORCE COEF. (+)	0.00	-0.001	0.005	-14.86	0.157	2.
AXIAL FORCE COEF. (-)	0.00	0.001	-0.005	14.61	-0.159	-2.
C.G. OFFSET (-Z)	0.00	0.001	-0.005	3.65	0.483	16.
C.G. OFFSET (+Z)	0.00	-0.001	0.005	-3.73	-0.484	-16.
C.G. OFFSET (-Y)	0.00	-0.006	-0.002	-0.25	-0.012	725.
C.G. OFFSET (+Y)	0.00	0.006	0.002	0.20	0.015	-724.
HEADWIND	0.00	-0.005	0.017	-14.60	-0.235	8.
TAILWIND	0.00	0.008	-0.028	23.21	0.335	-15.
RIGHT CROSS WIND	0.00	0.009	0.011	-6.06	-0.071	-1315.
LEFT CROSS WIND	0.00	-0.022	-0.001	-5.94	-0.076	2419.
MAXIMUM ATMOSPHERE	0.00	-0.000	0.001	-2.90	0.040	0.
MINIMUM ATMOSPHERE	0.00	0.001	-0.002	5.44	-0.082	-1.
POSITIVE RSS	0.00	0.024	0.028	30.24	1.939	3350.
NEGATIVE RSS	-0.00	-0.031	-0.034	-25.11	-1.931	-2664.

TABLE 6

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	143.34	61175.	2462.50	66.348	69972.	35424.	395107.
PRPT. LOADING MASS (+)	0.00	-406.	-10.53	0.085	-280.	1.	2283.
PRPT. LOADING MASS (-)	0.00	409.	10.61	-0.086	281.	-1.	-2283.
LOX LOADING (+)	0.00	-343.	-8.69	0.072	-236.	1.	1927.
LOX LOADING (-)	0.00	345.	8.95	-0.072	237.	-1.	-1927.
LH2 LOADING (+)	0.00	-64.	-1.65	0.013	-44.	0.	356.
LH2 LOADING (-)	0.00	64.	1.65	-0.013	44.	-0.	-356.
POSITIVE RSS	0.00	539.	13.97	0.113	370.	1.	3009.
NEGATIVE RSS	-0.00	-536.	-13.88	-0.113	-369.	-1.	-3009.

TABLE 6 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	143.34	-63.649	-0.109	-0.005	-0.000	0.010	-0.002
PRPT. LOADING MASS (+)	0.00	0.001	-0.000	0.000	0.001	-0.000	0.000
PRPT. LOADING MASS (-)	0.00	-0.001	0.000	-0.000	-0.001	0.000	-0.000
LOX LOADING (+)	0.00	0.001	-0.000	0.000	0.001	-0.000	0.000
LOX LOADING (-)	0.00	-0.001	0.000	-0.000	-0.001	0.000	-0.000
LH2 LOADING (+)	0.00	0.000	-0.000	0.000	0.000	-0.000	0.000
LH2 LOADING (-)	0.00	-0.000	0.000	-0.000	-0.000	0.000	-0.000
POSITIVE RSS	0.00	0.001	0.000	0.000	0.001	0.000	0.000
NEGATIVE RSS	-0.00	-0.001	-0.000	-0.000	-0.001	-0.000	-0.000

TABL. 6 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	6433153.	35424.	123333.	943.90	116.90	2271.41
PRPT. LOADING MASS (+)	0.00	-401.	1.	-290.	-7.31	0.03	-8.38
PRPT. LOADING MASS (-)	0.00	404.	-1.	291.	7.38	-0.03	8.43
LOX LOADING (+)	0.00	-338.	1.	-245.	-6.18	0.03	-7.08
LOX LOADING (-)	0.00	340.	-1.	246.	6.22	-0.03	7.11
LH2 LOADING (+)	0.00	-63.	0.	-45.	-1.15	0.01	-1.31
LH2 LOADING (-)	0.00	63.	-0.	45.	1.15	-0.01	1.31
POSITIVE RSS	0.00	532.	1.	384.	9.72	0.05	11.11
NEGATIVE RSS	-0.00	-528.	-1.	-382.	-9.64	-0.05	-11.05

TABLE 6 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	60788.	-35.	70589.	969.05	0.69	1869.54
PRPT. LOADING MASS (+)	0.00	-403.	1.	-286.	-7.41	0.01	-8.29
PRPT. LOADING MASS (-)	0.00	406.	-1.	288.	7.47	-0.01	8.34
LOX LOADING (+)	0.00	-341.	1.	-242.	-6.26	0.01	-7.00
LOX LOADING (-)	0.00	343.	-1.	243.	6.30	-0.01	7.03
LH2 LOADING (+)	0.00	-63.	0.	-45.	-1.16	0.00	-1.30
LH2 LOADING (-)	0.00	63.	-0.	45.	1.16	-0.00	1.30
POSITIVE RSS	0.00	535.	1.	379.	9.84	0.01	10.99
NEGATIVE RSS	-0.00	-532.	-1.	-377.	-9.77	-0.01	-10.93

TABLE 6 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	143.34	28.727	79.884	2105.76	62.022	-35.
PRPT. LOADING MASS (+)	0.00	-0.001	0.003	-10.77	0.078	1.
PRPT. LOADING MASS (-)	0.00	0.001	-0.003	10.84	-0.078	-1.
LOX LOADING (+)	0.00	-0.001	0.002	-9.09	0.066	1.
LOX LOADING (-)	0.00	0.001	-0.002	9.15	-0.066	-1.
LH2 LOADING (+)	0.00	-0.000	0.000	-1.69	0.012	0.
LH2 LOADING (-)	0.00	0.000	-0.000	1.69	-0.012	-0.
POSITIVE RSS	0.00	0.001	0.004	14.29	0.103	1.
NEGATIVE RSS	-0.00	-0.001	-0.004	-14.19	-0.103	-1.

TABLE 7

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	143.34	61175.	2462.50	66.348	69972.	35424.	395107.
NON-PROPELLANT MASS (+)	0.00	-36.	-0.93	0.007	-25.	0.	200.
NON-PROPELLANT MASS (-)	0.00	36.	0.93	-0.007	25.	-0.	-200.
POSITIVE RSS	0.00	36.	0.93	0.007	25.	0.	200.
NEGATIVE RSS	-0.00	-36.	-0.93	-0.007	-25.	-0.	-200.

TABLE 7 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	143.34	-63.649	-0.109	-0.005	-0.000	0.010	-0.002
NON-PROPELLANT MASS (+)	0.00	0.000	-0.000	0.000	0.000	-0.000	0.000
NON-PROPELLANT MASS (-)	0.00	-0.000	0.000	-0.000	-0.000	0.000	-0.000
POSITIVE RSS	0.00	0.000	0.000	0.000	0.000	0.000	0.000
NEGATIVE RSS	-0.00	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000

TABLE 7 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	143.34	6433.53.	35424.	123333.	943.90	116.90	2271.41
NON-PROPELLANT MASS (+)	C.CC	-35.	C.	-25.	-C.64	0.00	-0.74
NON-PROPELLANT MASS (-)	C.CC	35.	-C.	25.	C.64	-0.00	0.74
POSITIVE RSS	C.OC	35.	C.	25.	C.64	0.00	0.74
NEGATIVE RSS	-C.CC	-35.	-C.	-25.	-0.64	-0.00	-0.74

TABLE 7 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	443.34	60768.	-35.	70589.	969.05	0.69	1869.54
NON-PROPELLANT MASS (+)	0.00	-35.	0.	-25.	-0.65	0.00	-0.73
NON-PROPELLANT MASS (-)	0.00	35.	-0.	25.	0.65	-0.00	0.73
POSITIVE MASS	0.00	35.	0.	25.	0.65	0.00	0.73
NEGATIVE MASS	-0.00	-35.	-0.	-25.	-0.65	-0.00	-0.73

TABLE 7 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPERATION

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	143.34	28.727	79.884	2105.76	62.022	-35.
NONPROPELLANT MASS (+)	0.00	-0.000	0.000	-0.95	0.007	0.
NONPROPELLANT MASS (-)	0.00	0.000	-0.000	0.95	-0.007	-0.
POSITIVE RSS	0.00	0.000	0.000	0.95	0.007	0.
NEGATIVE RSS	-0.00	-0.000	-0.000	-0.95	-0.007	-0.

