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LAUNCH VEHICLE ERROR ANALYSIS FOR APOLLO/SATURN 501 (U)

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Prepared by Bell Telephone Laboratories, Incorporated
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I. INTRODUCTION

This study evaluates and explains the effects of launch vehicle platform and performance errors on the Apollo/Saturn 501 unmanned test mission. AS501 is the first flight test of a Saturn V launch vehicle consisting of an S-IC first stage, an S-II second stage, and an S-IVB third stage.

The mission profile for AS501 is illustrated in Figure 9. The vehicle is launched along a 72 degree azimuth into a 100 nautical mile circular earth orbit. After two revolutions, the S-IVB is reignited for a non-optimum burn into a waiting orbit with a 9000 nautical mile apogee. A variable reignition criterion is employed which attempts to hold the total S-IVB consumed fuel constant by compensating for non-nominal S-IVB burn time during boost to earth parking orbit.

The SM is ignited twice on the waiting orbit. The first burn, which is approximately 27 seconds long, is performed shortly after waiting orbit injection. The second burn, which is approximately 265 seconds long, is performed before entry to increase the velocity to that of a lunar return. In this launch vehicle study, perfect updates and no platform or performance errors were considered for the SM burns.

The effects of launch vehicle platform and performance errors were determined by simulating perturbed trajectories for ± three-sigma magnitudes of each independent error source. The following resulting three-sigma errors and fuel reserve deviations* at earth orbit injection (EOI) and waiting orbit injection (WOI) were obtained:

	EOI	WOI
Radius (ft)	1314.	5640.
Velocity magnitude (ft/sec)	2.92	41.7
Flight path angle (deg)	.0094	.057
Inclination (deg)	.0066	.027
Descending node (deg)	.0247	.141
Fuel reserve (lbs)	5173.	4350.

The three-sigma actual deviations at entry are as follows:

	Without SM Burns	With Perfect SM Burns
Velocity magnitude (ft/sec)	38.7	.06
Flight path angle (deg)	.119	.0005
Flight path azimuth (deg)	.220	.080
Latitude (deg)	.258	.058
Longitude (deg)	.468	.185

* In this report, an error is defined as desired minus actual. An actual deviation is defined as actual minus actual nominal, and an uncertainty is defined as estimate minus actual.

The three sigma spacecraft ΔV penalty due to launch vehicle errors is 52.8 ft/sec.

As a result of this analysis, the following conclusions have been reached:

1. The errors at waiting orbit injection are almost entirely due to range angle uncertainty* at S-IVB reignition and gyro drift. The range angle uncertainty is due to the propagation of errors from earth orbit injection and uncertainty in venting thrust.
2. The sensitivities of velocity error at waiting orbit injection to range angle uncertainty and gyro drift are a function of the plane change and change in flight path angle made during this burn. Since both the plane and the flight path are changed appreciably, the sensitivities are large in comparison to those for a burn made along the velocity vector.
3. The perfect SM burns effectively reduce velocity and flight path angle deviations at entry. However, for the error sources considered in this study, the actual deviations at entry due to launch vehicle errors are small, even without the SM burns.

* The range angle is defined as the central angle to the instantaneous position measured in the plane of the orbit from the inertial position at launch. In the case of range angle uncertainty only, the shape and orientation of the orbit are known.

4. The variable ignition criterion for the S-IVB stage second burn effectively compensates for non-nominal performance during the boost to earth orbit. The three-sigma fuel deviation at waiting orbit injection is due to deviations in specific impulse, weight rate, and mixture ratio during the S-IVB second burn.

This study was performed by the Control Systems Analysis Department on behalf of Bellcomm, Inc.

II. Reference Trajectory Description

The nominal closed loop trajectory used for this study is a match of the Saturn V AS-501 Launch Vehicle Trajectory.[1] To develop this nominal trajectory, an open loop trajectory was first generated which matches significant parameters on the reference (cf. Table A).

The pitch profile of the open loop trajectory consists of a 12 second vertical rise followed by an instantaneous change in pitch (kick angle) to initiate a gravity turn. The gravity turn is flown until 144.846 seconds (from launch) at which time the attitude is fixed. At 183.846 seconds, the vehicle is given a second instantaneous pitch change followed by a constant pitch rate until S-IVB cutoff.

The kick angle at 12 seconds was selected to match the reference altitude at 183.846 seconds (288,983 ft). The pitch rate and S-IVB cutoff time were chosen to satisfy the radius (21,533,354 ft), velocity (25,567.705 ft/sec), and inertial flight path angle (0.0 deg) at S-IVB cutoff. In addition, the above scheme is nested in a procedure that finds a value for the thrust chamber area of the S-IC to match the time of S-IVB cutoff (687.542 seconds). The thrust chamber area A_T for the S-IC is used in the thrust formula found in Section IV.A, "Missile Dynamics", of this report. The value selected for A_T is 75844.533 in.^{2}

The above constraints together with a launch azimuth of 72 degrees and no roll or yaw maneuvers, yield an orbital plane with an inclination of 32.557 degrees and an angle from the launch meridian to the descending node of 123.190 degrees.

The S-IVB remains in the parking orbit approximately three hours during which time the vehicle longitudinal axis is maintained along the velocity vector. Ullage and venting thrust with resulting mass losses are simulated in parking orbit. The ullage and venting thrust characteristics and time sequence were obtained from Reference 1.

The S-IVB is reignited when the vehicle's longitude matches the longitude in Reference 1 (81.4931 degrees west longitude). The time of reignition is at 11486.008 seconds compared with the reference value of 11486.034 seconds. Furthermore, the vehicle altitude and inertial velocity match the reference to within 700 ft and 3.6 ft/sec, respectively.

The S-IVB second burn uses a constant small pitch-rate attitude (measured in the launch plane from the x platform axis) with a constant yaw attitude (measured from the vehicle axis to the projection on the launch plane).

The four parameters of initial pitch angle, pitch rate, constant yaw angle, and the length of the second S-IVB burn, are selected to match the conditions of inertial velocity

(32067.974 ft/sec), inertial flight path angle (-9.1888 degrees), geodetic latitude (21.2845 degrees North), and longitude (156.7013 degrees east) at reentry (400,000 ft altitude) without SM burns. The selected parameters are 64.26 degrees for initial pitch angle, -.305 degrees/sec constant pitch rate, -20.60 degrees constant yaw angle, and 336.458 seconds burn time.

The resulting open loop reference trajectory was then processed to calculate all required guidance constants for the launch vehicle. The guidance constants of interest are listed below.

1. Parking Orbit Parameters

(a)	Geocentric radius	21,533,279.7 ft.
(b)	Inertial velocity	25,567.77 ft/sec
(c)	Inertial flight path angle	0.0 deg
(d)	Angle to descending node (from launch meridian)	123.190 deg
(e)	Inclination	32.55723 deg

2. Waiting Orbit Parameters

(a)	Energy	-292,569,740. ft^2/sec^2
(b)	Eccentricity	.57250593
(c)	Angle between target vector and perigee vector	0.0 deg
(d)	Angle to descending node (from launch meridian)	135.490 deg
(e)	Inclination	30.15168 deg

The angle between the target vector and the perigee vector above corresponds to the angle specified in "AS-501/AFRM 017 Joint Launch Vehicle Targeting Requirements", September 1, 1965, (Reference 18).

A complete closed loop simulation of the launch vehicle was then performed, using the IGM equations planned for mission AS-501.[4] The closed loop reference was generated in two modes starting at waiting orbit injection. The first is simply a match of the open loop reference without SM (Service Module) burns. The second incorporates two SM burns. The closed loop reference with SM burns uses the cross-product guidance law from Section 5.1 of Reference 14, including the revision of Reference 15. The values for eccentricity and semilatus rectum for these burns were obtained from Reference 17. The spacecraft burns are performed assuming a perfect update for each burn and no errors in the vehicle platform or in accelerometer measurements. The errors at reentry, therefore, using this reference, reflect errors that could not be eliminated by the spacecraft under ideal conditions. Table A summarizes the closed loop reference trajectory with and without SM burns.

TABLE A

Closed Loop Reference Trajectory

Event	Time From Lift-off (Sec)	Weight (lbs)	Altitude (ft)	Geodetic Latitude (deg)	Longitude (deg)	Inertial Velocity (ft/sec)	Inertial Flight Path Angle (deg)	Inertial Azimuth (deg)
SATURN V ASCENT TO ORBIT								
Liftoff	0.0	6,089,286	83.96	28.608	-80.604	1,340.67	0.0	90.00
S-IC Inboard Engine Cut-off	144.846	1,890,087	181,765.22	28.804	-79.911	8,326.17	20.823	75.469
S-IC Outboard Engine Cut-off	148.846	1,797,318	193,788.79	28.825	-79.832	8,767.12	20.306	75.356
S-II Engine Ignition	152.156	1,410,795	203,722.93	28.844	-79.764	8,731.00	19.736	75.396
S-IC Interstage Jettison	178.846	1,330,752	276,230.00	28.999	-79.196	9,161.53	15.728	75.529
LES Jettison	183.846	1,309,194	288,474.43	29.029	-79.084	9,254.67	15.035	75.558
S-II Engine Cut-off	511.526	459,835	611,442.87	31.627	-66.219	22,067.25	0.930	81.255
S-IVB Engine Ignition	515.286	355,738	612,771.63	31.661	-65.979	22,065.45	0.854	81.389
S-IVB Engine Cut-off	687.957	274,671	627,994.63	32.675	-53.891	25,567.78	0.000	88.122
EARTH PARKING ORBIT								
Fixed Time 1	800.000	274,585	627,920.24	32.609	-45.321	25,568.74	0.000	93.006
Fixed Time 2	11,100.000	272,836	644,804.06	31.692	-110.814	25,559.37	0.006	81.442
Start S-IVB Preignition Sequence	11,156.139	272,825	645,486.13	32.187	-106.599	25,558.96	0.005	83.800
SECOND S-IV BURN								
S-IVB Engine Ignition	11,486.113	271,954	646,512.41	31.855	-81.515	25,562.78	0.016	97.987
S-IVB Engine Cut-off	11,814.134	128,492	1,893,306.88	27.445	-57.052	30,695.23	15.411	103.439

TABLE A (cont'd)

Event	Time From Lift-off (Sec)	Weight (lbs)	Altitude (ft)	Geodetic Latitude (deg)	Longitude (deg)	Inertial Velocity (ft/sec)	Inertial Flight Path Angle (deg)	Inertial Azimuth (deg)
WAITING ORBIT WITHOUT SM BURNS								
Fixed Time 3	11,900.000	128,492	2,631,603.66	25.849	-50.727	30,056.90	17.522	106.431
Apogee	20,145.297	51,759	54,742,382.0	-28.431	39.155	8,920.74	0.000	100.614
Reentry	28,697.928	11,250	400,000.01	21.252	156.630	32,071.29	-9.192	67.950
WAITING ORBIT WITH SM BURNS								
Fixed Time 3	11,900.000	128,492	2,631,603.66	25.849	-50.727	30,056.90	17.522	106.431
First SPS Engine Ignition	12,514.134	51,735	9,302,875.38	12.775	-20.185	25,280.16	27.960	117.679
First SPS Engine Cut-off	12,541.503	49,847	9,631,908.75	12.237	-19.256	25,386.65	28.763	117.902
Apogee	20,921.553	49,847	60,083,785.5	-28.663	37.384	8,395.00	0.000	99.908
Second SPS Engine Ignition	29,663.841	49,922	5,351,623.06	3.676	117.260	28,189.20	-23.360	59.970
Second SPS Engine Cut-off	29,929.086	31,620	2,339,661.00	12.449	132.011	34,780.31	-18.189	62.221
Reentry	30,176.969	11,250	400,000.16	21.891	152.155	36,334.06	-7.05	68.560

III. Vehicle Data

Table B presents the vehicle data used to generate the closed loop reference trajectory. The weight used for each stage is illustrated in Table A and corresponds to the Saturn V AS-501 Launch Vehicle Reference Trajectory.[1]

TABLE B

Engine Performance Data

S-IC Engine Performance Data
(five engines burning)

Sea Level Thrust	7,610,000 lbs
Weight Rate	28,990.79 lbs/sec
Thrust Chamber Area	75,844.53 in^2
Drag Area	855.30 ft^2

S-IC Engine Performance Data
(four engines burning)

Sea Level Thrust	6,088,000 lbs
Weight Rate	23,192.632 lbs/sec
Thrust Chamber Area	60,675.624 in^2

S-II Engine Performance Data

5.0:1 Mixture Ratio

Vacuum Thrust	1,000,000 lbs
Weight Rate	2,358.4279 lbs/sec

5.5:1 Mixture Ratio

Vacuum Thrust	1,125,000 lbs
Weight Rate	2,671.576 lbs/sec

Table B - 2

4.7:1 Mixture Ratio	
Vacuum Thrust	925,000 lbs
Weight Rate	2,172.766 lbs/sec

S-IVB Engine Performance Data

5.0:1 Mixture Ratio	
Vacuum Thrust	200,000 lbs
Weight Rate	469.48 lbs/sec
4.5:1 Mixture Ratio	
Vacuum Thrust	175,000 lbs
Weight Rate	408.688 lbs/sec

Spacecraft Engine Performance Data

Vacuum Thrust	21,460 lbs
Weight Rate	69.0 lbs/sec

IV. Simulation Description

The simulation required for the error analysis was performed using the Bellcomm Apollo Simulation Program (BCMASP). This program is a three degree of freedom simulator which generates the trajectory by numerical integration of all significant accelerations acting on the vehicle. Since BCMASP is described elsewhere in detail,[10] only those aspects of the program that relate directly to the error analysis will be discussed in this report.

A functional diagram of the calculations performed in each guidance cycle by the simulation program is given in Figure 1. As illustrated in this diagram, the missile dynamics are simulated to obtain the actual position, velocity, and the integral of the nongravity acceleration. The accelerometer measurements are simulated by converting the integral of nongravity acceleration to platform coordinates and adding errors associated with the platform gyros and accelerometers. The accelerometer processing, navigation, and guidance equations are equivalent to those specified in the Launch Vehicle Digital Computer (LVDC) Equation Defining Document for AS-501.[4] The pertinent details of these functions will now be discussed.

A. Missile Dynamics

In simulating the missile dynamics, the accelerations due to thrust, drag, and gravity were considered.

Thrust for the S-IC stage is computed by the following equation:

$$T = T_{sl} + A_T (14.696-p)$$

where

T = thrust

T_{sl} = constant sea level thrust

A_T = thrust chamber area

p = atmospheric pressure (lbs/sq. in)

All other burns are assumed to have constant thrusts. Also, constant weight rates were assigned to all burns.

The S-IC burns at full thrust until either fuel remaining reaches 28445 lbs or oxidizer remaining reaches 64324 lbs, at which time the center engine is shut down, resulting in a 20% decrease in weight rate, T_{sl}, and A_T. Upon total depletion of either fuel or oxidizer, the remaining engines are shut down and a 3.31 second coast is initiated. The S-II is then ignited at a mixture ratio 5.0:1 and held there for 3.613 seconds at which time the propellant utilization (PU) system is released and the mixture ratio is stepped to 5.5:1. When the ratio of LOX to hydrogen reaches 4.7:1, the mixture ratio is stepped to 4.7:1 and held there until

shutdown is forced by depletion of either LOX or hydrogen. On the nominal, these occur simultaneously. Following a fixed time coast of 3.76 sec, the S-IVB is ignited at a mixture ratio of 5.0:1, which is held until parking orbit conditions have been attained. The S-IVB second burn is initiated at a mixture ratio of 4.5:1, which is changed to 5.0:1 by the PU system when the ratio of LOX to hydrogen reaches 5.0:1, and is then held constant until shutdown is executed.

Venting is simulated by applying a small thrust along the instantaneous velocity vector throughout parking orbit. The magnitude of this thrust is a function of time as tabulated in the Boeing reference trajectory.[1]

Drag force was computed using the drag coefficient curve given in Reference 1 and the Patrick Reference Atmosphere.[9] The gravitational force is computed from the standard Fisher Ellipsoid model of the Earth as defined in Reference 16.

The attitude of the vehicle is determined by integrating constant attitude rates. These rates are recomputed each guidance cycle and ordered to accomplish the required change in attitude as determined by the guidance equations. Although angular dynamics and autopilot response are not simulated, rate limiting of 1 deg/sec is applied.

Uncertainties in specific impulse, weight rate, mixture ratio, fuel loading, and inert weight were considered for each stage. Deviations in these quantities are expressed as fractions of nominal and are implemented in the following way:

$$W_p = W_{nom}(1+E_W)$$

$$F_p = F_{nom}(1+E_F)$$

$$\dot{W}_p = \dot{W}_{nom}(1+E_{\dot{W}}) + bM_{nom}E_m$$

$$T_p = (T_{nom}(1+E_{ISP}) - cM_{nom}E_m)(1+E_{\dot{W}})$$

$$ISP_p = T_p/\dot{W}_p$$

where

W	=	inert weight
$\dot{W}$	=	weight rate
F	=	fuel loaded
M	=	mixture ratio
T	=	thrust
ISP	=	specific impulse
E_x	=	deviation associated with x
nom	=	subscript denoting nominal value
p	=	subscript denoting perturbed value

$$\left.\begin{aligned} b &= \left.\frac{\partial \dot{W}}{\partial M}\right|_{M = M_{nom}} \\ c &= \left.\frac{\partial T}{\partial M}\right|_{M = M_{nom}} \end{aligned}\right\} \text{from engine performance curves}$$

In addition, the effects of perturbations in weight rate, mixture ratio, and fuel loading are reflected in the times of S-IC inboard engine cutoff and outboard engine cutoff, S-II second mixture ratio shift and cutoff, and the S-IVB mixture ratio shift. An error in fuel loading is assumed to be distributed in the same proportion as oxidizer and fuel are nominally loaded. Errors in mixture ratio are carried through an entire stage, causing the same percent error at all mixture ratio levels. During those burns for which the PU system is active and not in saturation, errors in mixture ratio are assumed to be zero.

Errors in drag coefficient, atmospheric density, ullage and venting thrust are also expressed as fractions of the nominal value. Perturbations of ullage and venting thrust are assumed to be caused by proportional variations in weight rate.

Cutoff execution uncertainties are simulated for both S-IVB shutdowns. These uncertainties are represented by an equivalent time increment at full thrust.

B. Inertial Platform Simulation

The accelerometer measurements are simulated by integrating the actual sensed acceleration due to thrust and aerodynamic forces, and adding errors associated with the platform gyros and accelerometers. The error sources considered include the following:

(1) initial platform misalignment

(2) gyro drift

(3) gyro mass unbalance

(4) gyro anisoelastic effects

(5) accelerometer misalignment

(6) accelerometer bias

(7) accelerometer scale factor error

The inertial platform alignment and the orientation of the gyro axes are illustrated in Figure 2. As shown in Figure 3, the operations performed to simulate this platform proceed by first forming the increment in velocity gained during the last guidance cycle due to thrust and aerodynamic forces. This velocity increment ($\overline{\Delta V}_a$) is expressed in the platform coordinate system which is defined by the nominal platform alignment at guidance reference release.

The effects of initial misalignment and platform drift are simulated by the A matrix. This matrix relates

the actual instantaneous platform orientation to the nominal alignment. The initial misalignment is described by three Euler angles taken about the pitch, yaw, and roll axes. The drift rate about each platform axis is given by

$$\omega_j = GD_j + U_{sj}a_{ij} + U_{ij}a_{sj} + U_{oj}a_{oj} + S_j a_{ij} a_{sj}$$

where

GD_j = the fixed gyro drift rate of the jth axis gyro

U_{sj}, U_{ij}, U_{oj} = the mass unbalance about the spin, input, and output axes of the jth axis gyro

S_j = the anisoelastic constant of the jth axis gyro, and

a_{ij}, a_{sj}, a_{oj} = the sensed acceleration along the input, spin, and output axes of the jth axis gyro.

The total drift rate is calculated and used to update the A matrix each computation cycle.

With reference to Figure 3, the B matrix simulates accelerometer misalignment. Since this matrix is not time dependent, it need only be calculated once and is given by

$$[B] = \begin{bmatrix} \cos\varepsilon_{yx}\cos\varepsilon_{xz} & -\sin\varepsilon_{xy}\cos\varepsilon_{yz} & \sin\varepsilon_{xz}\cos\varepsilon_{xy} \\ \sin\varepsilon_{yx}\cos\varepsilon_{yz} & \cos\varepsilon_{yx}\cos\varepsilon_{yz} & -\sin\varepsilon_{yz}\cos\varepsilon_{yx} \\ -\sin\varepsilon_{zx}\cos\varepsilon_{zy} & \sin\varepsilon_{zy}\cos\varepsilon_{zx} & \cos\varepsilon_{zx}\cos\varepsilon_{zy} \end{bmatrix}$$

where the epsilons are the angles by which the accelerometer axes deviate from the platform axes as illustrated in Figure 4. Accelerometer bias and scale factor error are introduced by the vector $\overline{a_b}$ and the matrix $[1 + SF]$ respectively. The scale factor matrix is of the form

$$\begin{bmatrix} (1 + SF_x) & 0 & 0 \\ 0 & (1 + SF_y) & 0 \\ 0 & 0 & (1 + SF_z) \end{bmatrix}$$

where SF_i represents the scale factor error of the accelerometer along the ith axis.

$\overline{\Delta V}_m$, the output of the platform simulation, now represents the change in the accelerometer measurements that has occurred during the last computation cycle. This quantity is used by the navigation equations, the M/F filter[8], and the mixture ratio shift sensor.

C. Navigation Equations

The onboard navigation equations consists of two sections: boost navigation and orbital navigation. The boost navigation (as specified in the LVDC Equation Defining Document[4]) is simulated during powered flight and during ullage burns. At ullage cutoff, after parking orbit insertion, the boost navigation state vector is used as the initial state for the orbital navigation equation.

The orbital navigation scheme uses a venting model where the thrust acceleration is the nominal value (derived from nominal values for venting thrust, weight rate, and weight-into-orbit). The direction of the thrust acceleration for this model is maintained along the navigation velocity vector and the equations of motion are integrated with the fourth order Runge-Kutta scheme in BCMASP.[11] The direction of the thrust acceleration for the actual vehicle is derived from this model knowing the orientation of the actual platform with respect to the inertial navigation coordinates. In addition to platform errors, deviations in weight-into-orbit and venting thrust (assumed to be a deviation in weight rate) will, in this model, cause uncertainties in the vehicle state vector.

When ullage thrust is again applied, prior to the S-IVB reignition, the orbital navigation state vector is used as the initial state for the boost navigation equations which are used until S-IVB waiting orbit insertion. The boost navigation state vector is then integrated (using fourth order Runge-Kutta and no thrust acceleration) until 86 seconds from nominal S-IVB cutoff. The two spacecraft burns are both simulated assuming a perfect navigation model.

D. Guidance Equations

Steering commands are generated in the following manner: from tower clearance to S-IC center engine cutoff, a fourth degree polynomial provides pitch commands as a function of time. The polynomial is a least-squares fit to the zero lift open loop trajectory. The attitude of the vehicle is then held constant until the launch escape system has been jettisoned. From this point until earth orbit insertion, pitch and yaw steering orders are generated by the 3-stage Iterative Guidance Mode (IGM).

The out-of-orbit burn is also guided by IGM (2-stage). This burn is intentionally non-optimum in order to deplete the S-IVB fuel supply. A variable reignition criterion corrects for dispersions in the first S-IVB burn time. The following formula redefines α_{TS}, the angle between the target vector and the intersection of the parking orbit and waiting orbit planes:

$$\alpha_{TS} = \alpha_N + K_1 \Delta t_4 + K_2 \Delta t_4^2$$

where

α_N = 147.56356 deg

K_1 = $.56338027 \times 10^{-2}$ deg/sec

K_2 = $.20939407 \times 10^{-3}$ deg/sec^2

Δt_4 = actual S-IVB burn time for earth orbit injection minus nominal burn time.

Adjusting α_{TS} causes a slight reorientation of the waiting orbit plane, and hence, the use of more or less fuel as desired.

Cross-product steering is employed during both spacecraft burns. The guidance objectives are to control the eccentricity and semilatus rectum of the orbit, and to maintain the vehicle in the present waiting orbit plane.

V. Results

The effects of platform errors[19] and performance errors[2] were determined by simulating perturbed trajectories for ± three-sigma magnitudes of each error source. The resulting variations in significant parameters at earth orbit injection, S-IVB reignition, waiting orbit injection, entry, and three fixed times are listed in Appendix C. The variations at entry are examined both with and without (perfect) SM burns. The fixed times occur after earth orbit injection (800 sec), before S-IVB reignition (11,100 sec), and after waiting orbit injection (11,900 sec). The coordinate systems and symbols used in Appendix C are defined in Appendices A and B respectively.

In addition to listing variations due to individual sources, Appendix C contains covariance matrices of these variations due to all platform and performance errors considered. These matrices list the standard deviations (one-sigma) down the main diagonal, correlation coefficients above the diagonal, and covariances below the diagonal.

The remainder of this section describes the significant results in two parts: guidance and navigation error analysis, and performance analysis.

A. Guidance and Navigation Error Analysis

The significant guidance and navigation errors at earth orbit injection, waiting orbit injection, and entry are discussed.

1. Earth Orbit Injection

The three-sigma actual deviations at earth orbit injection are as follows:

Radius	1314. ft
Velocity magnitude	2.92 ft/sec
Flight path angle	.0094 deg
Inclination	.0066 deg
Descending node	.0247 deg

Since the guidance and navigation system can sense and correct for non-nominal performance, the above deviations are caused almost entirely by uncertainties due to platform anomalies and cutoff execution error.

Table 1 in Appendix C lists the actual deviations at earth orbit injection due to the individual platform errors. The results in this table indicate that the platform errors fall into three categories: those that cause in-plane deviations (radius, velocity, and flight path angle); those that cause out-of-plane deviations (inclination and node); and those that cause no significant deviations. This behavior is explained by the orientation of the platform relative to the trajectory.

As illustrated in Figure 2, the flight to earth orbit lies nearly in the xy platform plane. The x component of thrust acceleration is dominant, and the z component is near zero. Although the y component of thrust acceleration is significant, it experiences a sign change such that the integrated effect is small. Thus, rotations about the x axis cause no significant deviations. Rotations about the y axis cause out-of-plane deviations, and rotations about the z axis cause in-plane deviations.

Platform rotations about the y and z axes are caused by initial platform misalignment (CHI1Y and CHI1Z) and platform drift. With reference to Section IV.B and Figure 2, the drift rates about these axes are given by the following:

$$\omega_y = \text{GDSVY} + (\ddot{z})\text{UISVY} + (\ddot{y})\text{USSVY} + (\ddot{x})\text{UOSVY} + (\ddot{y})(\ddot{z})\text{SSVY}$$

$$\omega_z = \text{GDSVZ} + (\ddot{x})\text{UISVZ} + (\ddot{z})\text{USSVZ} + (\ddot{y})\text{UOSVZ} + (\ddot{z})(\ddot{x})\text{SSVZ}$$

where

GDSVY and GDSVZ are the constant drift terms;

UISVY and UISVZ represent mass unbalance about the input axes;

USSVY and USSVZ represent mass unbalance about the spin axes;

UOSVY and UOSVZ represent mass unbalance about the output axis;

SSVY and SSVZ represent anisoelastic constants;

and $\ddot{x}$, $\ddot{y}$, and $\ddot{z}$ are the thrust acceleration components. Since $\ddot{z}$ is near zero, only GDSVY, USSVY, and UOSVY contribute significantly to drift about the y axis. Similarly, only GDSVZ, UISVZ, and UOSVZ contribute significantly to drift about the z axis.

Similar arguments can be made for the accelerometer errors. Bias and scale factor error in the x and y accelerometers contribute to in-plane deviations. Although bias in the z accelerometer contributes to the out-of-plane deviations, z scale factor error does not contribute significantly because of the small acceleration in this direction. If the x and y accelerometers are misaligned in the xy plane, in-plane deviations result. If the z accelerometer is misaligned, it senses accelerations in the xy plane resulting in out-of-plane deviations.

2. Waiting Orbit Injection

The three-sigma errors at waiting orbit injection are as follows:

Radius	5640. ft
Velocity magnitude	41.7 ft/sec
Flight path angle	.057 deg
Inclination	.027 deg
Node angle	.141 deg

The above errors are differences between the desired values as computed by the guidance equations and the actual values (see Table 39), and should not be confused with actual deviations (Table 40). The desired values can change due to a change in the injection point on the ellipse or because the ellipse itself has changed due to the variable ignition criterion.

Errors at waiting orbit insertion are due to uncertainties at S-IVB reignition, platform errors that affect the sensed acceleration during the burn, and cutoff execution errors. Since non-nominal performance during the burn can be sensed, it does not appreciably affect guidance accuracy.

Although uncertainties in the shape and orientation of the orbit at S-IVB reignition are small, a significant range angle uncertainty exists. The range angle uncertainty is due to deviations in the orbital period that are not sensed by the on-board navigation system. The deviations in period are caused by deviations in energy at earth orbit injection due to platform errors and uncertainties in venting thrust. As described in Section IV.C, the actual venting thrust is not sensed by the navigation system.

To illustrate the propagation of errors from earth orbit injection, consider the energy relationship.

$$E = V^2/2 - \mu/R$$

Differentiating and using the relationship that V on a circular orbit is equal to $\sqrt{\mu/R}$, we obtain

$$\frac{\delta E}{E} = -2\left[\frac{\delta V}{V} + \frac{\delta R}{R}\right] \tag{1}$$

This change in energy in turn affects the orbital period. The period is given by

$$\tau = 2\pi\sqrt{a^3/\mu}$$

where a is the semi major axis given by

$$a = -\mu/2E$$

Thus,

$$\frac{\delta\tau}{\tau} = -\frac{3}{2}\frac{\delta E}{E} \tag{2}$$

When the change in period is not sensed by the navigation system, it causes a range angle uncertainty at S-IVB reignition. The range angle φ_T(PHIT) is the central angle measured in the plane of the orbit from the inertial position at launch. At S-IVB reignition, the range angle is approximately given by

$$\varphi_T = \varphi_{TO} + 2\pi T/\tau \tag{3}$$

where φ_{TO} is the range angle at earth orbit injection and T is the flight time from earth orbit injection to S-IVB reignition.

The deviation in φ_T at S-IVB reignition is given by

$$\delta\varphi_T = \delta\varphi_{TO} - \left(\frac{2\pi T}{\tau}\right)\frac{\delta\tau}{\tau} + \left(\frac{2\pi}{\tau}\right)\delta T$$

If we consider only deviations that are not sensed, δT is equal to zero. Also, since $\delta\varphi_{TO}$ is near zero for these error sources (PHIT column in Table 1), the φ_T deviation is approximated by the following.

$$\delta\varphi_T = -\left(\frac{2\pi T}{\tau}\right)\frac{\delta\tau}{\tau} \tag{4}$$

From Eqs. 1 through 4, we obtain

$$\delta\varphi_T = -3(\varphi_T - \varphi_{TO})\left[\frac{\delta V}{V} + \frac{\delta R}{R}\right] \tag{5}$$

where φ_T is evaluated at S-IVB reignition on the nominal trajectory. For AS501,

$$\varphi_T - \varphi_{TO} = 735 \text{ deg}$$

$$V = 25{,}567 \text{ ft/sec}$$

and

$$R = 21{,}533{,}280 \text{ ft.}$$

Table C illustrates Eq. (5) by listing φ_T deviations ($\delta\hat{\varphi}_T$) at S-IVB reignition computed from radius and velocity deviations at earth orbit injection. The δV used to compute $\delta\hat{\varphi}_T$ for non-nominal venting thrust is the average velocity change attributed to this source. As illustrated, the computed values agree closely with the actual deviations ($\delta\varphi_T$) listed from Table 22.

Since the platform has been released for over 3.3 hours, the platform errors that affect the sensed acceleration during the waiting orbit injection burn are dominated by the constant gyro drift terms.

The simple model shown in Figure 8 was developed to explain the affects of gyro drift and range angle uncertainty on the velocity errors at waiting orbit injection. In this model, the burn is represented by an instantaneous ΔV applied up from the local horizontal by an angle α, and out of the initial plane by an angle γ. V_0, V, and β represent the

Table C

φ_T Errors at S-IVB Reignition

Error Source	δR^* (ft)	δV (ft/sec)	$\delta\hat{\varphi}_T$ (deg)	$\delta\varphi_T$ (deg)
CHI1Z	224.	-.60	.029	.027
GDSVZ	667.	-1.49	.060	.056
UISVZ	786.	-1.69	.065	.061
UOSVZ	525.	-1.17	.047	.044
SFSVX	-117.	-.59	.063	.061
SFSVY	-189.	.14	.007	.007
ABSVX	-101.	-.53	.056	.058
ABSVY	-233.	.30	-.002	-.003
EPSVXY	176.	.44	-.056	-.055
EPSVYX	-440.	.54	-.002	.000
EVENTR	0.	1.	-.086	-.094
RSS			.169	.169

* δR and δV are from Table 1 in Appendix C. $\delta\hat{\varphi}_T$ is computed from Eq. (5), and $\delta\varphi_T$ is from Table 22.

initial velocity, the final velocity, and the final flight path angle respectively. The initial flight path angle is assumed to be zero.

Using this model, the final velocity magnitude is given by

$$V = \left\{(V_0 + \Delta V \cos\gamma \cos\alpha)^2 + (\Delta V \cos\gamma \sin\alpha)^2 + (\Delta V \sin\gamma)^2\right\}^{1/2}$$

The deviation in velocity magnitude due to deviations in V_0, α, and γ which are not sensed by the navigation system is given by

$$\delta V = \left\{\frac{-V_0 \Delta V \cos\gamma \sin\alpha}{V}\right\}\delta\alpha + \left\{\frac{-V_0 \Delta V \sin\gamma \cos\alpha}{V}\right\}\delta\gamma + \left\{\frac{V_0 + \Delta V \cos\gamma \cos\alpha}{V}\right\}\delta V_0 \qquad (6)$$

For AS501, the following values approximate the waiting orbit injection burn:

V_0 = 25562 ft/sec

ΔV = 9095 ft/sec

α = 60.4 deg

$\gamma = 25$ deg

$\beta = 15.4$ deg

$V = 30695$ ft/sec

Substituting these values into Eq. (6) we obtain

$$\delta V \approx -108\delta\alpha - 24.8\delta\gamma + \delta V_0 \tag{7}$$

where the velocity and angle deviations are expressed in feet/second and degrees respectively.

Note from Eq. (6) that the sensitivities of δV to errors in the direction of $\overline{\Delta V}$ depend strongly upon the nominal orientation. If the ΔV could be applied along the initial velocity vector, the sensitivities would be greatly reduced. For AS501, α is large to obtain the desired velocity and flight path angle at entry. The large γ is required to perform the plane change.

Deviations in φ_T that are not sensed by the navigation system result in an error in α. In this case,

$$\delta\alpha = \delta\varphi_T. \tag{8}$$

Gyro drift can be related to deviations in α and γ by noting the platform orientation relative to the nominal ΔV vector. Since φ_T is approximately 60 degrees at waiting orbit injection

(note that α is also 60 degrees), the ΔV is applied almost directly along the x axis. The z axis is normal to the plane, and the y axis completes the right handed set as illustrated in Figure 8. Thus, y and z gyro drift cause deviations in γ and α respectively. A drift about the x axis rotates the out-of-plane ΔV component ($\Delta V \sin \gamma$) toward the initial plane resulting in a change in α given by

$$\delta\alpha = \frac{(\Delta V \sin \gamma)(GDSVX)T}{\Delta V \cos \gamma}$$

or

$$\delta\alpha = (\tan \gamma)(GDSVX)T \tag{9}$$

where GDSVX is the x gyro drift (.1 deg/hr) and T is the time from launch to waiting orbit injection (3.3 hr). Since the total rotation is small, $\delta\gamma$ can be assumed zero.

