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DISPERSION ANALYSIS FOR BASELINE REFERENCE MISSION 3A USING POWERED EXPLICIT GUIDANCE

MISSION PLANNING, MISSION ANALYSIS AND SOFTWARE FORMULATION

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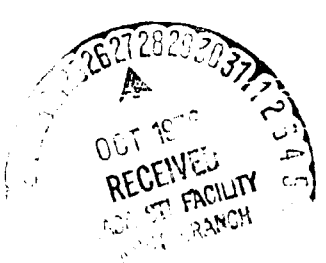


1.0 INTRODUCTION

A dispersion analysis considering 3σ uncertainties (or perturbations) in platform, vehicle, and environmental parameters has been performed for baseline reference mission (BRM) 3A. Powered Explicit Guidance (PEG) as implemented in SVDS Version 2.3.9 is used to develop closed loop steering commands for this dispersion analysis. The nominal profile for the dispersion analysis is identical to the nominal profile of Reference 1 with the exception that Generalized Linear Tangent (GLT) guidance is used in Reference 1.

This analysis is intended to

a. determine nominal trajectory differences which result from using PEG instead of GLT

b. develop dispersion data using PEG for comparison with similar data developed using GLT guidance (Reference 1).

2.0 DISCUSSION

2.1 Groundrules and Assumptions

The groundrules describing the Reference 1 ascent trajectory are used for this dispersion analysis. In addition, the following assumptions are made:

a. Dispersion analysis simulations are generated using the Space Vehicle Dynamics Simulation (SVDS) program operating in a three-degree-of-freedom flight simulation mode.

b. Dispersion analysis results are based on the nominal mission for BRM 3A.

c. Guidance target switchover occurs at a fixed time from liftoff for all perturbation simulations.

d. First stage steering is defined by vehicle attitude as a function of relative velocity from the nominal profile. This attitude history is used to provide steering commands for all perturbation simulations.

e. The perturbations considered for evaluation in this dispersion analysis are assumed normally distributed about their statistical mean.

f. The perturbations are statistically independent.

g. The perturbations considered include error sources in guidance and propulsion systems, uncertainties in measurements of system properties and perturbations in nominal environmental conditions.

2.2 General

2.2.1 Nominal Trajectory Comparison

In order to evaluate PEG operation in a simulation which includes uncertainties, a nominal profile must first be developed. PEG operation in a nominal mode has previously been verified as indicated in Reference 2. As a check of nominal performance, the nominal trajectory developed using PEG in this analysis is compared to the Reference 1 profile which was developed using GLT guidance.

Comparison data are shown in Table I for main engine cutoff (MECO), insertion, and entry interface conditions. Trajectory data (radius, inertial velocity, and inertial flight-path angle) and a performance indicator (total weight) are included in Table I. The data indicate that PEG and GLT guidance perform similarly in a nominal mode (no simulated uncertainties).

2.2.2 Dispersion Simulation Techniques

A dispersion analysis is based on a nominal trajectory generated without including any of the uncertainties. Performance-optimum first stage steering commands and second stage guidance inputs are determined for the nominal profile. Since perturbations are unplanned occurrences, the nominal steering and guidance inputs are used in simulating trajectories with perturbations.

The perturbation simulations in this analysis are determined by independently simulating 3σ values of the indicated uncertainties. That is, a complete trajectory simulation (liftoff to entry inter-

face) is developed using only one error source. The dispersion results from these independent simulations are then statistically correlated by 1) a root-sum-square (RSS) process and 2) determining a covariance matrix indicative of all error sources.

2.2.3 Error Sources, Symbols and Definitions

A list of the error sources used in this study and their 3σ values is given in Table II. Included in Table II are symbols used in the RSS data tables to identify dispersions resulting from the error sources.

Figure 1 contains the definition of a local horizontal coordinate system (LHS). The RSS data and covariance matrices indicate state vector dispersions in the LHS. Since the LHS is determined from the nominal state, a different LHS is determined at each instance for which RSS or covariance data is required.

Tables III and IV contain symbols used to identify elements of the covariance matrices, a definition of the symbols, and the format of the covariance matrices. Although 3σ values of the error sources are used in the trajectory simulations, state vector dispersions are adjusted to a 1σ level for determining the covariance matrices.

2.2.4 Events and Time Slices for Dispersion Analysis

RSS and covariance matrix data are presented for several events and time slices in this analysis. An event is defined as a fixed occurrence (sensed by attaining a given target value) and may have a time-from-liftoff dispersion associated with it. A time slice

is indicative of a fixed time from liftoff.

The events and time slices for which RSS and covariance matrix data are presented are as follows:

a. Solid Rocket Booster (SRB) Separation (See Tables V-A, V-B)

b. Main Engine Cutoff (MECO) (See Tables VI-A, VI-B)

c. Time slice defined as nominal MECO time plus 25 seconds, 511.3 seconds from liftoff (See Tables VII-A, VII-B)

d. Insertion (See Tables VIII-A, VIII-B)

e. Time slice defined as nominal insertion time plus 25 seconds, 779.4 seconds from liftoff (See Tables IX-A, IX-B)

f. Time slice defined as 10 seconds prior to the time of nominal de-orbit burn, 3505.6 seconds from liftoff (See Tables X-A, X-B)

g. Time slice defined as end of nominal de-orbit burn plus 25 seconds, 3623.2 seconds from liftoff (See Tables XI-A, XI-B)

h. Time slice defined as 10 minutes prior to nominal entry interface, 3665.3 seconds from liftoff (See Tables XII-A, XII-B)

i. Entry Interface (See Tables XIII-A, XIII-B)

As previously stated, the LHS in which state vector dispersions (RSS data and covariance matrix data) are calculated is determined by the nominal state at each of the indicated events and time slices. Each event and time slice has its own LHS in which dispersions are presented.

2.3 RSS Data

The RSS techinque is the method used in this analysis to statistically combine dispersions in flight parameters to determine the 3-sigma limits in the significant parameters. In actual vehicle flight, there is a 99.73 percent probability that the value of the parameter will be inside the 3-sigma band (the RSS value) if all assumptions required for this method are justified.

Inherent in the RSS method are the assumptions of linearity and normality. These assumptions are as follows:

a. The perturbations are statistically independent; that is, the occurrence of one perturbation will not effect the probability of a second perturbation.

b. A perturbation and its associated flight dispersions are linearly related.

The RSS data presented in this report includes dispersions in altitude, down range and cross range position, and cross range rate computed in the LHS. Speed, flight-path angle, altitude rate, time and total vehicle weight dispersions are also included in the RSS data. The dispersions presented in the RSS data are computed as:

dispersion = (Actual integrated state of perturbed trajectory) - (nominal trajectory state).

RSS data are presented in Tables V-A through XIII-A for the major events and time slices defined in Section 2.2.4. Data are included in the tables to indicate parameter dispersions for each individual

error source and the RSS combination of the dispersions. As previously stated, this study assumes all error sources to be normally distributed. Consequently, the RSS data indicated in Tables V-A through XIII-A are computed from the dispersions without regard to sign.

RSS data at SRB separation (Table V-A) and MECO (Table VI-A) contain total vehicle weight dispersions and the resulting penalty in terms of orbiter main engine propellant. The propellant variations will be used to indicate whether the cumulative penalty is within the flight performance reserve requirements.

RSS data Tables VII-A through XIII-A contain orbital maneuvering system (OMS) propellant dispersions.

2.4 Covariance Matrix Data

The covariance matrix represents a multivariate normal distribution of a 6 by 1 vector of dispersions in the actual (integrated) state, a 6 by 1 vector of navigated state deviations, and vehicle weight. The navigated state deviations represented in the covariance matrix are computed as:

deviation = (perturbed navigated state) - (actual integrated state of perturbed trajectory).

Table III defines the parameters presented in the covariance matrices of this paper. The matrices are expressed in the LHS (UVW coordinates) defined by the nominal state vector at each event or time slice. (See Figure 1.) The covariance matrices are indicative of

1σ perturbations. Each diagonal element of the matrix (Table IV) represents the variance of the associated parameter. For example, the element in the second row and second column represents the variance of the actual state in the V (or down-range) direction. Each off-diagonal element represents the covariance between the diagonal elements directly above and directly to the right of it. For example, the element in the fourth row and second column represents the covariance between the down-range variance and the $\dot{U}$ variance.

The elements of the matrix are symbolically defined in Table IV. The matrices are given in Tables V-B through XIII-B. Since a covariance matrix is symmetrical, only the lower triangle of the matrices is given.

2.5 Exchange Ratios

An exchange ratio is defined to be the ratio of a dispersion in a given variable to the magnitude of the error source causing the dispersion. The use of exchange ratios enables a quick-look assessment of the variations from nominal which may be expected to result from the application of error sources of various magnitudes. To use an exchange ratio, multiply a change in a parameter by its corresponding exchange ratio. This defines the predicted performance change at the event or time slice for which the ratio has been calculated.

Table XIV contains exchange ratios indicating space shuttle main

engine (SSME) propellant dispersion at MECO for several performance error sources. The exchange ratios are valid for perturbations only within a specified range. The exchange ratios show a sensitivity to an unplanned anomaly; that is, the trajectory is not optimized for the uncertainties. These exchange ratios may be used to predict SSME propellant variations at MECO.

2.6 RSS Summary Data

Summary tables of the RSS data are given in Tables XV and XVI. Table XV contains the RSS data of Tables V-A through XIII-A. Data are presented for each event and time slice indicated in the tables. The variations indicated by Table XV are dispersions of the actual (integrated) perturbed state from the nominal state. Table XVI is the RSS of navigation deviations computed as defined in Section 2.4. Data are presented in Table XVI for each event and time slice indicated by Tables V-B through XIII-B. In considering the data of Tables XV and XVI, it should be noted that uncertainties in atmospheric winds and SSME thrust tailoff are not simulated. These uncertainties are major contributors to position errors at SRB separation and MECO, respectively. Results of these error sources will be included in the dispersion analysis at a later date.

2.7 Covariance Matrix Principal Contributors

Principal error contributors to the covariance matrix at MECO and entry interface are listed in Tables XVII and XVIII, respectively. The dispersion data indicate that the largest position error occurs in the down range component. At MECO the vehicle performance uncertainties are the major contributors to down range error, and at entry interface the major contributors are platform errors.