TABLE 8

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE-FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE-FIXED CROSS RANGE (M)	VEHICLE WEIGHT (LB)
S-IB Propulsion	+RSS	3.63	1364.	17.16	1.434	3684.	437.	2442.
S-IB Propulsion	-RSS	2.43	1315.	20.95	1.100	2309.	293.	1886.
S-IB Non Propulsion	+RSS	0.00	1559.	32.95	1.629	3384.	3353.	310.
S-IB Non Propulsion	-RSS	0.00	1564.	28.60	1.624	2623.	2662.	310.
S-IVB Propulsion	+RSS	0.00	539.	13.97	0.113	370.	1.	3009.
S-IVB Propulsion	-RSS	0.00	536.	13.88	0.113	369.	1.	3009.
S-IVB Non Propulsion	+RSS	0.00	36.	0.93	0.007	25.	0.	200.
S-IVB Non Propulsion	-RSS	0.00	36.	0.93	0.007	25.	0.	200.
Combined Positive	RSS	3.63	2141.	39.70	2.173	5016.	3381.	3893.
Combined Negative	RSS	2.43	2113.	38.08	1.965	3514.	2678.	3570.

TABLE 8 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	VEHICLE ATTITUDE PITCH (DEG)	VEHICLE ATTITUDE YAW (DEG)	VEHICLE ATTITUDE ROLL (DEG)	(1) VEHICLE ATTITUDE RATE PITCH (DEG/S)	(1) VEHICLE ATTITUDE RATE YAW (DEG/S)	(1) VEHICLE ATTITUDE RATE ROLL (DEG/S)
S-IB Propulsion	+RSS	3.63	0.012	0.095	0.015	----	----	----
S-IB Propulsion	-RSS	2.43	0.010	0.009	0.010	----	----	----
S-IB Non Propulsion	+RSS	0.00	2.117	2.119	5.762	----	----	----
S-IB Non Propulsion	-RSS	0.00	2.118	2.119	5.762	----	----	----
S-IVB Propulsion	+RSS	0.00	0.001	0.000	0.000	----	----	----
S-IVB Propulsion	-RSS	0.00	0.001	0.000	0.000	----	----	----
S-IVB Non Propulsion	+RSS	0.00	0.000	0.000	0.000	----	----	----
S-IVB Non Propulsion	-RSS	0.00	0.000	0.000	0.000	----	----	----
Combined Positive	RSS	3.63	2.117	2.121	5.762	----	----	----
Combined Negative	RSS	2.43	2.118	2.119	5.762	----	----	----

(1) The S-IB stage attitude rates have been omitted in order that more realistic values, reflecting conditions at physical separation, can be determined. These data will be published at a later date.

TABLE 8 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB and S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	SPACE FIXED POSITION VECTOR X (M)	Y (M)	Z (M)	SPACE FIXED VELOCITY VECTOR XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
S-IB Propulsion	+RSS	3.63	1414.	437.	5118.	44.53	0.32	30.92
S-IB Propulsion	-RSS	2.43	1400.	293.	3250.	58.37	0.30	27.99
S-IB Non Propulsion	+RSS	0.00	1585.	3353.	3402.	58.22	76.36	50.30
S-IB Non Propulsion	-RSS	0.00	1596.	2662.	2638.	59.87	74.29	48.58
S-IVB Propulsion	+RSS	0.00	532.	1.	384.	9.72	0.05	11.11
S-IVB Propulsion	-RSS	0.00	528.	1.	382.	9.64	0.05	11.05
S-IVB Non Propulsion	+RSS	0.00	35.	0.	25.	0.64	0.00	0.74
S-IVB Non Propulsion	-RSS	0.00	35.	0.	25.	0.64	0.00	0.74
Combined Positive	RSS	3.63	2190.	3381.	6158.	73.94	76.36	60.08
Combined Negative	RSS	2.43	2188.	2678.	4203.	84.17	74.29	57.15

TABLE 8 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	EARTH FIXED POSITION X (M)	Y (M)	Z (M)	EARTH FIXED VELOCITY XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
S-IB Propulsion	+RSS	3.63	1382.	14.	3708.	43.92	0.35	31.19
S-IB Propulsion	-RSS	2.43	1347.	9.	2322.	57.44	0.19	28.14
S-IB Non Propulsion	+RSS	0.00	1574.	3350.	3409.	57.75	76.34	50.78
S-IB Non Propulsion	-RSS	0.00	1581.	2664.	2644.	59.42	74.30	49.07
S-IVB Propulsion	+RSS	0.00	535.	1.	379.	9.84	0.01	10.99
S-IVB Propulsion	-RSS	0.00	532.	1.	377.	9.77	0.01	10.93
S-IVB Non Propulsion	+RSS	0.00	35.	0.	25.	0.65	0.00	0.73
S-IVB Non Propulsion	-RSS	0.00	35.	0.	25.	0.65	0.00	0.73
Combined Positive	RSS	3.63	2162.	3350.	5051.	73.22	76.34	60.60
Combined Negative	RSS	2.43	2144.	2664.	3539.	83.22	74.30	57.62

TABLE 8 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POS. WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
S-IB Propulsion	+RSS	3.63	0.010	0.023	16.67	1.680	14.
S-IB Propulsion	-RSS	2.43	0.006	0.036	21.20	1.287	9.
S-IB Non Propulsion	+RSS	0.00	0.024	0.028	30.24	1.939	3350.
S-IB Non Propulsion	-RSS	0.00	0.031	0.034	25.11	1.931	2664.
S-IVB Propulsion	+RSS	0.00	0.001	0.004	14.29	0.103	1.
S-IVB Propulsion	-RSS	0.00	0.001	0.004	14.19	0.103	1.
S-IVB Non Propulsion	+RSS	0.00	0.000	0.000	0.95	0.007	0.
S-IVB Non Propulsion	-RSS	0.00	0.000	0.000	0.95	0.007	0.
Combined Positive	RSS	3.63	0.026	0.036	37.38	2.568	3350.
Combined Negative	RSS	2.43	0.031	0.050	35.81	2.323	2664.

TABLE 9

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	580.46	163194.	7821.99	90.005	1773422.	140410.	71736.
HIGH SURF. WIND +LOX(ρ)	0.62	2.	-0.00	-0.000	2417.	144.	93.
LOW SURF. WIND -LOX(ρ)	-0.31	4.	-0.00	0.000	-1571.	-91.	-77.
HIGH AMB. TEMP. +FUEL(ρ)	-0.85	6.	0.00	0.000	-1909.	-121.	7.
LOW AMB. TEMP. -FUEL(ρ)	2.53	3.	0.00	0.001	4558.	300.	-78.
PRPT. LOADING MASS + LOX	-0.03	1.	0.00	-0.000	2461.	132.	241.
PRPT. LOADING MASS - LOX	0.02	3.	0.00	-0.000	-2531.	-136.	-240.
PRPT. LOADING MASS + FUEL	0.27	5.	0.00	0.000	-646.	-29.	-118.
PRPT. LOADING MASS - FUEL	-0.27	2.	-0.00	-0.000	644.	29.	118.
THRUST AND FLOWRATE (+)	-2.62	4.	-0.00	-0.001	-3594.	-250.	229.
THRUST AND FLOWRATE (-)	3.29	-1.	-0.00	0.001	3505.	250.	-331.
ISP AND FLOWRATE (+,-)	-0.02	1.	-0.00	-0.000	2097.	113.	209.
ISP AND FLOWRATE (-,+)	0.02	3.	0.00	-0.000	-2167.	-117.	-209.
E.M.R. LOX BIAS	0.37	1.	0.00	-0.000	-2431.	-123.	-304.
E.M.R. FUEL BIAS	0.25	2.	0.00	0.000	-1653.	-94.	-205.
POSITIVE RSS	4.22	11.	0.00	0.001	7055.	458.	421.
NEGATIVE RSS	-2.78	-1.	-0.00	-0.001	-6038.	-365.	-574.