Table D illustrates the effectiveness of Eq. (7) in explaining the velocity errors at waiting orbit injection. In the case of x gyro drift, the velocity deviation was derived by assuming that Eq. (9) describes the only contribution to Eq. (7). Similarly, the y gyro drift was derived assuming that the only contribution to Eq. (7) is given by

$$\delta\gamma = (GDSVY)T$$

Table D

Velocity Errors at Waiting Orbit Injection

Error Source	$\delta\hat{V}$*	δV
GDSVX	-16.6	-15.2
GDSVY	-6.1	-6.7
GDSVZ	-34.2	-33.3
UISVZ	-8.3	-10.4
UOSVZ	-5.9	-6.5
SFSVX	-6.6	-6.9
ABSVX	-6.8	-6.7
ABSVY	.6	1.2
CHI1Z	-3.5	-3.6
EPSWXY	6.4	5.9
EVENTR	10.2	8.3
RSS	42.8	41.8

* $\delta\hat{V}$ is computed from Eq. (7), and δV is obtained from simulations as given in Table 31.

where GDSVY is the y gyro drift (.075 deg/hr). In the case of z gyro drift, Eq. (7) was evaluated as

$$\delta V = -108[(GDSVZ)(T) + \delta\varphi_T] + \delta V_0$$

where $\delta\varphi_T$ was computed from Eq. (5), and δV_0 is the deviation at S-IVB reignition due to the z gyro drift (GDSVZ = .075 deg/hr) as given in Table 22. Since earth orbit injection and S-IVB reignition occur at almost the same point on the orbit, δV_0 is nearly equal to the velocity deviation at earth orbit injection.

In the case of all other error sources, the velocity deviations were computed from the following:

$$\delta V = -108\delta\varphi_T + \delta V_0$$

In these cases, the velocity deviation is almost entirely due to the propagation of errors from earth orbit injection. It should also be noted that δV_0 is usually small as compared to the $\delta\varphi_T$ contribution.

It is concluded that the errors at waiting orbit injection are due to range angle uncertainty at S-IVB reignition and gyro drift. The range angle uncertainty is due to

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venting model uncertainties and platform errors which contribute to in-plane errors at earth orbit injection. Other sources, including cutoff execution errors, contribute negligible errors to this burn.

3. Entry

The three-sigma actual deviations at entry due to the launch vehicle platform and performance errors considered in this study are given as follows:

	Without SM Burns	With Perfect SM Burns
Velocity magnitude (ft/sec)	38.7	.06
Flight path angle (deg)	.119	.0005
Flight path azimuth (deg)	.220	.080
Latitude (deg)	.258	.058
Longitude (deg)	.468	.185

The first spacecraft burn has a three-sigma ΔV penalty (DELV1) of 52.8 ft/sec. Since, in this analysis, the first burn corrects the in-plane velocity error, the ΔV penalty for the second SM burn (DELV2) is not significant.

The velocity and flight path angle deviations at entry are effectively reduced by the perfect spacecraft burns. Other deviations are not completely removed since the SM burns do not correct position deviations or out-of-plane velocity errors at waiting orbit injection. However, even without SM burns, the deviations at entry are small.

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B. Performance Analysis

Performance uncertainties determine the fuel reserve requirements for the S-IVB. Tables 4 and 36 list fuel deviations at first and second S-IVB cutoff caused by performance perturbations. As shown by Table 36, the variable ignition criterion for the S-IVB stage second burn effectively compensates for non-nominal performance in the first two stages, and the only significant contributors to fuel deviations are those error sources affecting the S-IVB stage. The total three-sigma fuel uncertainty of 4350 lbs is due primarily to deviations in specific impulse, weight rate, inert weight, and mixture ratio in the S-IVB stage.

Figures 5 through 7 are plots of fuel penalties caused by perturbations of engine mixture ratios. The discontinuous slope exhibited in Figure 5 is due to the fact that an off nominal mixture ratio in the first stage causes early depletion of either fuel or oxidizer. The S-II and S-IVB stages do not demonstrate this characteristic since the PU system is assumed to guarantee simultaneous depletion of fuel and oxidizer. The slopes on these curves are due to the variation of specific impulse with mixture ratio.

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APPENDIX A

COORDINATE SYSTEMS

Platform Coordinates

The platform coordinate system is a geocentric inertial system defined as follows: The y axis is upward along the local vertical at launch. The x axis is orthogonal to the y axis and points down-range in the launch plane. The z axis completes the right-handed orthogonal system.

Local Vertical Coordinates

The local vertical coordinate system is a geocentric inertial system defined relative to the state vector at a specific time. The "cross-range" axis is directed opposite to the angular momentum vector; the "up" axis is defined as upward along the position vector; and the "down-range" axis is parallel to the projection of the velocity vector into a plane perpendicular to the "up" axis.

APPENDIX B

DEFINITION OF SYMBOLS

Trajectory Parameters

Symbol	Units	Definition
R	ft	position magnitude
V	ft/sec	velocity magnitude
BETA	deg	inertial flight path angle
INCL	deg	orbit inclination
NODE	deg	angle from launch meridian to descending node
PHIT	deg	central angle from inertial launch site
FUEL	lbs-m	S-IVB fuel reserve
RPX	ft	position in platform coordinates
RPY	ft	
RPZ	ft	
VPX	ft/sec	velocity in platform coordinates
VPY	ft/sec	
VPZ	ft/sec	
TIME	sec	time measured from midnight of launch date
ERNX	ft	position uncertainties, navigation minus actual, in platform coordinates
ERNY	ft	
ERNZ	ft	
EVNX	ft/sec	velocity uncertainties, navigation minus actual, in platform coordinates
EVNY	ft/sec	
EVNZ	ft/sec	

Symbol	Units	Definition
ERCR ERDR ERUP	ft ft ft	position deviations, actual minus actual nominal, in local vertical coordinates defined using the actual nominal state
EVCR EVDR EVUP	ft/sec ft/sec ft/sec	velocity deviations, actual minus actual nominal, in local vertical coordinates defined using the actual nominal state
ERNCR ERNDR ERNUP	ft ft ft	position uncertainties, navigation minus actual, in local vertical coordinates defined using the actual state
EVNCR EVNDR EVNUP	ft/sec ft/sec ft/sec	velocity uncertainties, navigation minus actual, in local vertical coordinates defined using the actual state
ER EV EBETA EINCL ENODE	ft ft/sec deg deg deg	errors, actual minus desired at waiting orbit insertion
LAT	deg	geodetic latitude
LON	deg	longitude
ALFA	deg	inertial flight path azimuth
CRMN	naut miles	cross range ground distance to landing site at reentry
DRNM	naut miles	down range ground distance to landing site at reentry
DELV1	ft/sec	delta-V at first SM burn
DELV2	ft/sec	delta-V at second SM burn

Platform Perturbations

Symbol	Units	Definition
GDSVX	deg/hr	constant gyro drift rates about X, Y, and Z axes
GDSVY	deg/hr	
GDSVZ	deg/hr	
USSVX	deg/hr/g	gyro drift due to mass unbalance about spin axis
USSVY	deg/hr/g	
USSVZ	deg/hr/g	
UISVX	deg/hr/g	gyro drift due to mass unbalance about input axis
UISVY	deg/hr/g	
UISVZ	deg/hr/g	
UOSVX	deg/hr/g	gyro drift due to mass unbalance about output axis
UOSVY	deg/hr/g	
UOSVZ	deg/hr/g	
SSVX	deg/hr/g^2	gyro drift due to anisoelastic effects
SSVY	deg/hr/g^2	
SSVZ	deg/hr/g^2	
SFSVX	-	accelerometer scale factors
SFSVY	-	
SFSVZ	-	
ABSVX	g	accelerometer bias
ABSVY	g	
ABSVZ	g	
CHI1X	deg	initial platform misalignment
CHI1Y	deg	
CHI1Z	deg	
EPSVXY	deg	accelerometer misalignment coefficients
EPSVXZ	deg	
EPSVYX	deg	
EPSVYZ	deg	
EPSVZX	deg	
EPSVZY	deg	

Performance Perturbations

Symbol	Units	Definition
EISP1	%	uncertainty in specific impulse, S-IC
EDWGT1	%	uncertainty in weight rate, S-IC
EM1	%	uncertainty in mixture ratio, S-IC
EFUEL1	%	uncertainty in fuel loading, S-IC
EWGT1	%	uncertainty in inert weight, S-IC
ECD	%	uncertainty in axial force coefficient
ERHOA	%	uncertainty in atmospheric density
EISP2	%	uncertainty in specific impulse, S-II
EDWGT2	%	uncertainty in weight rate, S-II
EM2	%	uncertainty in mixture ratio, S-II
EFUEL2	%	uncertainty in fuel loading, S-II
EWGT2	%	uncertainty in inert weight, S-II
EISP3	%	uncertainty in specific impulse, S-IVB
EDWGT3	%	uncertainty in weight rate, S-IVB

Symbol	Units	Definition
EM3	%	uncertainty in mixture ratio, S-IVB
EFUEL3	%	uncertainty in fuel loading, S-IVB
EWGT3	%	uncertainty in inert weight, S-IVB
E4OFF1	sec	uncertainty in S-IVB cutoff, parking orbit insertion
E4OFF2	sec	uncertainty in S-IVB cutoff, waiting orbit insertion
EULAGE	%	uncertainty in ullage thrust
EVENTR	%	uncertainty in venting thrust

APPENDIX C

ERROR ANALYSIS SIMULATION RESULTS

TABLE 1

ACTUAL DEVIATIØNS AT PARKING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
GDSVX	.100	5.	0.00	0.0	-0.8	-1.2	0.0	-0.0
	-.100	-5.	-0.00	-0.0	0.8	1.2	-0.0	-0.0
GDSVY	.075	-12.	-0.03	-0.1	2.4	11.3	-0.1	-0.0
	-.075	11.	0.03	0.1	-2.4	-11.3	0.1	0.0
GDSVZ	.075	667.	-1.49	5.0	0.0	0.1	-1.5	0.3
	-.075	-668.	1.49	-5.0	-0.0	-0.1	1.5	-0.4
USSVX	.100	4.	0.00	0.0	-0.8	-1.1	0.0	-0.0
	-.100	-4.	-0.00	-0.0	0.8	1.1	-0.0	0.0
USSVY	.075	-12.	-0.02	-0.1	2.3	9.2	-0.1	0.0
	-.075	11.	0.02	0.1	-2.3	-9.2	0.0	0.1
USSVZ	.100	0.	0.00	0.0	-0.0	0.	0.0	-0.0
	-.100	0.	0.00	0.	0.	0.	-0.0	-0.0
UISVX	.100	-1.	0.00	-0.0	0.	0.	-0.0	0.
	-.100	0.	0.00	0.0	-0.0	0.	0.0	-0.1
UISVY	.075	0.	0.00	0.0	0.	0.	0.0	-0.0
	-.075	0.	0.00	0.0	-0.0	-0.0	0.0	-0.0
UISVZ	.075	786.	-1.69	6.2	0.0	0.1	-1.6	0.1
	-.075	-787.	1.69	-6.2	-0.0	-0.1	1.6	-0.1
UØSVX	.060	4.	0.00	0.0	-0.7	-1.4	0.0	-0.0
	-.060	-3.	-0.00	-0.0	0.7	1.4	-0.0	-0.1
UØSVY	.060	-11.	-0.03	-0.1	2.2	10.7	-0.1	-0.0
	-.060	10.	0.03	0.1	-2.2	-10.7	0.1	-0.0
UØSVZ	.060	525.	-1.17	3.0	0.0	0.0	-1.4	0.5
	-.060	-525.	1.16	-3.0	-0.0	-0.0	1.3	-0.3
SSVX	.050	-0.	0.00	0.	-0.0	0.	0.0	-0.0
	-.050	1.	0.00	0.0	0.	0.	0.0	-0.1
SSVY	.050	0.	0.00	0.0	0.	0.	0.0	-0.0
	-.050	0.	0.00	0.0	-0.0	0.	0.0	-0.0
SSVZ	.050	0.	0.00	-0.0	-0.0	0.	0.0	-0.0
	-.050	0.	0.00	-0.0	-0.0	0.	0.0	-0.0

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		R FT	V FT/SEC	BETA E-3 DEG	INCI E-3 DEG	NODE E-3 DEG	PHIT E-3 DEG	FUEL LBS
SFSVX	.00003	-117.	-0.59	-1.4	-0.0	-0.0	-2.3	17.1
	-.00003	123.	0.59	1.4	0.0	0.0	2.3	-17.5
SFSVY	.00003	-189.	0.14	-0.7	-0.0	-0.0	-0.4	5.5
	-.00003	188.	-0.14	0.7	0.0	0.0	0.4	-5.6
SFSVZ	.00003	0.	0.00	0.	0.	0.	0.0	-0.0
	-.00003	0.	0.	-0.0	-0.0	0.	-0.0	0.0
ABSVX	.00003	-103.	-0.53	-1.2	-0.0	-0.0	-2.0	15.1
	-.00003	103.	0.53	1.2	0.0	0.0	2.0	-15.3
ABSVY	.00003	-233.	0.30	-1.4	-0.0	-0.0	-0.2	4.3
	-.00003	231.	-0.29	1.4	0.0	0.0	0.2	-4.4
ABSVZ	.00003	-4.	-0.00	-0.0	0.6	2.4	-0.0	-0.0
	-.00003	3.	0.01	0.0	-0.6	-2.4	0.0	-0.0
CHI1X	.00196	3.	0.00	0.0	-0.5	-1.0	0.0	-0.1
	-.00196	-3.	-0.00	-0.0	0.5	1.0	-0.0	-0.1
CHI1Y	.00573	-13.	-0.02	-0.1	2.5	9.0	-0.1	-0.0
	-.00573	13.	0.02	0.1	-2.5	-9.0	0.1	-0.0
CHI1Z	.00196	224.	-0.60	1.0	-0.0	0.0	-0.9	1.0
	-.00196	-223.	0.60	-1.0	0.	-0.0	0.9	-1.2
EPSVXZ	.00834	0.	0.00	0.0	-0.0	0.	0.0	-0.0
	-.00834	-0.	0.00	0.0	-0.0	0.	0.0	-0.0
EPSVXY	.00393	176.	0.44	1.6	0.0	0.0	2.1	-16.8
	-.00393	-175.	-0.44	-1.6	-0.0	-0.0	-2.1	16.7
EPSVYZ	.00834	0.	0.00	0.0	-0.0	0.	0.0	-0.0
	-.00834	0.	-0.00	-0.0	-0.0	0.	-0.0	0.0
EPSVYX	.00278	-440.	0.54	-2.5	-0.0	-0.0	-0.4	8.5
	-.00278	442.	-0.53	2.5	0.0	0.0	0.4	-8.7
EPSVZY	.00879	-14.	-0.01	-0.1	2.3	4.6	-0.0	0.0
	-.00879	13.	0.01	0.1	-2.3	-4.6	0.0	-0.1
EPSVZX	.00834	20.	0.02	0.2	-3.7	-13.0	0.1	-0.1
	-.00834	-19.	-0.02	-0.2	3.7	13.0	-0.1	-0.0
PSS		1316.	2.84	9.4	6.6	24.7	4.7	30.8

TABLE 2

ACTUAL DEVIATIØNS AT PARKING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
GDSVX	.100	1.	0.	293.	0.00	0.00	0.32	0.
	-.100	0.	-1.	-293.	-0.00	-0.00	-0.32	0.
GDSVY	.075	2.	-2.	-765.	-0.00	-0.01	-2.76	0.
	-.075	-1.	1.	765.	0.00	0.01	2.77	0.
GDSVZ	.075	-212.	842.	1.	-0.08	3.27	0.01	-0.001
	-.075	213.	-843.	-1.	0.08	-3.27	-0.01	0.001
USSVX	.100	-0.	0.	274.	0.00	0.00	0.28	0.
	-.100	-2.	1.	-274.	-0.00	-0.00	-0.28	0.
USSVY	.075	-3.	1.	-768.	-0.00	-0.00	-2.26	-0.000
	-.075	-3.	2.	768.	0.00	0.01	2.26	-0.000
USSVZ	.100	1.	-0.	-0.	0.00	-0.	0.00	0.
	-.100	-0.	0.	0.	0.00	0.00	0.00	0.
UISVX	.100	-1.	-0.	0.	0.00	-0.00	0.00	0.
	-.100	2.	-1.	0.	0.00	-0.00	0.00	0.
UISVY	.075	1.	-1.	0.	0.00	-0.00	0.00	0.
	-.075	0.	-0.	0.	0.00	-0.00	0.00	0.
UISVZ	.075	-187.	962.	1.	-0.03	3.84	0.01	-0.000
	-.075	187.	-963.	-1.	0.03	-3.84	-0.01	0.000
UØSVX	.060	0.	-0.	235.	0.00	0.00	0.34	0.
	-.060	2.	-1.	-235.	0.00	-0.00	-0.34	0.
UØSVY	.060	-1.	-1.	-707.	-0.00	-0.00	-2.63	0.
	-.060	0.	1.	707.	0.00	0.00	2.63	0.
UØSVZ	.060	-233.	694.	1.	-0.21	2.27	0.00	-0.001
	-.060	223.	-690.	-1.	0.20	-2.26	-0.00	0.000
SSVX	.050	1.	-1.	0.	0.00	-0.00	0.00	0.
	-.050	2.	-1.	-0.	0.00	-0.00	0.00	0.000
SSVY	.050	1.	-0.	0.	0.00	-0.00	0.00	0.
	-.050	1.	0.	0.	0.00	-0.00	0.00	0.
SSVZ	.050	1.	0.	0.	0.	-0.00	0.00	0.
	-.050	1.	-0.	0.	0.00	-0.00	0.00	0.

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
SFSVX	.00003	-826.	267.	-7.	-0.36	0.61	0.01	-0.037
	-.00003	841.	-268.	7.	0.36	-0.62	-0.01	0.037
SFSVY	.00003	-204.	-112.	-3.	0.06	-0.20	0.00	-0.012
	-.00003	206.	110.	3.	-0.06	0.20	-0.00	0.012
SFSVZ	.00003	1.	-0.	-0.	0.00	-0.00	0.00	0.
	-.00003	-1.	0.	0.	0.00	0.00	0.00	0.
ABSVX	.00003	-729.	239.	-6.	-0.32	0.55	0.01	-0.032
	-.00003	737.	-241.	6.	0.32	-0.56	-0.01	0.032
ABSVY	.00003	-154.	-184.	-2.	0.03	-0.63	0.00	-0.009
	-.00003	156.	182.	2.	-0.02	0.62	-0.00	0.009
ABSVZ	.00003	1.	-1.	-216.	0.00	-0.00	-0.59	0.
	-.00003	0.	0.	216.	0.00	0.00	0.59	0.
CHI1X	.00196	1.	0.	184.	0.00	0.00	0.26	0.
	-.00196	2.	-2.	-184.	-0.00	-0.00	-0.26	0.000
CHI1Y	.00573	-1.	-1.	-857.	-0.00	-0.01	-2.22	0.
	-.00573	2.	0.	856.	0.00	0.01	2.22	0.
CHI1Z	.00196	-202.	345.	0.	-0.18	1.01	0.00	-0.002
	-.00196	207.	-347.	0.	0.18	-1.01	-0.00	0.002
EPSVXZ	.00834	0.	-1.	0.	0.00	-0.00	0.00	0.
	-.00834	1.	-1.	0.	0.00	-0.00	0.00	0.
EPSVXY	.00393	792.	-186.	5.	0.31	-0.38	-0.01	0.036
	-.00393	-790.	186.	-5.	-0.31	0.38	0.01	-0.036
EPSVYZ	.00834	1.	-1.	-0.	0.00	-0.00	0.00	0.
	-.00834	-1.	0.	-0.	0.00	0.00	0.00	0.
EPSVYX	.00278	-314.	-338.	-4.	0.06	-1.11	0.00	-0.018
	-.00278	320.	336.	4.	-0.06	1.10	-0.00	0.019
EPSVZY	.00879	-2.	-1.	-826.	-0.00	-0.01	-1.15	0.
	-.00879	2.	1.	826.	0.00	0.01	1.15	0.
EPSVZX	.00834	3.	1.	1246.	0.01	0.01	3.21	0.
	-.00834	1.	-3.	-1246.	-0.00	-0.01	-3.21	0.
RSS		1491.	1602.	2223.	0.65	5.84	6.07	0.065

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TABLE 3

UNCERTAINTIES AT PARKING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
GDSVX	.100	-1.	-0.	-293.	-0.00	-0.00	-0.32
	-.100	-1.	1.	293.	0.00	0.01	0.32
GDSVY	.075	-2.	2.	765.	0.00	0.01	2.77
	-.075	1.	-1.	-765.	-0.00	-0.01	-2.77
GDSVZ	.075	204.	-838.	-1.	0.08	-3.26	-0.01
	-.075	-207.	840.	1.	-0.08	3.26	0.01
USSVX	.100	0.	0.	-274.	-0.00	-0.00	-0.28
	-.100	2.	-1.	274.	0.00	0.00	0.28
USSVY	.075	-3.	2.	768.	0.01	0.01	2.26
	-.075	-2.	1.	-768.	0.00	-0.00	-2.26
USSVZ	.100	-2.	1.	0.	-0.00	0.00	-0.00
	-.100	-0.	0.	-0.	-0.00	0.00	0.00
UISVX	.100	0.	0.	-0.	0.00	0.00	-0.00
	-.100	-3.	1.	-0.	-0.	0.00	-0.00
UISVY	.075	-2.	1.	-0.	-0.00	0.00	0.00
	-.075	-1.	1.	-0.	-0.00	0.00	-0.00
UISVZ	.075	186.	-962.	-1.	0.03	-3.84	-0.01
	-.075	-187.	963.	1.	-0.03	3.84	0.01
UØSVX	.060	-1.	1.	-235.	-0.00	-0.00	-0.34
	-.060	-3.	1.	235.	0.00	0.01	0.34
UØSVY	.060	0.	1.	707.	0.00	0.01	2.63
	-.060	-0.	-1.	-707.	-0.00	-0.00	-2.63
UØSVZ	.060	221.	-689.	-1.	0.21	-2.26	-0.00
	-.060	-223.	690.	1.	-0.20	2.26	0.00
SSVX	.050	-0.	1.	-0.	-0.	0.00	-0.00
	-.050	1.	-2.	0.	-0.00	-0.00	-0.00
SSVY	.050	-1.	1.	-0.	-0.00	0.00	-0.00
	-.050	-2.	0.	-0.	0.00	0.00	-0.00
SSVZ	.050	-1.	-0.	-0.	-0.	0.00	-0.00
	-.050	-1.	0.	-0.	-0.00	0.00	-0.00

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
SFSVX	.00003	256.	8.	0.	0.69	0.07	0.00
	-.00003	-262.	-11.	-0.	-0.69	-0.07	-0.00
SFSVY	.00003	9.	206.	0.	0.05	0.43	0.00
	-.00003	-11.	-204.	-0.	-0.05	-0.43	-0.00
SFSVZ	.00003	-1.	0.	0.	-0.00	0.00	-0.00
	-.00003	1.	-0.	-0.	0.00	0.00	0.00
ABSVX	.00003	218.	7.	-0.	0.61	0.06	0.00
	-.00003	-221.	-8.	-0.	-0.61	-0.06	-0.00
ABSVY	.00003	5.	256.	0.	0.06	0.81	0.00
	-.00003	-6.	-254.	-0.	-0.06	-0.80	-0.00
ABSVZ	.00003	-1.	1.	216.	0.00	0.00	0.59
	-.00003	-0.	-0.	-216.	-0.00	-0.00	-0.59
CHI1X	.00196	-3.	1.	-184.	0.00	0.00	-0.26
	-.00196	2.	-0.	184.	-0.00	0.00	0.26
CHI1Y	.00573	0.	2.	856.	0.00	0.01	2.22
	-.00573	-3.	-0.	-856.	-0.00	-0.00	-2.22
CHI1Z	.00196	174.	-332.	-0.	0.19	-0.97	-0.00
	-.00196	-178.	333.	0.	-0.19	0.98	0.00
EPSVXZ	.00834	-1.	1.	-0.	-0.00	0.00	0.00
	-.00834	-1.	1.	-0.	-0.00	0.00	0.00
EPSVXY	.00393	-376.	-14.	-0.	-0.55	-0.11	-0.00
	-.00393	374.	15.	0.	0.55	0.11	0.00
EPSVYZ	.00834	-1.	1.	0.	-0.00	0.00	0.00
	-.00834	1.	-0.	0.	-0.00	-0.00	-0.00
EPSVYX	.00278	12.	483.	1.	0.11	1.47	0.00
	-.00278	-14.	-484.	-1.	-0.12	-1.47	-0.00
EPSVZY	.00879	3.	1.	826.	0.00	0.01	1.15
	-.00879	-3.	-0.	-826.	-0.00	-0.01	-1.15
EPSVZX	.00834	-4.	-1.	-1247.	-0.00	-0.01	-3.23
	-.00834	-1.	3.	1247.	0.00	0.01	3.23
RSS		647.	1600.	2223.	1.13	5.87	6.08

TABLE 4

ACTUAL DEVIATIØNS AT PARKING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
EISP1	0.419	0.	0.	0.0	0.	-0.0	-126.6	1535.8
	-0.419	-1.	0.00	0.0	0.0	0.0	137.9	-1555.2
EDWGT1	0.716	-18.	0.02	-0.0	0.	0.0	-83.7	529.5
	-0.716	-6.	0.01	0.0	0.0	0.1	96.5	-446.1
EM1	0.895	2.	-0.00	0.0	0.0	0.0	183.6	-2145.1
	-0.895	-6.	0.01	-0.0	0.0	0.1	235.1	-3301.3
EFUEL1	0.5	-25.	0.02	-0.1	0.	0.0	-28.1	634.6
	-0.5	-13.	0.01	-0.0	0.0	0.1	39.6	-721.0
EWGT1	2.846	1.	-0.00	0.0	0.0	0.1	109.8	-1259.8
	-2.846	1.	0.00	0.0	0.0	0.1	-110.3	1261.0
ECD	10.0	-1.	-0.00	0.0	0.0	0.0	53.0	-594.0
	-10.0	2.	-0.00	0.0	0.0	0.1	-52.5	588.2
ERHØA	10.0	4.	0.00	0.0	0.0	0.1	43.6	-485.4
	-10.0	-2.	0.00	0.0	0.0	0.1	-44.2	491.5
EISP2	0.427	0.	0.00	0.0	0.	-0.0	-158.6	1540.0
	-0.427	2.	-0.00	0.0	0.0	0.0	157.4	-1538.2
EDWGT2	1.34	-1.	0.00	0.0	0.0	0.1	-246.4	755.4
	-1.34	9.	0.00	0.0	0.0	-0.0	270.2	-934.2
EM2	0.895	-1.	0.00	-0.0	0.0	0.1	24.2	500.6
	-0.895	8.	-0.00	0.0	0.0	0.0	-15.8	-681.1
EFUEL2	0.5	-4.	0.00	-0.0	0.	0.0	31.5	199.5
	-0.5	2.	-0.00	0.0	0.0	0.1	-28.2	-228.1
EWGT2	2.402	2.	0.	0.0	0.0	0.0	146.6	-1434.0
	-2.402	-2.	0.00	0.0	0.0	0.1	-148.6	1444.7
EISP3	0.939	-1.	-0.00	0.0	0.0	0.1	-50.6	676.5
	-0.939	-1.	-0.00	0.0	0.0	0.0	92.1	-688.1
EDWGT3	3.0	-3.	0.00	-0.0	-0.0	0.0	-323.7	49.2
	-3.0	2.	-0.00	0.0	0.0	0.1	344.7	-56.2
EM3	2.0	-1.	-0.00	0.0	0.0	0.1	-272.8	-43.7
	-2.0	2.	-0.00	0.0	0.0	0.0	287.5	43.1

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		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NODE E-3 DEG	PHIT E-3 DEG	FUEL LBS
FFUEL3	1.0	3.	-0.00	0.0	0.0	0.1	209.7	439.1
	-1.0	1.	-0.00	0.0	0.0	0.0	-209.0	-449.0
FWGT3	1.936	2.	-0.00	0.0	0.0	0.1	217.0	-1945.1
	-1.936	-2.	-0.00	-0.0	0.0	0.1	-216.3	1934.6
F40FF1	0.03	0.	0.70	0.1	0.0	0.0	2.0	-14.1
	-0.03	0.	-0.70	-0.1	-0.0	-0.0	-2.0	14.1
F40FF2	0.03	0.	0.	0.	0.	0.	0.	0.
	-0.03	0.	0.	0.	0.	0.	0.	0.
FULAGE	5.0	0.	0.	0.	0.	0.	0.	0.
	-5.0	0.	0.	0.	0.	0.	0.	0.
FVENTR	20.0	0.	0.	0.	0.	0.	0.	0.
	-20.0	0.	0.	0.	0.	0.	0.	0.
RSS		34.	.70	0.2	0.0	0.3	724.5	5172.8

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TABLE 5

ACTUAL DEVIATIONS AT PARKING ORBIT INSERTION
DUE TO PERFORMANCE ERRORS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EISP1	0.419	-45275.	22191.	-518.	26.34	54.95	0.85	-3.271
	-0.419	46661.	-22514.	521.	-26.72	-55.40	-0.86	3.312
EDWGT1	0.716	-28372.	13601.	-318.	16.17	33.65	0.51	-2.186
	-0.716	32656.	-15748.	365.	-18.68	-38.78	-0.42	2.450
EM1	0.895	62137.	-30009.	694.	-35.62	-73.77	-1.16	4.466
	-0.895	79533.	-38463.	888.	-45.64	-94.45	-1.48	5.808
EFUEL1	0.5	-9531.	4554.	-107.	5.44	11.27	0.16	-0.612
	-0.5	13406.	-6468.	150.	-7.65	-15.94	-0.26	0.798
EWGT1	2.846	37171.	-17923.	415.	-21.27	-44.13	-0.70	2.683
	-2.846	-37380.	17936.	-419.	21.39	44.39	0.67	-2.688
ECD	10.0	17933.	-8637.	200.	-10.25	-21.29	-0.34	1.265
	-10.0	-17782.	8545.	-199.	10.14	21.12	0.30	-1.253
ERHOA	10.0	14766.	-7106.	165.	-8.43	-17.53	-0.28	1.034
	-10.0	-14958.	7185.	-168.	8.53	17.76	0.26	-1.047
EISP2	0.427	-53764.	25769.	-602.	30.59	63.84	0.99	-3.280
	-0.427	53289.	-25720.	595.	-30.53	-63.27	-0.98	3.276
EDWGT2	1.34	-83544.	39963.	-936.	47.44	99.20	1.51	-6.361
	-1.34	91411.	-44225.	1020.	-52.49	-108.52	-1.68	6.875
EM2	0.895	8197.	-3946.	92.	-4.68	-9.74	-0.17	-0.772
	-0.895	-5334.	2574.	-60.	3.05	6.36	0.09	1.146
EFUEL2	0.5	10655.	-5133.	119.	-6.09	-12.66	-0.20	1.272
	-0.5	-9579.	4606.	-108.	5.47	11.38	0.15	-1.311
EWGT2	2.402	49623.	-23946.	554.	-28.42	-58.92	-0.92	3.054
	-2.402	-50348.	24134.	-564.	28.65	59.78	0.90	-3.077
EISP3	0.939	-30685.	14729.	-343.	17.48	36.44	0.54	-1.441
	-0.939	31186.	-15032.	348.	-17.84	-37.03	-0.58	1.466
EDWGT3	3.0	-109774.	52418.	-1231.	62.22	130.34	2.01	-5.131
	-3.0	116560.	-56496.	1300.	-67.06	-138.39	-2.17	5.464
EM3	2.0	-92480.	44211.	-1037.	52.48	109.81	1.68	-4.323
	-2.0	97248.	-47075.	1085.	-55.88	-115.47	-1.80	4.557

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
FFUEL3	1.0	70942.	-34280.	792.	-40.69	-84.23	-1.32	4.002
	-1.0	-70844.	33918.	-794.	40.26	84.12	1.29	-3.981
FWGT3	1.936	73435.	-35492.	820.	-42.13	-87.19	-1.37	4.143
	-1.936	-73338.	35103.	-822.	41.67	87.08	1.33	-4.121
F40FF1	0.03	691.	-333.	8.	0.26	-1.08	-0.01	0.030
	-0.03	-691.	332.	-8.	-0.26	1.08	0.01	-0.030
F40FF2	0.03	0.	0.	0.	0.	-0.	0.	0.
	-0.03	0.	0.	0.	0.	-0.	0.	0.
FULAGE	5.0	0.	0.	0.	0.	-0.	0.	0.
	-5.0	0.	0.	0.	0.	-0.	0.	0.
EVENTR	20.0	0.	0.	0.	0.	-0.	0.	0.
	-20.0	0.	0.	0.	0.	-0.	0.	0.
RSS		257532.	118478.	2737.	140.62	291.07	4.56	14.762

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TABLE 6

UNCERTAINTIES AT PARKING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
EISP1	0.419	-2.	1.	0.	0.00	0.00	0.00
	-0.419	-3.	3.	-0.	-0.00	0.00	0.00
EDWGT1	0.716	11.	16.	0.	-0.01	0.02	0.00
	-0.716	-0.	9.	-0.	-0.01	0.01	0.00
EM1	0.895	-5.	1.	-0.	-0.00	-0.00	0.00
	-0.895	8.	3.	-0.	-0.01	0.01	0.00
EFUEL1	0.5	15.	21.	0.	-0.01	0.02	0.00
	-0.5	4.	14.	0.	-0.01	0.02	0.00
EWGT1	2.846	0.	-0.	0.	-0.00	0.00	0.00
	-2.846	-3.	2.	0.	-0.00	0.00	0.00
ECD	10.0	2.	0.	0.	-0.00	-0.00	0.00
	-10.0	2.	-2.	0.	-0.00	-0.00	0.00
ERHØA	10.0	0.	-3.	0.	-0.00	-0.00	0.00
	-10.0	-0.	4.	0.	-0.00	0.00	0.00
EISP2	0.427	-2.	1.	0.	0.00	0.00	0.00
	-0.427	-3.	-1.	-0.	0.00	-0.00	0.00
EDWGT2	1.34	5.	-1.	0.	-0.00	-0.00	0.00
	-1.34	-16.	-1.	-0.	-0.00	-0.00	-0.00
EM2	0.895	6.	-2.	-0.	-0.00	0.00	0.00
	-0.895	-13.	-1.	-0.	0.00	-0.01	0.00
EFUEL2	0.5	7.	2.	-0.	-0.00	0.00	0.00
	-0.5	-3.	1.	0.	0.00	-0.00	0.00
EWGT2	2.402	1.	-2.	-0.	-0.00	-0.00	0.00
	-2.402	-1.	4.	0.	0.00	0.01	0.00
EISP3	0.939	-1.	1.	0.	0.00	0.00	0.00
	-0.939	2.	0.	0.	-0.00	-0.00	0.00
EDWGT3	3.0	2.	2.	0.	0.00	0.00	0.00
	-3.0	0.	-2.	-0.	-0.00	-0.00	0.00
EM3	2.0	-3.	4.	-0.	0.00	0.01	0.00
	-2.0	-0.	-2.	-0.	0.00	-0.00	0.00