2.8 Dispersion Result Comparison

Comparison of dispersion results using PEG (Tables V-A through XIII-A) with similar dispersion data developed using GLT guidance indicates the following:

a. PEG simulations have similar dispersions for navigation error source simulations

b. at entry interface, PEG and GLT guidance simulations have similar dispersions

c. at MECO, insertion (first OMS burn), and following the OMS deorbit burn, PEG simulations of the performance error sources have larger inertial flight-path angle and altitude rate dispersions.

d. at MECO, insertion and following the OMS deorbit burn, PEG simulations of the performance error sources have similar cross range and cross range rate dispersions. Comparison of down range dispersions indicates an inconsistent variation between PEG and GLT guidance error source cases.

e. at MECO and insertion (following first OMS burn), PEG and GLT guidance simulations have similar main engine and OMS propellant dispersions.

f. after OMS deorbit burn, PEG simulations indicate an OMS propellant dispersion of nearly twice the GLT guidance simulations.

To investigate the dispersion differences which are realized for the performance error source simulations, the orbiter specific impulse (ISP) uncertainty simulations were investigated. This data case has substantial differences in position and flight-path angle dispersions at insertion and following the OMS deorbit burn.

A comparison of dispersions in orbital elements for the PEG and GLT guidance simulations of orbiter ISP uncertainty is contained in Table XIX. The table contains dispersions from the nominal for both guidance simulations. The data reveals that at MECO and insertion the PEG simulation has 1) larger orbital dispersions (indicated by dispersions in semi-major axis) and 2) greater true anomaly and argument of perigee dispersions. This is indicative of a larger altitude dispersion and a more dispersed orbit orientation following the two guidance maneuvers.

It is noted that the first two closed-loop guidance maneuvers of these simulations (1- SRB separation to MECO and 2- orbit insertion) do not constrain orbit orientation. However, the OMS deorbit burn is sensitive to orbit orientation. Any reorientation of the orbit which occurs at MECO or insertion in a simulated uncertainty would be reflected by an additional OMS propellant dispersion during the second OMS burn.

It is concluded that the larger flight-path angle, altitude, and orbiter reorientation dispersions at MECO and insertion of the PEG simulations accounts for the increased OMS propellant dispersion after the second OMS burn.

3.0 CONCLUSIONS

Comparison of the data of Tables V-A through XIII-A in this document with similar tables in Reference 1 indicate that the PEG and GLT guidance simulations have similar dispersion results with respect to the RSS combination of dispersion magnitudes. However, the difference in flight-path angle dispersions and orbit reorientation at MECO and insertion for some error source simulations should be investigated.

4.0 RECOMMENDATIONS

Future trajectory simulations in support of Mission Planning and Analysis Division (MPAD) are to use PEG for closed loop guidance. PEG is the guidance technique being developed by Powered Flight Guidance Working Group to simulate the onboard system and will include any future requirements (such as throttling for rendezvous) which may be identified. The PEG version used in this analysis is an updated version of the SVDS 2.3.9 PEG. The Powered Flight Guidance group indicates that some recent updates to PEG may have corrected the problems indicated in this paper. It is recommended that a similar dispersion analysis be conducted on a later SVDS version at a later date.

5.0 REFERENCES

1. Design Note No. 1.4-16, "Dispersion Analysis for Baseline Reference Mission 3A", dated 26 September 1975.

2. JSC Memorandum FM 73(75-102), "PEG Nominal Ascent Performance Analysis", dated 23 September 1975.

TABLE I

Trajectory Comparison Data

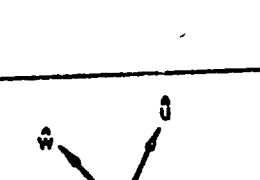
	PEG	GLT
MECO:		
Time (Sec)	486.42	486.32
Radius (Ft)	21290378.	21290399.
Inertial Velocity (Ft/Sec)	25383.	25383.
Inertial Flight-path Angle (Deg)	.495	.496
Total Weight (Lb)	301364.	301562.
Insertion:		
Time (Sec)	754.65	754.67
Radius (Ft)	21328420.	21327850.
Inertial Velocity (Ft/Sec)	25753.	25754.
Inertial Flight-path Angle (Deg)	.251	.245
Total Weight (Lb)	205269.	205265.
Entry Interface:		
Time (Sec)	4265.34	4264.11
Radius (Ft)	21326048.	21326041.
Inertial Velocity (Ft/Sec)	25602.	25604.
Inertial Flight-path Angle (Deg)	-.876	-.880
Total Weight (Lb)	202112.	202153.

TABLE II

ERROR SOURCE DEFINITIONS

ERROR SOURCE SYMBOLS*	DEFINITION	3-SIGMA VALUES	UNITS
PLATFORM ALINE	INITIAL PLATFORM MISALIGNMENT		
	AZIMUTH	180.000	ARC SEC
	TILT,ROLL	60.000	ARC SEC
DRIFT BIAS	FREE GYRO BIAS	.045	DEG/HR
G-SENS IA DRIFT	GYRO INPUT AXIS ACCELERATION SENSITIVE DRIFT	.075	DEG/HR/G
G-SENS SA DRIFT	GYRO SPIN AXIS ACCELERATION SENSITIVE DRIFT	.075	DEG/HR/G
G-SENS OA DRIFT	GYRO OUTPUT AXIS ACCELERATION SENSITIVE DRIFT	.075	DEG/HR/G
G-SENS-SQ DRIFT	GYRO ACCELERATION SQUARED SENSITIVE DRIFT	.075	DEG/HR/G**2
ACCEL BIAS	ACCELEROMETER BIAS	150.000	MICRO-G
ACCEL SCALE FAC	ACCELEROMETER SCALE FACTOR	120.000	PPM
ACCEL IA ALINE	ACCELEROMETER INPUT AXIS MISALIGNMENT		
- TOWARD OA	-TOWARD OUTPUT AXIS	45.000	ARC SEC
- TOWARD SA	-TOWARD SPIN AXIS	45.000	ARC SEC
WEB ACT	POS. WEB ACTION TIME	4.710	PERCENT
S ISP	NEG. SRB SPECIFIC IMPULSE	.500	PERCENT
S PROP	NEG. SRB PROPELLANT LOADING	.210	PERCENT
S INERT	POS. SRB INERT WEIGHT	.850 (2978.230)	PERCENT (LB)
O THRST	NEG. ORBITER THRUST	6000.000 (10392.000)	LB/ENG (LB/3 ENG)
O ISP	NEG. ORBITER SPECIFIC IMPULSE	2.300 (1.328)	SEC-1 ENG (SEC/3 ENG)
O INERT	POS. ORBITER INERT WEIGHT	.810 (1215.000)	PERCENT (LB)
ET INERT	POS. EXTERNAL TANK INERT WEIGHT	.810 (577.000)	PERCENT (LB)
ET PROP	NEG. EXTERNAL TANK PROPELLANT LOADING	.480 (7422.480)	PERCENT (LB)
AX FR	POS. AXIAL FORCE	ROCKWELL DOCUMENT NO. SD-72-SH-0060-26 JUNE 1974, AERODYNAMIC DESIGN DATA BOOK. VOL. II	
B DRAG	POS. BASE DRAG	ROCKWELL DOCUMENT NO. SD-72-SH-0060-26 JUNE 1974, AERODYNAMIC DESIGN DATA BOOK. VOL. II	

* Symbols used in Tables V-A through XIII-A.



Let R_I be the inertial position vector and V_I be the inertial velocity vector. The LHS coordinate system is defined by the following three vector equations.

$$\hat{u} = \vec{R}_I / |\vec{R}_I|$$

$$\hat{v} = (\vec{R}_I \times \vec{V}_I \times \vec{R}_I) / |\vec{R}_I \times \vec{V}_I \times \vec{R}_I|$$

$$\hat{w} = \hat{u} \times \hat{v}$$

Figure 1 - Local Horizontal Coordinate System

TABLE III

Covariance Matrix Parameter Definition

State Vector Component	Definition	Units
U ACT V ACT W ACT	Actual state vector position component dispersions in the Local Horizontal Coordinate System (LHS)	FT
U-DOT ACT V-DOT ACT W-DOT ACT	Actual state vector velocity component dispersions in the LHS	FT/SEC
U NAV V NAV W NAV	Navigated state vector position component deviations in a LHS*	FT
U-DOT NAV V-DOT NAV W-DOT NAV	Navigated state vector velocity component deviations in a LHS*	FT/SEC
WT	Vehicle weight	LB

* The navigated state has its own LHS developed from the nominal navigated state vectors similar to the actual state LHS development. Navigated state vector deviations are computed as:

deviation = (perturbed navigated state) - (actual integrated state of perturbed trajectory)