TABLE 9 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	580.46	-99.019	3.099	0.616	-0.000	-0.002	0.002
HIGH SURF. WIND +LOX(ρ)	0.62	-0.221	-0.018	-0.346	0.006	0.000	0.055
LOW SURF. WIND -LOX(ρ)	-0.31	0.096	0.010	0.059	0.001	-0.000	0.059
HIGH AMB. TEMP. +FUEL(ρ)	-0.85	0.229	0.005	-0.255	0.001	-0.000	0.039
LOW AMB. TEMP. -FUEL(ρ)	2.53	-1.307	0.074	-0.578	0.004	-0.001	0.094
PRPT. LOADING MASS + LOX	-0.03	0.023	-0.003	-0.720	0.000	-0.001	0.071
PRPT. LOADING MASS - LOX	0.02	0.027	0.027	-0.003	0.003	0.000	0.040
PRPT. LOADING MASS + FUEL	0.27	-0.275	-0.002	-0.938	-0.000	-0.001	-0.041
PRPT. LOADING MASS - FUEL	-0.27	0.107	-0.007	-0.820	0.003	-0.000	0.061
THRUST AND FLOWRATE (+)	-2.62	1.122	0.010	-1.158	0.001	-0.001	-0.057
THRUST AND FLOWRATE (-)	3.29	-1.357	0.097	-0.984	0.010	-0.001	-0.003
ISP AND FLOWRATE (+,-)	-0.02	0.069	-0.012	0.126	-0.000	0.000	0.047
ISP AND FLOWRATE (-,+)	0.02	-0.019	0.022	-0.819	0.003	-0.001	0.063
E.M.R. LOX BIAS	0.37	-0.077	0.041	-1.076	0.006	-0.000	-0.058
E.M.R. FUEL BIAS	0.25	-0.115	0.023	-1.317	0.000	-0.001	-0.054
POSITIVE RSS	4.22	1.156	0.134	0.139	0.015	0.000	0.158
NEGATIVE RSS	-2.78	-1.920	-0.023	-2.366	-0.000	-0.002	-0.091

TABLE 9 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	6215193.	140410.	2013138.	-2415.64	411.75	7428.23
HIGH SURF. WIND +LOX(ρ)	0.62	-843.	144.	2594.	-3.09	-0.05	-1.00
LOW SURF. WIND -LOX(ρ)	-0.31	540.	-91.	-1646.	1.96	0.05	0.63
HIGH AMB. TEMP. +FUEL(ρ)	-0.85	717.	-121.	-2183.	2.60	0.08	0.84
LOW AMB. TEMP. -FUEL(ρ)	2.53	-1761.	300.	5413.	-6.64	-0.11	-2.16
PRPT. LOADING MASS + LOX	-0.03	-776.	132.	2388.	-2.85	-0.05	-0.92
PRPT. LOADING MASS - LOX	0.02	801.	-136.	-2456.	2.96	0.08	0.96
PRPT. LOADING MASS + FUEL	0.27	177.	-29.	-525.	0.58	0.03	0.19
PRPT. LOADING MASS - FUEL	-0.27	-169.	29.	525.	-0.59	-0.00	-0.19
THRUST AND FLOWRATE (+)	-2.62	1469.	-250.	-4507.	5.49	0.13	1.77
THRUST AND FLOWRATE (-)	3.29	-1525.	260.	4679.	-5.71	-0.09	-1.85
ISP AND FLOWRATE (+,-)	-0.02	-662.	113.	2036.	-2.43	-0.05	-0.79
ISP AND FLOWRATE (-,+)	0.02	687.	-117.	-2103.	2.54	0.08	0.82
E.M.R. LOX BIAS	0.37	725.	-123.	-2225.	2.71	0.07	0.88
E.M.R. FUEL BIAS	0.25	494.	-84.	-1514.	1.80	0.05	0.58
POSITIVE RSS	4.22	2153.	458.	8249.	7.98	0.21	2.58
NEGATIVE RSS	-2.78	-2684.	-365.	-6593.	-10.03	-0.17	-3.26

TABLE 9 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	-87867.	89655.	1793145.	-2032.52	528.24	7112.55
HIGH SURF. WIND +LOX(ρ)	0.62	-679.	168.	2379.	-2.68	0.25	-0.79
LOW SURF. WIND -LOX(ρ)	-0.31	446.	-112.	-1544.	1.75	-0.10	0.51
HIGH AMB. TEMP. +FUEL(ρ)	-0.85	543.	-121.	-1877.	2.12	-0.27	0.62
LOW AMB. TEMP. -FUEL(ρ)	2.53	-1281.	274.	4488.	-5.25	0.88	-1.57
PRPT. LOADING MASS + LOX	-0.03	-692.	191.	2421.	-2.74	0.05	-0.79
PRPT. LOADING MASS - LOX	0.02	714.	-197.	-2489.	2.85	-0.03	0.82
PRPT. LOADING MASS + FUEL	0.27	187.	-58.	-634.	0.67	0.08	0.19
PRPT. LOADING MASS - FUEL	-0.27	-179.	58.	633.	-0.68	-0.06	-0.19
THRUST AND FLOWRATE (+)	-2.62	1014.	-195.	-3539.	4.10	-0.84	1.23
THRUST AND FLOWRATE (-)	3.29	-988.	168.	3452.	-4.02	1.08	-1.23
ISP AND FLOWRATE (+,-)	-0.02	-589.	163.	2063.	-2.34	0.04	-0.67
ISP AND FLOWRATE (-,+)	0.02	612.	-168.	-2131.	2.44	-0.02	0.70
E.M.R. LOX BIAS	0.37	684.	-200.	-2391.	2.77	0.07	0.79
E.M.R. FUEL BIAS	0.25	466.	-136.	-1625.	1.84	0.05	0.52
POSITIVE RSS	4.22	1706.	445.	5945.	6.82	1.42	1.99
NEGATIVE RSS	-2.78	-1984.	-419.	-5940.	-8.02	-0.89	-2.39

TABLE 9 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	580.46	31.502	62.479	7416.20	90.005	89655.
HIGH SURF. WIND +LOX(ρ)	0.62	0.002	-0.025	-0.00	-0.000	168.
LOW SURF. WIND -LOX(ρ)	-0.31	-0.001	0.016	-0.00	0.000	-112.
HIGH AMB. TEMP. +FUEL(ρ)	-0.85	-0.002	0.020	-0.00	0.000	-121.
LOW AMB. TEMP. -FUEL(ρ)	2.53	0.004	-0.048	-0.00	0.001	274.
PRPT. LOADING MASS + LOX	-0.03	0.002	-0.026	-0.00	-0.000	191.
PRPT. LOADING MASS - LOX	0.02	-0.002	0.027	0.00	-0.000	-197.
PRPT. LOADING MASS + FUEL	0.27	-0.000	0.007	-0.00	0.000	-58.
PRPT. LOADING MASS - FUEL	-0.27	0.000	-0.007	-0.00	-0.000	58.
THRUST AND FLOWRATE (+)	-2.62	-0.003	0.038	0.00	-0.001	-195.
THRUST AND FLOWRATE (-)	3.29	0.003	-0.037	-0.00	0.001	168.
ISP AND FLOWRATE (+,-)	-0.02	0.001	-0.022	-0.00	-0.000	163.
ISP AND FLOWRATE (-,+)	0.02	-0.002	0.023	0.00	-0.000	-168.
E.M.R. LOX BIAS	0.37	-0.002	0.026	0.00	-0.000	-200.
E.M.R. FUEL BIAS	0.25	-0.001	0.017	0.00	0.000	-136.
POSITIVE RSS	4.22	0.006	0.064	0.00	0.002	445.
NEGATIVE RSS	-2.78	-0.005	-0.074	-0.00	-0.001	-419.