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
EFUEL3	1.0	-2.	-2.	-0.	-0.00	-0.00	0.00
	-1.0	-2.	1.	0.	0.00	0.00	0.00
EWGT3	1.936	1.	-1.	-0.	-0.00	-0.00	-0.00
	-1.936	3.	2.	0.	0.00	0.00	0.00
E40FF1	0.03	1.	-0.	-0.	-0.00	-0.00	0.00
	-0.03	-1.	1.	0.	0.00	0.00	0.00
E40FF2	0.03	-0.	-0.	-0.	-0.	-0.	-0.
	-0.03	-0.	-0.	-0.	-0.	-0.	-0.
EULAGE	5.0	-0.	-0.	-0.	-0.	-0.	-0.
	-5.0	-0.	-0.	-0.	-0.	-0.	-0.
EVENTR	20.0	-0.	-0.	-0.	-0.	-0.	-0.
	-20.0	-0.	-0.	-0.	-0.	-0.	-0.
RSS		30.	29.	1.	0.02	0.04	0.00

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TABLE 7

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT PARKING ORBIT INSERTION

	R	V	BETA	INCL	NODE	PHIT	FUEL
R	4.38E 02	-0.8	1.0	-0.0	-0.0	0.0	-0.0
V	-3.55E 02	9.72E-01	-0.8	-0.0	-0.0	0.0	-0.0
BETA	1.35E 00	-2.40E-03	3.14E-03	-0.0	-0.0	0.0	-0.0
INCL	-2.18E-02	-4.61E-05	-1.89E-07	2.20E-03	1.0	0.0	-0.0
NODE	-6.88E-02	-2.00E-04	-6.43E-07	1.75E-05	8.23E-03	0.0	-0.0
PHIT	1.49E-01	1.06E-03	3.22E-07	1.22E-07	2.26E-06	2.20E-01	-0.5
FUEL	-3.62E 03	-1.36E 00	-2.41E-02	-1.13E-03	-1.65E-02	-1.39E 02	1.29E 03

[redacted]

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TABLE 8

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT PARKING ORBIT INSERTION

	RPX	RPY	RPZ	VPX	VPY	VPZ	TIME
RPX	7.45E 04	-1.0	0.7	-1.0	-1.0	-0.6	1.0
RPY	-2.65E 09	3.56E 04	-0.7	1.0	1.0	0.6	-1.0
RPZ	6.22E 07	-2.97E 07	1.12E 03	-0.7	-0.7	0.1	0.7
VPX	-3.14E 06	1.50E 06	-3.52E 04	4.22E 01	1.0	0.6	-1.0
VPY	-6.59E 06	3.15E 06	-7.38E 04	3.73E 03	8.85E 01	0.6	-1.0
VPZ	-1.02E 05	4.86E 04	3.01E 02	5.77E 01	1.21E 02	2.44E 00	-0.5
TIME	3.23E 05	-1.54E 05	3.62E 03	-1.83E 02	-3.84E 02	-5.93E 00	4.44E 00

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TABLE 9

COVARIANCE MATRIX OF UNCERTAINTIES
AT PARKING ORBIT INSERTION

	ERNX	ERNY	ERNZ	EVNX	EVNY	EVNZ
ERNX	2.14E 02	-0.5	0.0	0.9	-0.5	0.0
ERNY	-6.02E 04	5.33E 02	0.0	-0.1	1.0	0.0
ERNZ	4.97E 02	9.77E 02	7.41E 02	0.0	0.0	1.0
EVNX	6.89E 01	-2.40E 01	2.09E 00	3.73E-01	-0.1	0.0
EVNY	-2.16E 02	1.03E 03	5.91E 00	-7.68E-02	1.95E 00	0.0
EVNZ	4.45E-01	4.02E 00	1.44E 03	5.78E-03	2.04E-02	2.03E 00

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TABLE 10

ACTUAL DEVIATIØNS AT FIXED TIME NØ. 1
DUE TØ PLATFØRM ERRØRS

		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
GDSVX	.100	326.	1.	6.	0.27	0.00	0.01
	-.100	-326.	-4.	-6.	-0.27	-0.00	-0.01
GDSVY	.075	-1067.	-9.	-18.	-2.62	-0.02	-0.05
	-.075	1067.	8.	18.	2.62	0.02	0.05
GDSVZ	.075	-5.	-825.	902.	-0.02	-1.77	2.92
	-.075	5.	823.	-902.	0.02	1.77	-2.92
USSVX	.100	302.	2.	5.	0.23	0.00	0.01
	-.100	-302.	-3.	-6.	-0.23	-0.00	-0.01
USSVY	.075	-1013.	-9.	-18.	-2.12	-0.02	-0.05
	-.075	1013.	7.	17.	2.12	0.01	0.04
USSVZ	.100	-0.	-1.	0.	0.00	0.00	0.00
	-.100	-0.	-1.	-0.	0.00	0.00	0.00
UISVX	.100	-0.	-0.	-1.	0.00	0.00	-0.00
	-.100	-0.	-0.	0.	0.00	0.00	0.00
UISVY	.075	-0.	-1.	0.	0.00	0.00	0.00
	-.075	-0.	-0.	-0.	0.00	0.00	0.00
UISVZ	.075	-7.	-915.	1075.	-0.02	-2.04	3.49
	-.075	7.	914.	-1076.	0.02	2.04	-3.49
UØSVX	.060	271.	1.	5.	0.30	0.00	0.01
	-.060	-272.	-3.	-4.	-0.30	-0.00	-0.01
UØSVY	.060	-994.	-8.	-17.	-2.49	-0.02	-0.05
	-.060	994.	8.	16.	2.49	0.02	0.05
UØSVZ	.060	-3.	-705.	663.	-0.01	-1.33	1.95
	-.060	3.	703.	-664.	0.01	1.32	-1.95
SSVX	.050	-0.	0.	-1.	0.00	0.00	-0.00
	-.050	-0.	-1.	1.	0.00	0.00	0.00
SSVY	.050	-0.	-1.	0.	0.00	0.00	0.00
	-.050	-0.	-1.	0.	0.00	0.00	0.00
SSVZ	.050	-0.	-0.	0.	0.00	0.00	-0.00
	-.050	-0.	-0.	0.	0.00	0.00	0.00

[redacted]

		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
SFSVX	.00003	5.	33.	-197.	0.01	-0.49	-0.84
	-.00003	-5.	-36.	203.	-0.01	0.50	0.85
SFSVY	.00003	2.	212.	-224.	0.00	0.18	-0.56
	-.00003	-2.	-211.	223.	-0.00	-0.18	0.56
SFSVZ	.00003	-0.	-0.	-0.	0.00	0.00	0.00
	-.00003	-0.	-0.	-0.	0.00	0.	-0.00
ABSVX	.00003	4.	27.	-170.	0.01	-0.44	-0.72
	-.00003	-4.	-28.	172.	-0.01	0.45	0.73
ABSVY	.00003	2.	249.	-300.	0.01	0.38	-0.87
	-.00003	-3.	-248.	298.	-0.01	-0.37	0.87
ABSVZ	.00003	-279.	-3.	-5.	-0.55	-0.00	-0.01
	-.00003	279.	2.	5.	0.55	0.00	0.01
CHI1X	.00196	211.	-1.	4.	0.22	0.00	0.01
	-.00196	-211.	-3.	-4.	-0.22	-0.00	-0.00
CHI1Y	.00573	-1096.	-9.	-19.	-2.06	-0.01	-0.05
	-.00573	1096.	8.	19.	2.06	0.02	0.05
CHI1Z	.00196	-0.	-381.	265.	-0.00	-0.65	0.76
	-.00196	-0.	376.	-265.	0.00	0.65	-0.75
EPSVXZ	.00834	-0.	-0.	-0.	-0.00	0.00	0.00
	-.00834	-0.	-0.	-0.	0.00	0.00	0.00
EPSVXY	.00393	-7.	-106.	266.	-0.01	0.34	1.00
	-.00393	7.	105.	-265.	0.01	-0.34	-1.00
EPSVYZ	.00834	-0.	-0.	-0.	0.00	0.00	0.00
	-.00834	-0.	-0.	-0.	0.00	-0.00	-0.00
EPSVYX	.00278	5.	466.	-563.	0.01	0.68	-1.60
	-.00278	-5.	-467.	564.	-0.01	-0.68	1.61
EPSVZY	.00879	-948.	-7.	-18.	-1.01	-0.01	-0.03
	-.00879	947.	6.	18.	1.01	0.01	0.03
EPSVZX	.00834	1594.	11.	29.	2.98	0.02	0.07
	-.00834	-1593.	-12.	-28.	-2.98	-0.02	-0.07
RSS		2861.	1581.	1756.	5.68	3.27	5.57

[redacted]

TABLE II

UNCERTAINTIES AT FIXED TIME NØ. 1
DUE TØ PLATFØRM ERRØRS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
GDSVX	.100	-326.	-3.	-6.	-0.27	-0.00	-0.01
	-.100	326.	1.	6.	0.27	0.00	0.01
GDSVY	.075	1067.	6.	18.	2.62	0.02	0.05
	-.075	-1067.	-8.	-18.	-2.62	-0.02	-0.05
GDSVZ	.075	5.	834.	-902.	0.02	1.77	-2.93
	-.075	-5.	-838.	903.	-0.02	-1.77	2.93
GSSVX	.100	-302.	-2.	-5.	-0.23	-0.00	-0.01
	-.100	302.	5.	6.	0.23	0.00	0.01
GSSVY	.075	1013.	5.	18.	2.12	0.02	0.05
	-.075	-1013.	-10.	-16.	-2.12	-0.01	-0.04
GSSVZ	.100	0.	-2.	0.	-0.00	-0.00	0.00
	-.100	-0.	-0.	0.	-0.00	-0.00	0.00
GISVX	.100	-0.	0.	0.	0.00	-0.00	0.00
	-.100	0.	-3.	-0.	-0.00	-0.00	0.00
GISVY	.075	0.	-2.	0.	-0.00	-0.00	0.00
	-.075	0.	-1.	0.	-0.00	-0.00	0.00
GISVZ	.075	7.	917.	-1075.	0.02	2.04	-3.49
	-.075	-7.	-920.	1076.	-0.02	-2.04	3.49
GØSVX	.060	-271.	-3.	-5.	-0.30	-0.00	-0.01
	-.060	272.	-1.	4.	0.30	0.00	0.01
GØSVY	.060	994.	8.	17.	2.49	0.02	0.05
	-.060	-994.	-8.	-17.	-2.49	-0.02	-0.05
GØSVZ	.060	3.	718.	-663.	0.01	1.33	-1.96
	-.060	-3.	-720.	664.	-0.01	-1.32	1.97
SSVX	.050	0.	-1.	1.	-0.00	-0.00	0.00
	-.050	-0.	2.	-1.	0.00	-0.00	-0.00
SSVY	.050	0.	-1.	-0.	0.00	-0.00	0.00
	-.050	0.	-2.	-0.	-0.00	-0.00	0.00
SSVZ	.050	0.	-0.	-0.	0.00	-0.00	0.00
	-.050	0.	-1.	-0.	-0.00	-0.00	0.00

[redacted]

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
SFSVX	.00003	-5.	266.	199.	-0.01	0.49	0.48
	-.00003	5.	-272.	-203.	0.01	-0.50	-0.48
SFSVY	.00003	-2.	-127.	225.	-0.00	-0.18	0.46
	-.00003	2.	124.	-223.	0.00	0.18	-0.45
SFSVZ	.00003	0.	-1.	0.	-0.00	-0.00	0.00
	-.00003	0.	1.	0.	-0.00	0.00	0.00
ABSVX	.00003	-4.	232.	173.	-0.01	0.48	0.45
	-.00003	4.	-238.	-175.	0.01	-0.49	-0.45
ABSVY	.00003	-2.	-182.	304.	-0.01	-0.40	0.83
	-.00003	3.	178.	-302.	0.01	0.40	-0.83
ABSVZ	.00003	284.	1.	5.	0.60	0.00	0.01
	-.00003	-284.	-2.	-5.	-0.60	-0.00	-0.01
CHI1X	.00196	-211.	-5.	-4.	-0.22	-0.00	-0.00
	-.00196	211.	3.	4.	0.22	0.00	0.00
CHI1Y	.00573	1096.	8.	19.	2.06	0.01	0.05
	-.00573	-1096.	-11.	-19.	-2.06	-0.02	-0.04
CHI1Z	.00196	0.	403.	-265.	0.00	0.65	-0.79
	-.00196	0.	-408.	265.	-0.00	-0.65	0.79
EPSVXZ	.00834	0.	-1.	0.	-0.00	-0.00	0.00
	-.00834	-0.	-2.	0.	-0.00	-0.00	0.00
EPSVXY	.00393	7.	-348.	-266.	0.01	-0.34	-0.46
	-.00393	-6.	345.	266.	-0.01	0.34	0.46
EPSVYZ	.00834	-0.	-1.	0.	0.00	-0.00	0.00
	-.00834	-0.	1.	0.	-0.00	-0.00	-0.00
EPSVYX	.00278	-4.	-334.	563.	-0.01	-0.68	1.45
	-.00278	5.	330.	-563.	0.01	0.68	-1.45
EPSVZY	.00879	947.	10.	18.	1.00	0.01	0.03
	-.00879	-947.	-10.	-17.	-1.01	-0.01	-0.03
EPSVZX	.00834	-1596.	-16.	-29.	-3.00	-0.02	-0.06
	-.00834	1595.	11.	28.	3.00	0.02	0.07
RSS		2862.	1627.	1758.	5.69	3.28	5.38

[redacted]

TABLE 12

ACTUAL DEVIATIØNS AT FIXED TIME NØ. 1
DUE TØ PERFØRMANCE ERRØRS

		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
EISP1	0.479	10.	32312.	-24.	0.14	-0.03	-38.37
	-0.479	-10.	-32884.	-26.	-0.14	-0.02	39.06
EDWGT1	0.716	5.	24438.	-33.	0.08	-0.00	-29.03
	-0.716	-9.	-25372.	-23.	-0.12	-0.01	31.22
EM1	0.895	-14.	-45193.	-44.	-0.20	-0.05	53.68
	-0.895	-18.	-60153.	-89.	-0.26	-0.09	71.45
EFUEL1	0.5	1.	5078.	-29.	0.01	0.02	-6.06
	-0.5	-5.	-5502.	-13.	-0.05	0.01	6.54
EWGT1	2.846	-9.	-27338.	-16.	-0.13	-0.02	32.47
	-2.846	5.	27262.	-16.	0.09	-0.02	-32.37
ECD	10.0	-5.	-12445.	-4.	-0.06	-0.00	14.78
	-10.0	1.	12301.	-1.	0.03	-0.01	-14.61
ERHØA	10.0	-5.	-10046.	2.	-0.06	0.00	11.94
	-10.0	1.	10172.	-4.	0.02	-0.00	-12.08
EISP2	0.427	12.	24244.	-15.	0.14	-0.02	-28.80
	-0.427	-11.	-24593.	-10.	-0.14	-0.02	29.22
EDWGT2	1.24	15.	70029.	-120.	0.25	-0.12	-83.21
	-1.24	-18.	-74238.	-112.	-0.29	-0.17	88.24
EM2	0.895	-3.	28849.	-23.	0.02	-0.01	-34.29
	-0.895	-1.	-35239.	-16.	-0.06	-0.05	41.90
EFUEL2	0.5	-3.	-23252.	-16.	-0.06	-0.01	27.42
	-0.5	-1.	22894.	-11.	0.03	-0.01	-27.19
EWGT2	2.402	-11.	-22992.	-10.	-0.13	-0.01	27.32
	-2.402	8.	22840.	-16.	0.10	-0.02	-27.13
EISP3	0.939	3.	2803.	-1.	0.03	-0.00	-3.33
	-0.939	-7.	-2854.	0.	-0.07	0.00	3.40
EDWGT3	3.0	23.	9539.	-6.	0.21	-0.00	-11.35
	-3.0	-27.	-10174.	2.	-0.25	-0.00	12.11
EM3	2.0	17.	8017.	-4.	0.16	-0.00	-9.54
	-2.0	-21.	-8468.	2.	-0.20	-0.00	10.08

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		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
EFUEL2	1.0	-17.	-23535.	-8.	-0.19	-0.02	27.97
	-1.0	13.	23233.	-13.	0.16	-0.01	-27.60
EWGT2	1.936	-17.	-24367.	-11.	-0.19	-0.02	28.96
	-1.936	14.	24048.	-17.	0.16	-0.01	-28.58
E40FF1	.03	-1.	77.	16.	-0.00	0.68	0.14
	-.03	0.	-77.	-16.	0.00	-0.68	-0.14
E40FF2	.03	-0.	0.	0.	0.	0.	-0.
	-.03	-0.	0.	0.	0.	0.	-0.
EULAGE	5.0	-0.	4.	1.	-0.00	0.04	0.01
	-5.0	-0.	-4.	-1.	0.00	-0.04	-0.01
EVENTR	20.0	-0.	0.	0.	-0.00	0.01	0.00
	-20.0	-0.	-1.	0.	0.00	-0.01	-0.00
RSS		55.	127294.	166.	0.66	0.72	151.19

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TABLE 13

UNCERTAINTIES AT FIXED TIME NØ. 1
DUE TØ PERFØRMANCE ERRØRS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
EISP1	0.419	0.	-4.	0.	0.00	0.00	-0.00
	-0.419	-0.	-5.	1.	0.00	-0.00	0.00
EDWGT1	0.716	-0.	-2.	21.	0.00	-0.02	0.02
	-0.716	-0.	-6.	8.	0.00	-0.01	0.00
EM1	0.895	C.	-6.	-1.	-0.00	0.00	-C.CC
	-0.895	-0.	3.	10.	0.00	-0.02	C.C1
EFUEL1	0.5	-0.	-3.	30.	0.00	-0.02	0.03
	-0.5	-0.	-6.	15.	0.00	-0.01	0.01
EWGT1	2.846	0.	-1.	2.	0.00	-0.00	0.00
	-2.846	0.	-4.	-1.	0.00	-0.00	-0.00
ECD	10.0	0.	0.	2.	0.00	0.00	-0.01
	-10.0	0.	2.	-1.	0.00	0.00	-0.00
ERHØA	10.0	0.	1.	-3.	0.00	-0.00	-0.01
	-10.0	-0.	-3.	3.	0.00	-0.00	0.00
EISP2	0.427	-0.	-4.	-1.	0.00	-0.00	0.00
	-0.427	0.	-3.	-1.	0.00	0.00	-0.00
EDWGT2	1.34	-0.	5.	1.	0.00	-0.00	-0.01
	-1.34	-0.	-14.	-9.	0.00	-0.00	-0.00
EM2	0.895	-0.	5.	1.	C.CC	-0.00	-C.CC
	-0.895	C.	-11.	-8.	0.CC	0.0C	-C.C1
EFUEL2	0.5	-0.	2.	6.	0.00	-0.00	-0.00
	-0.5	0.	-3.	-1.	0.00	0.00	-0.00
EWGT2	2.402	-0.	2.	-1.	0.00	-0.00	-0.01
	-2.402	0.	-3.	4.	0.00	-0.00	0.00
EISP3	0.939	0.	-1.	0.	0.00	-0.00	0.00
	-0.939	-0.	0.	3.	0.00	-0.00	-0.C0
EDWGT3	3.0	-0.	-1.	2.	0.00	-0.00	0.00
	-3.0	-0.	0.	0.	0.00	-0.00	-0.00
EM3	2.C	-C.	-5.	1.	0.C0	-0.00	C.C1
	-2.0	C.	C.	-0.	-0.C0	0.00	-C.CC

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
EFUEL3	1.0	-0.	-2.	-1.	0.00	-0.00	0.00
	-1.0	0.	-3.	-0.	0.00	-0.00	0.00
EWGT3	1.936	-0.	-0.	1.	0.00	-0.00	-0.00
	-1.936	-0.	1.	3.	0.00	-0.00	0.00
E40FF1	.03	-0.	0.	1.	0.00	-0.00	-0.00
	-.03	0.	-1.	-0.	0.00	0.00	0.00
E40FF2	.03	-0.	0.	-0.	-0.	-0.	-0.
	-.03	-0.	0.	-0.	-0.	-0.	-0.
EULAGE	5.0	0.	0.	-0.	0.00	0.00	-0.00
	-5.0	-0.	1.	-0.	0.00	0.00	0.00
EVENTR	20.0	0.	-0.	-0.	0.00	-0.01	-0.00
	-20.0	-0.	0.	-0.	0.00	0.01	0.00
RSS		1.	25.	41.	0.00	0.04	0.05

TABLE 14

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT FIXED TIME NO. 1

	ERCR	ERDR	ERUP	EVCR	EVDR	EVUP
ERCR	9.54E 02	0.0	0.0	1.0	0.0	-0.0
ERDR	4.72E 05	3.74E 04	-0.1	0.1	-0.0	-1.0
ERUP	1.34E 04	-1.28E 06	5.86E 02	0.0	-0.9	0.1
EVCR	1.76E 03	6.30E 03	2.04E 01	1.90E 00	0.0	-0.1
EVDR	1.57E 01	-2.40E 02	-5.65E 02	3.51E-02	1.11E 00	-0.0
EVUP	-5.19E 02	-1.66E 06	2.24E 03	-7.41E 00	-8.05E-01	4.45E 01

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TABLE 15

COVARIANCE MATRIX OF UNCERTAINTIES
AT FIXED TIME NO. 1

	ERNCR	ERNDR	ERNUP	EVNCR	EVNDR	EVNUP
ERNCR	9.54E 02	0.0	0.0	1.0	0.0	0.0
ERNDR	8.51E 03	5.40E 02	-0.8	0.0	1.0	-0.9
ERNUP	1.37E 04	-2.67E 05	5.85E 02	0.0	-0.9	1.0
EVNCR	1.76E 03	1.86E 01	2.37E 01	1.90E 00	0.0	0.0
EVNDR	1.59E 01	5.83E 02	-5.68E 02	3.79E-02	1.09E 00	-0.9
EVNUP	3.22E 01	-8.52E 02	1.04E 03	5.68E-02	-1.80E 00	1.79E 00

[redacted]

[redacted]

TABLE 16

ACTUAL DEVIATIONS AT FIXED TIME NO. 2
DUE TO PLATFORM ERRORS

		ERCR FT	ERDR FT	ERDP FT	EVCR FT/SEC	EVDR FT/SEC	EVDP FT/SEC
GDSVX	.100	252.	-242.	2.	0.37	0.01	0.30
	-.100	-253.	224.	-3.	-0.37	-0.00	-0.27
GDSVY	.075	-325.	1163.	-4.	-2.90	-0.03	-1.42
	-.075	325.	-1191.	3.	2.90	0.04	1.45
GDSVZ	.075	-5.	21843.	225.	0.04	-0.99	-23.25
	-.075	5.	-21883.	-245.	-0.04	0.97	23.30
GSSVX	.100	227.	-212.	2.	0.33	0.00	0.26
	-.100	-227.	264.	-3.	-0.33	-0.01	-0.32
GSSVY	.075	-403.	1143.	-4.	-2.39	-0.03	-1.39
	-.075	403.	-959.	4.	2.39	0.03	1.17
GSSVZ	.100	-0.	-25.	-1.	0.00	0.00	0.03
	-.100	-0.	-1.	-1.	0.00	0.00	0.00
GISVX	.100	-0.	-0.	-1.	0.00	0.00	-0.00
	-.100	-0.	-67.	0.	-0.00	0.00	0.08
GISVY	.075	-0.	-32.	-1.	-0.	0.00	0.04
	-.075	-0.	-19.	-1.	0.00	0.00	0.02
GISVZ	.075	-6.	23928.	248.	0.04	-1.08	-25.18
	-.075	0.	-23954.	-270.	-0.04	1.06	25.21
GOSVX	.060	178.	-212.	1.	0.39	0.01	0.26
	-.060	-178.	155.	-2.	-0.39	-0.00	-0.19
GOSVY	.060	-287.	1148.	-3.	-2.74	-0.03	-1.40
	-.060	286.	-1156.	3.	2.74	0.03	1.41
GOSVZ	.060	-4.	17172.	251.	0.04	-0.86	-18.69
	-.060	4.	-16860.	-263.	-0.03	0.84	18.32
SSVX	.050	-0.	-21.	-1.	0.00	0.00	0.03
	-.050	-0.	-89.	1.	-0.00	0.00	0.11
SSVY	.050	-0.	-31.	0.	0.00	0.00	0.04
	-.050	-0.	-38.	0.	0.00	0.00	0.05
SSVZ	.050	-0.	-15.	0.	0.00	0.00	0.02
	-.050	-0.	-29.	0.	0.00	0.00	0.03

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		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
SFSVX	.00003	-3.	23331.	-45.	0.07	-0.71	-28.01
	-.00003	3.	-23709.	23.	-0.07	0.68	28.46
SFSVY	.00003	0.	2767.	-134.	0.01	0.07	-3.60
	-.00003	-1.	-2851.	131.	-0.01	-0.07	3.70
SFSVZ	.00003	-0.	-22.	-0.	0.00	0.00	0.03
	-.00003	-0.	18.	-1.	0.00	0.	-0.02
ABSVX	.00003	-3.	20677.	-38.	0.07	-0.63	-24.81
	-.00003	3.	-20894.	18.	-0.07	0.61	25.07
ABSVY	.00003	1.	-524.	-118.	0.00	0.16	-0.05
	-.00003	-1.	424.	116.	-0.00	-0.15	0.17
ABSVZ	.00003	-121.	263.	-2.	-0.62	-0.01	-0.32
	-.00003	121.	-296.	1.	0.62	0.01	0.36
CHI1X	.00196	141.	-153.	2.	0.29	0.00	0.19
	-.00196	-142.	133.	-2.	-0.29	-0.00	-0.16
CHI1Y	.00573	-497.	1084.	-6.	-2.37	-0.03	-1.32
	-.00573	497.	-1137.	6.	2.37	0.03	1.39
CHI1Z	.00196	-2.	10410.	127.	0.03	-0.49	-11.73
	-.00196	2.	-10469.	-132.	-0.03	0.49	11.82
EPSVXZ	.00834	-0.	-23.	-1.	0.00	0.00	0.03
	-.00834	-0.	-41.	-1.	0.00	0.00	0.05
EPSVXY	.00393	1.	-20982.	57.	-0.07	0.56	25.38
	-.00393	-1.	20920.	-79.	0.07	-0.59	-25.30
EPSVYZ	.00834	-0.	-28.	-1.	-0.00	0.00	0.03
	-.00834	-0.	16.	-1.	0.00	0.	-0.02
EPSVYX	.00278	2.	-192.	-233.	0.01	0.29	-0.99
	-.00278	-2.	5.	233.	-0.01	-0.28	1.21
EPSVZY	.00879	-633.	778.	-8.	-1.32	-0.02	-0.95
	-.00879	632.	-762.	7.	1.32	0.02	0.93
EPSVZX	.00834	725.	-1665.	8.	3.43	0.05	2.03
	-.00834	-726.	1578.	-9.	-3.43	-0.04	-1.92
RSS		1305.	53981.	561.	6.45	2.12	61.47

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TABLE 17

UNCERTAINTIES AT FIXED TIME NØ. 2
DUE TØ PLATFØRM ERRØRS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
GDSVX	.100	-252.	237.	-3.	-0.37	-0.01	-0.29
	-.100	253.	-215.	3.	0.37	0.00	0.26
GDSVY	.075	326.	-1185.	4.	2.90	0.03	1.45
	-.075	-326.	1220.	-3.	-2.90	-0.04	-1.49
GDSVZ	.075	5.	-21796.	-241.	-0.04	0.97	23.20
	-.075	-5.	21846.	215.	0.04	-1.00	-23.26
USSVX	.100	-227.	194.	-2.	-0.33	-0.00	-0.24
	-.100	228.	-258.	2.	0.33	0.01	0.31
USSVY	.075	404.	-1163.	5.	2.39	0.03	1.42
	-.075	-404.	942.	-4.	-2.39	-0.03	-1.15
USSVZ	.100	0.	27.	0.	-0.00	-0.00	-0.03
	-.100	0.	5.	1.	-0.00	-0.00	-0.01
UISVX	.100	0.	-10.	0.	-0.00	0.00	0.01
	-.100	0.	50.	-0.	-0.00	-0.00	-0.06
UISVY	.075	0.	56.	0.	0.00	-0.00	-0.07
	-.075	-0.	20.	1.	-0.00	-0.00	-0.02
UISVZ	.075	0.	-23915.	-266.	-0.04	1.07	25.17
	-.075	-0.	23936.	235.	0.04	-1.09	-25.19
UØSVX	.060	-178.	209.	-2.	-0.39	-0.01	-0.26
	-.060	178.	-161.	2.	0.39	0.00	0.20
UØSVY	.060	287.	-1160.	3.	2.74	0.03	1.41
	-.060	-287.	1145.	-3.	-2.74	-0.04	-1.39
UØSVZ	.060	4.	-17096.	-259.	-0.04	0.85	18.60
	-.060	-4.	16809.	245.	0.03	-0.86	-18.26
SSVX	.050	0.	1.	1.	-0.00	-0.00	-0.00
	-.050	0.	80.	-1.	0.00	-0.00	-0.10
SSVY	.050	0.	26.	-0.	-0.00	-0.00	-0.03
	-.050	0.	45.	-0.	-0.00	-0.00	-0.05
SSVZ	.050	-0.	10.	-0.	-0.00	-0.00	-0.02
	-.050	-0.	34.	-0.	-0.00	-0.00	-0.04

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
SFSVX	.00003	3.	-23060.	29.	-0.07	0.69	27.69
	-.00003	-3.	23490.	-56.	0.07	-0.73	-28.20
SFSVY	.00003	-0.	-2624.	134.	-0.01	-0.08	3.43
	-.00003	1.	2787.	-132.	0.01	0.07	-3.63
SFSVZ	.00003	0.	21.	0.	0.00	-0.00	-0.02
	-.00003	0.	-24.	0.	-0.00	0.00	0.03
ABSVX	.00003	3.	-21780.	23.	-0.07	0.65	26.12
	-.00003	-3.	22036.	-43.	0.07	-0.69	-26.43
ABSVY	.00003	-1.	1350.	108.	-0.00	-0.17	-0.87
	-.00003	1.	-1201.	-105.	0.00	0.16	0.70
ABSVZ	.00003	112.	-286.	2.	0.68	0.01	0.35
	-.00003	-111.	313.	-1.	-0.68	-0.01	-0.38
CHI1X	.00196	-141.	153.	-1.	-0.29	-0.00	-0.19
	-.00196	142.	-129.	2.	0.29	0.00	0.16
CHI1Y	.00573	498.	-1078.	6.	2.37	0.03	1.32
	-.00573	-497.	1101.	-6.	-2.37	-0.03	-1.34
CHI1Z	.00196	2.	-10368.	-129.	-0.03	0.49	11.68
	-.00196	-2.	10440.	124.	0.03	-0.50	-11.76
EPSVXZ	.00834	0.	23.	0.	0.00	-0.00	-0.03
	-.00834	0.	41.	0.	-0.00	-0.00	-0.05
EPSVXY	.00393	0.	20548.	-84.	0.06	-0.60	-24.86
	-.00393	1.	-20469.	67.	-0.06	0.57	24.77
EPSVYZ	.00834	0.	39.	0.	0.00	-0.00	-0.05
	-.00834	0.	3.	1.	-0.00	-0.00	-0.00
EPSVYX	.00278	-2.	382.	231.	-0.01	-0.29	0.77
	-.00278	2.	-148.	-230.	0.01	0.28	-1.05
EPSVZY	.00879	634.	-775.	8.	1.31	0.02	0.95
	-.00879	-633.	771.	-7.	-1.31	-0.02	-0.94
EPSVZX	.00834	-724.	1678.	-9.	-3.44	-0.05	-2.04
	-.00834	724.	-1589.	9.	3.44	0.04	1.94
RSS		1306.	54128.	555.	6.46	2.16	61.64

TABLE 18

ACTUAL DEVIATIØNS AT FIXED TIME NØ. 2
DUE TØ PERFØRMANCE ERRØRS

		ERCR FT	ERDP FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
EISP1	0.419	-13.	33396.	-119.	0.14	0.01	-39.41
	-0.419	14.	-34016.	67.	-0.14	-0.07	40.35
FDWGT1	0.716	-6.	25007.	-61.	0.08	0.01	-29.66
	-0.716	12.	-26860.	14.	-0.12	-0.03	31.85
FM1	0.895	20.	-46792.	81.	-0.20	-0.11	55.51
	-0.895	26.	-62520.	107.	-0.26	-0.19	74.17
FFUEL1	0.5	-1.	5792.	-61.	0.02	0.03	-6.91
	-0.5	6.	-5913.	31.	-0.05	-0.03	7.02
FWGT1	2.846	13.	-28256.	58.	-0.13	-0.05	33.52
	-2.846	-8.	27993.	-94.	0.09	0.02	-33.20
FCD	10.0	6.	-12832.	32.	-0.06	-0.02	15.22
	-10.0	-2.	12659.	-38.	0.03	0.01	-15.01
FRHØA	10.0	6.	-10598.	29.	-0.06	-0.01	12.57
	-10.0	-2.	10542.	-35.	0.02	0.01	-12.50
EISP2	0.427	-15.	25288.	-106.	0.14	0.02	-30.01
	-0.427	16.	-25686.	78.	-0.14	-0.06	30.48
FDWGT2	1.34	-20.	70454.	-140.	0.24	-0.14	-83.61
	-1.34	27.	-75073.	-93.	-0.29	-0.15	89.11
FM2	0.895	4.	29028.	-44.	0.02	-0.01	-34.47
	-0.895	0.	-35792.	9.	-0.06	-0.05	42.51
FFUEL2	0.5	4.	-23065.	-36.	-0.06	0.00	27.36
	-0.5	0.	22766.	9.	0.03	-0.02	-27.01
FWGT2	2.402	15.	-24059.	73.	-0.14	-0.05	28.55
	-2.402	-10.	23909.	-102.	0.10	0.02	-28.37
EISP3	0.939	-4.	3328.	-42.	0.03	0.02	-3.95
	-0.939	10.	-3300.	39.	-0.07	-0.02	3.92
FDWGT3	3.0	-30.	9685.	8.	0.21	-0.02	-11.50
	-3.0	37.	-10286.	-15.	-0.25	0.01	12.22
FM3	2.0	-23.	8085.	13.	0.16	-0.02	-9.60
	-2.0	29.	-8463.	-16.	-0.20	0.01	10.05