TABLE IV

Covariance Matrix Format

U ACT	σ_u^2													
V ACT	$\sigma_u\sigma_v$	σ_v^2												
W ACT	$\sigma_u\sigma_w$	$\sigma_v\sigma_w$	σ_w^2											
U-DOT ACT	$\sigma_u\sigma_{\dot{u}}$	$\sigma_v\sigma_{\dot{u}}$	$\sigma_w\sigma_{\dot{u}}$	$\sigma_{\dot{u}}^2$										
V-DOT ACT	$\sigma_u\sigma_{\dot{v}}$	$\sigma_v\sigma_{\dot{v}}$	$\sigma_w\sigma_{\dot{v}}$	$\sigma_{\dot{u}}\sigma_{\dot{v}}$	$\sigma_{\dot{v}}^2$									
W-DOT ACT	$\sigma_u\sigma_{\dot{w}}$	$\sigma_u\sigma_{\dot{w}}$	$\sigma_w\sigma_{\dot{w}}$	$\sigma_{\dot{u}}\sigma_{\dot{w}}$	$\sigma_{\dot{v}}\sigma_{\dot{w}}$	$\sigma_{\dot{w}}^2$								
U NAV	$\sigma_u\sigma_{u'}$	$\sigma_v\sigma_{u'}$	$\sigma_w\sigma_{u'}$	$\sigma_{\dot{u}}\sigma_{u'}$	$\sigma_{\dot{v}}\sigma_{u'}$	$\sigma_{\dot{w}}\sigma_{u'}$	$\sigma_{u'}^2$							
V NAV	$\sigma_u\sigma_{v'}$	$\sigma_v\sigma_{v'}$	$\sigma_w\sigma_{v'}$	$\sigma_{\dot{u}}\sigma_{v'}$	$\sigma_{\dot{v}}\sigma_{v'}$	$\sigma_{\dot{w}}\sigma_{v'}$	$\sigma_{u'}\sigma_{v'}$	$\sigma_{v'}^2$						
W NAV	$\sigma_u\sigma_{w'}$	$\sigma_v\sigma_{w'}$	$\sigma_w\sigma_{w'}$	$\sigma_{\dot{u}}\sigma_{w'}$	$\sigma_{\dot{v}}\sigma_{w'}$	$\sigma_{\dot{w}}\sigma_{w'}$	$\sigma_{u'}\sigma_{w'}$	$\sigma_{v'}\sigma_{w'}$	$\sigma_{w'}^2$					
U-DOT NAV	$\sigma_u\sigma_{\dot{u}'}$	$\sigma_v\sigma_{\dot{u}'}$	$\sigma_w\sigma_{\dot{u}'}$	$\sigma_{\dot{u}}\sigma_{\dot{u}'}$	$\sigma_{\dot{v}}\sigma_{\dot{u}'}$	$\sigma_{\dot{w}}\sigma_{\dot{u}'}$	$\sigma_{u'}\sigma_{\dot{u}'}$	$\sigma_{v'}\sigma_{\dot{u}'}$	$\sigma_{w'}\sigma_{\dot{u}'}$	$\sigma_{\dot{u}'}^2$				
V-DOT NAV	$\sigma_u\sigma_{\dot{v}'}$	$\sigma_v\sigma_{\dot{v}'}$	$\sigma_w\sigma_{\dot{v}'}$	$\sigma_{\dot{u}}\sigma_{\dot{v}'}$	$\sigma_{\dot{v}}\sigma_{\dot{v}'}$	$\sigma_{\dot{w}}\sigma_{\dot{v}'}$	$\sigma_{u'}\sigma_{\dot{v}'}$	$\sigma_{v'}\sigma_{\dot{v}'}$	$\sigma_{w'}\sigma_{\dot{v}'}$	$\sigma_{\dot{u}'}\sigma_{\dot{v}'}$	$\sigma_{\dot{v}'}^2$			
W-DOT NAV	$\sigma_u\sigma_{\dot{w}'}$	$\sigma_v\sigma_{\dot{w}'}$	$\sigma_w\sigma_{\dot{w}'}$	$\sigma_{\dot{u}}\sigma_{\dot{w}'}$	$\sigma_{\dot{v}}\sigma_{\dot{w}'}$	$\sigma_{\dot{w}}\sigma_{\dot{w}'}$	$\sigma_{u'}\sigma_{\dot{w}'}$	$\sigma_{v'}\sigma_{\dot{w}'}$	$\sigma_{w'}\sigma_{\dot{w}'}$	$\sigma_{\dot{u}'}\sigma_{\dot{w}'}$	$\sigma_{\dot{v}'}\sigma_{\dot{w}'}$	$\sigma_{\dot{w}'}^2$		
WT	$\sigma_u\sigma_{w_t}$	$\sigma_v\sigma_{w_t}$	$\sigma_w\sigma_{w_t}$	$\sigma_{\dot{u}}\sigma_{w_t}$	$\sigma_{\dot{v}}\sigma_{w_t}$	$\sigma_{\dot{w}}\sigma_{w_t}$	$\sigma_{u'}\sigma_{w_t}$	$\sigma_{v'}\sigma_{w_t}$	$\sigma_{w'}\sigma_{w_t}$	$\sigma_{\dot{u}'}\sigma_{w_t}$	$\sigma_{\dot{v}'}\sigma_{w_t}$	$\sigma_{\dot{w}'}\sigma_{w_t}$	$\sigma_{w_t}^2$	

Notes: a. Unprimed symbols represent actual (integrated) state vector errors.
b. Primed symbols represent navigation state vector error.
c. W_t represents total vehicle weight error.

TABLE V-A

LINEAR ERROR ANALYSIS

RSS DATA AT SRB SEPARATION (EVENT)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROP LB
PLATFORM ALINE										
AZIMUTH	1.	39.	135.	1.0	-.005	.0	3.7	.0	0.	0.
TILT	46.	-80.	23.	-.6	.029	1.2	.3	.0	0.	0.
ROLL	-1.	-28.	-94.	-.4	.002	-.0	-1.5	.0	0.	0.
DRIFT BIAS										
X	0.	1.	2.	.0	-.000	.0	.1	.0	0.	0.
Y	3.	-3.	1.	-.0	.001	.1	.0	.0	0.	0.
Z	0.	-1.	-3.	-.0	.000	-.0	-.1	.0	0.	0.
G-SENS IA DRIFT										
X	0.	2.	6.	.1	-.000	.0	.2	.0	0.	0.
Y	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Z	0.	-1.	-2.	-.0	.000	-.0	-.1	.0	0.	0.
G-SENS SA DRIFT										
X	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Y	3.	-2.	1.	-.0	.002	.1	.0	.0	0.	0.
Z	-0.	-2.	-8.	-.0	.000	-.0	-.2	.0	0.	0.
G-SENS OA DRIFT										
X	0.	1.	2.	.0	-.000	.0	.1	.0	0.	0.
Y	6.	-8.	2.	-.1	.003	.2	.0	.0	0.	0.
Z	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Y	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Z	0.	-1.	-3.	-.0	.000	-.0	-.1	.0	0.	0.
ACCEL BIAS										
X	-14.	20.	-6.	.1	-.005	-.3	-.1	.0	0.	0.
Y	-0.	0.	-0.	.0	-.000	-.0	-.0	.0	0.	0.
Z	-9.	10.	-3.	.1	-.004	-.2	-.1	.0	0.	0.
ACCEL SCALE FAC										
X	-18.	27.	-8.	.2	-.007	-.4	-.1	.0	0.	0.
Y	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Z	-4.	4.	-1.	.0	-.002	-.1	-.0	.0	0.	0.
ACCEL IA ALINE										
-TOWARD OA										
X	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
Y	-0.	0.	-0.	.0	-.000	-.0	-.0	.0	0.	0.
Z	-21.	24.	-7.	.2	-.009	-.6	-.1	.0	0.	0.
-TOWARD SA										
X	-8.	9.	-3.	.1	-.003	-.2	-.0	.0	0.	0.
Y	-0.	1.	-0.	.0	-.000	-.0	-.0	.0	0.	0.
Z	0.	0.	0.	.0	.000	.0	.0	.0	0.	0.
PERFORMANCE										
AEB ACT	1739.	4273.	5551.	-9.5	-.588	-46.8	-4.5	5.6	-18841.	-18842.
S ISP	-862.	-1824.	534.	-37.5	.130	-6.9	11.2	.0	0.	0.
S PROP	-210.	-423.	124.	-9.9	.026	-2.4	2.9	-.0	0.	0.
S INERT	-193.	-386.	113.	-9.7	.023	-2.5	2.8	.0	2978.	0.
O THRST	-427.	-853.	250.	-21.3	.051	-5.6	6.1	.0	2775.	2775.
O ISP	33.	60.	-18.	2.2	-.002	.8	-.6	.0	-1199.	-1199.
O INERT	-79.	-158.	46.	-3.9	.009	-1.0	1.1	.0	1215.	0.
ET INERT	-37.	-75.	22.	-1.9	.004	-.5	.5	.0	577.	0.
ET PROP	479.	967.	-283.	24.2	-.057	6.3	-6.9	.0	-7422.	-7422.
AERODYNAMIC										
AX FR	-294.	-586.	171.	-11.5	.037	-2.3	3.4	.0	0.	0.
S DRAG	-365.	-769.	225.	-13.8	.055	-2.0	4.2	.0	0.	0.
RSS =	2120.	4955.	5601.	55.4	.613	48.3	17.1	5.6	20734.	20475.

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TABLE V-8

COVARIANCE MATRIX

AT SRB SEPARATION

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	4.9921647+05						
V ACT	1.1621820+06	2.7283498+06					
W ACT	9.7385158+05	2.4316076+06	3.4861680+06				
U-DOT ACT	-7.7288527+03	-1.9623282+04	-3.0289399+04	2.6738224+02			
V-DOT ACT	9.7385288+03	2.1084246+04	2.9854375+03	4.1324694+00	3.5566215+02		
W-DOT ACT	-3.0196354+03	-6.5720302+03	-1.4007137+03	4.0604084+00	-1.0407750+02	3.2677829+01	
U NAV	-1.7763734+02	1.2336380+03	2.9256064+02	-1.4882259+01	1.4643691+01	-5.0030226+00	7.5912505+02
V NAV	4.6669810+02	-6.6349854+02	-1.1172425+03	1.2313217+01	-5.9452408+00	-2.1401842+01	-5.4270176+02
W NAV	-1.6880397+02	-8.5453908+02	-3.3738196+03	-1.4260265+00	-1.9251523+01	-7.4558390+01	2.0309005+02
U-DOT NAV	-9.9430046+00	1.5708945+01	-5.3790733+00	-2.5607921-01	2.4713355-01	-8.5282108-02	1.6589051+01
V-DOT NAV	4.9042664+00	-1.6867804+01	-1.7825816+01	1.2653597-01	-2.9809773-01	-4.8219880-01	-8.5167059+00
W-DOT NAV	-1.9787382+00	-1.8315692+01	-7.3817208+01	-5.0492164-02	-4.8668966-01	-1.8250625+00	3.4078036+00
WT	-4.2483671+06	-1.0167615+07	-1.1262109+07	9.2016574+04	-5.5558986+04	1.8228641+04	-2.3153484+03

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	2.4080897+03					
W NAV	6.2590808+02	4.3883862+03				
U-DOT NAV	-1.4827051+01	5.0075544+00	3.8713552-01			
V-DOT NAV	4.0620612+01	1.6761165+01	-2.3441216-01	7.1294156-01		
W-DOT NAV	1.7112311+01	9.4094573+01	8.3340249-02	4.6091681-01	2.1715873+00	
WT	1.2352006+03	6.4660756+02	6.7750934-01	-5.3333280-01	-3.3741949-01	4.7766839+07