TABLE 10

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	580.46	163194.	7821.99	90.005	1773422.	140410.	71736.
NON-PROPELLANT MASS (+)	0.08	5.	0.00	0.000	-203.	-9.	-37.
NON-PROPELLANT MASS (-)	-0.08	0.	0.00	-0.000	204.	9.	37.
THRUST MIS. + PITCH	-0.00	-1.	0.00	0.001	7307.	394.	2.
THRUST MIS. - PITCH	0.37	6.	0.00	-0.001	-7569.	-401.	-162.
THRUST MIS. + YAW	0.50	5.	0.00	0.000	-850.	-37.	-220.
THRUST MIS. - YAW	-0.04	0.	0.00	0.000	510.	29.	19.
THRUST MIS. + ROLL	0.00	0.	0.00	0.000	106.	6.	-2.
THRUST MIS. - ROLL	-0.00	-0.	0.00	0.000	-84.	-4.	2.
AXIAL FORCE COEF. (+)	0.89	2.	0.00	-0.000	-2101.	-94.	-393.
AXIAL FORCE COEF. (-)	-0.86	5.	0.00	-0.000	2010.	90.	381.
C.G. OFFSET (-Z)	-0.08	0.	0.00	0.000	2099.	112.	37.
C.G. OFFSET (+Z)	0.11	7.	0.00	-0.000	-2139.	-113.	-48.
C.G. OFFSET (-Y)	-0.04	0.	0.00	-0.000	91.	5.	19.
C.G. OFFSET (+Y)	0.08	7.	0.00	0.000	-119.	-5.	-35.
HEADWIND	0.72	3.	-0.00	0.000	-4203.	-212.	-319.
TAILWIND	-1.15	6.	-0.00	0.000	6671.	336.	507.
RIGHT CROSS WIND	0.37	5.	0.00	-0.000	-1833.	-91.	-154.
LEFT CROSS WIND	0.23	6.	0.00	0.000	-1279.	-63.	-104.
MAXIMUM ATMOSPHERE	0.17	6.	0.00	0.000	-393.	-17.	-77.
MINIMUM ATMOSPHERE	-0.33	2.	0.00	-0.000	729.	32.	146.
POSITIVE RSS	1.37	18.	0.00	0.001	10354.	540.	654.
NEGATIVE RSS	-1.48	-1.	-0.00	-0.001	-9394.	-487.	-607.

TABLE 10 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	580.46	-99.019	3.099	0.616	-0.000	-0.002	0.002
NON-PROPELLANT MASS (+)	0.08	-0.185	-0.005	-0.046	0.002	0.000	-0.000
NON-PROPELLANT MASS (-)	-0.08	0.035	-0.003	-0.199	0.001	-0.000	0.033
THRUST MIS. + PITCH	-0.00	-1.674	-0.071	-1.269	0.000	-0.001	-0.052
THRUST MIS. - PITCH	0.37	1.489	0.082	-1.029	0.005	-0.000	-0.004
THRUST MIS. + YAW	0.50	-0.164	-1.958	-1.132	0.004	-0.000	0.080
THRUST MIS. - YAW	-0.04	-0.064	1.892	-0.556	0.000	-0.001	0.073
THRUST MIS. + ROLL	0.00	-0.039	-0.100	-0.785	0.000	-0.001	0.082
THRUST MIS. - ROLL	-0.00	0.022	0.093	0.029	0.000	-0.000	0.054
AXIAL FORCE COEF. (+)	0.89	-0.426	0.027	-0.742	0.006	-0.000	0.015
AXIAL FORCE COEF. (-)	-0.86	0.373	-0.020	0.073	0.005	0.001	-0.054
C.G. OFFSET (-Z)	-0.08	-0.402	-0.021	-0.398	0.001	-0.000	0.095
C.G. OFFSET (+Z)	0.11	0.236	0.018	-1.290	0.002	-0.001	-0.056
C.G. OFFSET (-Y)	-0.04	-0.009	0.518	-1.332	0.000	-0.001	-0.051
C.G. OFFSET (+Y)	0.08	-0.172	-0.529	-1.053	0.002	-0.000	-0.059
HEADWIND	0.72	-0.052	0.046	-0.926	0.001	-0.001	0.008
TAILWIND	-1.15	-0.204	-0.083	-0.396	0.001	-0.000	0.054
RIGHT CROSS WIND	0.37	-0.080	-0.460	-0.513	0.006	0.000	-0.040
LEFT CROSS WIND	0.23	-0.172	0.832	-0.288	0.000	-0.001	0.023
MAXIMUM ATMOSPHERE	0.17	-0.255	-0.003	-1.277	0.001	-0.001	-0.056
MINIMUM ATMOSPHERE	-0.33	0.186	0.002	-1.002	0.004	-0.000	-0.067
POSITIVE RSS	1.37	1.565	2.135	0.078	0.012	0.001	0.164
NEGATIVE RSS	-1.48	-1.837	-2.085	-3.207	-0.000	-0.003	-0.140

TABLE 10 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	6216193.	140410.	2013138.	-2415.64	411.76	7428.23
NON-PROPELLANT MASS (+)	0.08	60.	-9.	-164.	0.17	0.02	0.05
NON-PROPELLANT MASS (-)	-0.08	-54.	9.	166.	-0.19	0.00	-0.06
THRUST MIS. + PITCH	-0.00	-2321.	394.	7116.	-8.62	-0.20	-2.80
THRUST MIS. - PITCH	0.37	2355.	-401.	-7233.	8.79	0.22	2.84
THRUST MIS. + YAW	0.50	212.	-37.	-636.	0.76	-0.19	0.26
THRUST MIS. - YAW	-0.04	-156.	29.	480.	-0.58	0.24	-0.20
THRUST MIS. + ROLL	0.00	-34.	6.	105.	-0.13	-0.00	-0.04
THRUST MIS. - ROLL	-0.00	27.	-4.	-84.	0.09	0.02	0.03
AXIAL FORCE COEF. (+)	0.89	557.	-94.	-1706.	2.05	0.05	0.66
AXIAL FORCE COEF. (-)	-0.86	-526.	90.	1629.	-1.90	-0.03	-0.62
C.G. OFFSET (-Z)	-0.08	-655.	112.	2013.	-2.44	-0.04	-0.79
C.G. OFFSET (+Z)	0.11	671.	-113.	-2041.	2.45	0.07	0.79
C.G. OFFSET (-Y)	-0.04	-23.	3.	72.	-0.07	0.07	-0.03
C.G. OFFSET (+Y)	0.08	34.	-5.	-84.	0.08	-0.04	0.03
HEADWIND	0.72	1244.	-212.	-3818.	4.56	0.12	1.47
TAILWIND	-1.15	-1969.	336.	6060.	-7.28	-0.15	-2.36
RIGHT CROSS WIND	0.37	539.	-91.	-1642.	1.98	0.01	0.64
LEFT CROSS WIND	0.23	362.	-63.	-1155.	1.34	0.13	0.43
MAXIMUM ATMOSPHERE	0.17	109.	-17.	-314.	0.34	0.02	0.11
MINIMUM ATMOSPHERE	-0.33	-188.	32.	584.	-0.64	-0.01	-0.21
POSITIVE RSS	1.37	2865.	540.	9731.	10.63	0.39	3.43
NEGATIVE RSS	-1.48	-3167.	-487.	-8787.	-11.74	-0.32	-3.81

TABLE 10 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	-87867.	89655.	1793145.	-2032.52	528.24	7112.66
NON-PROPELLANT MASS (+)	0.08	63.	-18.	-198.	0.20	0.03	0.05
NON-PROPELLANT MASS (-)	-0.08	-57.	18.	200.	-0.22	-0.01	-0.06
THRUST MIS. + PITCH	-0.00	-2061.	566.	7186.	-8.27	0.14	-2.38
THRUST MIS. - PITCH	0.37	2130.	-598.	-7444.	8.59	-0.02	2.45
THRUST MIS. + YAW	0.50	244.	-83.	-834.	0.94	-0.08	0.28
THRUST MIS. - YAW	-0.04	-143.	43.	501.	-0.57	0.25	-0.18
THRUST MIS. + ROLL	0.00	-30.	8.	104.	-0.12	0.00	-0.04
THRUST MIS. - ROLL	-0.00	24.	-6.	-82.	0.09	0.02	0.02
AXIAL FORCE COEF. (+)	0.89	593.	-191.	-2065.	2.36	0.24	0.65
AXIAL FORCE COEF. (-)	-0.86	-561.	183.	1977.	-2.20	-0.20	-0.62
C.G. OFFSET (-Z)	-0.08	-591.	165.	2065.	-2.37	0.03	-0.68
C.G. OFFSET (+Z)	0.11	608.	-169.	-2102.	2.40	0.00	0.68
C.G. OFFSET (-Y)	-0.04	-25.	9.	89.	-0.09	0.06	-0.03
C.G. OFFSET (+Y)	0.08	40.	-12.	-115.	0.11	-0.02	0.03
HEADWIND	0.72	1184.	-348.	-4133.	4.68	0.15	1.33
TAILWIND	-1.15	-1874.	553.	6561.	-7.49	-0.20	-2.13
RIGHT CROSS WIND	0.37	520.	-154.	-1802.	2.07	0.04	0.59
LEFT CROSS WIND	0.23	365.	-106.	-1256.	1.39	0.15	0.38
MAXIMUM ATMOSPHERE	0.17	116.	-36.	-384.	0.40	0.06	0.11
MINIMUM ATMOSPHERE	-0.33	-203.	67.	717.	-0.76	-0.08	-0.21
POSITIVE RSS	1.37	2648.	833.	10182.	10.60	0.44	3.02
NEGATIVE RSS	-1.48	-2914.	-759.	-9237.	-11.66	-0.30	-3.34