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		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
FFUEL3	1.0	23.	-23349.	-52.	-0.18	0.02	27.70
	-1.0	-18.	22948.	30.	0.15	-0.05	-27.22
FWGT3	1.936	23.	-24075.	-55.	-0.19	0.01	28.57
	-1.936	-19.	23845.	28.	0.16	-0.05	-28.29
F40FF1	.03	6.	-22446.	8.	-0.06	0.67	26.38
	-.03	-5.	22447.	-31.	0.06	-0.70	-26.38
F40FF2	.03	-0.	0.	0.	0.	0.	0.
	-.03	-0.	0.	0.	0.	0.	0.
FLLAGE	5.0	0.	-1394.	1.	-0.00	0.04	1.64
	-5.0	-0.	1395.	-2.	0.00	-0.04	-1.64
EVENTR	20.0	5.	-32848.	3609.	-0.09	-2.06	39.18
	-20.0	-5.	32817.	-3654.	0.09	2.00	-39.17
RSS		76.	135954.	3667.	0.67	2.19	161.34

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TABLE 19

UNCERTAINTIES AT FIXED TIME NØ. 2
DUE TØ PERFØRMANCE ERRØRS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
EISP1	0.419	0.	-989.	104.	-0.00	-0.06	1.17
	-0.419	-0.	1013.	-101.	0.00	0.05	-1.21
EDWGT1	0.716	-0.	-595.	52.	-0.00	-0.03	0.72
	-0.716	-0.	367.	-34.	0.00	0.01	-0.44
EM1	0.895	-0.	1309.	-142.	0.00	0.08	-1.57
	-0.895	-1.	2143.	-216.	0.01	0.11	-2.54
EFUEL1	0.5	-0.	-723.	65.	-0.00	-0.04	0.89
	-0.5	-0.	243.	-34.	0.00	0.02	-0.28
EWGT1	2.846	-0.	747.	-82.	0.00	0.04	-0.89
	-2.846	-0.	-652.	85.	-0.00	-0.05	0.77
ECD	10.0	0.	229.	-35.	0.00	0.02	-0.28
	-10.0	-0.	-317.	38.	-0.00	-0.02	0.38
ERHØA	10.0	-0.	405.	-32.	0.00	0.01	-0.49
	-10.0	-0.	-336.	37.	-0.00	-0.02	0.40
EISP2	0.427	-0.	-872.	102.	-0.00	-0.06	1.04
	-0.427	-0.	892.	-102.	0.00	0.06	-1.07
EDWGT2	1.34	-0.	-471.	51.	-0.00	-0.03	0.56
	-1.34	-0.	925.	-65.	0.00	0.03	-1.12
EM2	0.895	-0.	-180.	33.	-0.00	-0.02	0.22
	-0.895	-0.	551.	-48.	0.00	0.02	-0.68
EFUEL2	0.5	-0.	-192.	19.	-0.00	-0.01	0.23
	-0.5	-0.	17.	-14.	0.00	0.01	-0.03
EWGT2	2.402	-0.	873.	-95.	0.00	0.05	-1.04
	-2.402	0.	-962.	99.	-0.00	-0.05	1.15
EISP3	0.939	-0.	-376.	45.	-0.00	-0.03	0.45
	-0.939	-0.	293.	-41.	0.00	0.02	-0.36
EDWGT3	3.0	-0.	-82.	6.	0.00	-0.00	0.10
	-3.0	-0.	55.	-3.	0.00	-0.00	-0.07
EM3	2.0	-0.	-5.	-2.	0.00	0.00	0.01
	-2.0	-0.	-58.	3.	-0.00	-0.00	0.07

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
FFUEL3	1.0	-0.	-205.	29.	-0.00	-0.02	0.24
	-1.0	-0.	294.	-30.	0.00	0.02	-0.35
FWGT3	1.936	-0.	-238.	31.	-0.00	-0.02	0.28
	-1.936	-0.	207.	-29.	0.00	0.02	-0.25
F40FF1	.03	0.	7.	1.	0.00	-0.00	-0.01
	-.03	-0.	-22.	1.	0.00	-0.00	0.02
F40FF2	.03	-0.	0.	-0.	-0.	-0.	-0.
	-.03	-0.	0.	-0.	-0.	-0.	-0.
FULAGF	5.0	-0.	-29.	1.	0.00	0.00	0.03
	-5.0	-0.	-132.	1.	-0.00	0.00	0.15
EVENTR	20.0	-5.	32843.	-3670.	0.09	1.98	-39.19
	-20.0	4.	-32822.	3615.	-0.09	-2.04	39.16
RSS		5.	33003.	3684.	0.09	2.05	39.38

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TABLE 20

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT FIXED TIME NO. 2

	ERCR	ERDR	ERUP	EVCR	EVDR	EVUP
ERCR	4.36E 02	-0.1	0.0	0.9	0.0	0.1
ERDR	-1.11E 06	4.41E 04	-0.3	0.1	-0.2	-1.0
ERUP	4.40E 03	-1.43E 07	1.22E 03	-0.0	-0.7	0.3
EVCR	8.34E 02	5.52E 03	-3.30E 01	2.16E 00	0.0	-0.1
EVDR	1.25E 01	-6.75E 03	-9.11E 02	4.50E-02	1.01E 00	0.1
EVUP	1.33E 03	-2.29E 06	1.73E 04	-6.46E 00	7.10E 00	5.19E 01

TABLE 21

COVARIANCE MATRIX OF UNCERTAINTIES
AT FIXED TIME NO. 2

	ERNCR	ERNDR	ERNUP	EVNCR	EVNDR	EVNUP
ERNCR	4.35E 02	-0.1	0.0	0.9	0.0	0.1
ERNDR	-4.73E 05	2.10E 04	-0.5	-0.0	-0.2	-1.0
ERNUP	3.73E 03	-1.19E 07	1.24E 03	-0.0	-0.8	0.5
EVNCR	8.39E 02	-1.01E 03	-2.35E 01	2.15E 00	0.0	0.0
EVNDR	1.23E 01	-4.84E 03	-9.04E 02	5.16E-02	9.65E-01	0.2
EVNUP	5.70E 02	-5.09E 05	1.45E 04	1.29E 00	4.85E 00	2.42E 01

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TABLE 22

ACTUAL DEVIATIØNS AT S-IVB REIGNITIØN
DUE TØ PLATFØRM ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
GDSVX	.100	7.	0.00	0.0	-0.9	-1.2	-0.6	-0.0
	-.100	-7.	0.00	-0.0	0.9	1.2	0.6	-0.0
GDSVY	.075	-24.	-0.01	-0.1	2.4	11.4	3.1	-0.0
	-.075	24.	0.01	0.2	-2.4	-11.4	-3.2	0.0
GDSVZ	.075	1084.	-1.99	3.7	-0.0	-0.2	55.6	0.3
	-.075	-1081.	1.99	-3.7	0.0	0.2	-55.7	-0.4
USSVX	.100	6.	0.00	0.0	-0.8	-1.1	-0.5	-0.0
	-.100	-7.	-0.00	-0.0	0.8	1.1	0.7	0.0
USSVY	.075	-23.	-0.01	-0.1	2.3	9.2	3.1	0.0
	-.075	22.	0.01	0.1	-2.3	-9.2	-2.5	0.1
USSVZ	.100	1.	0.00	0.0	-0.0	0.	-0.1	-0.0
	-.100	0.	0.00	0.0	-0.0	0.	-0.0	-0.0
UISVX	.100	-0.	0.00	-0.0	-0.0	0.	0.0	0.
	-.100	1.	0.00	0.0	-0.0	0.	-0.1	-0.1
UISVY	.075	1.	0.00	0.0	-0.0	0.	-0.1	-0.0
	-.075	0.	0.00	0.0	0.	0.	-0.0	-0.0
UISVZ	.075	1294.	-2.30	4.6	0.	-0.2	60.8	0.1
	-.075	-1291.	2.30	-4.6	0.	0.2	-60.9	-0.1
UØSVX	.060	6.	0.00	0.0	-0.7	-1.4	-0.6	-0.0
	-.060	-5.	0.00	-0.0	0.7	1.4	0.4	-0.1
UØSVY	.060	-23.	-0.01	-0.1	2.2	10.7	3.1	-0.0
	-.060	23.	0.01	0.1	-2.2	-10.7	-3.0	-0.0
UØSVZ	.060	760.	-1.45	2.0	-0.0	-0.2	43.6	0.5
	-.060	-760.	1.44	-2.0	0.0	0.1	-42.8	-0.3
SSVX	.050	-0.	0.00	0.0	0.	0.	0.0	-0.0
	-.050	2.	0.00	0.0	0.	0.	-0.2	-0.1
SSVY	.050	1.	0.00	0.0	-0.0	0.	-0.1	-0.0
	-.050	1.	0.00	0.0	-0.0	0.	-0.1	-0.0
SSVZ	.050	0.	0.00	-0.0	-0.0	0.	-0.0	-0.0
	-.050	0.	0.00	0.0	-0.0	0.	-0.1	-0.0

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		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NODE E-3 DEG	PHIT E-3 DEG	FUEL LBS
SFSVX	.00003	-283.	-0.40	-2.1	-0.0	-0.3	61.1	17.1
	-.00003	288.	0.40	2.1	0.0	0.3	-62.2	-17.5
SFSVY	.00003	-254.	0.22	-0.7	-0.0	-0.0	7.4	5.5
	-.00003	253.	-0.21	0.7	0.0	0.0	-7.9	-5.6
SFSVZ	.00003	0.	0.00	0.0	-0.0	0.	-0.1	-0.0
	-.00003	-1.	0.00	-0.0	-0.0	0.	0.1	0.0
ABSVX	.00003	-245.	-0.36	-1.8	-0.0	-0.3	57.7	15.1
	-.00003	247.	0.37	1.8	0.0	0.3	-58.4	-15.3
ABSVY	.00003	-353.	0.44	-1.2	-0.0	-0.0	-2.9	4.3
	-.00003	353.	-0.43	1.2	0.0	0.0	2.5	-4.4
ABSVZ	.00003	-6.	-0.00	-0.0	0.6	2.4	0.8	-0.0
	-.00003	6.	0.00	0.0	-0.6	-2.4	-0.8	-0.0
CHI1X	.00196	5.	-0.00	0.0	-0.5	-1.0	-0.4	-0.1
	-.00196	-5.	0.00	-0.0	0.5	1.0	0.3	-0.1
CHI1Y	.00573	-25.	-0.01	-0.1	2.5	9.0	2.9	-0.0
	-.00573	25.	0.01	0.1	-2.5	-9.0	-2.9	-0.0
CHI1Z	.00196	290.	-0.68	0.4	-0.0	-0.1	26.7	1.0
	-.00196	-289.	0.68	-0.4	0.0	0.1	-26.9	-1.2
EPSVXZ	.00834	0.	0.00	0.0	0.	0.	-0.1	-0.0
	-.00834	0.	0.00	0.0	-0.0	0.	-0.1	-0.0
EPSVXY	.00393	356.	0.24	2.2	0.0	0.3	-54.6	-16.8
	-.00393	-357.	-0.23	-2.2	-0.0	-0.3	54.4	16.7
EPSVYZ	.00834	0.	0.00	0.0	-0.0	0.	-0.1	-0.0
	-.00834	0.	-0.00	0.	-0.0	0.	-0.0	0.0
EPSVYX	.00278	-661.	0.80	-2.2	-0.0	-0.0	0.2	8.6
	-.00278	663.	-0.79	2.2	0.0	0.0	-0.3	-8.7
EPSVZY	.00879	-22.	-0.00	-0.1	2.3	4.6	2.1	0.0
	-.00879	22.	0.00	0.1	-2.3	-4.6	-2.1	-0.1
EPSVZX	.00834	38.	0.01	0.2	-3.7	-13.0	-4.4	-0.1
	-.00834	-36.	-0.01	-0.2	3.7	13.0	4.2	-0.0
RSS		2101.	3.61	7.7	6.6	24.8	140.8	30.8

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TABLE 23

ACTUAL DEVIATIØNS AT S-IVB REIGNITIØN
DUE TØ PLATFØRM ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
GDSVX	.100	-184.	158.	361.	0.19	0.22	0.20	0.
	-.100	170.	-146.	-361.	-0.17	-0.21	-0.20	-0.000
GDSVY	.075	914.	-781.	-1359.	-0.91	-1.10	-2.48	0.000
	-.075	-939.	802.	1358.	0.93	1.13	2.48	-0.001
GDSVZ	.075	16582.	-12760.	332.	-16.53	-16.28	-0.40	-0.002
	-.075	-16628.	12776.	-333.	16.55	16.34	0.40	0.001
USSVX	.100	-150.	129.	325.	0.15	0.18	0.18	0.000
	-.100	200.	-172.	-324.	-0.21	-0.24	-0.18	-0.000
USSVY	.075	898.	-769.	-1235.	-0.90	-1.08	-1.96	0.000
	-.075	-728.	622.	1239.	0.72	0.88	1.95	0.000
USSVZ	.100	-19.	17.	-0.	0.02	0.02	0.00	0.
	-.100	-2.	2.	0.	0.00	0.00	0.00	-0.000
UISVX	.100	7.	-6.	0.	-0.01	-0.01	-0.00	0.
	-.100	-36.	32.	-1.	0.04	0.04	0.00	0.000
UISVY	.075	-41.	35.	-1.	0.04	0.05	0.00	-0.001
	-.075	-13.	11.	-0.	0.01	0.02	0.00	0.
UISVZ	.075	18222.	-13887.	364.	-18.03	-17.56	-0.44	-0.000
	-.075	-18252.	13885.	-364.	18.03	17.60	0.44	0.000
UØSVX	.060	-162.	140.	302.	0.17	0.20	0.26	0.
	-.060	127.	-108.	-303.	-0.12	-0.15	-0.26	0.
UØSVY	.060	895.	-765.	-1261.	-0.89	-1.08	-2.33	0.000
	-.060	-880.	751.	1261.	0.87	1.06	2.33	0.000
UØSVZ	.060	12955.	-10081.	261.	-13.16	-13.17	-0.32	-0.003
	-.060	-12746.	9885.	-257.	12.92	12.92	0.31	0.002
SSVX	.050	2.	-2.	0.	-0.00	-0.00	0.00	0.000
	-.050	-58.	52.	-1.	0.06	0.07	0.00	0.
SSVY	.050	-19.	16.	-0.	0.02	0.02	0.00	0.
	-.050	-33.	29.	-1.	0.04	0.04	0.00	-0.000
SSVZ	.050	-10.	9.	-0.	0.01	0.01	0.00	0.
	-.050	-26.	22.	-1.	0.03	0.03	0.00	-0.000

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
SFSVX	.00003	17280.	-15157.	352.	-18.62	-21.17	-0.44	-0.008
	-.00003	-17618.	15420.	-359.	18.94	21.58	0.45	0.005
SFSVY	.00003	1959.	-2008.	40.	-2.18	-2.88	-0.05	-0.005
	-.00003	-2081.	2111.	-42.	2.31	3.03	0.06	0.001
SFSVZ	.00003	-16.	14.	-0.	0.02	0.02	0.00	0.
	-.00003	18.	-16.	0.	-0.02	-0.02	-0.00	0.
ABSVX	.00003	16333.	-14296.	332.	-17.53	-19.95	-0.42	0.045
	-.00003	-16538.	14443.	-336.	17.71	20.20	0.42	-0.047
ABSVY	.00003	-1067.	447.	-20.	0.84	0.31	0.02	-0.032
	-.00003	957.	-355.	18.	-0.73	-0.18	-0.02	0.029
ABSVZ	.00003	222.	-191.	-337.	-0.22	-0.27	-0.50	0.001
	-.00003	-242.	207.	337.	0.24	0.29	0.50	-0.001
CHI1X	.00196	-119.	103.	234.	0.12	0.15	0.19	0.
	-.00196	102.	-88.	-234.	-0.10	-0.12	-0.19	-0.000
CHI1Y	.00573	835.	-715.	-1313.	-0.83	-1.01	-1.89	-0.000
	-.00573	-849.	727.	1312.	0.85	1.03	1.89	0.001
CHI1Z	.00196	7820.	-6305.	159.	-8.12	-8.47	-0.19	-0.001
	-.00196	-7875.	6347.	-160.	8.17	8.53	0.20	0.001
EPSVXZ	.00834	-17.	14.	-0.	0.02	0.02	0.00	0.
	-.00834	-31.	27.	-1.	0.03	0.04	0.00	0.
EPSVXY	.00393	-15395.	13613.	-315.	16.63	19.13	0.40	0.014
	-.00393	15323.	-13579.	314.	-16.59	-19.05	-0.39	-0.015
EPSVYZ	.00834	-28.	24.	-1.	0.03	0.03	0.00	-0.000
	-.00834	-2.	2.	0.	0.00	0.00	0.00	-0.001
EPSVYX	.00278	-369.	-554.	-5.	-0.08	-1.32	-0.00	-0.006
	-.00278	196.	704.	2.	0.26	1.53	0.00	0.004
EPSVZY	.00879	601.	-518.	-1047.	-0.61	-0.73	-0.87	-0.000
	-.00879	-599.	515.	1047.	0.61	0.73	0.87	-0.000
EPSVZX	.00834	-1293.	1109.	1904.	1.30	1.56	2.73	-0.000
	-.00834	1228.	-1052.	-1906.	-1.23	-1.48	-2.73	0.000
RSS		40883.	33746.	3549.	42.42	45.63	5.35	0.060

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TABLE 24

UNCERTAINTIES AT S-IVB REIGNITIØN
DUE TØ PLATFØRM ERRØRS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
GDSVX	.100	184.	-158.	-361.	-0.19	-0.22	-0.20
	-.100	-168.	145.	361.	0.17	0.21	0.20
GDSVY	.075	-924.	789.	1358.	0.91	1.11	2.48
	-.075	932.	-795.	-1358.	-0.92	-1.12	-2.48
GDSVZ	.075	-16578.	12757.	-332.	16.54	16.28	0.40
	-.075	16628.	-12776.	333.	-16.56	-16.34	-0.40
USSVX	.100	152.	-130.	-325.	-0.15	-0.18	-0.18
	-.100	-199.	171.	325.	0.21	0.24	0.18
USSVY	.075	-905.	775.	1235.	0.91	1.09	1.96
	-.075	729.	-623.	-1238.	-0.72	-0.88	-1.95
USSVZ	.100	20.	-17.	0.	-0.02	-0.03	-0.00
	-.100	-5.	4.	-0.	0.01	0.01	0.00
UISVX	.100	-17.	15.	-0.	0.02	0.02	0.00
	-.100	38.	-33.	1.	-0.04	-0.05	-0.00
UISVY	.075	42.	-36.	1.	-0.04	-0.05	-0.00
	-.075	15.	-12.	0.	-0.02	-0.02	-0.00
UISVZ	.075	-18221.	13888.	-364.	19.03	17.56	0.44
	-.075	18252.	-13885.	364.	-18.03	-17.60	-0.44
UØSVX	.060	162.	-140.	-302.	-0.16	-0.20	-0.26
	-.060	-127.	108.	303.	0.13	0.15	0.26
UØSVY	.060	-893.	763.	1261.	0.89	1.08	2.33
	-.060	882.	-753.	-1261.	-0.88	-1.06	-2.33
UØSVZ	.060	-12953.	10078.	-261.	13.16	13.17	0.32
	-.060	12745.	-9884.	257.	-12.92	-12.92	-0.31
SSVX	.050	-9.	8.	-0.	0.01	0.01	-0.00
	-.050	51.	-46.	1.	-0.05	-0.06	-0.00
SSVY	.050	20.	-17.	1.	-0.02	-0.02	-0.00
	-.050	33.	-29.	1.	-0.04	-0.04	-0.00
SSVZ	.050	12.	-11.	0.	-0.01	-0.01	-0.00
	-.050	26.	-22.	1.	-0.03	-0.03	-0.00

[redacted]

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
SFSVX	.00003	-17227.	15110.	-351.	18.57	21.11	0.44
	-.00003	17557.	-15369.	358.	-18.88	-21.51	-0.45
SFSVY	.00003	-1941.	1992.	-39.	2.16	2.86	0.05
	-.00003	2064.	-2098.	42.	-2.29	-3.01	-0.06
SFSVZ	.00003	16.	-14.	0.	-0.02	-0.02	-0.00
	-.00003	-17.	16.	-0.	0.02	0.02	0.00
ABSVX	.00003	-16222.	14253.	-331.	17.85	19.91	0.41
	-.00003	16419.	-14399.	335.	-18.02	-20.15	-0.42
ABSVY	.00003	1083.	-397.	21.	-0.84	0.06	-0.02
	-.00003	-980.	308.	-19.	0.73	-0.18	0.02
ABSVZ	.00003	-221.	190.	400.	0.22	0.27	0.87
	-.00003	242.	-207.	-400.	-0.24	-0.29	-0.87
CHI1X	.00196	119.	-103.	-233.	-0.12	-0.14	-0.19
	-.00196	-111.	96.	234.	0.11	0.14	0.19
CHI1Y	.00573	-843.	722.	1313.	0.84	1.02	1.89
	-.00573	850.	-729.	-1312.	-0.85	-1.03	-1.89
CHI1Z	.00196	-7815.	6300.	-158.	8.12	8.46	0.19
	-.00196	7872.	-6345.	160.	-8.17	-8.53	-0.20
EPSVXZ	.00834	17.	-15.	0.	-0.02	-0.02	-0.00
	-.00834	31.	-26.	1.	-0.03	-0.04	-0.00
EPSVXY	.00393	15329.	-13557.	314.	-16.56	-19.05	-0.39
	-.00393	-15266.	13527.	-312.	16.53	18.98	0.39
EPSVYZ	.00834	30.	-25.	1.	-0.03	-0.03	-0.00
	-.00834	2.	-2.	0.	-0.00	-0.00	-0.00
EPSVYX	.00278	400.	527.	6.	0.05	1.29	-0.00
	-.00278	-224.	-683.	-2.	-0.24	-1.50	-0.00
EPSVZY	.00879	-610.	526.	1045.	0.62	0.74	0.86
	-.00879	598.	-515.	-1045.	-0.61	-0.73	-0.86
EPSVZX	.00834	1294.	-1109.	-1908.	-1.30	-1.56	-2.75
	-.00834	-1227.	1051.	1910.	1.23	1.48	2.75
RSS		40782.	33679.	3557.	42.50	45.54	5.41

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TABLE 25

ACTUAL DEVIATIØNS AT S-IVB REIGNITIØN
DUE TØ PERFØRMANCE ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG
FISP1	0.419	-99.	0.02	-0.1	-0.0	-0.4	19.1
	-0.419	101.	-0.02	0.1	0.0	0.4	-24.0
EDWGT1	0.716	-52.	0.02	-0.0	-0.0	-0.2	7.8
	-0.716	34.	0.00	0.0	0.0	0.2	-9.2
EM1	0.895	145.	-0.03	0.1	0.0	0.6	-34.1
	-0.895	218.	-0.04	0.2	0.0	0.8	-56.4
EFUEL1	0.5	-75.	0.04	-0.1	-0.0	-0.0	9.3
	-0.5	37.	-0.00	0.1	0.0	0.2	-9.9
EWGT1	2.846	84.	-0.02	0.1	0.0	0.4	-18.9
	-2.846	-81.	0.02	-0.0	-0.0	-0.2	15.6
ECD	10.0	38.	-0.01	0.0	0.0	0.2	-8.2
	-10.0	-36.	0.01	-0.0	-0.0	-0.1	7.7
ERHØA	10.0	36.	-0.00	0.0	0.0	0.2	-7.2
	-10.0	-34.	0.01	-0.0	-0.0	-0.0	6.7
FISP2	0.427	-101.	0.02	-0.1	-0.0	-0.5	18.8
	-0.427	106.	-0.02	0.1	0.0	0.5	-23.4
EDWGT2	1.34	-52.	0.02	-0.1	-0.0	-0.6	9.9
	-1.34	76.	-0.02	0.2	0.0	0.7	-14.7
EM2	0.895	-42.	0.02	-0.1	0.0	0.1	6.4
	-0.895	65.	-0.03	0.1	0.0	0.0	-10.2
EFUEL2	0.5	-19.	0.01	0.0	0.0	0.1	2.9
	-0.5	18.	-0.01	-0.0	0.0	0.0	-2.9
EWGT2	2.402	96.	-0.02	0.1	0.0	0.5	-21.8
	-2.402	-97.	0.02	-0.1	-0.0	-0.2	18.2
FISP3	0.939	-44.	0.01	-0.0	-0.0	-0.1	8.8
	-0.939	45.	-0.01	0.0	0.0	0.2	-9.6
EDWGT3	3.0	3.	-0.01	-0.0	-0.0	-0.9	22.8
	-3.0	-4.	0.01	0.1	0.0	1.1	-37.5
EM3	2.0	10.	-0.01	-0.0	-0.0	-0.7	20.6
	-2.0	-9.	0.01	0.0	0.0	0.9	-30.1

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		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG
FFUEL3	1.0	-33.	0.01	0.0	0.0	0.7	-25.5
	-1.0	38.	-0.02	-0.0	-0.0	-0.5	18.4
FWGT2	1.936	-36.	0.01	0.0	0.0	0.7	-26.5
	-1.936	36.	-0.02	-0.0	-0.0	-0.5	19.2
F4ØFF1	0.03	50.	0.64	0.9	0.	0.1	0.4
	-0.03	-50.	-0.64	-0.9	-0.0	-0.1	-0.3
F4ØFF2	0.03	0.	0.	0.	0.	0.	0.
	-0.03	0.	0.	0.	0.	0.	0.
FULAGE	5.0	21.	0.29	0.4	-0.0	0.0	0.3
	-5.0	-21.	-0.29	-0.4	0.0	-0.0	0.3
FVENTR	20.0	3745.	-2.14	0.7	0.0	0.4	-93.9
	-20.0	-3739.	2.13	-0.7	-0.0	-0.4	93.9
RSS		3759.	2.25	1.3	0.1	2.3	135.5

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TABLE 26

ACTUAL DEVIATIØNS AT S-IVB REIGNITIØN
DUE TØ PERFØRMANCE ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EISP1	0.419	5400.	-4747.	127.	-5.55	-6.52	-0.06	-1.027
	-0.419	-6794.	5937.	-154.	6.96	8.18	0.09	0.980
EDWGT1	0.716	2204.	-1952.	53.	-2.26	-2.68	-0.02	-0.865
	-0.716	-2622.	2285.	-70.	2.69	3.14	-0.01	0.916
EM1	0.895	-9653.	8436.	-220.	9.88	11.63	0.13	1.333
	-0.895	-15998.	13946.	-354.	16.36	19.24	0.26	1.620
EFUEL1	0.5	2622.	-2340.	53.	-2.70	-3.23	-0.06	-0.091
	-0.5	-2813.	2453.	-66.	2.89	3.39	0.03	0.086
EWGT1	2.846	-5346.	4678.	-125.	5.48	6.44	0.06	0.830
	-2.846	4411.	-3877.	98.	-4.52	-5.32	-0.07	-0.868
ECD	10.0	-2315.	2029.	-55.	2.37	2.79	0.02	0.382
	-10.0	2176.	-1908.	45.	-2.23	-2.62	-0.05	-0.383
ERHØA	10.0	-2041.	1791.	-50.	2.10	2.46	0.02	0.309
	-10.0	1883.	-1654.	39.	-1.93	-2.27	-0.04	-0.315
EISP2	0.427	5321.	-4683.	128.	-5.47	-6.44	-0.04	-0.714
	-0.427	-5528.	5801.	-154.	6.79	8.00	0.08	0.663
EDWGT2	1.34	2808.	-2469.	86.	-2.91	-3.43	0.05	-2.611
	-1.34	-4164.	3658.	-121.	4.31	5.09	-0.05	2.721
EM2	0.895	1792.	-1587.	29.	-1.85	-2.20	-0.07	-1.043
	-0.895	-2887.	2552.	-58.	2.99	3.54	0.07	1.251
EFUEL2	0.5	825.	-730.	10.	-0.84	-0.99	-0.05	0.945
	-0.5	-814.	719.	-18.	0.83	0.98	0.02	-0.933
EWGT2	2.402	-6171.	5399.	-144.	6.33	7.44	0.07	0.623
	-2.402	5137.	-4520.	117.	-5.28	-6.21	-0.07	-0.670
EISP3	0.939	2494.	-2190.	56.	-2.56	-3.01	-0.04	-0.001
	-0.939	-2725.	2388.	-68.	2.80	3.29	0.01	-0.012
EDWGT3	3.0	6810.	-5820.	181.	-6.93	-8.09	0.01	-0.028
	-3.0	-10726.	9157.	-267.	10.89	12.74	0.05	-0.150
EM3	2.0	5899.	-5032.	152.	-6.00	-7.00	-0.01	-0.012
	-2.0	-8617.	7350.	-214.	8.74	10.23	0.04	-0.112

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EFUEL3	1.0	-7321.	6211.	-180.	7.41	8.66	0.05	0.537
	-1.0	5297.	-4479.	132.	-5.36	-6.25	-0.03	-0.625
FWGT3	1.936	-7594.	6441.	-186.	7.69	8.98	0.05	0.551
	-1.936	5519.	-4672.	137.	-5.59	-6.52	-0.03	-0.649
F40FF1	0.03	145.	-58.	-2.	0.63	-0.24	-0.01	0.874
	-0.03	-131.	47.	3.	-0.64	0.24	0.01	-0.873
F40FF2	0.03	0.	0.	0.	0.	-0.	0.	0.
	-0.03	0.	0.	0.	0.	-0.	0.	0.
FULAGE	5.0	80.	-41.	1.	0.27	-0.13	0.00	0.056
	-5.0	46.	-67.	1.	-0.40	-0.03	-0.01	-0.049
FVENTR	20.0	-24449.	25782.	-475.	25.77	33.53	0.64	0.
	-20.0	24388.	-25800.	473.	-25.81	-33.46	-0.64	0.
RSS		37001.	35252.	810.	38.34	47.22	0.73	4.238

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TABLE 27

UNCERTAINTIES AT S-IVB REIGNITION
DUE TO PERFORMANCE ERRORS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
EISP1	0.419	-737.	764.	-14.	0.78	0.99	0.02
	-0.419	745.	-776.	14.	-0.79	-1.01	-0.02
EDWGT1	0.716	-445.	453.	-9.	0.47	0.61	0.01
	-0.716	272.	-281.	5.	-0.29	-0.37	-0.01
EM1	0.895	984.	-1034.	19.	-1.04	-1.36	-0.03
	-0.895	1599.	-1646.	31.	-1.68	-2.15	-0.04
EFUEL1	0.5	-538.	557.	-11.	0.58	0.75	0.01
	-0.5	180.	-197.	3.	-0.19	-0.25	-0.00
EWGT1	2.846	557.	-586.	11.	-0.59	-0.77	-0.01
	-2.846	-486.	522.	-9.	0.51	0.67	0.01
ECD	10.0	170.	-197.	3.	-0.18	-0.25	-0.00
	-10.0	-236.	249.	-5.	0.25	0.32	0.01
ERHOA	10.0	301.	-306.	6.	-0.32	-0.41	-0.01
	-10.0	-251.	262.	-5.	0.26	0.34	0.01
EISP2	0.427	-649.	687.	-12.	0.69	0.89	0.02
	-0.427	654.	-698.	13.	-0.70	-0.91	-0.02
EDWGT2	1.34	-351.	367.	-7.	0.37	0.48	0.01
	-1.34	679.	-680.	13.	-0.73	-0.91	-0.02
EM2	0.895	-133.	157.	-2.	0.14	0.20	0.00
	-0.895	419.	-433.	9.	-0.45	-0.58	-0.01
EFUEL2	0.5	-144.	144.	-3.	0.15	0.19	0.00
	-0.5	13.	-34.	0.	-0.02	-0.04	-0.00
EWGT2	2.402	642.	-678.	12.	-0.68	-0.88	-0.02
	-2.402	-716.	744.	-14.	0.76	0.97	0.02
EISP3	0.939	-289.	305.	-6.	0.30	0.40	0.01
	-0.939	218.	-244.	4.	-0.23	-0.32	-0.01
EDWGT3	3.0	-63.	55.	-1.	0.06	0.08	0.00
	-3.0	43.	-39.	1.	-0.04	-0.06	-0.00
EM3	2.0	5.	-10.	0.	-0.00	-0.01	-0.00
	-2.0	-33.	34.	-1.	0.04	0.04	0.00

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
EFUEL3	1.0	-161.	175.	-3.	0.17	0.22	0.00
	-1.0	217.	-230.	4.	-0.23	-0.30	-0.01
EWGT3	1.936	-166.	183.	-3.	0.18	0.23	0.00
	-1.936	162.	-180.	3.	-0.17	-0.23	-0.00
E40FF1	0.03	6.	-4.	0.	-0.01	-0.01	0.00
	-0.03	-18.	12.	-0.	0.01	0.02	0.00
E40FF2	0.03	0.	-0.	0.	-0.	-0.	0.
	-0.03	0.	-0.	0.	-0.	-0.	0.
EULAGE	5.0	-19.	16.	-0.	0.04	0.02	0.00
	-5.0	-96.	81.	-2.	0.12	0.11	0.00
EVENTR	20.0	24450.	-25782.	475.	-25.76	-33.53	-0.64
	-20.0	-24390.	25800.	-473.	25.80	33.46	0.64
RSS		24569.	25920.	477.	25.93	33.68	0.64

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TABLE 28

CØVARIANCE MATRIX ØF ACTUAL DEVIATIØNS
AT S-IVB REIGNITIØN

	R	V	BETA	INCL	NØDE	PHIT	FUEL
R	1.43E 03	-0.8	0.6	-0.0	-0.0	-0.3	-0.1
V	-1.65E 03	1.42E 00	-0.7	-0.0	-0.0	-0.2	0.0
BETA	2.04E 00	-2.50E-03	2.58E-03	-0.0	-0.0	0.1	-0.0
INCL	-3.35E-02	-1.79E-05	-2.52E-07	2.20E-03	1.0	0.0	-0.0
NØDE	-2.29E-02	-3.90E-06	-9.25E-07	1.76E-05	8.29E-03	-0.0	-0.0
PHIT	-2.63E 01	-2.07E-02	1.58E-05	4.37E-06	-5.55E-06	6.10E-02	0.3
FUEL	-1.17E 05	2.50E 01	-1.23E-01	-1.65E-02	-4.35E-01	2.05E 01	1.29E 03

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TABLE 29

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT S-IVB REIGNITION

	RPX	RPY	RPZ	VPX	VPY	VPZ	TIME
RPX	1.72E 04	-1.0	0.3	-1.0	-1.0	-0.3	-0.2
RPY	-2.61E 08	1.53E 04	-0.3	1.0	1.0	0.3	0.2
RPZ	5.22E 06	-4.62E 06	1.20E 03	-0.3	-0.2	0.8	-0.1
VPX	-3.07E 05	2.72E 05	-5.45E 03	1.79E 01	1.0	0.3	0.2
VPY	-3.49E 05	3.12E 05	-6.13E 03	3.64E 02	2.05E 01	0.3	0.2
VPZ	-7.95E 03	7.02E 03	1.84E 03	8.23E 00	9.44E 00	1.80E 00	0.0
TIME	-5.11E 03	4.47E 03	-1.28E 02	5.32E 00	6.16E 00	2.24E-02	1.28E 00

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TABLE 30

COVARIANCE MATRIX OF UNCERTAINTIES
AT S-IVB REIGNITION

	ERNX	ERNY	ERNZ	EVNX	EVNY	EVNZ
ERNX	1.58E 04	-1.0	0.2	-1.0	-1.0	-0.3
ERNY	-2.21E 08	1.41E 04	-0.2	1.0	1.0	0.3
ERNZ	4.08E 06	-3.64E 06	1.20E 03	-0.2	-0.2	0.9
EVNX	-2.60E 05	2.31E 05	-4.31E 03	1.65E 01	1.0	0.3
EVNY	-2.93E 05	2.64E 05	-4.78E 03	3.08E 02	1.88E 01	0.3
EVNZ	-7.62E 03	6.73E 03	1.87E 03	7.91E 00	9.05E 00	1.81E 00