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROP LB
PLATFORM ALINE										
AZIMUTH	112.	179.	4108.	-.7	.002	.8	20.6	.0	-5.	-5.
TILT	1206.	-1136.	15.	-4.1	.012	5.3	-.0	-.0	13.	13.
ROLL	-20.	-51.	-1013.	-.1	-.000	-.1	-2.6	-.0	1.	1.
DRIFT BIAS										
X	6.	9.	215.	.1	.000	.0	1.5	.0	-0.	-0.
Y	199.	-110.	-1.	-.6	.003	1.4	-.0	-.0	1.	1.
Z	0.	-5.	-82.	-.0	-.000	-.1	-.3	-.0	0.	0.
G-SENS IA DRIFT										
X	9.	17.	375.	.1	.000	.0	2.3	.0	-0.	-0.
Y	-4.	0.	-3.	.0	-.000	-.0	-.0	.0	0.	0.
Z	1.	-8.	-126.	-.0	-.000	-.1	-.4	-.0	0.	0.
G-SENS SA DRIFT										
X	-1.	-1.	-3.	.0	-.000	-.0	-.0	-.0	0.	0.
Y	393.	-181.	-3.	-1.1	.007	3.1	-.1	-.0	1.	1.
Z	-0.	-10.	-172.	-.0	-.000	-.1	-.5	-.0	0.	0.
G-SENS OA DRIFT										
X	9.	19.	414.	.1	.000	.1	3.4	.0	-0.	-0.
Y	346.	-221.	-1.	-1.0	.004	2.0	-.0	-.0	1.	1.
Z	-1.	-1.	0.	-.0	.000	.0	.0	-.0	0.	0.
G-SENS-SQ DRIFT										
X	-1.	-1.	-2.	-.0	.000	.0	-.0	-.0	0.	0.
Y	-5.	1.	-0.	.0	-.000	-.1	-.0	-.0	0.	0.
Z	1.	-9.	-149.	-.0	-.000	-.0	-.5	-.0	0.	0.
ACCEL BIAS										
X	-590.	142.	11.	.5	-.005	-2.4	.0	-.0	24.	24.
Y	17.	33.	563.	.1	.000	.1	2.1	.0	-2.	-2.
Z	-124.	-561.	23.	-2.1	-.003	-1.3	.1	-.0	52.	52.
ACCEL SCALE FAC										
X	-459.	148.	8.	.3	-.003	-1.4	.0	-.0	21.	21.
Y	-0.	-1.	-5.	-.0	-.000	-.0	-.0	-.0	0.	0.
Z	-126.	-790.	24.	-2.9	-.003	-1.5	.1	-.0	68.	68.
ACCEL IA ALINE -TOWARD OA										
X	8.	-0.	-0.	-.0	-.000	-.0	.0	.0	-0.	-0.
Y	30.	53.	1027.	.2	.000	.2	5.2	.0	-3.	-3.
Z	-172.	-455.	32.	-1.9	-.003	-1.5	.1	-.0	50.	50.
-TOWARD SA										
X	-1077.	183.	20.	1.2	-.012	-5.5	.1	-.0	37.	37.
Y	23.	49.	759.	.1	.000	.1	2.0	.0	-3.	-3.
Z	1.	-1.	-0.	-.0	-.000	-.0	.0	-.0	0.	0.
PERFORMANCE										
WEB ACT	-29.	-33226.	-0.	.0	-.002	-1.0	-.1	1.8	-3593.	-3593.
S ISP	4.	-5865.	1.	.1	.005	2.1	.4	.5	-1095.	-1095.
S PROP	1.	-1449.	0.	.0	.001	.6	.1	.1	-291.	-291.
S INERT	-1.	-1374.	0.	-.0	.001	.6	.1	.1	-285.	-285.
O THRST	-25.	27182.	0.	.2	-.006	-2.7	-.3	3.5	-645.	-645.
O ISP	-9.	-7589.	-2.	.5	-.009	-4.0	-.9	.8	-1948.	-1948.
O INERT	3.	2005.	1.	.0	.003	1.4	.3	.4	79.	-1136.
ET INERT	1.	954.	0.	-.0	.002	.7	.1	.2	38.	-539.
ET PROP	-6.	-12394.	-1.	.0	-.001	-.7	-.2	-2.1	-497.	-497.
BODYNAMIC										
A FR	3.	-1818.	0.	-.0	.002	.7	.1	.2	-344.	-344.
B DRAG	1.	-2282.	0.	-.0	.002	.8	.2	.2	-403.	-403.
RSS =	1888.	45919.	4502.	6.2	.025	11.0	22.1	4.6	4163.	4348.
A FR		-14.	-6177.	4.	.0	.002	.8	.4		
B DRAG		-20.	-7381.							
RSS =	2363.		112555.	5044.	6.5	.026	11.0	21.9	.0	1215.

TABLE VI-A

LINEAR ERROR ANALYSIS

RSS DATA AT MECO (EVENT)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROP LB
PLATFORM ALINE										
AZIMUTH	112.	179.	4108.	.7	.052	.8	20.6	.0	-5.	-5.
TILT	1206.	-1136.	15.	-4.1	.012	5.3	-.0	-.0	13.	13.
ROLL	-20.	-51.	-1013.	-.1	-.000	-.1	-2.6	-.0	1.	1.
DRIFT BIAS										
X	6.	9.	215.	.1	.000	.0	1.5	.0	-0.	-0.
Y	199.	-110.	-1.	-.6	.003	1.4	-.0	-.0	1.	1.
Z	0.	-5.	-82.	-.0	-.000	-.1	-.3	-.0	0.	0.
G-SENS IA DRIFT										
X	9.	17.	375.	.1	.000	.0	2.3	.0	-0.	-0.
Y	-4.	0.	-0.	.0	-.000	-.0	.0	-.0	0.	0.
Z	1.	-8.	-126.	-.0	-.000	-.1	-.4	-.0	0.	0.
G-SENS SA DRIFT										
X	-1.	-1.	-3.	.0	-.000	-.0	-.0	-.0	0.	0.
Y	393.	-181.	-3.	-1.1	.007	3.1	-.1	-.0	1.	1.
Z	-0.	-10.	-172.	-.0	-.000	-.1	-.5	-.0	0.	0.
G-SENS OA DRIFT										
X	9.	19.	414.	.1	.000	.1	3.4	.0	-0.	-0.
Y	346.	-221.	-1.	-1.0	.004	2.0	-.0	-.0	1.	1.
Z	-1.	-1.	0.	-.0	.000	.0	.0	-.0	0.	0.
G-SENS-SQ DRIFT										
X	-1.	-1.	-2.	-.0	.000	.0	-.0	-.0	0.	0.
Y	-5.	1.	-0.	.0	-.000	-.1	-.0	-.0	0.	0.
Z	1.	-9.	-149.	-.0	-.000	-.0	-.5	-.0	0.	0.
ACCEL BIAS										
X	-590.	142.	11.	.5	-.005	-2.4	.0	-.0	24.	24.
Y	17.	33.	553.	.1	.000	.1	2.1	-.0	-2.	-2.
Z	-124.	-561.	23.	-2.1	-.003	-1.3	.1	-.0	52.	52.
ACCEL SCALE FAC										
X	-459.	148.	8.	.3	-.003	-1.4	.0	-.0	21.	21.
Y	-0.	-1.	-5.	-.0	-.000	-.0	-.0	-.0	0.	0.
Z	-126.	-790.	24.	-2.9	-.003	-1.5	.1	-.0	68.	68.
ACCEL IA ALINE										
-TOWARD OA										
X	8.	-0.	-0.	-.0	-.000	-.0	.0	.0	-0.	-0.
Y	30.	53.	1027.	.2	.000	.2	5.2	.0	-3.	-3.
Z	-172.	-455.	32.	-1.9	-.003	-1.5	.1	-.0	50.	50.
-TOWARD SA										
X	-1077.	183.	20.	1.2	-.012	-5.5	.1	-.0	37.	37.
Y	23.	49.	759.	.1	.000	.1	2.0	.0	-3.	-3.
Z	1.	-1.	-0.	-.0	-.000	-.0	.0	-.0	0.	0.
PERFORMANCE										
WEB ACT	-29.	-33226.	-0.	.0	-.002	-1.0	-.1	1.8	-3593.	-3593.
S ISP	4.	-5865.	1.	.1	.005	2.1	.4	.5	-1095.	-1095.
S PROP	1.	-1449.	0.	-.0	.001	.6	.1	-.1	-291.	-291.
S INERT	-1.	-1374.	0.	-.0	.001	.6	.1	.1	-285.	-285.
O THRST	-25.	27182.	0.	.2	-.006	-2.7	-.3	3.5	-645.	-645.
O ISP	-9.	-7589.	-2.	.5	-.009	-4.0	-.9	-.8	-1448.	-1448.
O INERT	3.	2005.	1.	.0	.003	1.4	.3	.4	79.	-1136.
ET INERT	1.	954.	0.	-.0	.002	.7	.1	.2	38.	-539.
ET PROP	-6.	-12394.	-1.	.0	-.001	-.7	-.2	-2.1	-497.	-497.
AERODYNAMIC										
AX FN	3.	-1818.	0.	-.0	.002	.7	.1	.2	-394.	-394.
6 DRAG	1.	-2282.	0.	-.0	.002	.8	.2	.2	-403.	-403.
RSS =	1888.	45919.	4502.	6.2	.025	11.0	22.1	4.6	9163.	9376.