TABLE 10 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	580.46	31.502	62.479	7416.20	90.005	89655.
NON-PROPELLANT MASS (+)	0.08	-0.000	0.002	-0.00	0.000	-18.
NON-PROPELLANT MASS (-)	-0.08	0.000	-0.002	0.00	-0.000	18.
THRUST MIS. + PITCH	-0.00	0.005	-0.077	-0.00	0.001	566.
THRUST MIS. - PITCH	0.37	-0.005	0.079	0.00	-0.001	-598.
THRUST MIS. + YAW	0.50	-0.000	0.009	0.00	0.000	-83.
THRUST MIS. - YAW	-0.04	0.000	-0.005	-0.00	0.000	43.
THRUST MIS. + ROLL	0.00	0.000	-0.001	-0.00	0.000	8.
THRUST MIS. - ROLL	-0.00	-0.000	0.001	0.00	0.000	-6.
AXIAL FORCE COEF. (+)	0.89	-0.001	0.022	0.00	-0.000	-191.
AXIAL FORCE COEF. (-)	-0.86	0.001	-0.021	-0.00	-0.000	183.
C.G. OFFSET (-Z)	-0.08	0.001	-0.022	-0.00	0.000	165.
C.G. OFFSET (+Z)	0.11	-0.001	0.022	0.00	-0.000	-169.
C.G. OFFSET (-Y)	-0.04	0.000	-0.001	-0.00	-0.000	9.
C.G. OFFSET (+Y)	0.08	-0.000	0.001	0.00	0.000	-12.
HEADWIND	0.72	-0.003	0.044	0.00	0.000	-348.
TAILWIND	-1.15	0.004	-0.070	-0.00	0.000	553.
RIGHT CROSS WIND	0.37	-0.001	0.019	0.00	-0.000	-154.
LEFT CROSS WIND	0.23	-0.001	0.013	-0.00	0.000	-106.
MAXIMUM ATMOSPHERE	0.17	-0.000	0.004	-0.00	0.000	-36.
MINIMUM ATMOSPHERE	-0.33	0.000	-0.008	-0.00	-0.000	67.
POSITIVE RSS	1.37	0.007	0.098	0.00	0.001	833.
NEGATIVE RSS	-1.48	-0.006	-0.109	-0.00	-0.001	-759.

TABLE 11

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	580.46	163194.	7821.99	90.005	1773422.	140410.	71736.
PRPT. LOADING MASS (+)	4.23	-1.	-0.00	-0.000	10603.	663.	131.
PRPT. LOADING MASS (-)	-4.14	-0.	0.00	-0.001	-12100.	-742.	-178.
LOX LOADING (+)	-1.95	-2.	-0.00	-0.001	-18027.	-1016.	68.
LOX LOADING (-)	2.12	0.	-0.00	-0.000	15550.	885.	-153.
LH2 LOADING (+)	6.30	7.	-0.00	0.000	26995.	1591.	4.
LH2 LOADING (-)	-6.11	-2.	0.00	-0.001	-30210.	-1764.	-105.
THRUST AND FLOWRATE (+)	-13.80	-12.	-0.00	-0.002	-51779.	-3098.	436.
THRUST AND FLOWRATE (-)	14.70	3.	-0.00	0.001	52142.	3124.	-567.
ISP AND FLOWRATE (+,-)	1.54	2.	0.00	-0.000	7411.	433.	702.
ISP AND FLOWRATE (-,+)	-1.55	-4.	-0.00	-0.001	-8434.	-489.	-728.
POSITIVE RSS	16.75	8.	0.00	0.001	62102.	3702.	839.
NEGATIVE RSS	-15.85	-13.	-0.00	-0.003	-64314.	-3812.	-958.

TABLE 11 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	580.46	-99.019	3.099	0.616	-0.000	-0.002	0.002
PRPT. LOADING MASS (+)	4.23	-0.350	0.032	-1.305	-0.015	-0.001	0.246
PRPT. LOADING MASS (-)	-4.14	0.523	-0.016	-1.144	-0.008	-0.001	0.316
LOX LOADING (+)	-1.95	0.683	0.021	-1.227	-0.008	-0.000	0.324
LOX LOADING (-)	2.12	-0.401	0.013	-0.814	-0.008	-0.001	0.255
LH2 LOADING (+)	6.30	-0.938	0.027	-0.417	-0.005	-0.001	0.304
LH2 LOADING (-)	-6.11	1.218	-0.035	-0.435	-0.013	-0.001	0.355
THRUST AND FLOWRATE (+)	-13.80	1.098	-0.051	-1.071	-0.014	-0.000	0.224
THRUST AND FLOWRATE (-)	14.70	-1.058	0.087	-1.065	-0.014	-0.001	0.232
ISP AND FLOWRATE (+,-)	1.54	-0.047	0.015	0.288	-0.007	0.001	0.315
ISP AND FLOWRATE (-,+)	-1.55	0.343	0.008	-0.712	-0.013	-0.000	0.243
POSITIVE RSS	16.75	1.883	0.100	0.288	0.000	0.001	0.696
NEGATIVE RSS	-15.85	-1.512	-0.063	-2.250	-0.029	-0.002	-0.000

TABLE 11 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	6216193.	140410.	2013138.	-2415.64	411.76	7428.23
PRPT. LOADING MASS (+)	4.23	-3905.	663.	11952.	-14.32	-0.32	-4.66
PRPT. LOADING MASS (-)	-4.14	4340.	-742.	-13385.	16.15	0.36	5.22
LOX LOADING (+)	-1.95	5931.	-1016.	-18321.	22.12	0.50	7.13
LOX LOADING (-)	2.12	-5216.	885.	15956.	-19.11	-0.42	-6.22
LH2 LOADING (+)	6.30	-9409.	1591.	28704.	-34.46	-0.75	-11.26
LH2 LOADING (-)	-6.11	10261.	-1764.	-31807.	38.27	0.86	12.29
THRUST AND FLOWRATE (+)	-13.80	17885.	-3098.	-55836.	67.14	1.46	21.43
THRUST AND FLOWRATE (-)	14.70	-18629.	3124.	56369.	-67.69	-1.51	-22.28
ISP AND FLOWRATE (+,-)	1.54	-2546.	433.	7811.	-9.31	-0.20	-3.02
ISP AND FLOWRATE (-,+)	-1.55	2858.	-489.	-8814.	10.64	0.23	3.44
POSITIVE RSS	16.75	22076.	3702.	66782.	82.68	1.82	26.46
NEGATIVE RSS	-15.85	-22011.	-3812.	-68716.	-80.17	-1.78	-26.32

TABLE 11 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	-87867.	89655.	1793145.	-2032.52	528.24	7112.66
PRPT. LOADING MASS (+)	4.23	-2994.	685.	10432.	-11.85	1.47	-3.51
PRPT. LOADING MASS (-)	-4.14	3394.	-805.	-11911.	13.65	-1.46	4.00
LOX LOADING (+)	-1.95	5047.	-1333.	-17742.	20.35	-0.93	5.86
LOX LOADING (-)	2.12	-4395.	1138.	15292.	-17.38	0.94	-5.06
LH2 LOADING (+)	6.30	-7648.	1897.	26547.	-30.25	2.42	-8.90
LH2 LOADING (-)	-6.11	8430.	-2140.	-29744.	33.97	-2.40	9.81
THRUST AND FLOWRATE (+)	-13.80	14355.	-3546.	-51014.	58.21	-5.16	16.78
THRUST AND FLOWRATE (-)	14.70	-14883.	3601.	51246.	-58.39	5.40	-17.37
ISP AND FLOWRATE (+,-)	1.54	-2088.	526.	7291.	-8.24	0.61	-2.41
ISP AND FLOWRATE (-,+)	-1.55	2365.	-604.	-8300.	9.51	-0.63	2.76
POSITIVE RSS	16.75	17881.	4314.	61047.	72.34	6.20	20.87
NEGATIVE RSS	-15.85	-17682.	-4468.	-63345.	-69.53	-5.98	-20.61