TABLE 31

ERRØRS AT WAITING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		ER FT	EV FT/SEC	EBETA E-3 DEG	EINCL E-3 DEG	ENØDE E-3 DEG
GDSVX	.100	1341.	-15.18	20.0	-7.8	9.2
	-.100	-1347.	15.17	-20.0	7.8	-9.7
GDSVY	.075	-1975.	-6.71	-25.3	-11.9	138.4
	-.075	1952.	6.62	24.9	12.0	-138.5
GDSVZ	.075	2518.	-33.31	41.7	-8.4	14.0
	-.075	-2555.	33.16	-42.1	8.4	-14.1
USSVX	.100	98.	-1.12	1.4	-1.4	0.9
	-.100	-99.	1.11	-1.4	1.4	-0.9
USSVY	.075	-56.	-0.40	-0.0	2.7	9.6
	-.075	44.	0.26	-0.1	-2.8	-9.7
USSVZ	.100	-8.	0.13	-0.3	0.0	-0.1
	-.100	10.	-0.12	0.3	-0.0	0.1
UISVX	.100	-4.	0.07	-0.1	0.1	-0.3
	-.100	5.	-0.05	0.1	-0.0	0.3
UISVY	.075	6.	0.05	0.1	0.1	-0.6
	-.075	-7.	-0.02	-0.1	-0.1	0.6
UISVZ	.075	2033.	-10.41	12.9	-7.8	1.8
	-.075	-2036.	10.41	-12.9	7.8	-1.8
UØSVX	.060	22.	-0.23	0.2	-0.9	-0.6
	-.060	-22.	0.24	-0.2	0.9	0.4
UØSVY	.060	-106.	-0.53	-0.7	2.3	15.2
	-.060	103.	0.53	0.7	-2.3	-15.2
UØSVZ	.060	1081.	-6.51	7.0	-5.6	0.5
	-.060	-1097.	6.35	-7.1	5.5	-0.8
SSVX	.050	-1.	0.03	-0.0	0.0	-0.1
	-.050	4.	-0.00	0.0	-0.0	0.1
SSVY	.050	2.	0.01	0.0	0.0	-0.1
	-.050	0.	0.01	-0.0	0.0	0.1
SSVZ	.050	-3.	0.05	-0.1	0.0	-0.0
	-.050	3.	-0.03	0.1	0.0	0.0

		ER FT	EV FT/SEC	EBETA E-3 DEG	EINCL E-3 DEG	ENODE E-3 DEG
SFSVX	.00003	-441.	-6.85	5.5	-7.9	-0.5
	-.00003	469.	6.98	-5.6	8.1	0.5
SFSVY	.00003	-313.	-0.58	0.6	-1.0	-0.2
	-.00003	316.	0.63	-0.6	1.0	0.2
SFSVZ	.00003	0.	-0.00	-0.0	0.1	-0.4
	-.00003	-0.	0.01	0.0	-0.1	0.4
ABSVX	.00003	-582.	-6.73	4.3	-7.5	-0.4
	-.00003	588.	6.80	-4.4	7.6	0.3
ABSVY	.00003	-624.	1.17	-1.6	0.3	-0.5
	-.00003	625.	-1.12	1.5	-0.3	0.5
ABSVZ	.00003	4.	0.04	0.3	1.0	3.8
	-.00003	-3.	-0.02	-0.3	-1.0	-3.8
CHI1X	.00196	9.	-0.05	-0.0	-0.6	-0.4
	-.00196	-7.	0.06	0.0	0.6	0.4
CHI1Y	.00573	-39.	-0.31	0.2	3.0	8.6
	-.00573	40.	0.32	-0.2	-3.0	-8.6
CHI1Z	.00196	390.	-3.59	3.6	-3.4	0.2
	-.00196	-388.	3.62	-3.6	3.5	-0.2
EPSVXZ	.00834	69.	0.37	0.9	0.0	-0.1
	-.00834	-69.	-0.35	-0.9	0.0	0.1
EPSVXY	.00393	549.	5.86	-5.0	7.1	0.5
	-.00393	-546.	-5.83	5.0	-7.1	-0.5
EPSVYZ	.00834	-33.	0.41	-0.5	0.0	-0.2
	-.00834	35.	-0.39	0.5	-0.0	0.2
EPSVYX	.00278	-934.	1.02	-1.6	-0.1	-0.6
	-.00278	940.	-0.95	1.6	0.2	0.6
EPSVZY	.00879	1.	-0.18	0.6	2.8	2.2
	-.00879	1.	0.18	-0.6	-2.8	-2.2
EPSVZX	.00834	-10.	0.12	-1.2	-4.4	-12.3
	-.00834	13.	-0.09	1.2	4.4	12.3
RSS		4474.	41.03	55.9	24.7	141.6

TABLE 32

ACTUAL DEVIATIØNS AT WAITING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
GDSVX	.100	1333.	-15.17	20.0	-7.8	9.2	-7.7	0.5
	-.100	-1357.	15.18	-20.0	7.8	-9.7	7.5	0.7
GDSVY	.075	-1990.	-6.70	-25.3	-11.9	138.4	-2.2	0.9
	-.075	1934.	6.63	24.9	12.0	-138.5	1.8	1.2
GDSVZ	.075	2503.	-33.30	41.7	-8.4	14.0	36.1	1.5
	-.075	-2573.	33.17	-42.1	8.4	-14.1	-36.5	0.9
USSVX	.100	99.	-1.12	1.4	-1.4	0.9	-1.1	-0.0
	-.100	-98.	1.11	-1.4	1.4	-0.9	1.2	-0.1
USSVY	.075	-77.	-0.38	-0.1	2.7	9.6	2.7	1.5
	-.075	29.	0.28	-0.1	-2.8	-9.7	-2.5	1.1
USSVZ	.100	-8.	0.13	-0.3	0.0	-0.1	-0.0	-0.0
	-.100	4.	-0.12	0.3	-0.0	0.1	-0.1	0.2
UISVX	.100	-12.	0.08	-0.1	0.1	-0.3	0.0	0.3
	-.100	7.	-0.05	0.1	-0.0	0.3	-0.1	-0.1
UISVY	.075	6.	0.05	0.1	0.1	-0.6	-0.1	-0.0
	-.075	-8.	-0.02	-0.1	-0.1	0.6	-0.1	0.0
UISVZ	.075	2033.	-10.41	12.9	-7.8	1.8	52.9	0.1
	-.075	-2036.	10.41	-12.9	7.8	-1.8	-53.0	-0.1
UØSVX	.060	8.	-0.22	0.2	-0.9	-0.6	-0.8	1.0
	-.060	-33.	0.25	-0.2	0.9	0.4	0.5	0.7
UØSVY	.060	-105.	-0.53	-0.7	2.3	15.2	2.7	-0.0
	-.060	104.	0.53	0.7	-2.3	-15.2	-2.7	0.1
UØSVZ	.060	1060.	-6.49	6.9	-5.6	0.5	38.7	2.0
	-.060	-1133.	6.38	-7.2	5.5	-0.8	-38.5	2.3
SSVX	.050	-8.	0.03	-0.1	0.0	-0.1	-0.0	0.3
	-.050	-2.	0.00	0.0	-0.0	0.1	-0.2	0.2
SSVY	.050	2.	0.01	0.0	0.0	-0.1	-0.1	-0.0
	-.050	-0.	0.01	-0.0	0.0	0.1	-0.1	-0.0
SSVZ	.050	-1.	0.05	-0.1	0.0	-0.0	-0.0	-0.1
	-.050	5.	-0.03	0.1	0.0	0.0	-0.1	-0.1

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		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NODE E-3 DEG	PHIT E-3 DEG	FUEL LBS
SFSVX	.00003	-263.	-7.02	6.1	-7.9	-0.6	59.8	4.2
	-.00003	264.	7.16	-6.3	8.1	0.6	-60.9	-4.3
SFSVY	.00003	-243.	-0.64	0.8	-1.0	-0.2	8.2	0.8
	-.00003	250.	0.69	-0.8	1.0	0.2	-8.5	-1.2
SFSVZ	.00003	-10.	0.01	-0.0	0.1	-0.4	-0.1	0.7
	-.00003	11.	0.00	0.0	-0.1	0.4	0.2	-0.9
ABSVX	.00003	-608.	-6.70	4.2	-7.5	-0.4	54.3	21.4
	-.00003	613.	6.78	-4.3	7.6	0.4	-54.9	-21.6
ABSVY	.00003	-741.	1.27	-1.9	0.3	-0.5	-2.5	12.7
	-.00003	740.	-1.23	1.9	-0.3	0.5	2.1	-12.7
ABSVZ	.00003	82.	-0.03	0.5	0.9	3.6	1.5	-6.6
	-.00003	-81.	0.05	-0.5	-0.9	-3.6	-1.5	6.5
CHI1X	.00196	7.	-0.05	-0.0	-0.6	-0.4	-0.5	-0.0
	-.00196	-16.	0.07	-0.0	0.6	0.4	0.4	0.3
CHI1Y	.00573	-46.	-0.30	0.2	3.0	8.6	2.7	0.3
	-.00573	40.	0.32	-0.2	-3.0	-8.6	-2.8	-0.0
CHI1Z	.00196	407.	-3.61	3.7	-3.4	0.2	24.5	-0.2
	-.00196	-403.	3.63	-3.7	3.5	-0.2	-24.6	-0.1
EPSVXZ	.00834	178.	0.28	1.2	0.0	-0.1	1.0	-8.2
	-.00834	-176.	-0.25	-1.2	0.0	0.1	-1.2	8.0
EPSVXY	.00393	313.	6.07	-5.8	7.1	0.6	-54.2	-1.8
	-.00393	-311.	-6.04	5.7	-7.1	-0.6	54.1	1.6
EPSVYZ	.00834	-45.	0.42	-0.6	0.0	-0.2	-0.0	0.9
	-.00834	53.	-0.41	0.6	-0.0	0.2	-0.0	-1.3
EPSVYX	.00278	-819.	0.92	-1.3	-0.1	-0.7	2.9	1.0
	-.00278	834.	-0.85	1.2	0.2	0.7	-3.4	-1.7
EPSVZY	.00879	9.	-0.19	0.6	2.8	2.2	2.2	-1.1
	-.00879	-12.	0.19	-0.6	-2.8	-2.2	-2.2	1.3
EPSVZX	.00834	-113.	0.21	-1.5	-4.4	-12.2	-5.3	7.6
	-.00834	118.	-0.18	1.5	4.4	12.2	5.1	-7.8
RSS		4466.	41.07	56.1	24.7	141.6	127.0	29.1

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TABLE 33

ACTUAL DEVIATIØNS AT WAITING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
GDSVX	.100	-85.	3146.	2419.	0.79	21.46	-0.86	-0.001
	-.100	32.	-3095.	-2390.	-0.71	-21.42	1.02	-0.002
GDSVY	.075	-1698.	-1081.	-7020.	-17.66	-1.07	-37.17	-0.001
	-.075	1582.	1181.	7047.	17.55	1.12	37.26	-0.004
GDSVZ	.075	8741.	-11835.	193.	-20.23	26.98	-0.47	-0.004
	-.075	-8888.	11952.	-172.	20.15	-26.89	0.52	-0.001
USSVX	.100	-86.	394.	497.	0.25	1.78	-0.19	0.000
	-.100	120.	-458.	-497.	-0.32	-1.82	0.18	0.
USSVY	.075	419.	-1013.	-1906.	-1.72	-0.68	-2.32	-0.002
	-.075	-417.	901.	1929.	1.47	0.59	2.36	-0.001
USSVZ	.100	-10.	1.	-0.	-0.04	-0.22	-0.00	0.
	-.100	-9.	28.	2.	0.08	0.23	-0.00	-0.000
UISVX	.100	-9.	-9.	3.	0.00	-0.11	0.07	-0.000
	-.100	-17.	49.	-0.	0.05	0.13	-0.07	0.001
UISVY	.075	-17.	49.	15.	0.14	0.03	0.18	-0.001
	-.075	-17.	16.	-16.	-0.06	0.01	-0.17	0.
UISVZ	.075	11263.	-17913.	202.	-22.77	-6.40	-0.54	-0.000
	-.075	-11291.	17921.	-202.	22.78	6.43	0.54	0.000
UØSVX	.060	-131.	280.	406.	0.28	0.52	0.12	-0.002
	-.060	49.	-172.	-390.	-0.15	-0.46	-0.08	-0.001
UØSVY	.060	411.	-1060.	-2210.	-2.24	-0.72	-3.84	0.000
	-.060	-405.	1043.	2210.	2.22	0.70	3.84	0.000
UØSVZ	.060	7844.	-13267.	158.	-16.86	-6.39	-0.35	-0.006
	-.060	-7883.	13158.	-119.	16.60	6.32	0.43	-0.004
SSVX	.050	-9.	2.	3.	0.01	-0.04	0.02	0.
	-.050	-43.	81.	2.	0.09	0.09	-0.03	-0.000
SSVY	.050	-9.	21.	2.	0.04	0.01	0.02	0.
	-.050	-20.	39.	-3.	0.04	0.02	-0.02	-0.000
SSVZ	.050	-1.	1.	-1.	-0.02	-0.09	-0.00	0.
	-.050	-12.	35.	-1.	0.07	0.10	0.00	0.

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
SFSVX	.00003	10430.	-21377.	112.	-25.90	-13.82	-0.54	0.020
	-.00003	-10646.	21754.	-114.	26.35	14.08	0.55	-0.022
SFSVY	.00003	1242.	-3012.	-8.	-3.35	-2.15	-0.06	0.005
	-.00003	-1297.	3140.	3.	3.50	2.22	0.06	-0.008
SFSVZ	.00003	-33.	44.	19.	0.05	0.02	0.11	-0.001
	-.00003	40.	-55.	-20.	-0.06	-0.04	-0.11	0.002
ABSVX	.00003	9143.	-19579.	195.	-24.25	-12.77	-0.52	0.032
	-.00003	-9266.	19789.	-197.	24.50	12.92	0.52	-0.034
ABSVY	.00003	-1106.	552.	41.	1.07	-0.76	0.03	-0.049
	-.00003	1044.	-429.	-42.	-0.92	0.83	-0.02	0.047
ABSVZ	.00003	335.	-487.	-708.	-0.54	-0.30	-0.90	0.015
	-.00003	-342.	504.	707.	0.56	0.31	0.90	-0.015
CHI1X	.00196	-72.	160.	290.	0.17	0.22	0.07	0.
	-.00196	46.	-128.	-287.	-0.13	-0.21	-0.07	-0.001
CHI1Y	.00573	440.	-983.	-1936.	-1.53	-0.66	-2.03	-0.001
	-.00573	-458.	1007.	1939.	1.56	0.67	2.03	0.001
CHI1Z	.00196	4730.	-8515.	78.	-10.62	-4.68	-0.24	0.001
	-.00196	-4759.	8572.	-81.	10.69	4.72	0.24	-0.000
EPSVXZ	.00834	342.	-284.	-48.	0.25	-0.15	-0.00	0.017
	-.00834	-366.	336.	47.	-0.19	0.18	0.00	-0.017
EPSVXY	.00393	-9399.	19387.	-75.	23.16	12.68	0.49	-0.018
	-.00393	9354.	-19339.	73.	-23.10	-12.64	-0.49	0.018
EPSVYZ	.00834	-47.	-6.	5.	0.07	-0.51	-0.00	-0.002
	-.00834	46.	27.	-8.	-0.04	0.51	0.00	0.002
EPSVYX	.00278	-219.	-1389.	-51.	-1.03	-2.18	0.00	0.010
	-.00278	142.	1577.	45.	1.26	2.30	0.00	-0.011
EPSVZY	.00879	384.	-749.	-1306.	-0.88	-0.49	-0.37	0.002
	-.00879	-386.	747.	1308.	0.88	0.48	0.36	-0.003
EPSVZX	.00834	-1037.	1821.	2856.	2.10	1.16	2.93	-0.017
	-.00834	1006.	-1749.	-2859.	-2.01	-1.12	-2.93	0.017
RSS		24222.	44563.	8884.	59.17	42.87	37.75	0.074

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TABLE 34

UNCERTAINTIES AT WAITING ØRBIT INSERTIØN
DUE TØ PLATFØRM ERRØRS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
GDSVX	.100	68.	-3128.	-2416.	-0.76	-21.46	0.86
	-.100	-55.	3120.	2394.	0.74	21.44	-1.02
GDSVY	.075	1668.	1112.	7025.	17.69	1.09	37.17
	-.075	-1625.	-1134.	-7040.	-17.50	-1.09	-37.27
GDSVZ	.075	-8774.	11872.	-187.	20.27	-26.96	0.47
	-.075	8837.	-11895.	181.	-20.09	26.92	-0.52
USSVX	.100	88.	-396.	-497.	-0.25	-1.78	0.19
	-.100	-110.	447.	496.	0.31	1.81	-0.19
USSVY	.075	-468.	1066.	1914.	1.78	0.71	2.32
	-.075	390.	-872.	-1924.	-1.44	-0.58	-2.36
USSVZ	.100	11.	-3.	0.	0.04	0.22	-0.00
	-.100	7.	-25.	-2.	-0.08	-0.23	0.00
UISVX	.100	-6.	25.	-0.	0.02	0.12	-0.07
	-.100	29.	-62.	-2.	-0.06	-0.14	0.07
UISVY	.075	18.	-50.	-15.	-0.14	-0.03	-0.18
	-.075	19.	-19.	15.	0.06	-0.01	0.17
UISVZ	.075	-11261.	17911.	-202.	22.77	6.40	0.54
	-.075	11292.	-17923.	202.	-22.78	-6.43	-0.54
UØSVX	.060	98.	-245.	-401.	-0.24	-0.51	-0.12
	-.060	-72.	197.	394.	0.18	0.47	0.08
UØSVY	.060	-409.	1057.	2210.	2.24	0.71	3.84
	-.060	407.	-1046.	-2211.	-2.23	-0.70	-3.84
UØSVZ	.060	-7897.	13325.	-149.	16.92	6.42	0.35
	-.060	7787.	-13053.	136.	-16.49	-6.26	-0.43
SSVX	.050	-4.	12.	-1.	0.01	0.05	-0.03
	-.050	31.	-68.	0.	-0.08	-0.08	0.03
SSVY	.050	10.	-23.	-2.	-0.04	-0.01	-0.02
	-.050	21.	-40.	3.	-0.04	-0.03	0.02
SSVZ	.050	2.	-2.	1.	0.02	0.08	-0.00
	-.050	22.	-45.	-1.	-0.08	-0.11	-0.00

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		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
SFSVX	.00003	-9926.	20818.	-184.	25.31	13.51	0.57
	-.00003	10139.	-21193.	186.	-25.75	-13.78	-0.58
SFSVY	.00003	-1061.	2812.	-19.	3.13	2.04	0.07
	-.00003	1137.	-2962.	20.	-3.31	-2.13	-0.07
SFSVZ	.00003	9.	-18.	-15.	-0.02	-0.01	-0.11
	-.00003	-6.	17.	14.	0.02	0.01	0.11
ABSVX	.00003	-9206.	19647.	-174.	24.33	12.80	0.53
	-.00003	9332.	-19863.	175.	-24.58	-12.97	-0.54
ABSVY	.00003	817.	-234.	13.	-0.73	0.93	-0.02
	-.00003	-749.	102.	-13.	0.57	-1.01	0.02
ABSVZ	.00003	-140.	268.	701.	0.31	0.18	0.95
	-.00003	147.	-289.	-701.	-0.34	-0.19	-0.95
CHI1X	.00196	73.	-162.	-290.	-0.17	-0.22	-0.07
	-.00196	-60.	143.	289.	0.15	0.21	0.07
CHI1Y	.00573	-454.	998.	1939.	1.55	0.67	2.03
	-.00573	459.	-1009.	-1939.	-1.56	-0.67	-2.03
CHI1Z	.00196	-4686.	8465.	-86.	10.57	4.65	0.24
	-.00196	4727.	-8537.	85.	-10.65	-4.70	-0.25
EPSVXZ	.00834	-72.	-16.	2.	-0.58	-0.02	-0.00
	-.00834	95.	-36.	-1.	0.51	-0.01	-0.00
EPSVXY	.00393	8813.	-18738.	162.	-22.46	-12.33	-0.51
	-.00393	-8764.	18683.	-162.	22.39	12.27	0.51
EPSVYZ	.00834	16.	40.	0.	-0.03	0.53	-0.00
	-.00834	5.	-83.	-1.	-0.02	-0.55	-0.00
EPSVYX	.00278	506.	1071.	9.	0.69	2.01	0.01
	-.00278	-402.	-1288.	-8.	-0.95	-2.15	-0.02
EPSVZY	.00879	-355.	718.	1297.	0.85	0.48	0.33
	-.00879	353.	-711.	-1299.	-0.84	-0.47	-0.33
EPSVZX	.00834	772.	-1528.	-2821.	-1.79	-1.00	-2.96
	-.00834	-740.	1454.	2822.	1.70	0.96	2.96
RSS		23754.	44000.	8865.	58.67	42.66	37.76

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TABLE 35

ERRØRS AT WAITING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		ER FT	EV FT/SEC	EBETA E-3 DEG	EINCL E-3 DEG	ENØDE E-3 DEG
EISP1	0.419	-71.	-0.27	0.5	-0.4	0.3
	-0.419	79.	0.27	-0.5	0.4	-0.3
EDWGT1	0.716	-48.	-0.16	0.3	-0.2	0.1
	-0.716	26.	0.10	-0.2	0.2	-0.2
EM1	0.895	109.	0.35	-0.6	0.6	-0.4
	-0.895	148.	0.59	-0.9	0.9	-0.6
EFUEL1	0.5	-67.	-0.19	0.3	-0.3	0.1
	-0.5	21.	0.07	-0.2	0.1	-0.2
EWGT1	2.846	63.	0.20	-0.3	0.3	-0.2
	-2.846	-56.	-0.18	0.3	-0.3	0.2
ECD	10.0	30.	0.06	-0.1	0.1	-0.1
	-10.0	-26.	-0.09	0.2	-0.1	0.2
ERHØA	10.0	33.	0.11	-0.2	0.2	-0.1
	-10.0	-28.	-0.09	0.2	-0.2	0.1
EISP2	0.427	-72.	-0.24	0.4	-0.4	0.3
	-0.427	81.	0.24	-0.4	0.4	-0.2
EDWGT2	1.34	-36.	-0.13	0.2	-0.2	0.2
	-1.34	62.	0.24	-0.3	0.4	-0.2
EM2	0.895	-25.	-0.04	0.1	-0.1	0.1
	-0.895	48.	0.15	-0.2	0.2	-0.2
EFUEL2	0.5	-11.	-0.05	0.1	-0.1	0.0
	-0.5	15.	0.00	-0.0	0.0	-0.0
EWGT2	2.402	75.	0.23	-0.4	0.4	-0.3
	-2.402	-73.	-0.27	0.5	-0.4	0.3
EISP3	0.939	-58.	-0.10	0.1	-0.1	-0.2
	-0.939	61.	0.06	-0.1	0.1	0.2
EDWGT3	3.0	-114.	0.03	-0.4	0.1	-1.6
	-3.0	139.	-0.05	0.7	-0.2	2.1
EM3	2.0	-19.	0.00	0.4	-0.1	-0.2
	-2.0	18.	-0.01	-0.0	0.0	0.2

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		ER FT	EV FT/SEC	ERETA E-3 DEG	EINCL E-3 DEG	ENØDE E-3 DEG
FFUEL3	1.0	-21.	-0.05	0.1	-0.1	0.0
	-1.0	27.	0.07	-0.1	0.1	-0.0
EWGT3	1.936	-23.	-0.06	0.1	-0.1	0.0
	-1.936	23.	0.06	-0.1	0.1	-0.0
E4ØFF1	0.03	2.	0.01	-0.0	0.0	0.
	-0.03	5.	-0.00	0.0	-0.0	0.0
E4ØFF2	0.03	244.	1.24	0.3	-0.2	0.9
	-0.03	-244.	-1.25	-0.3	0.2	-0.9
ELLAGE	5.0	-5.	-0.02	-0.0	-0.0	0.0
	-5.0	-4.	-0.05	-0.0	-0.0	0.0
FVENTR	20.0	3469.	8.31	-12.1	12.5	1.8
	-20.0	-3471.	-8.34	12.0	-12.5	-1.9
RSS		3491.	8.84	12.2	12.5	3.1

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TABLE 36

ACTUAL DEVIATIØNS AT WAITING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
FISP1	0.419	22622.	-20.27	71.6	-1.7	-7.2	209.4	14.9
	-0.419	-23099.	20.73	-73.6	2.1	9.4	-215.2	-18.1
FDWGT1	0.716	7810.	-7.09	24.9	-0.8	-2.9	73.3	5.7
	-0.716	-9583.	8.58	-30.4	0.9	3.9	-88.9	-7.2
FM1	0.895	-31819.	28.54	-101.5	3.0	13.8	-297.0	-29.4
	-0.895	-49098.	44.09	-157.0	4.9	22.6	-459.4	-50.0
FFUEL1	0.5	9360.	-8.50	29.9	-0.9	-3.1	88.0	5.3
	-0.5	-10733.	9.56	-34.0	0.8	4.0	-99.1	-6.5
FWGT1	2.846	-18649.	16.71	-59.4	1.7	7.6	-173.7	-15.9
	-2.846	18549.	-16.58	58.7	-1.4	-6.1	171.6	14.4
FCD	10.0	-8822.	7.87	-28.0	0.7	3.2	-81.6	-5.4
	-10.0	8714.	-7.80	27.6	-0.7	-2.8	80.6	4.8
FRHØA	10.0	-7217.	6.51	-22.9	0.6	2.6	-67.3	-3.8
	-10.0	7285.	-6.54	23.1	-0.6	-2.3	67.6	3.9
FISP2	0.427	22690.	-20.30	71.7	-1.7	-7.2	209.8	14.2
	-0.427	-22855.	20.48	-72.7	2.0	9.2	-212.7	-16.9
FDWGT2	1.34	11160.	-10.00	35.4	-1.0	-4.3	103.5	6.3
	-1.34	-13868.	12.54	-44.2	1.4	5.9	-130.1	-9.0
FM2	0.895	7447.	-6.63	23.6	-0.5	-2.5	68.6	2.5
	-0.895	-10105.	9.10	-32.2	0.9	3.8	-94.4	-5.8
FFUEL2	0.5	2923.	-2.63	9.3	-0.3	-1.1	27.4	3.2
	-0.5	-3350.	2.97	-10.6	0.2	1.3	-30.9	-3.4
FWGT2	2.402	-21319.	19.11	-67.9	1.9	8.6	-198.4	-15.0
	-2.402	21289.	-19.10	67.4	-1.6	-6.7	197.2	13.6
FISP3	0.939	-12695.	11.06	-39.7	-0.8	-3.9	-114.1	1658.2
	-0.939	12801.	-11.17	40.0	0.8	4.5	114.9	-1681.2
FDWGT3	3.0	-94544.	83.56	-301.5	-1.9	-13.0	-871.2	2558.6
	-3.0	112746.	-99.04	349.3	2.8	19.7	1011.1	-3261.1
FM3	2.0	-7060.	6.21	-22.3	-1.7	-9.9	-63.9	788.1
	-2.0	4850.	-4.27	15.3	2.5	14.3	43.4	-591.1

		R FT	V FT/SEC	BETA E-3 DEG	INCL E-3 DEG	NØDE E-3 DEG	PHIT E-3 DEG	FUEL LBS
FFUEL3	1.0	482.	-0.50	1.7	2.1	12.3	4.6	260.8
	-1.0	-1867.	1.74	-6.1	-1.5	-9.2	-17.7	-210.4
FWGT3	1.936	489.	-0.51	1.7	2.1	12.8	4.7	-2129.3
	-1.936	-1956.	1.80	-6.3	-1.6	-9.5	-18.3	2182.4
F4ØFF1	0.03	-360.	0.32	-1.1	0.1	0.3	-3.3	17.7
	-0.03	369.	-0.33	1.2	-0.1	-0.3	3.4	-18.1
F4ØFF2	0.03	244.	1.24	0.3	-0.2	0.9	2.2	-14.0
	-0.03	-245.	-1.25	-0.3	0.2	-0.9	-2.2	14.1
FULAGE	5.0	-699.	0.59	-2.2	-0.0	0.0	-6.3	4.7
	-5.0	682.	-0.66	2.2	-0.0	-0.0	6.6	-3.9
FVENTR	20.0	-915.	12.18	-25.9	12.5	1.8	-134.8	-40.5
	-20.0	937.	-12.23	25.9	-12.5	-1.9	135.0	38.9
RSS		133702.	118.65	418.1	15.0	43.8	1219.2	4349.7

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TABLE 37

ACTUAL DEVIATIØNS AT WAITING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EISP1	0.419	57246.	-63940.	-8703.	-68.17	-34.39	1.89	2.211
	-0.419	-58905.	65484.	8655.	69.87	35.65	-2.41	-2.293
FDWGT1	0.716	19959.	-22388.	-2953.	-23.89	-12.11	0.74	0.251
	-0.716	-24336.	27053.	3573.	28.86	14.67	-1.01	-0.444
EM1	0.895	-70593.	78366.	10346.	83.60	42.71	-2.98	-2.927
	-0.895	-142855.	158079.	20454.	168.72	86.76	-6.77	-5.954
FFUFL1	0.5	23945.	-26891.	-3606.	-28.70	-14.56	0.79	1.250
	-0.5	-27175.	30127.	4056.	32.13	16.32	-1.04	-1.438
FWGT1	2.846	-47528.	52867.	6997.	56.38	28.76	-1.95	-1.819
	-2.846	46935.	-52368.	-7126.	-55.80	-28.20	1.61	1.789
FCD	10.0	-22359.	24820.	3345.	26.47	13.44	-0.84	-0.871
	-10.0	22056.	-24558.	-3348.	-26.19	-13.24	0.73	0.859
FRHØA	10.0	-18384.	20498.	2741.	21.89	11.11	-0.66	-0.716
	-10.0	18478.	-20602.	-2801.	-21.98	-11.11	0.60	0.723
EISP2	0.427	57369.	-64033.	-8732.	-68.25	-34.44	1.90	2.535
	-0.427	-58234.	64700.	8568.	69.03	35.21	-2.38	-2.576
FDWGT2	1.34	28293.	-31562.	-4198.	-33.64	-17.04	1.11	-1.017
	-1.34	-35497.	39661.	5165.	42.32	21.60	-1.50	0.749
EM2	0.895	18810.	-20904.	-2850.	-22.28	-11.27	0.64	0.018
	-0.895	-25790.	28777.	3831.	30.71	15.63	-0.97	-0.188
FFUFL2	0.5	7473.	-8374.	-1113.	-8.93	-4.55	0.28	1.363
	-0.5	-8479.	9415.	1274.	10.02	5.10	-0.33	-1.411
FWGT2	2.402	-54311.	60354.	7996.	64.39	32.83	-2.21	-2.398
	-2.402	53904.	-60217.	-8197.	-64.20	-32.40	1.77	2.377
EISP3	0.939	-31617.	34581.	6010.	37.12	18.51	0.91	-2.093
	-0.939	31789.	-34893.	-6123.	-37.44	-18.56	-1.03	2.104
FDWGT3	3.0	-240684.	262831.	42843.	282.55	144.07	3.10	-14.773
	-3.0	277752.	-309928.	-50883.	-330.71	-161.68	-3.55	17.035
EM3	2.0	-17661.	19417.	4474.	21.06	10.27	2.44	-2.070
	-2.0	12047.	-13208.	-4137.	-14.55	-6.83	-3.55	1.524

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TABLE 38

UNCERTAINTIES AT WAITING ØRBIT INSERTIØN
DUE TØ PERFØRMANCE ERRØRS

		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
FISP1	0.419	-456.	1008.	69.	1.09	0.65	0.09
	-0.419	464.	-1024.	-69.	-1.11	-0.68	-0.09
FDWGT1	0.716	-259.	602.	20.	0.66	0.40	0.04
	-0.716	176.	-376.	-30.	-0.41	-0.25	-0.03
FM1	0.895	609.	-1355.	-93.	-1.45	-0.91	-0.12
	-0.895	1007.	-2156.	-143.	-2.33	-1.42	-0.19
FFUEL1	0.5	-314.	750.	26.	0.82	0.50	0.05
	-0.5	112.	-244.	-32.	-0.25	-0.16	-0.03
FWGT1	2.846	341.	-765.	-55.	-0.82	-0.51	-0.07
	-2.846	-298.	674.	56.	0.71	0.43	0.07
FCD	10.0	108.	-256.	-28.	-0.26	-0.18	-0.03
	-10.0	-147.	325.	27.	0.35	0.21	0.03
FRHØA	10.0	182.	-410.	-21.	-0.45	-0.28	-0.03
	-10.0	-158.	350.	22.	0.38	0.22	0.03
FISP2	0.427	-396.	897.	68.	0.96	0.58	0.08
	-0.427	414.	-925.	-70.	-0.99	-0.62	-0.08
FDWGT2	1.34	-221.	488.	35.	0.52	0.32	0.04
	-1.34	418.	-920.	-41.	-1.02	-0.61	-0.06
FM2	0.895	-84.	201.	23.	0.20	0.14	0.02
	-0.895	242.	-568.	-27.	-0.62	-0.39	-0.04
FFUEL2	0.5	-83.	187.	8.	0.20	0.12	0.01
	-0.5	14.	-47.	-12.	-0.04	-0.04	-0.01
FWGT2	2.402	408.	-897.	-65.	-0.96	-0.59	-0.08
	-2.402	-442.	985.	65.	1.07	0.64	0.08
FISP3	0.939	-130.	430.	-52.	0.47	0.28	-0.03
	-0.939	92.	-358.	51.	-0.39	-0.24	0.04
FDWGT3	3.0	126.	252.	-338.	0.33	0.18	-0.29
	-3.0	-181.	-254.	401.	-0.35	-0.19	0.33
FM3	2.0	14.	24.	-46.	0.04	0.02	-0.05
	-2.0	-39.	28.	39.	0.03	0.01	0.04

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EFUEL3	1.0	1270.	-1462.	-1992.	-1.93	-0.59	-3.09	0.918
	-1.0	-4823.	5449.	2143.	5.10	2.80	2.31	-1.135
EWGT3	1.936	1293.	-1493.	-2065.	-1.98	-0.60	-3.21	0.945
	-1.936	-5003.	5609.	2218.	6.28	2.87	2.37	-1.178
E40FF1	0.03	-910.	1011.	109.	1.07	0.54	-0.09	0.805
	-0.03	934.	-1039.	-111.	-1.10	-0.57	0.08	-0.804
E40FF2	0.03	612.	-676.	-105.	0.06	-1.57	-0.41	0.030
	-0.03	-615.	678.	106.	-0.06	1.57	0.42	-0.030
FULAGE	5.0	-1737.	1902.	298.	2.00	1.02	-0.01	-0.055
	-5.0	1777.	-2020.	-295.	-2.20	-1.10	0.00	0.041
FVFNTR	20.0	-24881.	47363.	1681.	51.14	29.73	0.85	-0.667
	-20.0	24811.	-47455.	-1693.	-51.27	-29.63	-0.85	0.670
RSS		333401.	373557.	57885.	390.58	198.05	10.45	18.931