TABLE VI-A

LINEAR ERROR ANALYSIS

RSS DATA AT MECO (EVENT)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROI LB
PLATFORM ALINE										
AZIMUTH	112.	179.	4108.	-.7	.002	.8	20.6	.0	-5.	-5.
TILT	1206.	-1136.	15.	-4.1	.012	5.3	-.0	.0	13.	13.
ROLL	-20.	-51.	-1013.	-.1	-.000	-.1	-2.6	.0	1.	1.
DRIFT BIAS										
X	6.	9.	215.	.1	.000	.0	1.5	.0	-0.	-0.
Y	199.	-110.	-1.	-.6	.003	1.4	-.0	.0	1.	1.
Z	0.	-5.	-82.	-.0	-.000	-.1	-.3	.0	0.	0.
G-SENS IA DRIFT										
X	9.	17.	375.	.1	.000	.0	2.3	.0	-0.	-0.
Y	-4.	0.	-0.	.0	-.000	-.0	-.0	.0	0.	0.
Z	1.	-8.	-126.	-.0	-.000	-.1	-.4	.0	0.	0.
G-SENS SA DRIFT										
X	-1.	-1.	-3.	.0	-.000	-.0	-.0	.0	0.	0.
Y	393.	-181.	-3.	-1.1	.007	3.1	-.1	.0	1.	1.
Z	-0.	-10.	-172.	-.0	-.000	-.1	-.5	.0	0.	0.
G-SENS DA DRIFT										
X	9.	19.	414.	.1	.000	.1	3.4	.0	-0.	-0.
Y	346.	-221.	-1.	-1.0	.004	2.0	-.0	.0	1.	1.
Z	-1.	-1.	0.	-.0	.000	.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	-1.	-1.	-2.	-.0	.000	.0	-.0	.0	0.	0.
Y	-5.	1.	-0.	.0	-.000	-.1	-.0	.0	0.	0.
Z	1.	-9.	-149.	-.0	-.000	-.0	-.5	.0	0.	0.
ACCEL BIAS										
X	-590.	142.	11.	.5	-.005	-2.4	.0	.0	24.	24.
Y	17.	33.	553.	.1	.000	-.1	2.1	.0	-2.	-2.
Z	-124.	-561.	23.	-2.1	-.003	-1.3	.1	.0	52.	52.
ACCEL SCALE FAC										
X	-459.	198.	8.	.3	-.003	-1.9	.0	.0	21.	21.
Y	-0.	-1.	-5.	-.0	-.000	-.0	-.0	.0	0.	0.
Z	-126.	-790.	24.	-2.9	-.003	-1.5	.1	.0	68.	68.
ACCEL IA ALINE -TOWARD OA										
X	8.	-0.	-0.	-.0	-.000	-.0	.0	.0	-0.	-0.
Y	30.	53.	1027.	.2	.000	.2	5.2	.0	-3.	-3.
Z	-172.	-955.	32.	-1.9	-.003	-1.5	.1	.0	50.	50.
-TOWARD SA										
X	-1077.	183.	20.	1.2	-.012	-5.5	.1	.0	37.	37.
Y	23.	49.	759.	.1	.000	.1	2.0	.0	-3.	-3.
Z	1.	-1.	-0.	-.0	-.000	-.0	.0	.0	0.	0.
PERFORMANCE										
MEB ACT	-29.	-33226.	-0.	.0	-.002	-1.0	-.1	1.8	-3593.	-3593.
S ISP	4.	-5865.	1.	.1	.005	2.1	.4	.5	-1095.	-1095.
S PROP	1.	-1449.	0.	-.0	.001	.6	.1	.1	-291.	-291.
S INERT	-1.	-1374.	0.	-.0	.001	.6	.1	.1	-285.	-285.
O THRST	-25.	27182.	0.	.2	-.006	-2.7	-.3	3.6	-645.	-645.
O ISP	-9.	-7589.	-2.	.5	-.009	-9.0	-.9	-.8	-1448.	-1448.
O INERT	3.	2005.	1.	.0	.003	1.4	.3	.4	79.	-1136.
ET INERT	1.	954.	0.	-.0	.002	.7	.1	.2	38.	-539.
ET PROP	-6.	-12394.	-1.	.0	-.001	-.7	-.2	-2.1	-497.	-497.
AERODYNAMIC										
AX FR	3.	-1818.	0.	-.0	.002	.7	.1	.2	-344.	-344.
D DRAG	1.	-2282.	0.	-.0	.002	.8	.2	.2	-403.	-403.
RSS =	1888.	45919.	4502.	6.2	.025	11.0	22.1	4.6	4163.	4398.

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TABLE VI-B

COVARIANCE MATRIX

AT MECO

		U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U	ACT	3.9612544+05						
V	ACT	-1.3378411+05	2.3427995+08					
W	ACT	5.7699978+04	9.8834633+04	2.2521392+06				
U-DOT	ACT	2.0939293+03	-2.8160170+05	2.5884153+02	3.5194888+02			
V-DOT	ACT	-7.3725571+02	3.5912519+03	3.5730994+02	-7.5043748+00	9.3977875+00		
W-DOT	ACT	2.7334779+02	7.7907783+02	1.0908985+04	1.5642959+00	1.8123099+00	5.9292361+01	
U	NAV	-3.9692550+05	1.7715484+05	-5.7944171+04	-2.1353880+03	7.3965360+02	-2.7222421+02	3.9789127+05
V	NAV	2.0607367+05	-3.0412919+05	-6.0279842+04	1.1620716+03	-1.1798212+03	-3.1545184+02	-2.0688441+05
W	NAV	-5.7601695+04	-9.4139221+04	-2.2571201+06	-2.6418977+02	-3.5815306+02	-1.0934399+04	5.8052724+04
U-DOT	NAV	-2.2814878+03	1.1303423+03	-3.4793807+02	-1.2716457+01	9.7699888+00	-1.6419994+00	2.2872899+03
V-DOT	NAV	7.5096695+02	-1.1403232+03	-4.1259896+02	4.3409833+00	-9.4089290+00	-2.1546073+00	-7.5398784+02
W-DOT	NAV	-2.8252007+02	-5.1121912+02	-1.1576298+04	-1.3816952+00	-1.9724104+00	-5.7550118+01	2.8373566+02
RT		6.9369039+03	1.4205327+07	-2.2523885+03	-1.6065040+04	-5.8057475+00	1.4263042+02	7.4162312+03

		V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	RT
V	NAV	3.3977523+05					
W	NAV	6.0403018+04	2.2621143+06				
U-DOT	NAV	-1.3420456+03	3.4861932+02	1.3771525+01			
V-DOT	NAV	[illegible]462+03	4.1386105+02	-4.8668994+00	4.4844786+00		
W-DOT	NAV	3.[illegible]356+02	1.1603673+04	1.7197022+00	2.2809424+00	6.1226202+01	
RT		1.[illegible]316+04	2.4767353+03	3.4231499+01	9.3982939+01	1.2925349+01	1.9268129+06

TABLE VII-A

LINEAR ERROR ANALYSIS

RSS DATA AT 511.3 SEC (NOMINAL MECO + 25 SEC)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	CMS PRO LB
PLATFORM ALINE										
AZIMUTH	130.	128.	4619.	.7	.002	.8	20.5	.0	0.	0.
TILT	1337.	-1115.	15.	-4.3	.012	5.2	-.0	.0	0.	0.
ROLL	-23.	-39.	-1078.	-.1	-.000	-.1	-2.6	.0	0.	0.
DRIFT BIAS										
X	6.	8.	253.	.1	.000	.0	1.5	.0	0.	0.
Y	234.	-123.	-1.	-.6	.003	1.4	-.0	.0	0.	0.
Z	-1.	-3.	-88.	-.0	-.000	-.1	-.3	.0	0.	0.
G-SENS IA DRIFT										
X	10.	13.	432.	.1	.000	.0	2.3	.0	0.	0.
Y	-4.	1.	-0.	.0	-.000	-.0	.0	.0	0.	0.
Z	0.	-5.	-137.	-.0	-.000	-.1	-.4	.0	0.	0.
G-SENS SA DRIFT										
X	-1.	0.	-4.	.0	-.000	-.0	-.0	.0	0.	0.
Y	469.	-217.	-4.	-1.2	.007	3.0	-.1	.0	0.	0.
Z	-2.	-7.	-185.	-.0	-.000	-.1	-.5	.0	0.	0.
G-SENS OA DRIFT										
X	12.	17.	439.	.1	.000	.1	3.4	.0	0.	0.
Y	395.	-241.	-1.	-1.1	.004	1.9	-.0	.0	0.	0.
Z	-1.	0.	1.	-.0	.000	.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	-0.	-0.	-2.	-.0	.000	.0	-.0	.0	0.	0.
Y	-6.	2.	-0.	.0	-.000	-.1	-.0	.0	0.	0.
Z	0.	-6.	-162.	-.0	-.000	-.0	-.5	.0	0.	0.
ACCEL BIAS										
X	-648.	478.	12.	.6	-.005	-2.4	.0	.0	0.	0.
Y	19.	11.	606.	.1	.000	.1	2.1	.0	0.	0.
Z	-152.	49.	25.	-2.1	-.003	-1.4	.1	.0	0.	0.
ACCEL SCALE FAC										
X	-491.	440.	9.	.3	-.003	-1.4	.0	.0	0.	0.
Y	-1.	-0.	-5.	-.0	-.000	-.0	-.0	.0	0.	0.
Z	-159.	2.	24.	-2.9	-.004	-1.6	.1	.0	0.	0.
ACCEL IA ALINE										
-TOWARD CA										
X	8.	-4.	-0.	-.0	-.000	-.0	.0	.0	0.	0.
Y	35.	23.	1154.	.2	.000	.2	5.1	.0	0.	0.
Z	-207.	137.	33.	-1.9	-.004	-1.6	.1	.0	0.	0.
-TOWARD SA										
X	-1210.	722.	22.	1.3	-.012	-5.5	-.1	.0	0.	0.
Y	25.	13.	808.	.1	.000	.1	2.0	.0	0.	0.
Z	1.	-1.	-0.	-.0	-.000	-.0	.0	.0	0.	0.
PERFORMANCE										
WEB ACT	-525.	-79059.	-3.	.4	.001	-1.0	-.2	.0	0.	0.
S ISP	-60.	-19730.	11.	.1	.006	2.1	.4	.0	0.	0.
S PROP	-12.	-5135.	3.	.0	.002	.6	.1	.0	0.	0.
S INERT	-15.	-4979.	3.	.0	.002	.6	.1	.0	0.	0.
O THRST	-850.	-62552.	-6.	.9	.001	-2.6	-.3	.0	0.	0.
O ISP	35.	11740.	-24.	.4	-.010	-4.0	-.9	.0	0.	0.
O INERT	-32.	-6914.	7.	.1	.004	1.4	.3	.0	1215.	0.
ET INERT	-15.	-3283.	4.	.0	.002	.7	.1	.0	0.	0.
ET PROP	354.	42116.	-5.	-.4	-.005	-.7	-.1	.0	0.	0.
AERODYNAMIC										
AX FR	-14.	-6177.	4.	.0	.002	.7	.1	.0	0.	0.
C DRAG	-20.	-7381.	4.	.0	.002	.8	.2	.0	0.	0.
RSS =	2363.	112555.	5044.	6.5	.026	11.0	21.9	.0	1215.	0.