TABLE 11 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	580.46	31.502	62.479	7416.20	90.005	89655.
PRPT. LOADING MASS (+)	4.23	0.009	-0.111	-0.00	-0.000	689.
PRPT. LOADING MASS (-)	-4.14	-0.010	0.127	0.00	-0.001	-805.
LOX LOADING (+)	-1.95	-0.013	0.189	0.00	-0.001	-1333.
LOX LOADING (-)	2.12	0.011	-0.163	-0.00	-0.000	1138.
LH2 LOADING (+)	6.30	0.020	-0.283	-0.01	0.000	1897.
LH2 LOADING (-)	-6.11	-0.023	0.317	0.01	-0.001	-2140.
THRUST AND FLOWRATE (+)	-13.80	-0.041	0.543	0.01	-0.002	-3548.
THRUST AND FLOWRATE (-)	14.70	0.039	-0.547	-0.01	0.001	3601.
ISP AND FLOWRATE (+,-)	1.54	0.006	-0.078	-0.00	-0.000	526.
ISP AND FLOWRATE (-,+)	-1.55	-0.006	0.088	0.00	-0.001	-604.
POSITIVE RSS	16.75	0.047	0.674	0.01	0.001	4314.
NEGATIVE RSS	-15.85	-0.051	-0.652	-0.01	-0.003	-4468.

TABLE 12

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
NOMINAL	580.46	163194.	7821.99	90.005	1773422.	140410.	71736.
NONPROPELLANT MASS (+)	0.42	6.	0.00	-0.000	1255.	77.	14.
NONPROPELLANT MASS (-)	-0.42	2.	0.00	-0.000	-1251.	-76.	-14.
THRUST MIS. + PITCH	0.04	-1.	-0.00	-0.000	1472.	80.	-17.
THRUST MIS. - PITCH	0.06	7.	0.00	-0.000	-1553.	-82.	-25.
THRUST MIS. + YAW	0.09	7.	0.00	0.000	-111.	-4.	-41.
THRUST MIS. - YAW	0.00	0.	0.00	-0.000	29.	2.	-1.
C.G. OFFSET (-Z)	0.01	3.	0.00	-0.001	779.	42.	-7.
C.G. OFFSET (+Z)	0.01	-3.	-0.00	0.001	-809.	-44.	-5.
C.G. OFFSET (-Y)	-0.01	0.	-0.00	0.000	31.	-1.	6.
C.G. OFFSET (+Y)	0.04	-0.	0.00	-0.000	-56.	-0.	-17.
POSITIVE RSS	0.44	12.	0.00	0.001	2086.	119.	15.
NEGATIVE RSS	-0.42	-3.	-0.00	-0.001	-2156.	-121.	-53.

TABLE 12 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE ** PITCH (DEG)	YAW (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE ** PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
NOMINAL	580.46	-99.019	3.399	0.616	-0.000	-0.002	0.002
NONPROPELLANT MASS (+)	0.42	-0.152	0.004	-1.189	0.005	-0.001	-0.057
NONPROPELLANT MASS (-)	-0.42	0.084	0.002	-0.249	0.006	0.001	-0.056
THRUST MIS. + PITCH	0.04	-0.508	-0.010	-0.924	0.008	0.000	-0.039
THRUST MIS. - PITCH	0.06	0.412	0.013	-0.914	0.002	-0.001	0.046
THRUST MIS. + YAW	0.09	-0.167	-0.636	-1.044	0.002	-0.000	0.022
THRUST MIS. - YAW	0.00	-0.033	0.624	-1.217	0.000	-0.001	-0.082
C.G. OFFSET (-Z)	0.01	-0.021	-0.011	-0.233	0.006	-0.000	0.027
C.G. OFFSET (+Z)	0.01	0.002	0.010	-0.658	-0.006	-0.000	-0.008
C.G. OFFSET (-Y)	-0.01	-0.015	-0.064	-1.190	0.000	-0.006	-0.045
C.G. OFFSET (+Y)	0.04	0.068	0.054	-0.887	0.007	0.004	0.070
POSITIVE RSS	0.44	0.425	0.626	0.000	0.014	0.004	0.091
NEGATIVE RSS	-0.42	-0.557	-0.639	-2.366	-0.006	-0.006	-0.117

TABLE 12 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** SPACE FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	6216193.	140410.	2013138.	-2415.64	411.76	7428.23
NONPROPELLANT MASS (+)	0.42	-445.	77.	1387.	-1.65	-0.02	-0.54
NONPROPELLANT MASS (-)	-0.42	451.	-76.	-1380.	1.71	0.05	0.55
THRUST MIS. + PITCH	0.04	-472.	80.	1448.	-1.71	-0.03	-0.55
THRUST MIS. - PITCH	0.06	492.	-82.	-1490.	1.81	0.06	0.58
THRUST MIS. + YAW	0.09	30.	-4.	-71.	0.06	-0.07	0.02
THRUST MIS. - YAW	0.00	-9.	2.	28.	-0.03	0.09	-0.01
C.G. OFFSET (-Z)	0.01	-246.	42.	766.	-0.76	-0.01	-0.25
C.G. OFFSET (+Z)	0.01	252.	-44.	-785.	0.78	0.03	0.25
C.G. OFFSET (-Y)	-0.01	-8.	-1.	25.	-0.03	-0.23	0.00
C.G. OFFSET (+Y)	0.04	13.	-0.	-39.	0.11	0.24	0.02
POSITIVE RSS	0.44	714.	119.	2147.	2.61	0.27	0.84
NEGATIVE RSS	-0.42	-694.	-121.	-2178.	-2.50	-0.24	-0.81

TABLE 12 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR ** X (M)	Y (M)	Z (M)	** EARTH FIXED VELOCITY VECTOR ** XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	580.46	-87867.	89655.	1793145.	-2032.52	528.24	7112.66
NONPROPELLANT MASS (+)	0.42	-348.	84.	1237.	-1.40	0.16	-0.41
NONPROPELLANT MASS (-)	-0.42	353.	-84.	-1231.	1.45	-0.14	0.43
THRUST MIS. + PITCH	0.04	-415.	113.	1448.	-1.62	0.05	-0.47
THRUST MIS. - PITCH	0.06	444.	-122.	-1526.	1.76	0.01	0.50
THRUST MIS. + YAW	0.09	38.	-12.	-107.	0.10	-0.04	0.03
THRUST MIS. - YAW	0.00	-8.	3.	28.	-0.02	0.09	-0.01
C.G. OFFSET (-Z)	0.01	-217.	60.	767.	-0.71	0.03	-0.21
C.G. OFFSET (+Z)	0.01	225.	-63.	-796.	0.74	-0.01	0.21
C.G. OFFSET (-Y)	-0.01	-9.	1.	31.	-0.04	-0.23	0.01
C.G. OFFSET (+Y)	0.04	16.	-4.	-55.	0.12	0.24	0.02
POSITIVE RSS	0.44	612.	153.	2053.	2.40	0.31	0.69
NEGATIVE RSS	-0.42	-583.	-161.	-2119.	-2.25	-0.28	-0.65

TABLE 12 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
NOMINAL	580.46	31.502	62.479	7416.20	90.005	89655.
NONPROPELLANT MASS (+)	0.42	0.001	-0.013	-0.00	-0.000	84.
NONPROPELLANT MASS (-)	-0.42	-0.001	0.013	0.00	-0.000	-84.
THRUST MIS. + PITCH	0.04	0.001	-0.015	-0.00	-0.000	113.
THRUST MIS. - PITCH	0.06	-0.001	0.016	-0.00	-0.000	-122.
THRUST MIS. + YAW	0.09	-0.000	0.001	0.00	0.000	-12.
THRUST MIS. - YAW	0.00	0.000	-0.000	-0.00	-0.000	3.
C.G. OFFSET (-Z)	0.01	0.001	-0.008	-0.00	-0.001	60.
C.G. OFFSET (+Z)	0.01	-0.001	0.008	0.00	0.001	-63.
C.G. OFFSET (-Y)	-0.01	0.000	-0.000	0.00	0.000	1.
C.G. OFFSET (+Y)	0.04	-0.000	0.001	-0.00	-0.000	-4.
POSITIVE RSS	0.44	0.002	0.023	0.00	0.001	153.
NEGATIVE RSS	-0.42	-0.002	-0.022	-0.00	-0.001	-161.