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		ERNX FT	ERNY FT	ERNZ FT	EVNX FT/SEC	EVNY FT/SEC	EVNZ FT/SEC
FFUEL3	1.0	-90.	229.	7.	0.25	0.15	0.02
	-1.0	126.	-308.	-10.	-0.34	-0.20	-0.02
FWGT3	1.936	-94.	242.	8.	0.26	0.16	0.02
	-1.936	96.	-238.	-11.	-0.25	-0.15	-0.02
F4ØFF1	0.03	8.	-10.	-2.	-0.01	-0.01	-0.00
	-0.03	-17.	20.	2.	0.02	0.01	0.00
F4ØFF2	0.03	7.	-9.	-1.	-0.01	-0.01	0.00
	-0.03	5.	-5.	-2.	-0.01	-0.00	-0.00
FULAGE	5.0	3.	15.	-4.	0.05	0.01	-0.00
	-5.0	-46.	102.	0.	0.15	0.07	0.01
FVFNTR	20.0	13855.	-35169.	207.	-38.10	-23.17	-0.87
	-20.0	-13725.	35181.	-205.	38.14	23.03	0.87
RSS		13936.	35336.	502.	38.32	23.27	0.98

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TABLE 39

CØVARIANCE MATRIX ØF ERRØRS
AT WAITING ØRBIT INSERTIØN

	ER	EV	EBETA	EINCL	ENØDE
ER	1.88E 03	-0.3	0.5	0.2	-0.3
EV	-9.17E 03	1.39E 01	-0.8	0.7	-0.3
EBETA	1.89E 01	-2.13E-01	1.90E-02	-0.4	-0.3
EINCL	2.59E 00	9.52E-02	-6.88E-05	9.16E-03	-0.4
ENØDE	-2.39E 01	-1.73E-01	-3.01E-04	-1.85E-04	4.71E-02

TABLE 40

CØVARIANCE MATRIX ØF ACTUAL DEVIATIØNS
AT WAITING ØRBIT INSERTIØN

	R	V	BETA	INCL	NØDE	PHIT	FUEL
R	3.75E 04	-0.9	1.0	-0.0	0.0	1.0	-0.8
V	-1.76E 06	3.61E 01	-1.0	0.3	-0.1	-0.9	0.7
BETA	4.48E 03	-4.19E 00	1.21E-01	-0.1	-0.0	1.0	-0.8
INCL	-8.61E 00	1.05E-01	-1.04E-04	9.38E-03	-0.4	-0.1	-0.1
NØDE	1.01E 01	-2.01E-01	-1.94E-04	-1.64E-04	4.83E-02	0.0	-0.1
PHIT	1.30E 04	-1.20E 01	4.18E-02	-4.74E-04	3.14E-04	3.50E-01	-0.7
FUEL	-3.18E 07	2.79E 04	-1.01E 02	-8.55E-01	-5.02E 00	-2.90E 02	1.11E 03

TABLE 41

CØVARIANCE MATRIX ØF ACTUAL DEVIATIØNS
AT WAITING ØRBIT INSERTIØN

	RPX	RPY	RPZ	VPX	VPY	VPZ	TIME
RPX	9.57E 04	-1.0	-1.0	-1.0	-1.0	-0.0	1.0
RPY	-1.02E 10	1.07E 05	1.0	1.0	1.0	0.0	-0.9
RPZ	-1.55E 09	1.72E 09	1.67E 04	1.0	0.9	0.2	-1.0
VPX	-1.09E 07	1.22E 07	1.85E 06	1.15E 02	1.0	0.1	-0.9
VPY	-5.52E 06	6.19E 06	9.41E 05	6.63E 03	5.95E 01	0.0	-0.9
VPZ	-1.17E 04	2.82E 04	3.80E 04	1.02E 02	1.44E 01	1.28E 01	-0.1
TIME	5.08E 05	-5.59E 05	-8.88E 04	-6.00E 02	-3.05E 02	-3.65E 00	5.52E 00

TABLE 42

COVARIANCE MATRIX OF UNCERTAINTIES
AT WAITING ORBIT INSERTION

	ERNX	ERNY	ERNZ	EVNX	EVNY	EVNZ
ERNX	9.12E 03	-1.0	0.1	-0.9	-0.4	0.0
ERNY	-1.66E 08	1.87E 04	0.0	1.0	0.6	0.1
ERNZ	2.12E 06	1.76E 05	2.95E 03	0.2	0.1	0.9
EVNX	-2.00E 05	4.20E 05	1.25E 04	2.32E 01	0.5	0.3
EVNY	-6.59E 04	1.76E 05	6.61E 03	1.80E 02	1.61E 01	0.0
EVNZ	1.61E 03	1.52E 04	3.16E 04	8.68E 01	7.36E 00	1.26E 01

TABLE 43

ACTUAL DEVIATIØNS AT FIXED TIME NØ. 3
DUE TØ PLATFØRM ERRØRS

		ERCR FT	ERDR FT	ERDP FT	EVCR FT/SEC	EVDR FT/SEC	EVDP FT/SEC
GDSVX	.100	1794.	-4879.	1723.	-3.26	-19.23	8.56
	-.100	-1701.	4898.	-1720.	3.41	19.20	-8.57
GDSVY	.075	-10158.	1217.	-3282.	-36.93	-0.83	-16.93
	-.075	10174.	-1204.	3250.	37.01	0.75	16.69
GDSVZ	.075	1528.	11339.	3279.	-4.58	-33.34	-9.10
	-.075	-1525.	-11346.	-3330.	4.62	33.24	8.89
USSVX	.100	415.	-600.	120.	-0.40	-1.50	0.89
	-.100	-407.	664.	-121.	0.40	1.51	-0.97
USSVY	.075	-1955.	1410.	-68.	-2.14	0.18	-1.91
	-.075	1992.	-1180.	48.	2.17	-0.20	1.52
USSVZ	.100	1.	12.	-19.	0.02	0.19	-0.12
	-.100	-3.	-17.	23.	-0.02	-0.18	0.13
UISVX	.100	10.	34.	-9.	0.08	0.10	-0.06
	-.100	-14.	-77.	4.	-0.08	-0.09	0.11
UISVY	.075	24.	-25.	22.	0.18	0.00	0.12
	-.075	-34.	-16.	-13.	-0.17	-0.00	-0.06
UISVZ	.075	2594.	20318.	2257.	-1.37	-3.90	-23.27
	-.075	-2597.	-20333.	-2278.	1.36	3.88	23.29
LØSVX	.060	372.	-328.	26.	0.04	-0.37	0.39
	-.060	-368.	304.	-20.	-0.00	0.36	-0.35
UØSVY	.060	-2383.	1398.	-159.	-3.64	0.21	-2.32
	-.060	2385.	-1404.	149.	3.64	-0.20	2.31
UØSVZ	.060	1922.	15172.	1206.	-0.79	-1.33	-18.04
	-.060	-1868.	-14809.	-1215.	0.86	1.30	17.51
SSVX	.050	5.	2.	-8.	0.04	0.04	-0.01
	-.050	-12.	-77.	3.	-0.03	-0.04	0.10
SSVY	.050	1.	-23.	2.	0.02	0.00	0.04
	-.050	-10.	-29.	3.	-0.02	0.00	0.03
SSVZ	.050	-1.	-2.	-8.	0.01	0.07	-0.04
	-.050	-6.	-32.	12.	-0.01	-0.07	0.09

		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
SFSVX	.00003	2875.	23167.	-415.	-0.78	1.65	-28.76
	-.00003	-2928.	-23519.	415.	0.79	-1.70	29.20
SFSVY	.00003	374.	3143.	-278.	-0.05	0.53	-3.81
	-.00003	-395.	-3205.	309.	0.06	-0.54	3.92
SFSVZ	.00003	22.	-13.	2.	0.11	-0.01	0.02
	-.00003	-22.	21.	-3.	-0.11	0.02	-0.02
ABSVX	.00003	2699.	20659.	-941.	-0.76	1.46	-26.60
	-.00003	-2730.	-20852.	942.	0.77	-1.49	26.85
ABSVY	.00003	-63.	615.	-337.	0.17	1.17	-0.67
	-.00003	46.	-683.	358.	-0.17	-1.18	0.77
ABSVZ	.00003	-708.	240.	-33.	-0.82	0.13	-0.20
	-.00003	704.	-261.	33.	0.82	-0.13	0.23
CHI1X	.00196	271.	-217.	6.	0.03	-0.13	0.24
	-.00196	-273.	219.	-3.	-0.03	0.14	-0.23
CHI1Y	.00573	-1962.	1348.	-37.	-1.85	0.19	-1.68
	-.00573	1961.	-1388.	27.	1.85	-0.19	1.72
CHI1Z	.00196	1199.	9545.	440.	-0.45	-0.24	-11.52
	-.00196	-1209.	-9612.	-442.	0.45	0.23	11.61
EPSVXZ	.00834	3.	-91.	82.	0.03	0.18	0.67
	-.00834	-11.	30.	-81.	-0.02	-0.18	-0.59
EPSVXY	.00393	-2562.	-21008.	414.	0.67	-1.75	25.83
	-.00393	2572.	20963.	-427.	-0.67	1.74	-25.78
EPSVYZ	.00834	8.	101.	-34.	0.05	0.49	-0.18
	-.00834	-13.	-99.	49.	-0.05	-0.49	0.20
EPSVYX	.00278	98.	1065.	-941.	0.17	1.56	-1.63
	-.00278	-128.	-1247.	963.	-0.16	-1.57	1.87
EPSVZY	.00879	-1224.	940.	12.	-0.24	0.10	-0.94
	-.00879	1225.	-900.	-4.	0.24	-0.09	0.90
EPSVZX	.00834	2825.	-1957.	-21.	2.64	-0.46	1.89
	-.00834	-2837.	1872.	24.	-2.63	0.46	-1.78
RSS		12953.	48406.	5842.	37.90	38.91	61.02

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TABLE 44

UNCERTAINTIES AT FIXED TIME NØ. 3
DUE TØ PLATFØRM ERRØRS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
GDSVX	.100	-1792.	4885.	-1722.	3.27	19.22	-8.57
	-.100	1760.	-4868.	1728.	-3.41	-19.20	8.54
GDSVY	.075	10166.	-1241.	3273.	36.93	0.76	16.90
	-.075	-10183.	1262.	-3232.	-37.00	-0.77	-16.74
GDSVZ	.075	-1528.	-11254.	-3254.	4.58	33.34	9.04
	-.075	1521.	11312.	3308.	-4.62	-33.25	-8.84
USSVX	.100	-414.	588.	-124.	0.40	1.50	-0.88
	-.100	407.	-644.	127.	-0.40	-1.50	0.96
USSVY	.075	1955.	-1402.	70.	2.14	-0.18	1.90
	-.075	-1992.	1195.	-43.	-2.17	0.21	-1.53
USSVZ	.100	-1.	-10.	20.	-0.02	-0.19	0.12
	-.100	3.	42.	-16.	0.02	0.19	-0.15
UISVX	.100	-10.	-33.	9.	-0.08	-0.09	0.06
	-.100	13.	76.	-4.	0.08	0.09	-0.11
UISVY	.075	-24.	54.	-12.	-0.18	-0.00	-0.14
	-.075	33.	23.	15.	0.17	0.01	0.05
UISVZ	.075	-2594.	-20294.	-2261.	1.37	3.89	23.26
	-.075	2595.	20322.	2248.	-1.37	-3.91	-23.27
UØSVX	.060	-372.	342.	-22.	-0.05	0.37	-0.40
	-.060	368.	-286.	25.	-0.00	-0.36	0.34
UØSVY	.060	2383.	-1410.	154.	3.64	-0.20	2.33
	-.060	-2386.	1398.	-151.	-3.64	0.20	-2.31
UØSVZ	.060	-1922.	-15066.	-1177.	0.78	1.34	17.96
	-.060	1867.	14780.	1189.	-0.86	-1.32	-17.49
SSVX	.050	-5.	-15.	3.	-0.04	-0.03	0.03
	-.050	12.	78.	-3.	0.03	0.04	-0.10
SSVY	.050	-1.	25.	-2.	-0.02	0.00	-0.04
	-.050	9.	44.	1.	0.02	0.00	-0.04
SSVZ	.050	0.	-4.	5.	-0.01	-0.07	0.05
	-.050	6.	56.	-4.	0.01	0.07	-0.11

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
SFSVX	.00003	-2859.	-23026.	444.	0.80	-1.66	28.64
	-.00003	2909.	23454.	-469.	-0.82	1.66	-29.16
SFSVY	.00003	-369.	-3040.	310.	0.06	-0.53	3.72
	-.00003	389.	3207.	-310.	-0.07	0.54	-3.92
SFSVZ	.00003	-22.	23.	0.	-0.11	0.01	-0.02
	-.00003	22.	-21.	3.	0.11	-0.02	0.02
ABSVX	.00003	-2689.	-21666.	612.	0.78	-1.47	27.50
	-.00003	2717.	21915.	-635.	-0.79	1.46	-27.80
ABSVY	.00003	69.	401.	658.	-0.17	-1.17	-0.23
	-.00003	-52.	-253.	-655.	0.16	1.18	0.06
ABSVZ	.00003	738.	-393.	-17.	0.87	-0.13	0.34
	-.00003	-735.	415.	15.	-0.87	0.13	-0.37
CHI1X	.00196	-271.	223.	-5.	-0.03	0.14	-0.24
	-.00196	273.	-200.	8.	0.03	-0.13	0.22
CHI1Y	.00573	1963.	-1336.	40.	1.85	-0.19	1.67
	-.00573	-1961.	1349.	-39.	-1.85	0.19	-1.68
CHI1Z	.00196	-1198.	-9509.	-430.	0.45	0.24	11.49
	-.00196	1207.	9592.	427.	-0.45	-0.24	-11.59
EPSVXZ	.00834	-4.	-26.	-120.	-0.03	-0.18	-0.57
	-.00834	11.	82.	118.	0.03	0.18	0.49
EPSVXY	.00393	2564.	20707.	-534.	-0.69	1.72	-25.56
	-.00393	-2557.	-20637.	516.	0.69	-1.74	25.48
EPSVYZ	.00834	-8.	-75.	43.	-0.06	-0.49	0.17
	-.00834	13.	121.	-43.	0.06	0.50	-0.22
EPSVYX	.00278	-90.	-959.	974.	-0.16	-1.56	1.54
	-.00278	119.	1200.	-978.	0.15	1.57	-1.84
EPSVZY	.00879	1216.	-955.	-18.	0.21	-0.10	0.96
	-.00879	-1219.	948.	18.	-0.21	0.09	-0.94
EPSVZX	.00834	-2838.	2070.	57.	-2.67	0.46	-1.98
	-.00834	2849.	-1990.	-62.	2.66	-0.46	1.68
RSS		12952.	48664.	5815.	37.90	38.91	61.26

TABLE 45

ACTUAL DEVIATIØNS AT FIXED TIME NØ. 3
DUE TØ PERFØRMANCE ERRØRS

		ERCR FT	ERDR FT	ERUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
EISP1	0.419	1357.	17333.	5056.	1.59	0.07	-15.60
	-0.419	-1711.	-17020.	-4953.	-2.10	-0.09	15.35
EDWGT1	0.716	572.	21039.	6394.	0.64	0.04	-18.82
	-0.716	-709.	-21434.	-6630.	-0.89	-0.03	19.10
EM1	0.895	-2491.	-23188.	-6730.	-3.11	-0.16	20.90
	-0.895	-4058.	-24367.	-6773.	-5.08	-0.21	22.16
EFUEL1	0.5	618.	-1914.	-918.	0.65	0.08	1.48
	-0.5	-711.	3110.	1085.	-0.89	-0.00	-2.72
EWGT1	2.846	-1370.	-14654.	-4284.	-1.70	-0.09	13.19
	-2.846	1122.	14849.	4374.	1.37	0.06	-13.32
ECD	10.0	-579.	-6409.	-1919.	-0.72	-0.02	5.73
	-10.0	521.	6391.	1890.	0.62	0.01	-5.74
ERHØA	10.0	-492.	-5349.	-1535.	-0.57	-0.02	4.85
	-10.0	443.	5285.	1538.	0.50	0.01	-4.76
EISP2	0.427	1344.	8197.	2209.	1.58	0.07	-7.48
	-0.427	-1677.	-7917.	-2112.	-2.06	-0.07	7.24
EDWGT2	1.34	787.	68989.	21508.	1.00	-0.04	-61.22
	-1.34	-1103.	-71486.	-22269.	-1.36	-0.21	63.70
EM2	0.895	448.	25904.	8089.	0.56	-0.00	-22.98
	-0.895	-709.	-30956.	-9549.	-0.85	-0.08	27.61
EFUEL2	0.5	206.	-28507.	-9101.	0.21	0.01	25.23
	-0.5	-216.	28550.	9039.	-0.26	-0.03	-25.30
EWGT2	2.402	-1558.	-7518.	-2009.	-1.91	-0.06	6.87
	-2.402	1274.	7871.	2083.	1.47	0.07	-7.22
EISP3	0.939	685.	15964.	4843.	0.97	0.08	-14.33
	-0.939	-763.	-15919.	-4863.	-1.11	-0.09	14.27
EDWGT3	3.0	2070.	88763.	27787.	3.55	0.08	-78.97
	-3.0	-3073.	-96185.	-30358.	-5.23	-0.49	85.90
EM3	2.0	1647.	34499.	10871.	2.39	-0.01	-30.61
	-2.0	-2355.	-26657.	-8423.	-3.43	-0.02	23.66

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		ERCR FT	ERDR FT	FRUP FT	EVCR FT/SEC	EVDR FT/SEC	EVUP FT/SEC
FFUEL3	1.0	-2012.	-24259.	-7775.	-2.96	0.02	21.45
	-1.0	1488.	25510.	8186.	2.22	-0.06	-22.52
FWGT3	1.936	-2090.	-25000.	-8016.	-3.07	0.02	22.10
	-1.936	1541.	26522.	8475.	2.28	-0.04	-23.44
F40FF1	.03	-55.	-24374.	-7702.	-0.10	-0.01	21.41
	-.03	57.	24356.	7677.	0.10	-0.00	-21.58
F40FF2	.03	-21.	124.	28.	-0.24	1.44	0.32
	-.03	21.	-124.	-28.	0.24	-1.44	-0.32
FULAGE	5.0	1.	-827.	-276.	-0.00	-0.01	0.49
	-5.0	16.	816.	211.	-0.01	0.00	-0.79
EVENTR	20.0	-4610.	-34427.	4362.	0.98	-4.81	41.41
	-20.0	4603.	34374.	-4430.	-0.99	4.73	-41.38
RSS		8667.	149990.	45850.	10.27	5.06	136.63

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TABLE 46

UNCERTAINTIES AT FIXED TIME NO. 3
DUE TO PERFORMANCE ERRORS

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
EISP1	0.419	-105.	-1125.	71.	0.11	-0.10	1.28
	-0.419	109.	1145.	-80.	-0.12	0.11	-1.32
EDWGT1	0.716	-60.	-661.	45.	0.04	-0.07	0.78
	-0.716	27.	420.	-22.	-0.04	0.04	-0.49
EM1	0.895	144.	1514.	-114.	-0.16	0.16	-1.73
	-0.895	243.	2423.	-153.	-0.25	0.23	-2.77
EFUEL1	0.5	-95.	-826.	68.	0.06	-0.10	0.97
	-0.5	29.	279.	-27.	-0.05	0.03	-0.31
EWGT1	2.846	80.	854.	-66.	-0.09	0.09	-0.98
	-2.846	-66.	-752.	59.	0.09	-0.07	0.85
ECD	10.0	23.	286.	-32.	-0.04	0.04	-0.32
	-10.0	-32.	-364.	26.	0.04	-0.03	0.42
ERHOA	10.0	46.	456.	-31.	-0.04	0.05	-0.54
	-10.0	-37.	-390.	25.	0.04	-0.03	0.44
EISP2	0.427	-98.	-1001.	78.	0.11	-0.10	1.14
	-0.427	102.	1036.	-82.	-0.11	0.11	-1.18
EDWGT2	1.34	-3.	-532.	23.	0.03	-0.03	0.62
	-1.34	58.	1011.	-47.	-0.05	0.08	-1.19
EM2	0.895	-2.	-220.	21.	0.02	-0.02	0.25
	-0.895	47.	623.	-50.	-0.04	0.07	-0.74
EFUEL2	0.5	-46.	-214.	20.	0.03	-0.03	0.24
	-0.5	25.	59.	-19.	-0.02	0.03	-0.05
EWGT2	2.402	100.	1007.	-71.	-0.11	0.11	-1.14
	-2.402	-111.	-1099.	73.	0.11	-0.10	1.26
EISP3	0.939	-61.	-436.	51.	-0.05	-0.06	0.55
	-0.939	50.	356.	-51.	0.06	0.06	-0.45
EDWGT3	3.0	-56.	-94.	52.	-0.45	-0.07	0.33
	-3.0	56.	58.	-63.	0.51	0.09	-0.33
EM3	2.0	-6.	-2.	7.	-0.07	0.01	0.04
	-2.0	4.	-53.	-12.	0.06	-0.01	0.03

		ERNCR FT	ERNDR FT	ERNUP FT	EVNCR FT/SEC	EVNDR FT/SEC	EVNUP FT/SEC
EFUEL3	1.0	-41.	-255.	26.	0.03	-0.04	0.29
	-1.0	53.	343.	-32.	-0.03	0.05	-0.39
EWGT3	1.936	-42.	-269.	27.	0.03	-0.04	0.30
	-1.936	43.	267.	-27.	-0.03	0.04	-0.30
F40FF1	.03	-19.	7.	7.	0.01	-0.01	-0.01
	-.03	17.	-19.	-11.	-0.01	0.01	0.02
F40FF2	.03	0.	11.	3.	0.00	0.00	-0.01
	-.03	-0.	7.	2.	-0.00	0.00	-0.01
FULAGE	5.0	-4.	-11.	11.	0.00	0.01	0.05
	-5.0	-14.	-111.	9.	0.01	0.00	0.16
EVENTR	20.0	4608.	38073.	-3270.	-0.99	4.71	-44.67
	-20.0	-4610.	-38030.	3222.	0.98	-4.76	44.63
RSS		4625.	38250.	3281.	1.17	4.77	44.87

TABLE 47

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT FIXED TIME NO. 3

	ERCR	ERDR	ERUP	EVCR	EVDR	EVUP
ERCR	4.92E 03	0.4	0.3	0.7	-0.1	-0.4
ERDR	1.05E 08	5.00E 04	0.9	0.1	-0.0	-1.0
ERUP	2.10E 07	6.47E 08	1.45E 04	0.2	-0.1	-0.8
EVCR	4.58E 04	6.30E 04	3.85E 04	1.29E 01	0.2	0.0
EVDR	-6.33E 03	-1.07E 04	-1.91E 04	2.70E 01	1.31E 01	-0.0
EVUP	-8.92E 04	-2.35E 06	-5.64E 05	1.19E 01	-8.96E 00	4.76E 01

TABLE 48

COVARIANCE MATRIX OF UNCERTAINTIES
AT FIXED TIME NO. 3

	ERNCR	ERNDR	ERNUP	EVNCR	EVNDR	EVNUP
ERNCR	4.57E 03	0.5	0.3	0.7	-0.1	-0.3
ERNDR	4.74E 07	2.05E 04	-0.2	-0.1	-0.0	-1.0
ERNUP	3.43E 06	-7.75E 06	2.21E 03	0.4	-0.7	0.3
EVNCR	4.12E 04	-2.55E 04	1.12E 04	1.26E 01	0.2	0.3
EVNDR	-6.55E 03	-1.02E 04	-1.89E 04	2.67E 01	1.31E 01	-0.0
EVNUP	-3.83E 04	-5.04E 05	1.72E 04	9.07E 01	-9.39E 00	2.52E 01

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TABLE 49
ACTUAL DEVIATIØNS
IN SPACECRAFT DELTA-V
DUE TØ PLATFØRM ERRØRS

		DELV1 FT/SEC	DELV2 FT/SEC
GDSVX	.100	18.02	-0.02
	-.100	-17.95	0.03
GDSVY	.075	14.46	-0.01
	-.075	-14.24	0.02
GDSVZ	.075	40.21	-0.02
	-.075	-39.61	0.01
USSVX	.100	1.34	0.00
	-.100	-1.32	0.01
USSVY	.075	0.61	-0.00
	-.075	-0.40	0.01
USSVZ	.100	-0.14	0.01
	-.100	0.12	0.
UISVX	.100	-0.08	0.01
	-.100	0.06	0.01
UISVY	.075	-0.09	0.01
	-.075	0.06	0.01
UISVZ	.075	11.51	0.01
	-.075	-11.49	-0.00
UØSVX	.060	0.28	0.00
	-.060	-0.30	0.01
UØSVY	.060	0.94	-0.00
	-.060	-0.93	0.01
UØSVZ	.060	7.53	-0.03
	-.060	-7.20	-0.02
SSVX	.050	-0.03	0.00
	-.050	-0.00	0.
SSVY	.050	-0.02	-0.00
	-.050	-0.02	0.
SSVZ	.050	-0.05	-0.00
	-.050	0.02	0.01

		DELV1 FT/SEC	DELV2 FT/SEC
SFSVX	.00003	9.46	0.02
	-.00003	-9.62	-0.01
SFSVY	.00003	1.03	0.
	-.00003	-1.10	0.01
SFSVZ	.00003	0.00	-0.00
	-.00003	-0.02	-0.00
ABSVX	.00003	9.53	0.02
	-.00003	-9.61	-0.01
ABSVY	.00003	-0.95	0.01
	-.00003	0.89	0.
ABSVZ	.00003	-0.09	0.01
	-.00003	0.07	0.01
CHI1X	.00196	0.07	0.01
	-.00196	-0.09	0.
CHI1Y	.00573	0.45	-0.00
	-.00573	-0.46	0.01
CHI1Z	.00196	4.36	-0.01
	-.00196	-4.39	0.02
EPSVXZ	.00834	-0.70	0.01
	-.00834	0.67	0.01
EPSVXY	.00393	-8.15	-0.03
	-.00393	8.19	-0.03
EPSVYZ	.00834	-0.49	0.01
	-.00834	0.46	0.01
EPSVYX	.00278	-0.47	0.01
	-.00278	0.37	-0.00
EPSVZY	.00879	0.18	0.01
	-.00879	-0.18	0.01
EPSVZX	.00834	-0.00	-0.00
	-.00834	-0.04	0.01
RSS		51.16	0.07

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TABLE 50

ACTUAL DEVIATIØNS
IN SPACECRAFT DELTA-V
DUE TØ PERFØRMANCE ERRØRS

		DELV1 FT/SEC	DELV2 FT/SEC
EISP1	0.419	0.87	-0.01
	-0.419	-0.89	0.02
EDWGT1	0.716	0.41	-0.01
	-0.716	-0.35	0.01
EM1	0.895	-0.98	0.02
	-0.895	-1.97	0.04
EFUEL1	0.5	0.49	-0.00
	-0.5	-0.33	0.01
EWGT1	2.846	-0.68	0.01
	-2.846	0.65	-0.01
ECD	10.0	-0.28	0.01
	-10.0	0.31	-0.00
ERHØA	10.0	-0.32	0.01
	-10.0	0.29	-0.00
EISP2	0.427	0.82	-0.01
	-0.427	-0.84	0.02
EDWGT2	1.34	0.42	-0.01
	-1.34	-0.65	0.01
EM2	0.895	0.23	-0.00
	-0.895	-0.44	0.01
EFUEL2	0.5	0.12	0.01
	-0.5	-0.08	0.01
EWGT2	2.402	-0.79	0.02
	-2.402	0.84	-0.01
EISP3	0.939	-0.09	0.01
	-0.939	0.13	-0.01
EDWGT3	3.0	-1.88	0.06
	-3.0	2.19	-0.06
EM3	2.0	-0.12	0.01
	-2.0	0.08	-0.00

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		DELV1 FT/SEC	DELV2 FT/SEC
FFUEL2	1.0	0.09	0.01
	-1.0	-0.15	0.01
FWGT2	1.936	0.09	-0.00
	-1.936	-0.13	0.01
F40FF1	.03	-0.02	-0.00
	-.03	0.01	0.00
F40FF2	.03	-2.03	0.01
	-.03	2.04	-0.01
FLLAGF	5.0	0.03	-0.00
	-5.0	0.09	-0.00
EVENTR	20.0	-13.26	-0.00
	-20.0	13.40	0.01
RSS		14.01	0.07

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TABLE 51

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
IN SPACECRAFT DELTA-V

	DELV1	DELV2
DELV1	1.76E 01	-0.2
DELV2	-1.04E-01	3.11E-02

[redacted]

[redacted]

TABLE 52

ACTUAL DEVIATIØNS AT RE-ENTRY
WITHØUT SPACECRAFT BURNS
DUE TØ PLATFØRM ERRØRS

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
GDSVX	.100	-0.110	0.072	-13.44	-40.9	-93.7	0.92	-1.27
	-.100	0.110	-0.075	13.43	40.9	94.0	-0.88	1.45
GDSVY	.075	-0.024	0.292	-8.10	24.2	-5.7	1.15	-14.67
	-.075	0.025	-0.290	7.98	-23.8	6.0	-1.11	14.51
GDSVZ	.075	-0.212	0.219	-29.85	-88.4	-188.5	1.58	-6.64
	-.075	0.210	-0.228	29.67	89.1	190.2	-1.33	7.20
USSVX	.100	-0.009	0.006	-0.99	-2.9	-6.4	0.12	-0.09
	-.100	0.009	-0.005	0.98	2.9	6.4	-0.12	0.08
USSVY	.075	-0.002	0.010	-0.43	-0.7	-5.7	-0.14	-0.46
	-.075	0.002	-0.007	0.29	0.7	5.7	0.15	0.30
USSVZ	.100	0.001	0.000	0.12	0.7	1.3	-0.01	-0.06
	-.100	-0.001	-0.001	-0.11	-0.7	-1.3	0.00	0.07
UISVX	.100	0.001	-0.000	0.06	0.2	0.6	-0.01	-0.00
	-.100	-0.001	-0.000	-0.05	-0.2	-0.5	0.00	0.01
UISVY	.075	0.000	-0.002	0.05	-0.1	0.0	-0.01	0.08
	-.075	-0.000	0.001	-0.03	0.2	0.1	0.01	-0.07
UISVZ	.075	-0.042	0.114	-8.27	-19.6	-28.9	0.74	-4.99
	-.075	0.042	-0.115	8.27	19.6	29.0	-0.73	5.05
UØSVX	.060	-0.002	0.001	-0.20	-0.4	-0.5	0.06	-0.03
	-.060	0.002	-0.002	0.21	0.4	0.6	-0.06	0.04
UØSVY	.060	-0.003	0.017	-0.59	0.1	-6.0	-0.10	-0.84
	-.060	0.003	-0.017	0.59	-0.1	6.0	0.10	0.84
UØSVZ	.060	-0.023	0.085	-5.33	-11.6	-14.1	0.51	-3.87
	-.060	0.023	-0.081	5.16	11.5	14.0	-0.49	3.72
SSVX	.050	0.000	-0.000	0.02	0.1	0.2	-0.00	-0.00
	-.050	-0.000	-0.000	-0.00	-0.0	-0.1	0.00	0.02
SSVY	.050	0.000	-0.000	0.01	0.0	0.0	-0.00	0.02
	-.050	0.000	-0.000	0.01	0.1	0.0	-0.00	0.00
SSVZ	.050	0.001	0.000	0.05	0.3	0.5	-0.00	-0.03
	-.050	-0.000	-0.001	-0.03	-0.2	-0.5	0.00	0.04

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
SFSVX	.00003	-0.027	0.118	-6.96	-18.9	-14.5	0.70	-5.54
	-.00003	0.028	-0.121	7.09	19.4	14.9	-0.70	5.67
SFSVY	.00003	-0.004	0.012	-0.82	-3.5	-2.4	0.09	-0.53
	-.00003	0.004	-0.013	0.88	3.6	2.6	-0.09	0.57
SFSVZ	.00003	0.000	-0.000	-0.00	0.0	0.1	-0.00	-0.00
	-.00003	-0.000	-0.000	0.01	0.0	-0.0	0.00	0.00
ABSVX	.00003	-0.026	0.121	-6.95	-17.6	-13.6	0.67	-5.71
	-.00003	0.026	-0.123	7.02	17.8	13.8	-0.67	5.80
ABSVY	.00003	0.003	-0.007	0.59	-0.0	2.6	-0.04	0.32
	-.00003	-0.003	0.007	-0.55	0.2	-2.5	0.03	-0.29
ABSVZ	.00003	-0.001	-0.001	0.04	-0.4	-2.0	-0.05	0.07
	-.00003	0.001	0.001	-0.02	0.4	2.1	0.05	-0.06
CHI1X	.00196	-0.001	0.000	-0.04	0.0	0.3	0.04	-0.01
	-.00196	0.001	-0.001	0.05	0.0	-0.3	-0.04	0.01
CHI1Y	.00573	-0.002	0.006	-0.33	-0.9	-5.8	-0.16	-0.30
	-.00573	0.002	-0.007	0.34	0.9	5.9	0.16	0.30
CHI1Z	.00196	-0.013	0.051	-3.12	-7.3	-7.5	0.31	-2.37
	-.00196	0.013	-0.052	3.14	7.4	7.5	-0.31	2.40
EPSVXZ	.00834	-0.000	-0.011	0.42	-0.7	-0.4	-0.01	0.59
	-.00834	0.000	0.011	-0.39	0.7	0.4	0.01	-0.57
EPSVXY	.00393	0.025	-0.102	6.09	17.8	13.3	-0.61	4.75
	-.00393	-0.025	0.101	-6.06	-17.6	-13.2	0.62	-4.70
EPSVYZ	.00834	0.003	-0.002	0.36	1.1	2.6	-0.01	0.04
	-.00834	-0.003	0.002	-0.35	-1.1	-2.6	0.01	-0.03
EPSVYX	.00278	0.001	-0.002	0.19	-2.0	1.3	-0.00	0.07
	-.00278	-0.001	0.001	-0.11	2.2	-1.1	-0.01	-0.02
EPSVZY	.00879	-0.000	0.000	-0.17	-1.2	-4.3	-0.16	-0.01
	-.00879	0.000	-0.000	0.17	1.2	4.3	0.16	0.01
EPSVZX	.00834	0.003	0.001	0.10	2.1	9.0	0.24	-0.13
	-.00834	-0.003	-0.002	-0.07	-2.1	-8.9	-0.25	0.15
RSS		0.250	0.455	37.20	108.7	216.8	2.67	20.14