TABLE VII-B

COVARIANCE MATRIX

AT NOMINAL MECO + 25 SEC

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	6.2063809+05						
V ACT	1.2079427+07	1.4076358+09					
W ACT	7.5313076+04	5.5381716+04	2.8270822+06				
U-DOT ACT	-1.2468666+04	-1.7122394+06	4.0086197+02	2.0960321+03			
V-DOT ACT	-8.7141274+02	4.0965702+03	3.8866538+02	-8.1785638+00	4.5949743+00		
W-DOT ACT	3.3819776+02	5.5715445+02	1.2157109+04	1.9372103+00	1.7346111+00	5.3393129+01	
U NAV	-5.0049822+05	3.3514778+05	-7.5982508+04	-2.5524402+03	8.8682243+02	-3.1818115+02	5.0568279+05
V NAV	2.6171359+05	-2.3334568+05	-7.7304727+04	1.1424092+03	-1.3430290+03	-3.5596173+02	-2.6478541+05
W NAV	-7.5473596+04	-8.5941736+04	-2.8513816+06	-3.4815893+02	-3.9381398+02	-1.2264095+04	7.6420677+04
U-DOT NAV	-2.5763491+03	1.7755761+03	-4.0759843+02	-1.3392750+01	5.0477291+00	-1.7151998+00	2.6064239+03
V-DOT NAV	8.9374209+02	-7.6544846+02	-4.5163580+02	3.9342109+00	-4.6324311+00	-2.0743962+00	-9.0400594+02
W-DOT NAV	-3.2735223+02	-3.7995472+02	-1.2914646+04	-1.5543756+00	-1.8986530+00	-5.6705302+01	3.3155302+02
WT	-4.3745071+03	-9.3335318+05	9.0554826+02	1.3398335+03	-2.7530967+00	3.7078898+01	2.1608720+01

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	4.1805197+05					
W NAV	7.7952672+04	2.8760202+06				
U-DOT NAV	-1.5053055+03	4.1016447+02	1.3901844+01			
V-DOT NAV	1.3729323+03	4.5580815+02	-5.1505290+00	4.7453324+00		
W-DOT NAV	3.7447049+02	1.3032765+04	1.7953821+00	2.1987135+00	6.0387291+01	
WT	1.2876845+02	3.8228986+01	8.5041828-02	8.4706265-02	-5.6964614-02	1.6402447+05

TABLE VIII-A

LINEAR ERROR ANALYSIS

RSS DATA AT INSERTION (EVENT)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	OMS PROP LB
PLATFORM ALINE										
AZIMUTH	381.	-2565.	9282.	.5	.003	.9	18.0	.1	-3.	-3.
TILT	2291.	-2821.	6.	-5.4	.006	4.7	-.0	.0	-0.	-0.
ROLL	-59.	99.	-1653.	-.0	-.000	-.1	-2.1	.0	-0.	-0.
DRIFT BIAS										
X	15.	241.	606.	.1	.000	.0	1.4	.0	-0.	-0.
Y	518.	-405.	-6.	-1.0	.002	1.3	-.0	.0	-0.	-0.
Z	-15.	-94.	-146.	.0	-.000	-.1	-.2	.0	0.	0.
G-SENS IA DRIFT										
X	28.	322.	950.	.1	.000	.1	2.0	.0	-0.	-0.
Y	-12.	-45.	1.	.0	-.000	-.0	.0	-.0	0.	0.
Z	-13.	65.	-234.	.0	-.000	-.1	-.3	.0	-0.	-0.
G-SENS SA DRIFT										
X	-6.	-48.	-9.	.0	-.000	-.0	-.0	-.0	0.	0.
Y	1107.	-566.	-17.	-2.0	.005	2.9	-.1	.0	-0.	-0.
Z	-18.	-61.	-304.	-.0	-.000	-.1	-.4	-.0	0.	0.
G-SENS OA DRIFT										
X	52.	862.	1275.	.1	.000	.1	3.1	.0	-1.	-1.
Y	784.	-628.	-6.	-1.5	.003	1.8	-.0	.0	-0.	-0.
Z	1.	-22.	3.	-.0	.000	.0	.0	-.0	0.	0.
G-SENS-SQ DRIFT										
X	2.	-31.	-3.	-.0	.000	.0	-.0	-.0	0.	0.
Y	-20.	-67.	-1.	.0	-.000	-.1	-.0	-.0	0.	0.
Z	-7.	4.	-273.	-.0	-.000	-.0	-.4	.0	-0.	-0.
ACCEL BIAS										
X	-1195.	4848.	19.	1.5	-.005	-2.4	.0	.2	-6.	-6.
Y	47.	838.	1128.	.1	.000	.1	2.7	.0	-1.	-1.
Z	-741.	-19036.	41.	-2.7	-.006	-1.7	.1	-.7	27.	27.
ACCEL SCALE FAC										
X	-821.	434.	12.	.7	-.003	-1.4	.0	-.0	0.	0.
Y	-5.	-6.	-6.	.0	-.000	-.0	-.0	-.0	0.	0.
Z	-782.	-2255.	44.	-2.2	-.007	-2.0	.1	-.1	1.	1.
ACCEL IA ALINE										
-TOWARD OA										
X	9.	-24.	0.	-.0	.000	.0	.0	-.0	0.	0.
Y	96.	663.	2318.	.1	.001	.2	4.5	.0	-1.	-1.
Z	-751.	94.	43.	-1.1	-.006	-1.9	.0	.0	-1.	-1.
-TOWARD SA										
X	-2465.	1730.	40.	2.9	-.011	-5.4	.1	-.0	-1.	-1.
Y	52.	-10.	1237.	.0	.000	.1	1.5	-.0	0.	0.
Z	-1.	-77.	-0.	-.0	-.000	-.0	-.0	-.0	0.	0.
PERFORMANCE										
AEB ACT	-361.	-32041.	-14.	.6	-.003	-1.3	-.0	1.8	-2.	-2.
S ISP	579.	-10640.	132.	-1.0	.005	2.3	.5	.4	7.	7.
S PROP	174.	-2404.	41.	-.3	.001	.7	.2	.1	1.	1.
S INERT	162.	-2380.	38.	-.3	.001	.6	.1	.1	1.	1.
O THRST	-861.	28930.	-24.	1.4	-.007	-3.3	-.1	3.6	-2.	-2.
O ISP	-1163.	-7701.	-270.	1.9	-.009	-4.5	-1.0	-.8	1.	1.
O INERT	469.	33546.	93.	-.7	.002	1.5	.4	1.6	1168.	-47.
ET INERT	192.	-159.	43.	-.3	.002	.8	.2	.1	2.	2.
ET PROP	-197.	-11360.	-67.	.3	-.002	-.8	-.3	-2.1	-1.	-1.
AERODYNAMIC										
AX FR	196.	-2921.	46.	-.3	.002	.8	.2	.1	2.	2.
B DRAG	226.	-3626.	52.	-.4	.002	.9	.2	.2	2.	2.
RSS =	4520.	61116.	10016.	8.3	.023	11.3	19.4	5.0	1168.	56.

TABLE VIII-B

COVARIANCE MATRIX

AT INSERTION

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	2.2697275+06						
V ACT	4.3449311+05	4.1502208+08					
W ACT	4.8475321+05	3.4160815+06	1.1146931+07				
U-DOT ACT	4.3115458+03	-4.9807123+05	-2.5843323+03	6.0992414+02			
V-DOT ACT	-2.8700054+03	1.1460391+04	5.4488008+02	-1.8120414+01	7.8009269+00		
W-DOT ACT	1.0339178+03	7.4810704+03	2.1458510+04	-5.6776990+00	9.3707615-01	4.1666705+01	
U NAV	-2.0431168+06	3.8209918+05	-4.5699392+05	-4.2836384+03	2.5677086+03	-8.6820032+02	-2.1603977+06
V NAV	1.2818759+06	-4.4833641+06	-2.5652679+05	6.6994409+03	-3.7383583+03	-5.2241907+02	-1.4063811+06
W NAV	-4.4216736+05	-3.1323594+06	-1.1664648+07	2.3927271+03	-6.6621152+02	-2.2460112+04	4.7234691+05
U-DOT NAV	-5.7619219+03	1.2150231+03	-1.2313788+03	-1.2042745+01	7.6462744+00	-2.3428872+00	6.1174803+03
V-DOT NAV	2.5499426+03	-1.0069075+04	-5.5562654+02	1.4915101+01	-7.2610208+00	-1.1311972+00	-2.7980629+03
W-DOT NAV	-8.6515592+02	-6.4375759+03	-2.3283695+04	5.0178671+00	-1.3893963+00	-4.5183145+01	9.2447154+02
WT	6.0001847+04	4.2801178+06	8.2090162+03	-5.0396824+03	-7.8527928+01	4.0296989+01	1.6538249+03

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	2.0757047+06					
W NAV	2.6830885+05	1.2223734+07				
U-DOT NAV	-4.2289409+03	1.2750333+03	1.7484799+01			
V-DOT NAV	3.9258351+03	5.6288507+02	-8.3453509+00	7.6241091+00		
W-DOT NAV	5.6063662+02	2.4434662+04	2.4987486+00	1.2212373+00	4.9239648+01	
WT	3.8752485+03	4.2464962+03	4.3239481+00	9.0541774+00	8.3924185+00	1.5154634+05