TABLE 13

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	ALTITUDE	SPACE FIXED VELOCITY (M/S)	FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	CROSS RANGE (M)	VEHICLE WEIGHT (LB)
S-IB Propulsion	+RSS	4.22	11.	0.00	0.001	7055.	458.	421.
S-IB Propulsion	-RSS	2.78	1.	0.00	0.001	6038.	365.	574.
S-IB Non Propulsion	+RSS	1.37	18.	0.00	0.001	10354.	540.	654.
S-IB Non Propulsion	-RSS	1.48	1.	0.00	0.001	9394.	487.	607.
S-IVB Propulsion	+RSS	16.75	8.	0.00	0.001	62102.	3702.	839.
S-IVB Propulsion	-RSS	15.85	13.	0.00	0.003	64314.	3812.	958.
S-IVB Non Propulsion	+RSS	.44	12.	0.00	0.001	2086.	119.	15.
S-IVB Non Propulsion	-RSS	.42	3.	0.00	0.001	2156.	121.	53.
IMU Dispersions	+RSS	0.03	601.	1.60	0.026	318.	725.	---
IMU Dispersions	-RSS	0.03	601.	1.60	0.026	318.	725.	---
Combined Positive	RSS	17.33	602.	1.60	0.026	63388.	3840.	1144.
Combined Negative	RSS	16.17	601.	1.60	0.026	65313.	3930.	1272.

TABLE 13 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION		FLIGHT TIME (SEC)	VEHICLE ATTITUDE PITCH (DEG)	VEHICLE ATTITUDE YAW (DEG)	*ROLL (DEG)	VEHICLE ATTITUDE RATE PITCH (DEG/S)	VEHICLE ATTITUDE RATE YAW (DEG/S)	*ROLL (DEG/S)
S-IB Propulsion	+RSS	4.22	1.156	0.134	----	0.015	0.000	----
S-IB Propulsion	-RSS	2.78	1.920	0.023	----	0.000	0.002	----
S-IB Non Propulsion	+RSS	1.37	1.565	2.135	----	0.012	0.001	----
S-IB Non Propulsion	-RSS	1.48	1.837	2.085	----	0.000	0.003	----
S-IVB Propulsion	+RSS	16.75	1.883	0.100	----	0.000	0.001	----
S-IVB Propulsion	-RSS	15.85	1.512	0.063	----	0.029	0.002	----
S-IVB Non Propulsion	+RSS	0.44	0.425	0.626	----	0.014	0.004	----
S-IVB Non Propulsion	-RSS	0.42	0.557	0.639	----	0.006	0.006	----
IMU Dispersions	+RSS	0.03	----	----	----	----	----	----
IMU Dispersions	-RSS	0.03	----	----	----	----	----	----
Combined Positive	RSS	17.33	2.741	2.231	----	0.024	0.004	----
Combined Negative	RSS	16.17	3.108	2.182	----	0.030	0.007	----

* Not Applicable

TABLE 13 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	SPACE FIXED POSITION VECTOR X (M)	Y (M)	Z (M)	SPACE FIXED VELOCITY VECTOR XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
S-IB Propulsion	+RSS	4.22	2153.	458.	8249.	7.98	0.21	2.58
S-IB Propulsion	-RSS	2.78	2684.	365.	6593.	10.03	0.17	3.26
S-IB Non Propulsion	+RSS	1.37	2865.	540.	9731.	10.63	0.39	3.43
S-IB Non Propulsion	-RSS	1.48	3167.	487.	8787.	11.74	0.32	3.81
S-IVB Propulsion	+RSS	16.75	22076.	3702.	66782.	82.68	1.82	26.46
S-IVB Propulsion	-RSS	15.85	22011.	3812.	68716.	80.17	1.78	26.32
S-IVB Non Propulsion	+RSS	.44	714.	119.	2147.	2.61	0.27	0.84
S-IVB Non Propulsion	-RSS	.42	694.	121.	2178.	2.50	0.24	0.81
IMU Dispersions	+RSS	0.03	654.	725.	207.	3.05	0.65	4.10
IMU Dispersions	-RSS	0.03	654.	725.	207.	3.05	0.65	4.10
Combined Positive	RSS	17.33	22386.	3840.	68024.	83.84	2.00	27.13
Combined Negative	RSS	16.17	22419.	3930.	69623.	81.74	1.94	27.12

TABLE 13 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB and S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	EARTH FIXED POSITION X (M)	Y (M)	Z (M)	EARTH FIXED VELOCITY XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
S-IB Propulsion	+RSS	4.22	1706.	445.	6945.	6.82	1.42	1.99
S-IB Propulsion	-RSS	2.78	1984.	419.	5940.	8.02	0.89	2.39
S-IB Non Propulsion	+RSS	1.37	2648.	833.	10182.	10.60	0.44	3.02
S-IB Non Propulsion	-RSS	1.48	2914.	759.	9237.	11.66	0.30	3.34
S-IVB Propulsion	+RSS	16.75	17881.	4314.	61047.	72.34	6.20	20.87
S-IVB Propulsion	-RSS	15.85	17682.	4468.	63345.	69.53	5.98	20.61
S-IVB Non Propulsion	+RSS	0.44	612.	153.	2053.	2.40	0.31	0.69
S-IVB Non Propulsion	-RSS	0.42	583.	161.	2119.	2.25	0.28	0.66
IMU Dispersions	+RSS	0.03	----	----	----	----	----	----
IMU Dispersions	-RSS	0.03	----	----	----	----	----	----
Combined Positive	RSS	17.33	18167.	4419.	62313.	73.47	6.38	21.19
Combined Negative	RSS	16.17	18039.	4554.	64325.	70.99	6.06	21.03

TABLE 13 (Cont'd)

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POS. WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED CROSS RANGE (M)
S-IB Propulsion	+RSS	4.22	0.006	0.064	0.00	0.002	445.
S-IB Propulsion	-RSS	2.78	0.005	0.074	0.00	0.001	419.
S-IB Non Propulsion	+RSS	1.37	0.007	0.098	0.00	0.001	833.
S-IB Non Propulsion	-RSS	1.48	0.006	0.109	0.00	0.001	759.
S-IVB Propulsion	+RSS	16.75	0.047	0.674	0.01	0.001	4314.
S-IVB Propulsion	-RSS	15.85	0.051	0.652	0.01	0.003	4468.
S-IVB Non Propulsion	+RSS	0.44	0.002	0.023	0.00	0.001	153.
S-IVB Non Propulsion	-RSS	0.42	0.002	0.022	0.00	0.001	161.
IMU Dispersions	+RSS	0.03	----	----	----	----	----
IMU Dispersions	-RSS	0.03	----	----	----	----	----
Combined Positive	RSS	17.33	0.048	0.684	0.01	0.003	4419.
Combined Negative	RSS	16.17	0.052	0.666	0.01	0.003	4554.

TABLE 14

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE SIGMA FLIGHT ENVELOPE OF PERTINENT DESIGN PARAMETERS

FLIGHT TIME (SEC)	RSS	LONGITUDINAL ACCELERATION (M/S^2)	AERO. HEATING INDICATOR ($x10^6$) ($KG-M/M^2-RAD$)	TOTAL ANGLE OF ATTACK (DEG)	DYNAMIC PRESSURE (KG/M^2)	AERO. LOAD INDICATOR ALPHA·Q ($KG-RAD/M^2$)
0	+	0.000	0.000	0.000	0.	0.000
	-	0.000	0.000	0.000	0.	0.000
5	+	0.214	0.000	10.546	2.	1.435
	-	0.277	0.000	10.158	2.	2.738
10	+	0.225	0.001	19.371	15.	12.503
	-	0.292	0.001	18.867	9.	24.929
15	+	0.240	0.005	14.018	27.	21.205
	-	0.309	0.004	13.158	23.	41.714
20	+	0.263	0.014	11.521	45.	32.916
	-	0.346	0.013	10.498	43.	64.548
25	+	0.276	0.035	9.691	69.	48.103
	-	0.351	0.034	8.712	70.	92.159
30	+	0.299	0.075	6.184	98.	70.254
	-	0.378	0.077	4.814	103.	104.075
35	+	0.320	0.145	4.395	131.	86.300
	-	0.402	0.153	2.801	141.	116.788
40	+	0.344	0.259	4.314	162.	78.230
	-	0.432	0.277	2.574	182.	138.398
45	+	0.369	0.428	5.058	192.	98.732
	-	0.460	0.467	1.126	222.	153.758
50	+	0.374	0.666	3.196	217.	117.684
	-	0.472	0.741	2.031	258.	139.038
55	+	0.268	0.978	2.190	233.	131.233
	-	0.421	1.115	1.055	285.	153.483
60	+	0.483	1.359	2.254	253.	155.221
	-	0.335	1.566	0.526	295.	190.113
65	+	0.626	1.827	3.120	290.	144.878
	-	0.678	2.135	1.035	385.	217.508
70	+	0.723	2.743	2.816	390.	184.947
	-	0.850	2.776	0.643	356.	79.069