TABLE 53

ACTUAL DEVIATIØNS AT RE-ENTRY
WITHØUT SPACECRAFT BURNS
DUE TØ PLATFØRM ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
GDSVX	.100	-99874.	-9503.	7672.	-3.92	128.24	14.08	-80.654
	-.100	99498.	9007.	-7798.	3.44	-127.74	-13.86	81.177
GDSVY	.075	29476.	335.	19714.	-11.81	-25.55	-30.27	-46.326
	-.075	-29076.	-348.	-19817.	11.63	25.21	30.26	45.898
GDSVZ	.075	-197178.	-18961.	12741.	-11.89	249.10	26.35	-178.178
	-.075	196503.	17067.	-12929.	9.89	-247.82	-25.98	180.101
USSVX	.100	-7434.	-719.	830.	-0.25	9.60	1.28	-5.983
	-.100	7401.	713.	-823.	0.24	-9.57	-1.26	5.910
USSVY	.075	-536.	-104.	542.	-0.56	0.80	-2.98	-2.539
	-.075	428.	95.	-540.	0.43	-0.65	3.06	1.716
USSVZ	.100	1342.	121.	-74.	-0.00	-1.65	-0.16	0.744
	-.100	-1288.	-116.	71.	0.01	1.58	0.15	-0.662
UISVX	.100	519.	52.	-76.	0.01	-0.67	-0.02	0.378
	-.100	-450.	-46.	70.	-0.00	0.59	0.01	-0.274
UISVY	.075	-110.	2.	-109.	0.07	0.09	0.11	0.313
	-.075	198.	6.	98.	-0.05	-0.19	-0.13	-0.167
UISVZ	.075	-35548.	-3453.	3893.	-4.90	42.99	6.91	-49.647
	-.075	35507.	3390.	-3906.	4.85	-42.92	-6.89	49.877
UØSVX	.060	-1444.	-146.	225.	-0.03	1.91	0.62	-1.205
	-.060	1446.	149.	-254.	0.04	-1.91	-0.60	1.261
UØSVY	.060	595.	-94.	1340.	-0.87	-0.25	-4.24	-3.473
	-.060	-591.	95.	-1339.	0.87	0.24	4.24	3.463
UØSVZ	.060	-18854.	-1859.	2391.	-3.55	22.15	4.21	-31.991
	-.060	18590.	1822.	-2407.	3.40	-21.82	-4.07	31.068
SSVX	.050	191.	20.	-31.	0.01	-0.25	-0.00	0.141
	-.050	-110.	-12.	23.	0.01	0.16	-0.01	-0.004
SSVY	.050	22.	4.	-14.	0.01	-0.03	0.01	0.086
	-.050	78.	7.	3.	0.01	-0.08	-0.03	0.077
SSVZ	.050	535.	49.	-30.	-0.00	-0.65	-0.07	0.281
	-.050	-459.	-41.	22.	0.02	0.56	0.05	-0.156

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
SFSVX	.00003	-21531.	-2153.	2999.	-5.12	22.15	5.31	-41.687
	-.00003	21996.	2177.	-3064.	5.20	-22.62	-5.41	42.631
SFSVY	.00003	-3366.	-326.	383.	-0.56	3.15	0.73	-4.958
	-.00003	3561.	345.	-406.	0.60	-3.37	-0.78	5.280
SFSVZ	.00003	-14.	6.	-64.	0.00	0.01	0.07	-0.008
	-.00003	57.	-2.	63.	0.00	-0.07	-0.08	0.062
ABSVX	.00003	-20219.	-2023.	2834.	-5.21	20.95	5.01	-41.484
	-.00003	20486.	2030.	-2874.	5.25	-21.21	-5.06	42.096
ABSVY	.00003	2767.	264.	-279.	0.27	-4.23	-0.44	3.524
	-.00003	-2616.	-249.	260.	-0.24	4.07	0.41	-3.272
ABSVZ	.00003	-149.	-37.	229.	-0.02	0.15	-1.13	0.212
	-.00003	211.	43.	-233.	0.03	-0.23	1.11	-0.125
CHI1X	.00196	-300.	-39.	130.	0.01	0.43	0.35	-0.264
	-.00196	336.	43.	-132.	-0.00	-0.48	-0.36	0.325
CHI1Y	.00573	-770.	-102.	341.	-0.44	1.00	-2.83	-1.967
	-.00573	803.	105.	-343.	0.44	-1.04	2.83	2.014
CHI1Z	.00196	-10405.	-1033.	1402.	-2.17	11.74	2.42	-18.719
	-.00196	10483.	1036.	-1414.	2.18	-11.82	-2.44	18.898
EPSVXZ	.00834	-385.	-32.	1.	0.43	0.17	0.01	2.421
	-.00834	458.	40.	-9.	-0.41	-0.25	-0.03	-2.277
EPSVXY	.00393	19656.	1942.	-2692.	4.42	-19.95	-4.77	36.610
	-.00393	-19515.	-1946.	2674.	-4.41	19.80	4.75	-36.307
EPSVYZ	.00834	2658.	241.	-154.	0.11	-3.40	-0.33	2.194
	-.00834	-2577.	-234.	147.	-0.10	3.30	0.31	-2.085
EPSVYX	.00278	1091.	105.	-115.	-0.01	-2.79	-0.11	1.153
	-.00278	-821.	-78.	82.	0.06	2.50	0.05	-0.687
EPSVZY	.00879	-1389.	-74.	-396.	-0.14	1.54	-1.25	-1.054
	-.00879	1401.	76.	397.	0.14	-1.55	1.25	1.055
EPSVZX	.00834	1682.	196.	-497.	0.23	-1.82	4.05	0.695
	-.00834	-1569.	-185.	485.	-0.20	1.69	-4.08	-0.492
RSS		229862.	21907.	25931.	20.34	288.34	44.89	223.797

TABLE 54

ACTUAL DEVIATIØNS AT RE-ENTRY
WITHØUT SPACECRAFT BURNS
DUE TØ PERFØRMANCE ERRØRS

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
FISP1	0.419	-0.001	0.005	-0.33	-1.7	1.6	0.11	-0.23
	-0.419	0.001	-0.005	0.34	1.7	-2.5	-0.13	0.24
EDWGT1	0.716	-0.001	0.005	-0.20	-0.9	0.5	0.05	-0.25
	-0.716	0.000	-0.004	0.12	0.6	-1.2	-0.06	0.20
FM1	0.895	0.001	-0.006	0.45	2.4	-3.9	-0.19	0.30
	-0.895	0.001	-0.008	0.72	3.7	-6.5	-0.30	0.41
FFUEL1	0.5	-0.001	0.002	-0.24	-1.1	0.4	0.06	-0.09
	-0.5	-0.000	0.000	0.09	0.5	-1.2	-0.05	-0.01
FWGT1	2.846	0.000	-0.004	0.26	1.4	-2.1	-0.10	0.18
	-2.846	-0.001	0.003	-0.23	-1.3	1.4	0.09	-0.16
ECD	10.0	0.000	-0.001	0.09	0.5	-0.9	-0.04	0.06
	-10.0	-0.000	0.002	-0.11	-0.6	0.7	0.04	-0.08
ERHØA	10.0	0.000	-0.002	0.14	0.6	-0.6	-0.04	0.10
	-10.0	-0.000	0.002	-0.12	-0.6	0.5	0.04	-0.07
FISP2	0.427	-0.001	0.003	-0.30	-1.6	1.7	0.11	-0.14
	-0.427	0.000	-0.003	0.31	1.6	-2.6	-0.13	0.15
EDWGT2	1.34	-0.000	0.011	-0.16	-0.8	1.1	0.07	-0.57
	-1.34	0.001	-0.013	0.30	1.3	-1.4	-0.10	0.67
FM2	0.895	-0.000	0.004	-0.07	-0.4	0.7	0.04	-0.20
	-0.895	0.001	-0.006	0.19	0.9	-0.9	-0.06	0.31
FFUEL2	0.5	-0.000	-0.004	-0.06	-0.3	0.2	0.01	0.20
	-0.5	-0.000	0.004	0.02	0.2	-0.4	-0.01	-0.23
FWGT2	2.402	0.001	-0.003	0.29	1.5	-2.3	-0.12	0.14
	-2.402	-0.001	0.004	-0.33	-1.6	1.4	0.11	-0.16
FISP3	0.939	0.000	0.004	-0.13	-0.5	1.4	0.05	-0.22
	-0.939	-0.001	-0.004	0.11	0.4	-1.8	-0.05	0.20
EDWGT3	3.0	0.005	0.016	-0.01	1.0	7.4	0.10	-0.97
	-3.0	-0.008	-0.018	0.01	-1.4	-11.0	-0.14	1.13
FM3	2.0	0.002	0.005	-0.01	0.1	4.6	0.10	-0.30
	-2.0	-0.003	-0.003	0.01	-0.1	-6.5	-0.13	0.23

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
EFUEL3	1.0	-0.003	-0.002	-0.07	-0.4	-5.9	-0.11	0.16
	-1.0	0.003	0.002	0.09	0.5	4.6	0.08	-0.16
EWGT3	1.936	-0.003	-0.002	-0.07	-0.4	-6.1	-0.12	0.17
	-1.936	0.003	0.002	0.08	0.4	4.7	0.08	-0.18
E4ØFF1	0.03	-0.000	-0.004	0.01	0.0	-0.1	-0.01	0.19
	-0.03	0.000	0.004	-0.00	-0.0	0.1	0.01	-0.18
E4ØFF2	0.03	0.006	-0.017	1.40	2.2	6.1	-0.03	0.77
	-0.03	-0.006	0.018	-1.40	-2.2	-6.1	0.03	-0.78
EULAGE	5.0	0.000	0.001	-0.03	0.0	0.0	0.00	-0.03
	-5.0	-0.000	0.001	-0.05	-0.1	-0.1	0.00	-0.06
EVENTR	20.0	0.065	-0.130	10.93	50.6	43.8	-1.08	5.30
	-20.0	-0.065	0.129	-10.95	-50.4	-43.6	1.11	-5.25
RSS		0.066	0.134	11.10	51.0	47.7	1.21	5.58

[redacted]

[redacted]

TABLE 55

ACTUAL DEVIATIØNS AT RE-ENTRY
WITHØUT SPACECRAFT BURNS
DUE TØ PERFØRMANCE ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
FISP1	0.419	-2068.	-140.	-329.	-0.05	1.94	2.39	-2.594
	-0.419	2092.	122.	506.	0.03	-1.88	-3.01	2.629
FDWGT1	0.716	-1067.	-79.	-104.	-0.07	1.02	1.02	-1.919
	-0.716	735.	39.	221.	0.00	-0.65	-1.23	1.477
FM1	0.895	2852.	156.	785.	0.00	-2.49	-4.38	3.482
	-0.895	4476.	237.	1303.	0.01	-3.91	-7.12	5.158
FFUEL1	0.5	-1307.	-101.	-90.	-0.09	1.25	1.10	-1.372
	-0.5	676.	31.	240.	-0.03	-0.59	-1.24	0.429
FWGT1	2.846	1657.	95.	423.	0.01	-1.46	-2.41	2.039
	-2.846	-1605.	-101.	-315.	-0.01	1.47	1.99	-1.914
FCD	10.0	627.	33.	182.	-0.02	-0.56	-1.01	0.734
	-10.0	-714.	-46.	-135.	-0.01	0.67	0.91	-0.890
FRHØA	10.0	730.	50.	114.	0.04	-0.69	-0.86	1.004
	-10.0	-722.	-51.	-96.	-0.02	0.70	0.78	-0.877
FISP2	0.427	-1935.	-127.	-345.	-0.03	1.79	2.37	-2.079
	-0.427	1970.	111.	513.	0.01	-1.76	-2.94	2.124
FDWGT2	1.34	-1007.	-61.	-224.	-0.01	0.92	1.38	-3.363
	-1.34	1584.	103.	285.	0.08	-1.43	-1.95	4.246
FM2	0.895	-523.	-31.	-132.	0.02	0.48	0.78	-1.303
	-0.895	1046.	70.	173.	0.04	-0.96	-1.25	2.192
FFUEL2	0.5	-324.	-22.	-49.	-0.01	0.28	0.36	0.666
	-0.5	207.	8.	85.	-0.02	-0.16	-0.38	-0.901
FWGT2	2.402	1898.	110.	468.	0.01	-1.71	-2.74	2.023
	-2.402	-2008.	-138.	-298.	-0.06	1.89	2.25	-2.231
FISP3	0.939	-446.	-4.	-312.	-0.04	0.27	1.21	-1.341
	-0.939	343.	-11.	371.	0.01	-0.14	-1.35	1.183
FDWGT3	3.0	1701.	305.	-1494.	0.03	-2.51	3.57	-3.136
	-3.0	-2397.	-437.	2170.	-0.07	3.57	-5.34	3.349
FM3	2.0	91.	98.	-842.	0.13	-0.44	2.81	-1.276
	-2.0	-12.	-132.	1212.	-0.21	0.51	-4.06	0.981

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		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
FFUFL3	1.0	-358.	-145.	1067.	-0.23	0.78	-3.44	0.442
	-1.0	488.	130.	-823.	0.19	-0.80	2.53	-0.343
FWGT3	1.936	-388.	-153.	1109.	-0.24	0.83	-3.57	0.442
	-1.936	442.	128.	-837.	0.18	-0.78	2.61	-0.479
F40FF1	0.03	51.	2.	25.	-0.00	-0.05	-0.10	0.894
	-0.03	-17.	1.	-24.	0.01	0.00	0.10	-0.853
F40FF2	0.03	6397.	553.	-122.	0.75	-8.45	-1.07	8.335
	-0.03	-6420.	-556.	122.	-0.75	8.49	1.07	-8.359
EULAGE	5.0	13.	1.	2.	-0.03	-0.01	0.00	-0.125
	-5.0	-109.	-11.	18.	-0.04	0.12	0.03	-0.338
EVENTR	20.0	55629.	5227.	-5589.	6.36	-55.88	-10.65	66.090
	-20.0	-55570.	-5367.	5549.	-6.48	55.94	10.68	-65.846
RSS		56435.	5433.	6544.	6.53	57.01	16.69	67.319

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TABLE 56

CØVARIANCE MATRIX ØF ACTUAL DEVIATIØNS
AT RE-ENTRY WITHØUT SM BURNS

	LAT	LØN	V	BETA	ALFA	CRNM	DRNM
LAT	8.60E-02	-0.7	1.0	0.9	1.0	-0.8	0.6
LØN	-9.59E-03	1.56E-01	-0.8	-0.6	-0.6	0.9	-1.0
V	1.09E 00	-1.69E 00	1.29E 01	0.9	0.9	-0.9	0.7
BETA	3.18E-03	-3.53E-03	4.63E-01	3.98E-02	0.9	-0.8	0.4
ALFA	6.25E-03	-7.25E-03	8.95E-01	2.69E-03	7.33E-02	-0.8	0.5
CRNM	-7.03E-02	1.41E-01	-1.16E 01	-2.93E-02	-5.43E-02	9.65E-01	-0.9
DRNM	3.33E-01	-1.05E 00	6.35E 01	1.12E-01	2.36E-01	-5.74E 00	6.87E 00

TABLE 57

CØVARIANCE MATRIX ØF ACTUAL DEVIATIØNS
AT RE-ENTRY WITHØUT SM BURNS

	RPX	RPY	RPZ	VPX	VPY	VPZ	TIME
RPX	7.89E 04	1.0	-0.5	0.7	-1.0	-0.8	0.9
RPY	5.88E 08	7.51E 03	-0.6	0.7	-1.0	-0.7	1.0
RPZ	-3.77E 08	-4.17E 07	8.81E 03	-0.9	0.6	-0.0	-0.8
VPX	3.69E 05	3.88E 04	-5.84E 04	7.10E 00	-0.7	-0.2	0.9
VPY	-7.70E 06	-7.32E 05	4.89E 05	-4.62E 02	9.79E 01	0.8	-0.9
VPZ	-9.76E 05	-8.49E 04	-4.59E 03	-2.21E 01	1.17E 03	1.57E 01	-0.6
TIME	5.63E 06	5.54E 05	-5.35E 05	4.90E 02	-7.00E 03	-7.01E 02	7.72E 01

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TABLE 58

ACTUAL DEVIATIØNS AT RE-ENTRY
WITH SPACECRAFT BURNS
DUE TØ PLATFØRM ERRØRS

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
GDSVX	.100	-0.016	-0.020	-0.01	-0.1	-4.9	0.45	1.39
	-.100	0.017	0.020	0.02	0.2	5.2	-0.46	-1.39
GDSVY	.075	-0.029	0.079	-0.02	-0.2	-11.9	0.51	-3.48
	-.075	0.030	-0.078	0.03	0.3	12.3	-0.51	3.42
GDSVZ	.075	-0.006	0.013	-0.00	-0.1	6.4	0.49	-0.53
	-.075	0.007	-0.012	0.01	0.1	-5.8	-0.49	0.47
USSVX	.100	-0.002	-0.002	0.00	-0.0	0.1	0.09	0.14
	-.100	0.002	0.002	0.01	0.0	-0.0	-0.08	-0.14
USSVY	.075	0.000	0.005	0.00	-0.0	-3.5	-0.18	-0.26
	-.075	-0.000	-0.004	0.00	-0.0	4.0	0.18	0.20
USSVZ	.100	0.000	0.000	0.00	0.0	0.1	-0.00	-0.02
	-.100	-0.000	-0.000	0.00	0.0	-0.1	0.00	0.02
UISVX	.100	0.000	0.000	0.00	-0.0	0.1	-0.00	-0.01
	-.100	-0.000	-0.000	0.00	-0.0	-0.2	0.00	0.02
UISVY	.075	0.000	-0.001	0.00	0.0	-0.0	-0.01	0.02
	-.075	-0.000	0.000	0.01	0.0	-0.0	0.00	-0.01
UISVZ	.075	0.008	0.040	0.01	0.1	19.7	0.47	-2.26
	-.075	-0.008	-0.040	-0.00	-0.1	-19.6	-0.47	2.26
UØSVX	.060	-0.001	-0.001	0.	-0.0	0.6	0.05	0.05
	-.060	0.001	0.001	0.00	0.0	-0.6	-0.06	-0.04
UØSVY	.060	-0.001	0.007	0.00	-0.0	-4.4	-0.16	-0.35
	-.060	0.001	-0.007	0.00	-0.0	4.4	0.16	0.34
UØSVZ	.060	0.008	0.033	0.01	0.1	16.4	0.34	-1.90
	-.060	-0.007	-0.033	-0.00	-0.0	-15.4	-0.33	1.85
SSVX	.050	0.000	0.000	0.	0.0	0.0	-0.00	-0.00
	-.050	-0.000	-0.000	0.	-0.	-0.1	0.00	0.01
SSVY	.050	0.000	-0.000	0.	0.0	-0.0	-0.00	0.00
	-.050	-0.000	-0.000	0.00	0.0	-0.0	-0.00	0.00
SSVZ	.050	0.000	0.000	-0.00	-0.0	0.0	-0.00	-0.01
	-.050	-0.000	-0.000	0.00	0.0	-0.1	-0.00	0.02

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		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
SFSVX	.00003	0.018	0.064	0.02	0.2	29.8	0.48	-3.72
	-.00003	-0.018	-0.065	-0.01	-0.2	-30.2	-0.49	3.78
SFSVY	.00003	0.003	0.009	0.01	0.0	4.4	0.06	-0.55
	-.00003	-0.003	-0.010	-0.00	0.0	-4.6	-0.06	0.57
SFSVZ	.00003	0.000	-0.000	0.00	0.0	0.1	-0.00	0.00
	-.00003	-0.000	0.000	0.	0.0	-0.1	0.00	-0.00
ABSVX	.00003	0.017	0.063	0.02	0.2	28.9	0.45	-3.64
	-.00003	-0.018	-0.063	-0.01	-0.1	-29.1	-0.46	3.67
ABSVY	.00003	0.001	0.003	0.00	-0.0	0.9	-0.02	-0.16
	-.00003	-0.001	-0.003	0.00	-0.0	-1.1	0.02	0.18
ABSVZ	.00003	-0.000	0.001	0.00	0.0	-1.7	-0.06	-0.03
	-.00003	0.000	-0.001	0.00	-0.	1.7	0.06	0.04
CHI1X	.00196	-0.000	-0.000	0.01	0.0	0.5	0.04	0.03
	-.00196	0.000	0.000	-0.00	0.0	-0.5	-0.04	-0.03
CHI1Y	.00573	0.001	0.004	0.00	0.0	-3.7	-0.19	-0.22
	-.00573	-0.001	-0.004	0.00	-0.0	3.7	0.19	0.22
CHI1Z	.00196	0.006	0.023	0.01	0.1	11.0	0.21	-1.31
	-.00196	-0.006	-0.023	-0.00	-0.0	-11.1	-0.21	1.32
EPSVXZ	.00834	-0.001	-0.002	0.00	0.0	-0.8	-0.00	0.12
	-.00834	0.001	0.002	0.01	0.0	0.7	0.00	-0.11
EPSVXY	.00393	-0.016	-0.058	-0.02	-0.2	-26.7	-0.43	3.35
	-.00393	0.016	0.057	0.02	0.1	27.0	0.43	-3.32
EPSVYZ	.00834	0.000	0.000	0.00	0.0	0.2	-0.00	-0.03
	-.00834	-0.000	-0.001	0.01	0.0	-0.2	0.00	0.03
EPSVYX	.00278	0.003	0.008	0.01	0.0	3.3	0.01	-0.47
	-.00278	-0.003	-0.008	0.00	0.0	-3.5	-0.01	0.50
EPSVZY	.00879	0.002	0.001	0.01	0.1	-2.2	-0.17	-0.11
	-.00879	-0.002	-0.001	0.00	-0.0	2.2	0.17	0.11
EPSVZX	.00834	-0.000	-0.004	0.00	0.0	6.1	0.28	0.21
	-.00834	0.000	0.004	0.00	0.0	-6.2	-0.28	-0.20
RSS		0.048	0.148	0.06	0.5	60.2	1.40	8.05

TABLE 59

ACTUAL DEVIATIØNS AT RE-ENTRY
WITH SPACECRAFT BURNS
DUE TØ PLATFØRM ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
GDSVX	.100	-7858.	-817.	3656.	0.94	13.50	1.85	0.387
	-.100	7942.	827.	-3746.	-0.94	-13.64	-1.74	-0.353
GDSVY	.075	24106.	-776.	19450.	-4.46	-35.81	-35.29	1.140
	-.075	-23666.	765.	-19548.	4.35	35.17	35.21	-1.091
GDSVZ	.075	4456.	-169.	3864.	-0.53	-7.16	-1.26	0.695
	-.075	-3873.	204.	-3911.	0.47	6.18	1.19	-0.565
GSSVX	.100	-747.	-98.	543.	0.11	1.26	0.42	0.047
	-.100	774.	99.	-538.	-0.10	-1.32	-0.42	-0.057
GSSVY	.075	1664.	50.	380.	-0.38	-2.43	-3.74	0.039
	-.075	-1309.	-29.	-399.	0.34	1.80	3.73	-0.025
GSSVZ	.100	116.	8.	-19.	-0.01	-0.19	-0.01	-0.009
	-.100	-125.	-9.	19.	0.02	0.22	0.01	0.011
GISVX	.100	42.	8.	-54.	0.00	-0.08	0.05	-0.004
	-.100	-104.	-11.	55.	0.01	0.18	-0.04	-0.002
GISVY	.075	-157.	3.	-105.	0.03	0.25	0.15	-0.006
	-.075	92.	-6.	101.	-0.01	-0.12	-0.14	0.004
GISVZ	.075	14165.	586.	1694.	-1.50	-24.03	-0.02	0.044
	-.075	-14091.	-591.	-1699.	1.48	23.90	0.00	-0.006
GØSVX	.060	-306.	-37.	184.	0.06	0.47	0.52	0.015
	-.060	235.	35.	-210.	-0.05	-0.37	-0.48	-0.018
GØSVY	.060	2311.	1.	1180.	-0.52	-3.31	-5.13	0.083
	-.060	-2298.	0.	-1180.	0.52	3.28	5.13	-0.077
GØSVZ	.060	12174.	551.	1014.	-1.30	-20.65	-0.19	0.281
	-.060	-11334.	-505.	-1075.	1.20	19.24	0.15	0.112
SSVX	.050	25.	4.	-24.	-0.00	-0.04	0.02	0.001
	-.050	-75.	-7.	21.	0.01	0.13	-0.02	0.005
SSVY	.050	-31.	-1.	-11.	0.00	0.06	0.02	-0.002
	-.050	-5.	-1.	6.	0.00	0.02	-0.02	0.008
SSVZ	.050	40.	3.	-8.	-0.01	-0.07	-0.00	-0.003
	-.050	-88.	-5.	6.	0.02	0.15	0.01	0.003

		RPX FT	RPY FT	RPZ FT.	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
SFSVX	.00003	23343.	1151.	989.	-2.54	-39.63	-0.96	0.193
	-.00003	-23670.	-1193.	-1011.	2.54	40.19	0.96	-0.165
SFSVY	.00003	3517.	183.	72.	-0.38	-5.96	-0.18	0.078
	-.00003	-3669.	-192.	-79.	0.40	6.25	0.19	-0.086
SFSVZ	.00003	6.	7.	-65.	0.00	-0.02	0.08	0.011
	-.00003	17.	-6.	64.	-0.01	-0.01	-0.08	-0.001
ABSVX	.00003	22901.	1137.	900.	-2.49	-38.87	-1.09	0.265
	-.00003	-23049.	-1169.	-916.	2.48	39.13	1.08	-0.228
ABSVY	.00003	948.	73.	-203.	-0.11	-1.63	-0.15	-0.035
	-.00003	-1104.	-81.	198.	0.13	1.89	0.16	0.020
ABSVZ	.00003	214.	-9.	190.	-0.09	-0.21	-1.31	0.001
	-.00003	-228.	8.	-191.	0.10	0.24	1.31	0.000
CHI1X	.00196	-162.	-23.	132.	0.04	0.27	0.37	0.001
	-.00196	146.	22.	-131.	-0.04	-0.22	-0.37	-0.009
CHI1Y	.00573	1418.	58.	182.	-0.34	-2.02	-3.55	0.035
	-.00573	-1436.	-59.	-182.	0.35	2.04	3.55	-0.039
CHI1Z	.00196	8386.	395.	565.	-0.90	-14.22	-0.23	0.189
	-.00196	-8431.	-400.	-570.	0.90	14.33	0.23	-0.189
EPSVXZ	.00834	-834.	-48.	23.	0.10	1.42	0.16	-0.060
	-.00834	758.	44.	-25.	-0.08	-1.27	-0.16	0.046
EPSVXY	.00393	-20903.	-1055.	-869.	2.23	35.48	0.84	-0.078
	-.00393	21201.	1052.	849.	-2.31	-36.01	-0.90	0.459
EPSVYZ	.00834	170.	14.	-43.	-0.01	-0.28	0.01	-0.011
	-.00834	-190.	-15.	41.	0.03	0.35	-0.01	0.009
EPSVYX	.00278	2968.	183.	-207.	-0.33	-5.06	-0.31	0.058
	-.00278	-3178.	-194.	195.	0.36	5.43	0.32	-0.050
EPSVZY	.00879	697.	94.	-522.	-0.16	-1.02	-1.71	0.016
	-.00879	-640.	-91.	521.	0.17	0.95	1.71	-0.003
EPSVZX	.00834	-1282.	-40.	-278.	0.41	1.66	4.97	0.015
	-.00834	1190.	35.	275.	-0.39	-1.48	-4.97	-0.024
RSS		51610.	2480.	20515.	6.70	85.29	36.55	1.549

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TABLE 60

ACTUAL DEVIATIØNS AT RE-ENTRY
WITH SPACECRAFT BURNS
DUE TØ PERFØRMANCE ERRØRS

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
EISP1	0.419	0.003	0.006	0.01	0.1	5.5	0.12	-0.39
	-0.419	-0.003	-0.006	0.00	0.0	-6.5	-0.14	0.40
EDWGT1	0.716	0.001	0.005	0.00	0.1	2.5	0.05	-0.30
	-0.716	-0.001	-0.004	0.00	0.0	-2.6	-0.05	0.26
EM1	0.895	-0.005	-0.009	-0.00	-0.0	-9.4	-0.20	0.55
	-0.895	-0.008	-0.012	-0.00	-0.1	-15.1	-0.33	0.76
EFUEL1	0.5	0.001	0.002	0.01	0.0	2.8	0.06	-0.15
	-0.5	-0.001	-0.001	0.00	-0.0	-2.6	-0.06	0.06
EWGT1	2.846	-0.003	-0.005	-0.00	0.0	-5.2	-0.11	0.32
	-2.846	0.002	0.005	0.01	0.1	4.5	0.09	-0.31
ECD	10.0	-0.001	-0.002	0.00	0.0	-2.1	-0.05	0.13
	-10.0	0.001	0.002	0.00	0.0	2.0	0.04	-0.14
ERHØA	10.0	-0.001	-0.002	0.00	-0.0	-2.0	-0.04	0.14
	-10.0	0.001	0.002	0.01	0.0	1.8	0.04	-0.12
EISP2	0.427	0.003	0.005	0.01	0.1	5.4	0.12	-0.31
	-0.427	-0.003	-0.005	0.00	-0.0	-6.4	-0.14	0.31
EDWGT2	1.34	0.002	0.012	0.00	0.0	3.0	0.05	-0.65
	-1.34	-0.002	-0.014	-0.00	-0.0	-4.5	-0.08	0.76
EM2	0.895	0.001	0.005	0.00	0.0	1.6	0.03	-0.26
	-0.895	-0.001	-0.007	0.00	0.0	-2.8	-0.06	0.37
EFUEL2	0.5	0.000	-0.003	0.01	0.0	0.9	0.02	0.17
	-0.5	-0.000	0.004	0.01	0.0	-0.8	-0.02	-0.19
EWGT2	2.402	-0.003	-0.004	0.00	0.0	-5.9	-0.13	0.29
	-2.402	0.003	0.005	0.00	0.0	5.2	0.11	-0.31
EISP3	0.939	0.001	0.002	0.00	0.0	2.0	0.05	-0.15
	-0.939	-0.001	-0.002	0.00	0.0	-2.1	-0.05	0.14
EDWGT3	3.0	0.001	0.006	0.00	0.0	3.1	0.10	-0.34
	-3.0	-0.002	-0.006	0.00	0.0	-5.7	-0.16	0.36
EM3	2.0	0.002	0.004	0.00	0.0	4.4	0.11	-0.24
	-2.0	-0.003	-0.002	-0.00	-0.0	-6.4	-0.16	0.19

		LAT DEG	LØN DEG	V FT/SEC	BETA E-3 DEG	ALFA E-3 DEG	CRNM NM	DRNM NM
FFUEL3	1.0	-0.002	-0.002	0.00	-0.0	-5.2	-0.14	0.14
	-1.0	0.001	0.002	0.00	0.0	3.7	0.10	-0.13
FWGT3	1.936	-0.002	-0.002	-0.00	-0.0	-5.5	-0.14	0.15
	-1.936	0.002	0.002	0.00	0.0	3.9	0.10	-0.15
E4ØFF1	.03	-0.000	-0.004	0.	0.0	-0.2	0.00	0.19
	-.03	0.000	0.004	-0.00	0.0	0.2	-0.00	-0.19
E4ØFF2	.03	-0.001	-0.001	0.00	0.0	-0.8	0.01	0.08
	-.03	0.001	0.001	0.00	0.0	0.8	-0.01	-0.08
EULAGE	5.0	0.000	-0.000	-0.00	0.0	0.0	0.00	0.00
	-5.0	0.000	0.001	0.00	0.0	0.2	0.00	-0.03
EVENTR	20.0	-0.032	-0.110	-0.02	-0.3	-51.1	-0.76	6.43
	-20.0	0.032	0.110	0.03	0.3	51.2	0.76	-6.44
RSS		0.034	0.113	0.04	0.4	56.5	0.94	6.60

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TABLE 61

ACTUAL DEVIATIØNS AT RE-ENTRY
WITH SPACECRAFT BURNS
DUE TØ PERFØRMANCE ERRØRS

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EISP1	0.419	1837.	149.	-470.	-0.07	-3.37	2.12	-0.426
	-0.419	-1886.	-171.	640.	0.05	3.59	-2.80	0.398
EDWGT1	0.716	930.	70.	-180.	-0.05	-1.66	0.85	-0.661
	-0.716	-719.	-68.	267.	0.02	1.39	-1.17	0.660
EM1	0.895	-2593.	-244.	964.	0.05	4.95	-4.13	0.550
	-0.895	-4049.	-388.	1578.	0.06	7.75	-6.78	0.443
EFUEL1	0.5	1151.	82.	-186.	-0.07	-2.06	0.88	0.162
	-0.5	-632.	-64.	280.	0.01	1.23	-1.20	-0.190
EWGT1	2.846	-1504.	-138.	529.	0.04	2.88	-2.25	0.354
	-2.846	1416.	122.	-422.	-0.04	-2.61	1.80	-0.375
ECD	10.0	-574.	-55.	221.	0.01	1.11	-0.96	0.151
	-10.0	607.	52.	-180.	-0.02	-1.14	0.83	-0.166
ERHØA	10.0	-691.	-55.	165.	0.04	1.28	-0.76	0.112
	-10.0	583.	47.	-144.	-0.02	-1.08	0.69	-0.125
EISP2	0.427	1749.	145.	-477.	-0.06	-3.22	2.12	-0.106
	-0.427	-1793.	-166.	638.	0.05	3.41	-2.76	0.079
EDWGT2	1.34	902.	80.	-289.	-0.02	-1.67	1.27	-2.320
	-1.34	-1521.	-125.	396.	0.07	2.80	-1.74	2.352
EM2	0.895	435.	41.	-163.	-0.00	-0.83	0.74	-0.858
	-0.895	-935.	-77.	244.	0.04	1.76	-1.11	0.999
EFUEL2	0.5	304.	25.	-72.	-0.01	-0.55	0.32	1.014
	-0.5	-186.	-20.	97.	0.01	0.38	-0.37	-1.025
EWGT2	2.402	-1660.	-153.	588.	0.04	3.17	-2.56	0.086
	-2.402	1766.	142.	-435.	-0.08	-3.24	1.98	-0.103
EISP3	0.939	80.	38.	-313.	0.07	-0.29	1.20	-0.612
	-0.939	-20.	-40.	362.	-0.07	0.24	-1.47	0.601
EDWGT3	3.0	-2815.	-25.	-1207.	0.56	4.23	4.74	-3.624
	-3.0	3172.	-19.	1799.	-0.70	-4.53	-6.89	3.939
EM3	2.0	-221.	70.	-775.	0.20	-0.01	3.23	-1.242
	-2.0	174.	-110.	1127.	-0.27	0.27	-4.61	0.954

		RPX FT	RPY FT	RPZ FT	VPX FT/SEC	VPY FT/SEC	VPZ FT/SEC	TIME SEC
EFUEL3	1.0	294.	-88.	973.	-0.24	-0.00	-3.57	0.847
	-1.0	-491.	51.	-730.	0.22	0.47	3.00	-0.937
EWGT3	1.936	358.	-88.	1008.	-0.26	-0.10	-4.14	0.896
	-1.936	-392.	58.	-749.	0.21	0.30	3.08	-0.961
E40FF1	.03	-15.	-4.	26.	-0.00	0.06	-0.10	0.841
	-.03	1.	2.	-23.	0.01	-0.01	0.11	-0.857
E40FF2	.03	-630.	-55.	190.	0.07	1.12	-0.04	-0.126
	-.03	624.	54.	-190.	-0.06	-1.08	0.04	0.110
EULAGE	5.0	23.	1.	2.	-0.00	-0.04	-0.00	0.021
	-5.0	168.	8.	5.	-0.02	-0.26	-0.01	-0.028
EVENTR	20.0	-40672.	-2119.	-1237.	4.35	69.08	1.96	-0.633
	-20.0	40789.	2047.	1232.	-4.48	-69.23	-1.99	0.665
RSS		41347.	2193.	3542.	4.56	70.28	13.77	5.401