TABLE IX-A

LINEAR ERROR ANALYSIS

RSS DATA AT 779.4 SEC (NOMINAL INSERTION + 25 SEC)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	OMS PROP LB
PLATFORM ALINE										
AZIMUTH	400.	184.	9721.	.5	.003	1.2	17.6	.0	-.	-3.
TILT	2356.	-3057.	5.	-5.5	.006	2.7	-.0	.0	-0.	-0.
ROLL	-65.	-45.	-1703.	-.0	-.000	-.2	-2.0	.0	-0.	-0.
DRIFT BIAS										
X	15.	20.	640.	.1	.000	.0	1.4	.0	-0.	-0.
Y	541.	-475.	-6.	-1.0	.002	1.0	-.0	.0	-0.	-0.
Z	-16.	1.	-151.	.0	-.000	-.1	-.2	.0	0.	0.
G-SENS IA DRIFT										
X	29.	26.	999.	.1	.000	.1	2.0	.0	-0.	-0.
Y	-13.	8.	1.	.0	-.000	-.0	.0	.0	0.	0.
Z	-15.	-3.	-242.	.0	-.000	-.1	-.3	.0	-0.	-0.
G-SENS SA DRIFT										
X	-6.	2.	-10.	.0	-.000	-.0	-.0	.0	0.	0.
Y	1160.	-939.	-18.	-2.1	.005	2.2	-.1	.0	-0.	-0.
Z	-19.	-5.	-314.	.0	-.000	-.1	-.4	.0	0.	0.
G-SENS OA DRIFT										
X	53.	38.	1350.	.1	.000	.2	3.0	.0	-1.	-1.
Y	814.	-803.	-7.	-1.6	.003	1.3	-.0	.0	-0.	-0.
Z	1.	-1.	3.	-.0	.000	.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	2.	-2.	-4.	-.0	.000	.0	-.0	.0	0.	0.
Y	-21.	13.	-1.	.0	-.000	-.1	-.0	.0	0.	0.
Z	-8.	-8.	-283.	-.0	-.000	-.0	-.4	.0	-0.	-0.
ACCEL BIAS										
X	-1264.	1058.	20.	1.6	-.005	-2.1	.0	.0	-6.	-6.
Y	46.	16.	1194.	.1	.000	.1	2.7	.0	-1.	-1.
Z	-720.	-323.	43.	-2.7	-.006	-2.8	.1	.0	27.	27.
ACCEL SCALE FAC										
X	-851.	805.	12.	.7	-.003	-1.3	.0	.0	0.	0.
Y	-5.	2.	-7.	.0	-.000	-.0	-.0	.0	0.	0.
Z	-859.	-501.	45.	-2.1	-.008	-3.3	.1	.0	1.	1.
ACCEL IA ALINE -TOWARD OA										
X	9.	-8.	0.	-.0	.000	.0	.0	.0	0.	0.
Y	101.	37.	2428.	.1	.001	.3	4.4	.0	-1.	-1.
Z	-821.	-109.	44.	-1.1	-.006	-2.8	.0	.0	-1.	-1.
-TOWARD SA										
X	-2583.	1937.	42.	3.0	-.011	-4.8	.1	.0	-1.	-1.
Y	56.	13.	1275.	.0	.000	.1	1.5	.0	0.	0.
Z	-1.	-1.	-0.	-.0	-.000	-.0	-.0	.0	0.	0.
PERFORMANCE										
WEB ACT	-730.	-79639.	-15.	.9	-.003	-1.3	-.0	.0	-2.	-2.
S ISP	582.	-20170.	144.	-1.0	.005	2.2	.5	.0	7.	7.
S PROP	177.	-5266.	45.	-.3	.001	.6	.2	.0	1.	1.
S INERT	164.	-5103.	41.	-.3	.001	.6	.1	.0	1.	1.
O THRST	-1418.	-63439.	-26.	1.9	-.008	-3.1	-.1	.0	-2.	-2.
O ISP	-1179.	12594.	-296.	1.9	-.009	-4.1	-1.0	.0	1.	1.
O INERT	332.	-7453.	102.	-.5	.002	1.0	.4	.0	1168.	-47.
ET INERT	195.	-3424.	47.	-.3	.002	.7	.2	.0	2.	2.
ET PROP	-10.	42979.	-74.	.0	-.001	-.7	-.3	.0	-1.	-1.
AERODYNAMIC										
AR FR	197.	-6325.	50.	-.3	.002	.7	.2	.0	2.	2.
B DRAG	228.	-7553.	57.	-.4	.002	.8	.2	.0	2.	2.
RSS =	4851.	114082.	10487.	8.5	.023	10.5	19.0	.0	1168.	56.

TABLE IX-B

COVARIANCE MATRIX

AT NOMINAL INSERTION + 25 SEC

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	2.5144429+06						
V ACT	1.0864907+07	1.4460740+09					
W ACT	5.3216819+05	-7.7608763+05	1.2220824+07				
U-DOT ACT	-7.9165516+03	-1.7238958+06	2.5848457+03	2.0669875+03			
V-DOT ACT	-3.1864421+03	-1.5869976+03	5.2055249+02	-2.3879536+00	8.0072560+00		
W-DOT ACT	1.0540065+03	-3.3022114+03	2.2049498+04	7.3111500+00	8.2314070-01	4.0109272+01	
U NAV	-2.2385895+06	1.8170662+06	-5.1820520+05	-6.1482143+03	2.7613139+03	-9.2471597+02	2.3832247+06
V NAV	1.4568113+06	-2.0043058+06	-2.6813771+05	3.7222025+03	-4.0384723+03	-5.1267774+02	-1.5889403+06
W NAV	-4.8638569+05	-2.6186938+05	-1.2810075+07	-1.1799171+03	-6.5661928+02	-2.3117071+04	5.3699691+05
U-DOT NAV	-6.0790632+03	5.0943370+03	-1.3411540+03	-1.6649391+01	7.9375811+00	-2.3935909+00	6.4993124+03
V-DOT NAV	2.7767900+03	-3.6328990+03	-5.3465836+02	7.1069382+00	-7.4335999+00	-1.0230357+00	-3.0210630+03
W-DOT NAV	-8.9106743+02	-4.9282299+02	-2.3940645+04	-2.1849682+00	-1.2841057+00	-4.3522451+01	9.8551343+02
WT	4.2552233+04	-9.6541409+05	9.1291172+03	1.2599072+03	-7.7607793+01	4.0060345+01	1.9135522+03

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	2.3681755+06					
W NAV	2.8093202+05	1.3448419+07				
U-DOT NAV	-4.6127006+03	1.3907496+03	1.7881873+01			
V-DOT NAV	4.2568065+03	5.6209232+02	-8.6925699+00	7.8381815+00		
W-DOT NAV	5.5069339+02	2.5169090+04	2.5548204+00	1.1058011+00	4.7464646+01	
WT	4.0634617+03	4.4488337+03	4.7634444+00	8.7773696+00	8.2314790+00	1.5154634+05

TABLE X-A

LINEAR ERROR ANALYSIS

RSS DATA AT 3505.6 SEC (10 SEC PRIOR TO END OF NOMINAL COAST)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	DMS PROP LB
PLATFORM ALINE										
AZIMUTH	2868.	-12289.	-11204.	-2.4	-.003	1.2	-16.1	.0	-3.	-3.
TILT	-11496.	11544.	-2.	11.0	-.004	2.6	.0	.0	-0.	-0.
ROLL	-316.	1547.	1875.	.3	.000	-.2	1.8	.0	-0.	-0.
DRIFT BIAS										
X	259.	-853.	-756.	-.2	-.000	.1	-1.3	.0	-0.	-0.
Y	-1813.	-472.	8.	1.8	-.002	.9	.0	.0	-0.	-0.
Z	-24.	301.	167.	.0	.000	-.1	.2	.0	0.	0.
G-SENS IA DRIFT										
X	348.	-1251.	-1166.	-.3	-.000	.1	-1.8	.0	-0.	-0.
Y	14.	95.	-2.	-.0	.000	-.0	-.0	.0	0.	0.
Z	3.	219.	269.	-.0	.000	-.1	.3	.0	-0.	-0.
G-SENS SA DRIFT										
X	-7.	98.	12.	.0	.000	-.0	.0	.0	0.	0.
Y	-3562.	-2261.	23.	3.6	-.004	2.2	.0	.0	-0.	-0.
Z	-51.	414.	349.	.0	.000	-.1	.4	.0	0.	0.
G-SENS OA DRIFT										
X	633.	-2372.	-1605.	-.5	-.000	.2	-2.8	.0	-1.	-1.
Y	-2924.	341.	8.	2.9	-.002	1.2	.0	.0	-0.	-0.
Z	-19.	30.	-4.	.0	-.000	.0	-.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	-22.	16.	4.	.0	-.000	.0	.0	.0	0.	0.
Y	33.	157.	1.	-.0	.000	-.1	.0	.0	0.	0.
Z	-49.	260.	316.	.0	.000	-.0	.3	.0	-0.	-0.
ACCEL BIAS										
X	1746.	7068.	-23.	-2.0	.004	-2.1	-.0	.0	-6.	-6.
Y	438.	-1648.	-1419.	-.4	-.000	.1	-2.5	.0	-1.	-1.
Z	-11334.	39744.	-50.	9.8	.007	-2.8	-.1	.0	27.	27.
ACCEL SCALE FAC										
X	-21.	7353.	-13.	-.3	.003	-1.3	-.0	.0	0.	0.
Y	1.	73.	7.	-.0	.000	-.0	.0	.0	0.	0.
Z	-9498.	37588.	-51.	8.1	.009	-3.4	-.1	.0	1.	1.
ACCEL IA ALINE -TOWARD OA										
X	11.	-67.	-1.	-.0	-.000	.0	-.0	.0	0.	0.
Y	725.	-3078.	-2800.	-.6	-.001	.3	-4.0	.0	-1.	-1.
Z	-5917.	26674.	-46.	5.0	.007	-2.8	-.0	.0	-1.	-1.
-TOWARD SA										
X	2627.	17888.	-48.	-3.2	.010	-4.7	-.1	.0	-1.	-1.
Y	253.	-1240.	-1403.	-.2	-.000	.1	-1.3	.0	0.	0.
Z	-22.	86.	0.	.0	.000	-.0	.0	.0	0.	0.
PERFORMANCE										
NEB ACT	1111.	-76750.	17.	-1.3	.003	-1.5	.0	.0	-2.	-2.
S ISP	-1743.	-24785.	-187.	1.8	-.004	2.1	-.5	.0	7.	7.
S PROP	-493.	-6668.	-58.	.5	-.001	.6	-.1	.0	1.	1.
S INERT	-494.	-6348.	-54.	.5	-.001	.6	-.1	.0	1.	1.
O THRST	2745.	-55378.	34.	-3.0	.007	-3.6	.1	.0	-2.	-2.
O ISP	3063.	21629.	381.	-3.2	.008	-3.9	1.0	.0	1.	1.
O INERT	-624.	-9422.	-132.	.7	-.002	.8	-.3	.0	1168.	-47.
ET INERT	-545.	-4966.	-61.	.6	-.001	.7	-.2	.0	2.	2.
ET PROP	254.	43927.	96.	-.3	.001	-.4	.2	.0	-1.	-1.
AERODYNAMIC										
AA FP	-533.	-7939.	-65.	.6	-.001	.7	-.2	.0	2.	2.
B DRAG	-636.	-9407.	-74.	.7	-.002	.8	-.2	.0	2.	2.
RSS =	21287.	129455.	12080.	11.5	.023	10.4	17.4	.0	1168.	56.