TABLE 14 (Cont'd)

AS-206 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE SIGMA FLIGHT ENVELOPE OF PERTINENT DESIGN PARAMETERS

FLIGHT TIME (SEC)	RSS	LONGITUDINAL ACCELERATION (M/S^2)	AERO. HEATING INDICATOR ($x10^6$) ($KG-M/M^2-RAD$)	TOTAL ANGLE OF ATTACK (DEG)	DYNAMIC PRESSURE (KG/M^2)	AERO. LOAD INDICATOR ALPHA·Q ($KG-RAD/M^2$)
75	+	0.769	3.310	1.473	392.	134.692
	-	0.919	3.338	0.323	339.	15.244
80	+	0.813	4.054	0.519	276.	58.402
	-	0.995	3.856	0.329	346.	15.842
85	+	0.867	4.401	0.301	303.	23.792
	-	1.052	4.106	0.641	322.	27.330
90	+	0.901	4.313	0.414	350.	35.242
	-	1.127	4.103	0.298	301.	48.299
95	+	0.948	4.048	0.419	362.	39.260
	-	1.167	3.877	0.675	280.	29.535
100	+	0.998	3.813	0.183	334.	27.404
	-	1.230	3.621	0.852	252.	19.961
105	+	1.080	3.696	0.160	299.	21.569
	-	1.317	3.503	0.743	226.	14.547
110	+	1.179	3.695	0.167	255.	16.140
	-	1.435	3.546	0.579	185.	8.495
115	+	1.301	3.798	0.175	205.	9.620
	-	1.566	3.727	0.365	148.	4.884
120	+	1.427	4.003	0.206	162.	5.351
	-	1.720	3.978	0.306	116.	3.483
125	+	1.590	4.261	2.213	123.	11.840
	-	1.893	4.254	2.229	89.	13.682
130	+	1.801	4.533	1.606	92.	6.307
	-	2.130	4.529	1.651	67.	7.573
IECO	+	0.683	5.206	1.525	41.	3.691
	-	1.109	5.057	1.258	34.	3.701
OECO	+	1.295	5.379	0.618	27.	2.356
	-	0.509	5.170	0.592	27.	1.792
SEP. SIG.	+	0.046	5.416	0.578	25.	2.139
	-	0.055	5.213	0.588	24.	1.480
SEP.	+	0.046	5.418	0.577	25.	2.122
	-	0.055	5.215	0.586	24.	1.461

TABLE 15

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
PERFORMANCE TRADE-OFFS AT S-IB/S-IVB SEPARATION

DISPERSION	PARAMETER TRADE-OFFS					
	TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED CROSS RANGE (M)
S-IB STAGE:						
Lox Loading Mass (±%)	±1.49	± 417.14	± 31.34	± 0.411	±2108.6	± 174.3
Fuel Loading Mass (±%)	0.00	∓ 502.86	∓ 13.00	± 0.106	∓ 345.7	0.0
Thrust and Flowrate (±%)	∓ 1.69	± 830.67	± 3.13	∓ 0.692	∓1620.7	∓ 204.7
I_{SP} and Flowrate (± sec I_{SP})	± 0.50	± 283.33	± 10.24	± 0.120	± 755.6	± 60.0
E.M.R., Lox Bias (+1000 lb)	- 0.11	- 112.67	- 4.37	- 0.013	- 209.9	- 12.7
E.M.R., Fuel Bias (+1000 lb)	- 0.16	- 172.09	- 6.67	- 0.019	- 320.2	- 19.4
Non-Propellant Mass (±100 lb)	0.00	∓ 17.74	∓ 0.46	± 0.004	∓ 12.3	0.0
Pitch Thrust Mis. (± deg)	0.00	∓2080.65	± 27.02	± 2.502	±2653.2	± 6.5
Yaw Thrust Mis. (± deg)	0.00	= 46.77	∓ 6.53	∓ 0.061	± 45.2	∓3538.7
Roll Thrust Mis. (± deg)	0.00	∓ 48.39	± 0.29	± 0.048	± 62.9	∓ 280.6
Z.C.G. Offset (± .01 m)	0.00	± 67.40	∓ 1.01	∓ 0.081	F 109.8	∓ 2.4
Y.C.G. Offset (± .01 m)	0.00	∓ 2.80	∓ 0.16	0.000	± 8.2	∓ 145.2

TABLE 16

AS-206A LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
S-IVB STAGE FLIGHT PERFORMANCE RESERVE

ITEM	DEVIATION	ΔPROPELLANT REQUIRED (LBS)	INJECTION WEIGHT TRADE-OFF FACTOR (-ΔPRPT. REQUIRED/DEVIATION)
S-IB STAGE:			
Non-Propellant Mass	± 310 lbs	± 38	∓ 0.12 lb/lb
Thrust Misalignment	+ 0.62° Pitch	- 1	+ 1.61 lb/deg
Thrust Misalignment	- 0.62° Pitch	+ 163	- 262.90 lb/deg
Thrust Misalignment	+ 0.62° Yaw	+ 221	- 356.45 lb/deg
Thrust Misalignment	- 0.62° Yaw	- 18	+ 29.03 lb/deg
Axial Force Coefficient	Maximum	+ 393	Not Applicable
Axial Force Coefficient	Minimum	- 380	Not Applicable
Headwind	Maximum	+ 319	Not Applicable
Tailwind	Maximum	- 507	Not Applicable
Right Cross Wind	Maximum	+ 165	Not Applicable
Left Cross Wind	Maximum	+ 104	Not Applicable
Atmosphere	Maximum	+ 77	Not Applicable
Atmosphere	Minimum	- 146	Not Applicable
Propellant Mass	± 0.35% LOX	∓ 241	± 688.57 lb/%
Propellant Mass	± 0.35% Fuel	± 119	∓ 340.00 lb/%
Thrust and Flow Rate	+ 1.5%	- 229	+ 152.67 lb/%
Thrust and Flow Rate	- 1.5%	+ 331	- 220.67 lb/%
I_{SP} and Flow Rate	± 0.9 sec	∓ 209	± 232.22 lb/sec
Engine Mixture Ratio	+ 2920 lb. Lox Bias	+ 305	- 0.10 lb/lb
Engine Mixture Ratio	+ 1290 lb. Fuel Bias	+ 205	- 0.16 lb/lb
S-IVB STAGE:			
Non-Propellant Mass	± 200 lbs	± 187	∓ 0.94 lb/lb
Propellant Mass	+ 1%	- 131	+ 131.00 lb/%
Propellant Mass	- 1%	+ 178	- 178.00 lb/%
Thrust and Flow Rate	+ 3%	- 436	+ 145.33 lb/%
Thrust and Flow Rate	- 3%	+ 567	- 189.00 lb/%
I_{SP} and Flow Rate	+ 3.12 sec	- 702	+ 225.00 lb/sec
I_{SP} and Flow Rate	- 3.12 sec	+ 728	- 233.33 lb/sec
LH_2 Mass	+ 1%	- 4	+ 4.00 lb/%
LH_2 Mass	- 1%	+ 105	- 105.00 lb/%
LOX Mass	+ 1%	- 68	+ 68.00 lb/%
LOX Mass	- 1%	+ 152	- 152.00 lb/%
RSS of Other Effects	-----	+ 137	Not Applicable
REQUIRED FLIGHT PERFORMANCE RESERVE (RSS OF POSITIVE PROPELLANT CONSUMED DEVIATIONS)		1,307 lbs	

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