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TABLE 62

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT RE-ENTRY WITH SM BURNS

	LAT	LON	V	BETA	ALFA	CRNM	DRNM
LAT	1.92E-02	0.5	0.9	1.0	0.9	0.3	-0.6
LON	6.12E-04	6.17E-02	0.6	0.5	0.8	0.8	-1.0
V	3.17E-04	6.68E-04	1.87E-02	0.9	0.8	0.4	-0.6
BETA	3.18E-06	5.91E-06	3.00E-06	1.75E-04	0.8	0.4	-0.6
ALFA	4.44E-04	1.33E-03	4.18E-04	3.97E-06	2.68E-02	0.8	-0.9
CRNM	3.60E-03	2.69E-02	4.40E-03	3.57E-05	1.12E-02	5.43E-01	-0.8
DRNM	-3.99E-02	-2.12E-01	-4.16E-02	-3.77E-04	-7.89E-02	-1.48E 00	3.44E 00

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TABLE 63

COVARIANCE MATRIX OF ACTUAL DEVIATIONS
AT RE-ENTRY WITH SM BURNS

	RPX	RPY	RPZ	VPX	VPY	VPZ	TIME
RPX	2.19E 04	0.8	0.5	-1.0	-1.0	-0.4	0.2
RPY	1.89E 07	1.09E 03	-0.2	-0.6	-0.8	0.2	0.0
RPZ	6.79E 07	-1.35E 06	6.86E 03	-0.6	-0.4	-0.9	0.3
VPX	-5.66E 04	-1.86E 03	-1.15E 04	2.06E 00	1.0	0.6	-0.3
VPY	-7.98E 05	-3.25E 04	-1.04E 05	9.34E 01	3.65E 01	0.4	-0.2
VPZ	-1.16E 05	2.31E 03	-8.04E 04	2.09E 01	1.74E 02	1.27E 01	-0.4
TIME	8.72E 03	3.43E 01	4.13E 03	-1.40E 00	-1.36E 01	-8.86E 00	1.78E 00

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CONFIDENTIAL

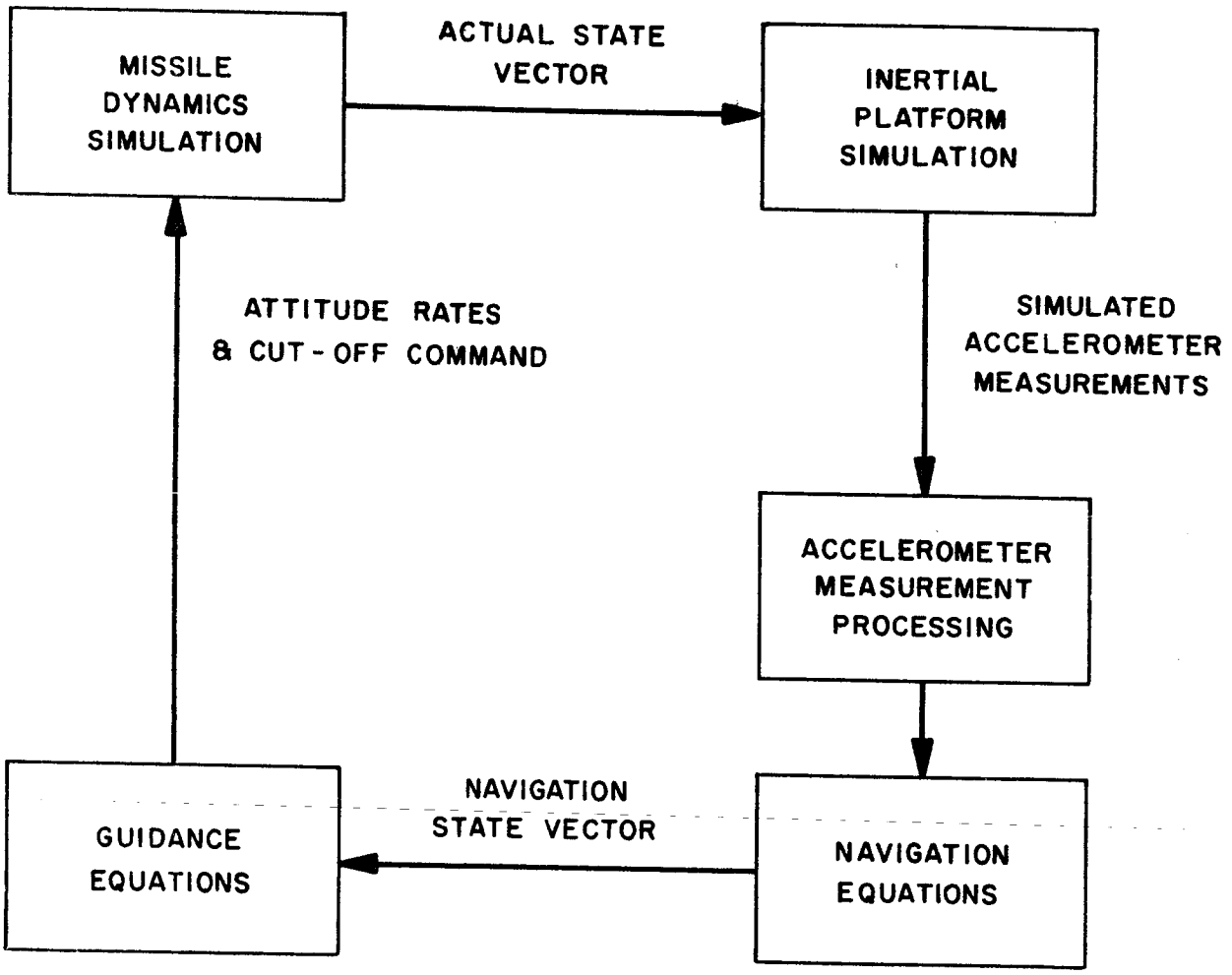

FIGURE 1

CLOSED LOOP SIMULATION

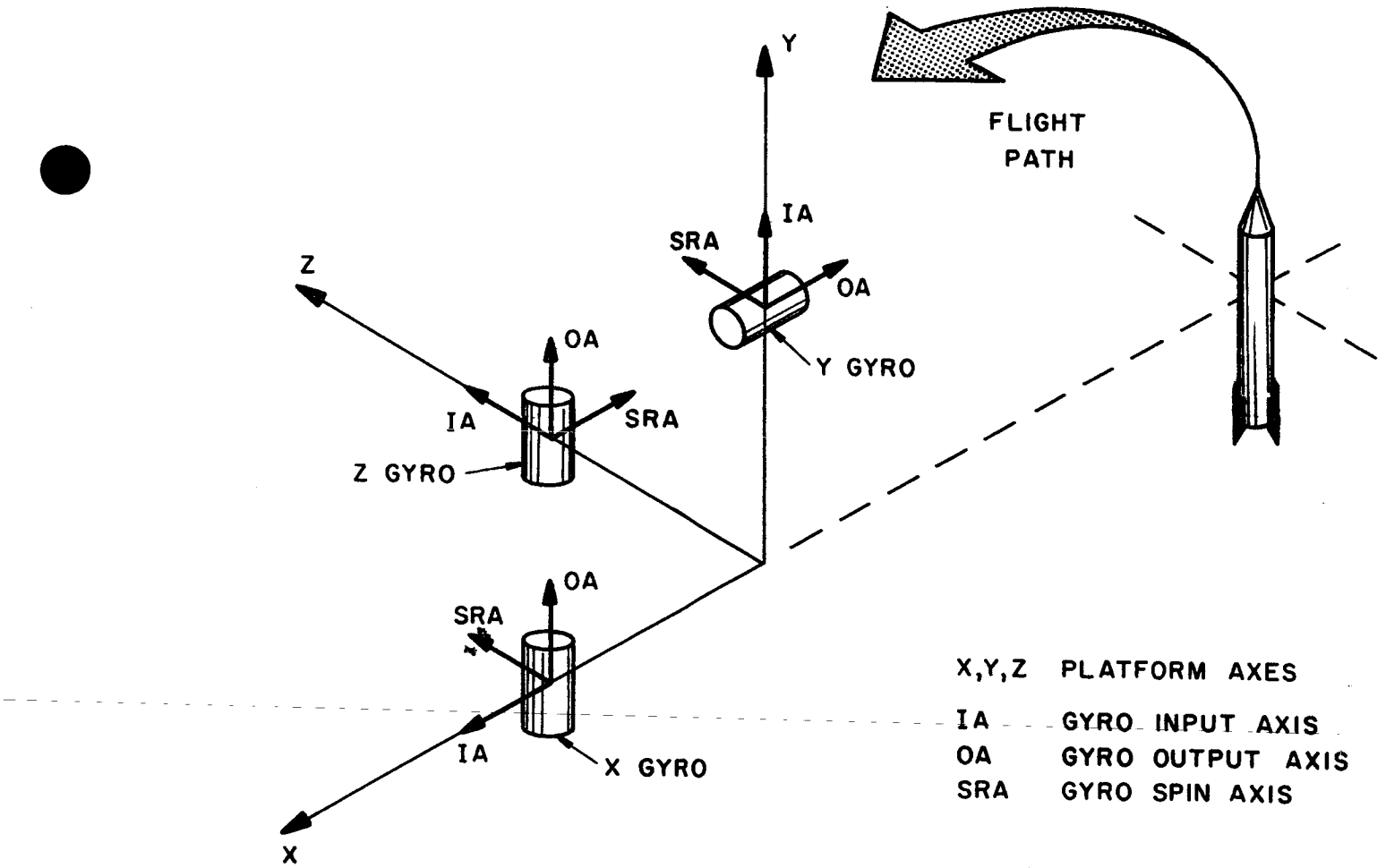

FIGURE 2

PLATFORM CONFIGURATION

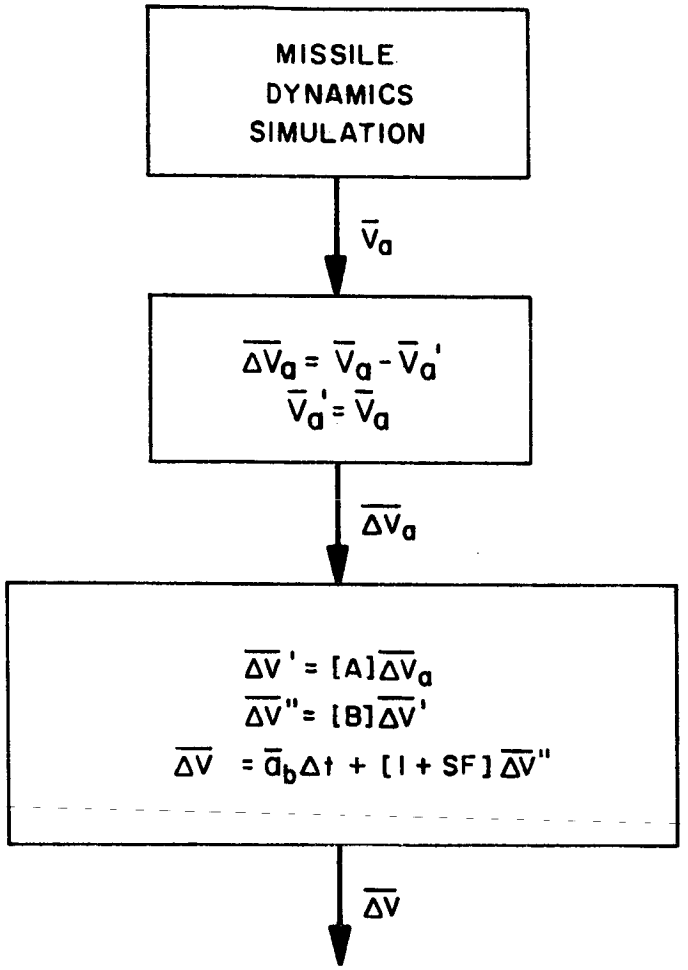

FIGURE 3

INERTIAL PLATFORM SIMULATION

ACCELEROMETER MISALIGNMENT

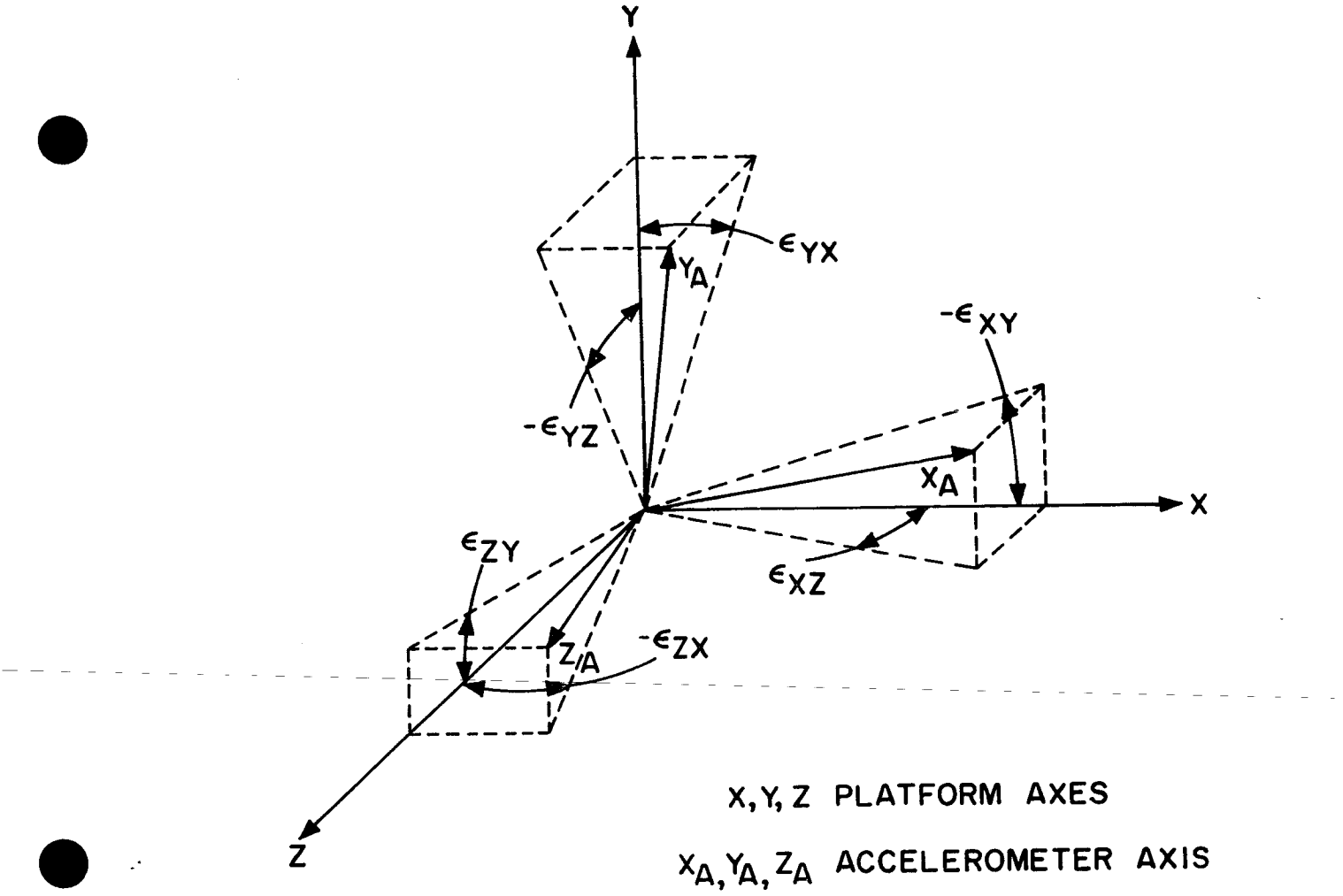

FIGURE 4

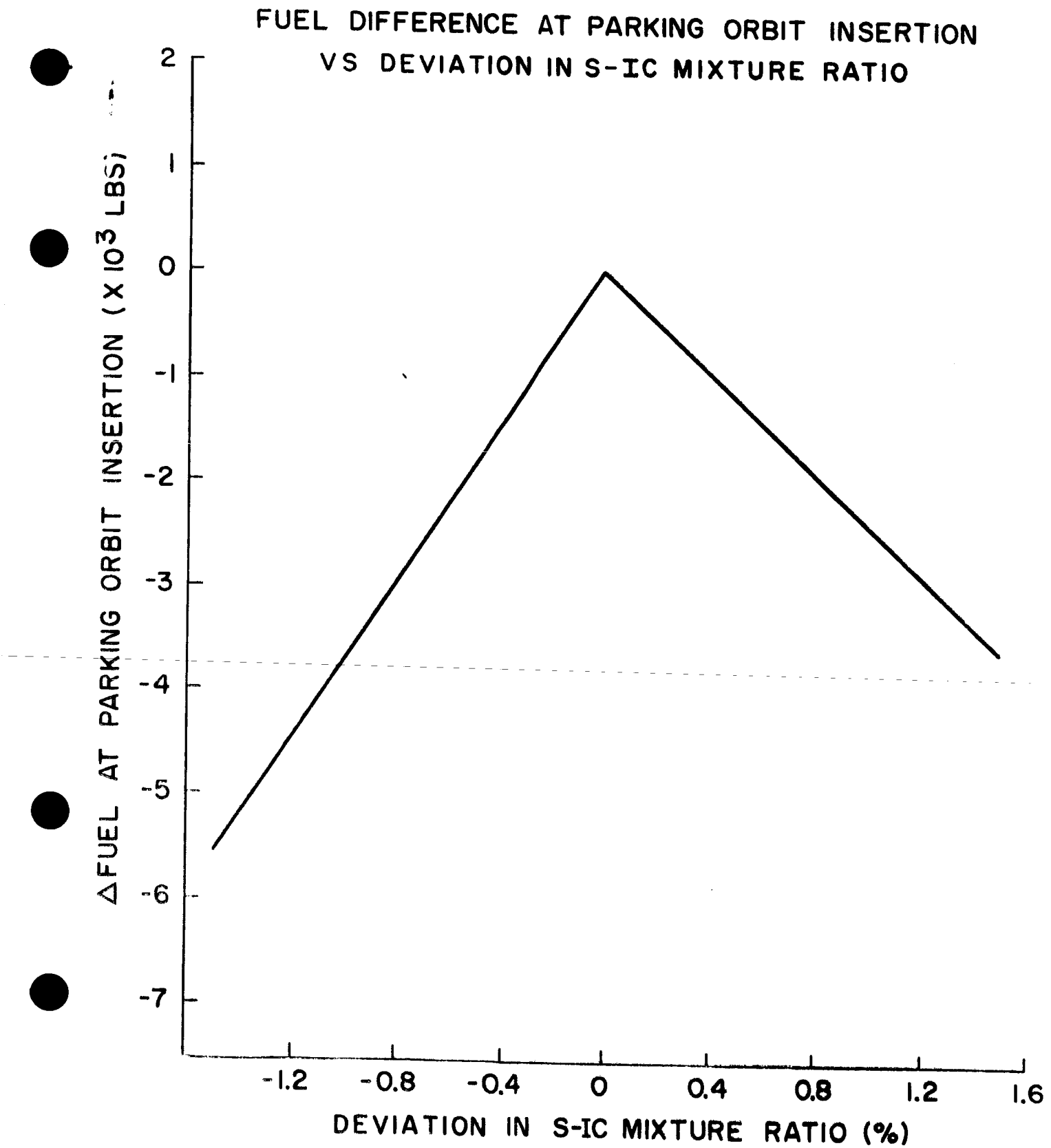
FUEL DIFFERENCE AT PARKING ORBIT INSERTION
VS DEVIATION IN S-IC MIXTURE RATIO
ΔFUEL AT PARKING ORBIT INSERTION (X 10³ LBS)
2
1
0
-1
-2
-3
-4
-5
-6
-7
-1.2
-0.8
-0.4
0
0.4
0.8
1.2
1.6
DEVIATION IN S-IC MIXTURE RATIO (%)

FIGURE 5

FUEL DIFFERENCE AT PARKING ORBIT INSERTION
VS DEVIATION IN S-II MIXTURE RATIO

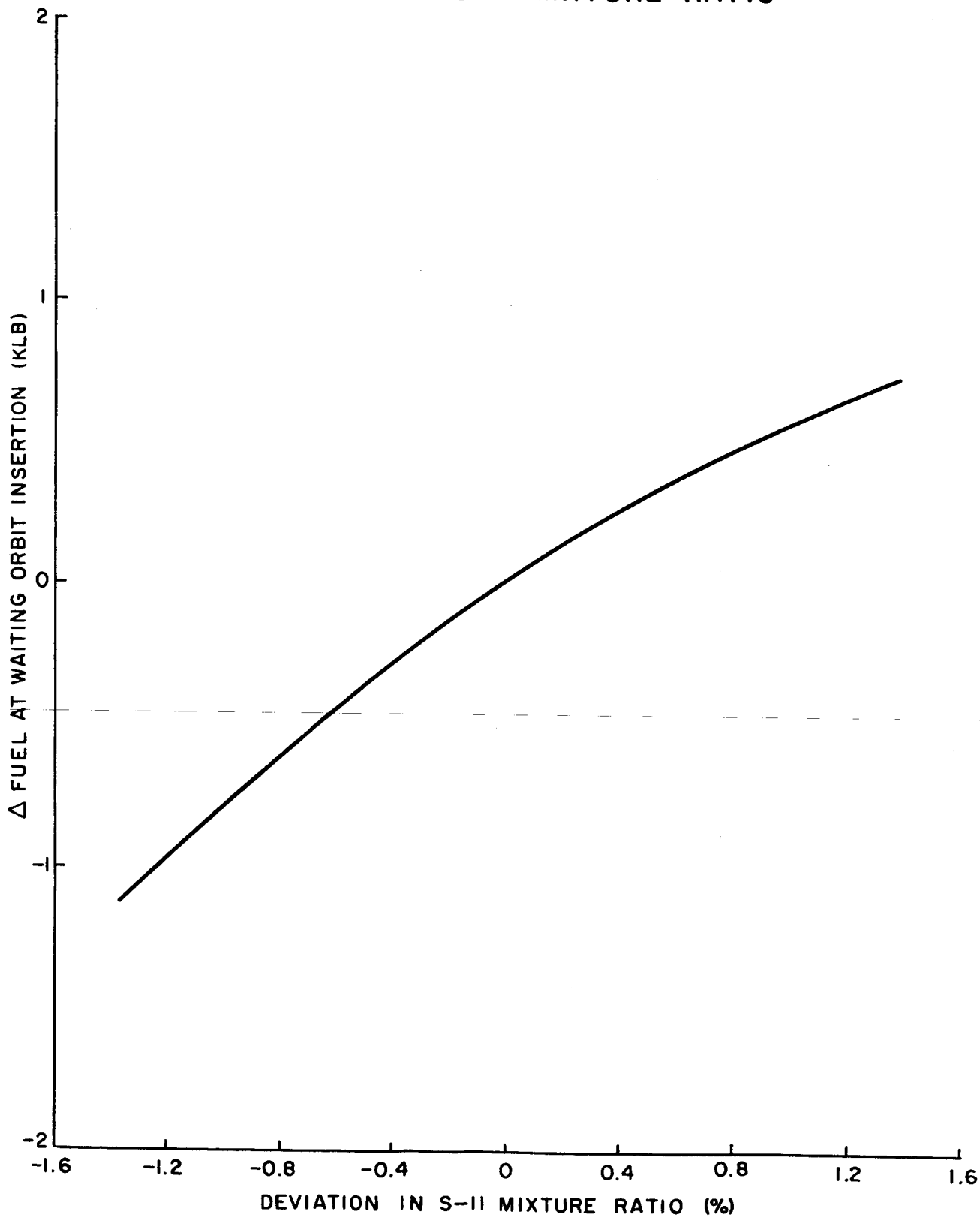

FIGURE 6

FUEL DIFFERENCE AT WAITING ORBIT INSERTION
VS DEVIATION IN S-IVB MIXTURE RATIO

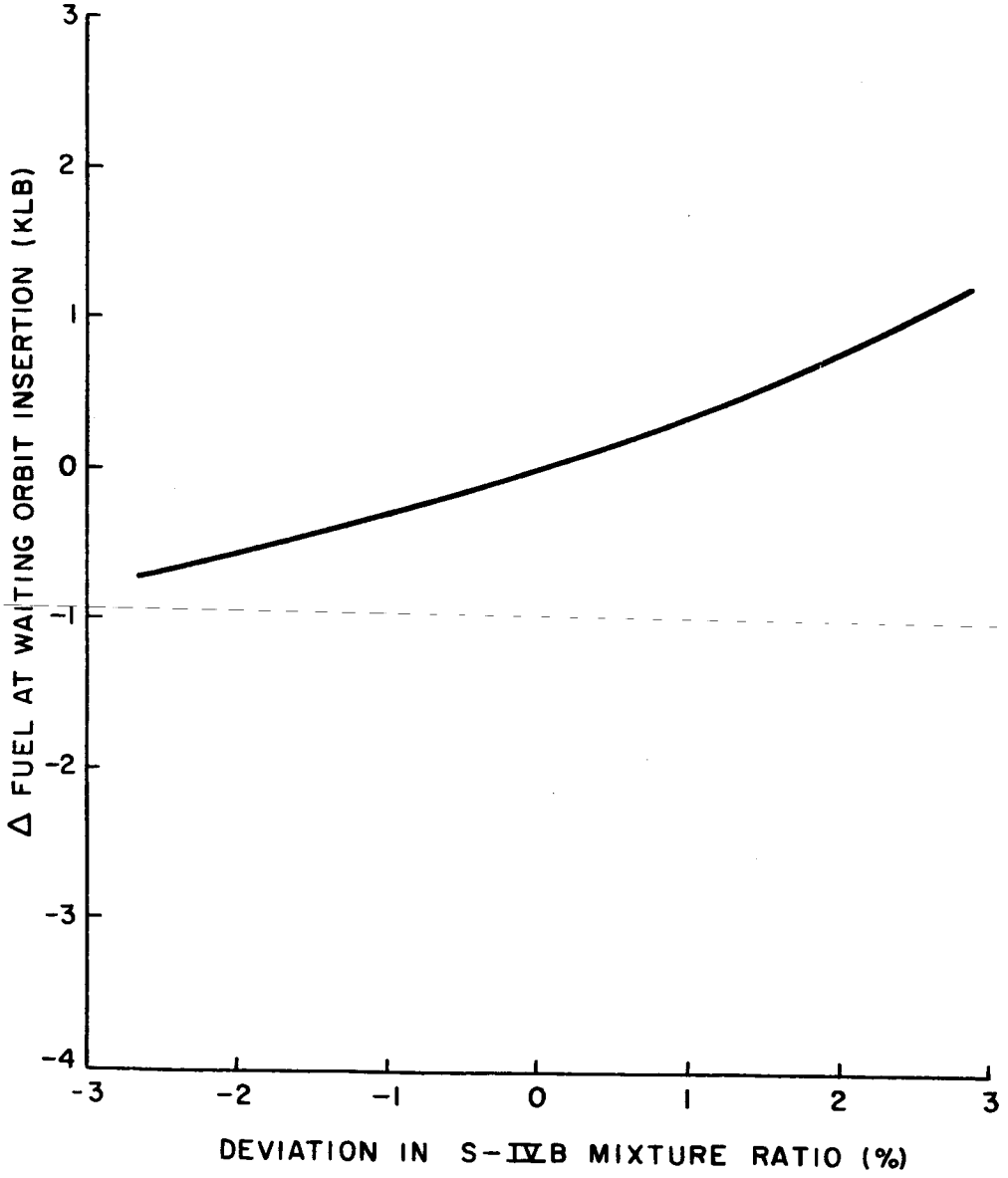

FIGURE 7

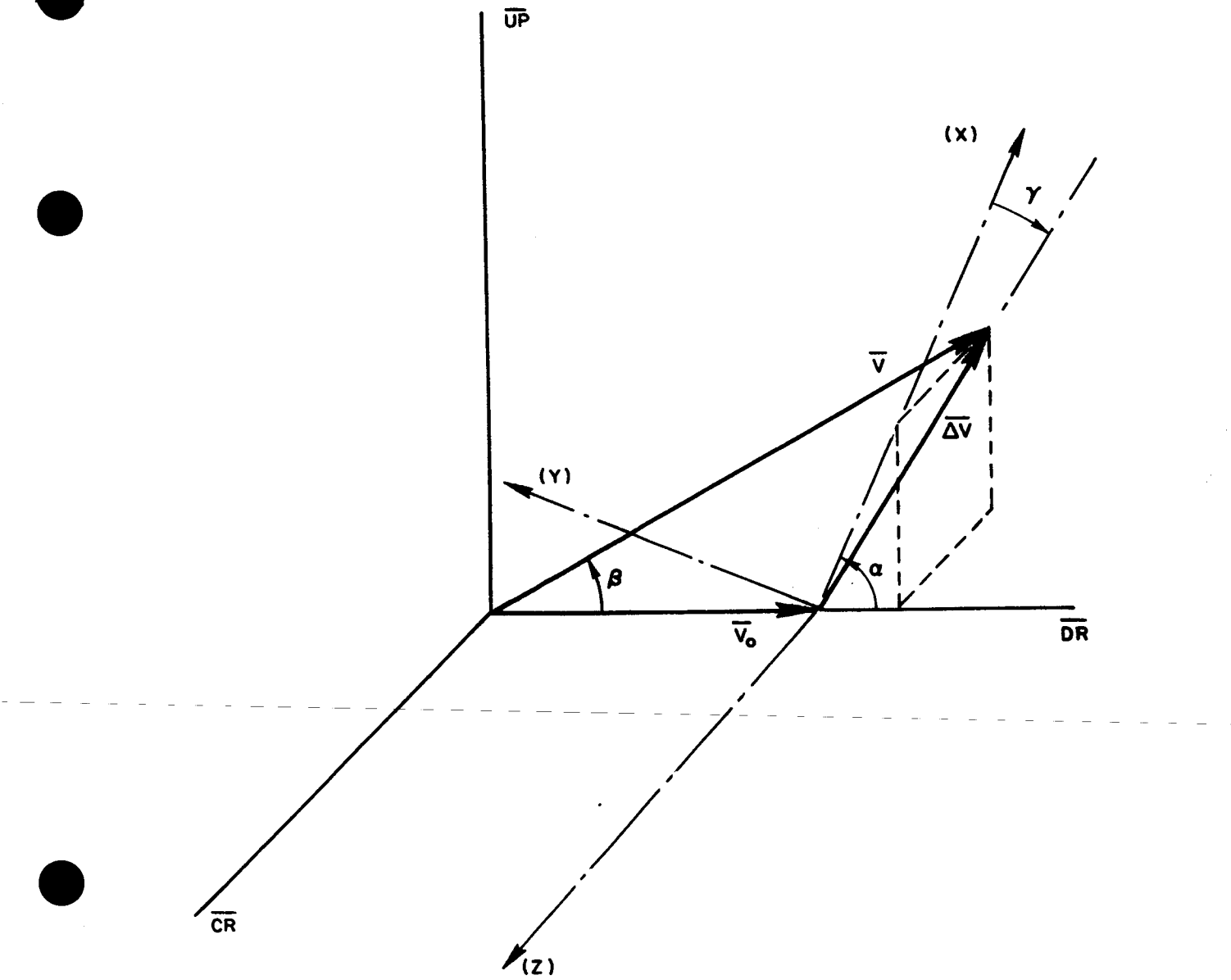

FIGURE 8

MODEL FOR WAITING ORBIT INJECTION BURN

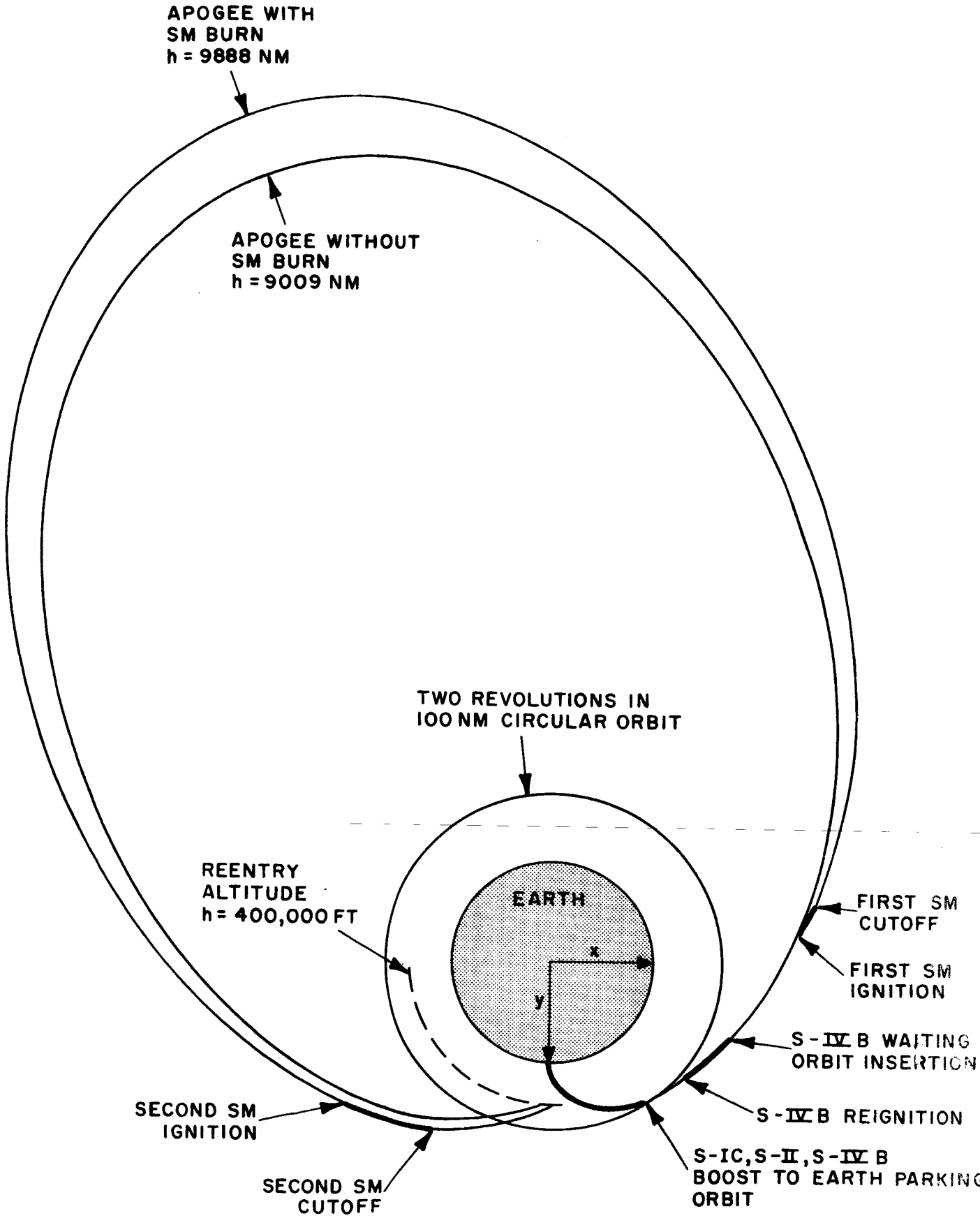

FIGURE 9
APOLLO-SATURN 501 MISSION PROFILE