TABLE X-B

COVARIANCE MATRIX

AT 10 SEC PRIOR END OF NOMINAL COAST

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	5.0349103+07						
V ACT	-1.2925230+08	1.8620776+09					
W ACT	-3.8273252+06	1.8959161+07	1.6214802+07				
U-DOT ACT	1.5093250+05	-2.1702231+06	-2.0430945+04	2.5397297+03			
V-DOT ACT	-4.5146341+04	1.0429310+05	3.1013721+03	-1.2359597+02	4.0892028+01		
W-DOT ACT	-5.3988481+03	2.9876488+04	2.3245490+04	-3.2198974+01	4.3199254+00	3.3570637+01	
U NAV	-4.8436947+07	1.1664806+08	3.8374783+06	-1.3360503+05	4.3191160+04	5.6417333+03	4.9267825+07
V NAV	1.1452408+08	-4.8860640+08	-1.7523933+07	5.2836737+05	-9.3418853+04	-2.5449787+04	-1.1174185+08
W NAV	4.2326629+06	-1.7790246+07	-1.7076356+07	1.9215546+04	-3.4950889+03	-2.4483302+04	-4.0233647+06
U-DOT NAV	-1.3109135+05	5.2599849+05	1.8739099+04	-5.7157407+02	1.0829143+02	2.7239423+01	1.2866703+05
V-DOT NAV	4.3194552+04	-9.5689767+04	-3.1297267+03	1.1085065+02	-3.8863459+01	-4.6130853+00	-4.4116611+04
W-DOT NAV	6.3893138+03	-2.6562263+04	-2.5304273+04	2.8718664+01	-5.2877607+00	-3.6519648+01	-6.0734891+03
WT	-1.1988273+05	-1.1053861+06	-1.2456315+04	1.2259875+03	1.2747840+02	-3.8294594+01	3.4768666+04

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	4.6610313+08					
W NAV	1.8323026+07	1.8017682+07				
U-DOT NAV	-5.2167764+05	-1.9597703+04	5.6311758+02			
V-DOT NAV	9.0823893+04	3.2834837+03	-1.0608730+02	3.9871622+01		
W-DOT NAV	2.7328814+04	2.6736212+04	-2.9256406+01	4.9694270+00	3.9942225+01	
WT	-1.2209781+05	-5.1582616+03	1.3376464+02	-2.9389662+01	-7.5544610+00	1.5154634+05

TABLE XI-A

LINEAR ERROR ANALYSIS

RSS DATA AT 3623.2 SEC (END OF NOMINAL DE-ORBIT BURN + 25 SEC)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	OMS PROP LB
PLATFORM ALINE										
AZIMUTH	2682.	-12921.	-13121.	-2.1	-.004	-1.8	-16.2	.0	-2.	-2.
TILT	-11744.	14466.	4.	11.7	-.005	-2.4	.0	.0	10.	10.
ROLL	-293.	1618.	2062.	.2	.000	.2	1.4	.0	-0.	-0.
DRIFT BIAS										
X	242.	-912.	-910.	-.2	-.000	-.2	-1.3	.0	1.	1.
Y	-1933.	9.	10.	2.1	-.003	-1.2	.0	.0	4.	4.
Z	-20.	304.	189.	.0	.000	.0	.2	.0	0.	0.
G-SENS IA DRIFT										
X	325.	-1329.	-1386.	-.2	-.001	-.3	-1.9	.0	0.	0.
Y	18.	90.	-2.	-.0	.000	.0	.0	.0	0.	0.
Z	7.	217.	297.	-.0	.000	.0	.2	.0	-0.	-0.
G-SENS SA DRIFT										
X	-8.	99.	15.	4.0	-.000	-.0	.0	.0	0.	0.
Y	-3855.	-1301.	28.	4.3	-.007	-3.0	.1	.0	10.	10.
Z	-46.	425.	389.	.0	.000	.0	.3	.0	0.	0.
G-SENS OA DRIFT										
X	593.	-2511.	-1961.	-.4	-.001	-.4	-3.2	.0	-0.	-0.
Y	-3068.	1108.	11.	3.2	-.003	-1.4	.0	.0	4.	4.
Z	-20.	35.	-4.	.0	-.000	-.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	-21.	22.	6.	.0	.000	.0	.0	.0	-0.	-0.
Y	36.	147.	1.	-.0	.000	.0	-.0	.0	0.	0.
Z	-45.	270.	354.	.0	.000	.0	.3	.0	0.	0.
ACCEL BIAS										
X	2128.	6553.	-27.	-3.4	.010	4.2	-.1	.0	-31.	-31.
Y	409.	-1743.	-1714.	-.3	-.001	-.3	-2.4	.0	-0.	-0.
Z	-10797.	42267.	-59.	9.1	.013	5.9	-.1	.0	21.	21.
ACCEL SCALE FAC										
X	100.	7301.	-14.	-.4	.002	.9	-.0	.0	2.	2.
Y	1.	73.	7.	.0	-.000	-.0	-.0	.0	0.	0.
Z	-9053.	39731.	-57.	7.7	.009	3.8	-.1	.0	4.	4.
ACCEL IA ALINE										
-TOWARD OA										
X	10.	-69.	-1.	-.0	-.000	-.0	.0	.0	0.	0.
Y	676.	-3237.	-3279.	-.5	-.001	-.5	-4.0	.0	0.	0.
Z	-5589.	28014.	-48.	4.7	.006	2.6	-.1	.0	2.	2.
-TOWARD SA										
X	3151.	17055.	-55.	-4.1	.010	4.6	-.1	.0	-7.	-7.
Y	234.	-1296.	-1543.	-.2	-.000	-.2	-1.1	.0	0.	0.
Z	-22.	91.	0.	.0	-.000	-.0	.0	.0	0.	0.
PERFORMANCE										
WEB ACT	1150.	-76736.	14.	-.7	-.001	-1.0	-.0	.0	16.	16.
S ISP	-1596.	-24273.	-198.	.1	.009	3.4	.2	.0	-35.	-35.
S PROP	-454.	-6522.	-61.	.0	.002	.9	.1	.0	-10.	-10.
S INERT	-453.	-6203.	-56.	.0	.003	.9	.1	.0	-10.	-10.
C THRST	2652.	-55506.	38.	-.7	-.009	-5.0	-.0	.0	50.	50.
C ISP	2628.	20736.	397.	-.2	-.015	-5.5	-.5	.0	63.	63.
C INERT	-567.	-8972.	-136.	.0	.003	.4	.2	.0	1135.	-80.
ET INERT	-505.	-4806.	-64.	.0	.003	1.0	.1	.0	-11.	-11.
ET PROP	174.	43503.	99.	.3	-.004	-.7	-.1	.0	9.	9.
AERODYNAMIC										
AX FR	-489.	-7779.	-68.	.0	.003	1.0	.1	.0	-11.	-11.
B DRAG	-582.	-9217.	-79.	.0	.003	1.3	.1	.0	-13.	-13.
RSS =	20956.	130975.	14133.	19.2	.032	13.8	17.4	.0	1139.	130.

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TABLE XI-B

COVARIANCE MATRIX

AT END OF NOMINAL DE-ORBIT BURN + 25 SEC

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	4.8795512+07						
V ACT	-1.3565675+08	1.9060554+09					
W ACT	-4.2394859+06	2.2995491+07	2.2194371+07				
U-DOT ACT	1.5024811+05	-2.1995296+06	-2.4655077+04	2.5597227+03			
V-DOT ACT	-4.2634266+04	1.0097376+05	3.3013707+03	-1.1696993+02	3.9423787+01		
W-DOT ACT	-5.7372359+03	2.3088729+04	2.7149554+04	-2.3059121+01	4.1765514+00	3.3688141+01	
U NAV	-4.7226166+07	1.2151595+08	4.2273836+06	-1.3910354+05	4.3237795+04	5.2238349+03	4.8090488+07
V NAV	1.1930197+08	-5.4347077+08	-2.1576053+07	5.7539020+05	-9.4089271+04	-2.6208475+04	-1.1688314+08
W NAV	4.6364749+06	-2.1073833+07	-2.3252904+07	2.2725572+04	-3.4815384+03	-2.8553664+04	-4.4129907+06
U-DOT NAV	-1.3375462+05	5.8088646+05	2.2950803+04	-6.1836376+02	1.0735964+02	2.7905572+01	1.3164795+05
V-DOT NAV	4.2405243+04	-9.8492416+04	-3.3078399+03	1.1487183+02	-3.9523855+01	-4.1083597+00	-4.3384779+04
W-DOT NAV	5.2412247+03	-2.4456154+04	-2.5813008+04	2.5428375+01	-3.9502378+00	-3.1914604+01	-4.9902958+03
WT	-8.8527962+04	-1.1417582+06	-1.0401478+04	1.4357908+03	6.3389003+01	1.8893295+01	6.2618042+04

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	5.3970548+08					
W NAV	2.2461128+07	2.4397778+07				
U-DOT NAV	-5.7560905+05	-2.3696449+04	6.1608918+02			
V-DOT NAV	9.3832363+04	3.4560517+03	-1.0715473+02	3.9684077+01		
W-DOT NAV	2.3096909+04	2.7108147+04	-2.6717798+01	3.9217123+00	3.0278810+01	
WT	-9.7496618+04	-2.5631159+03	1.1781390+02	-5.9970129+01	-2.9202439+00	1.4424784+05

TABLE XII-A

LINEAR ERROR ANALYSIS

RSS DATA AT 3665.3 SEC (10 MIN PRIOR TO NOMINAL ENTRY INTERFACE)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	OMS PROP LB
PLATFORM ALINE										
AZIMUTH	2606.	-13135.	-13786.	-2.0	-.004	-1.8	-15.4	.0	-2.	-2.
TILT	-11831.	15542.	6.	11.9	-.004	-2.3	.0	.0	10.	10.
ROLL	-284.	1642.	2119.	.2	.000	.2	1.3	.0	-0.	-0.
DRIFT BIAS										
X	233.	-930.	-969.	-.2	-.000	-.2	-1.2	.0	1.	1.
Y	-1982.	194.	11.	2.1	-.003	-1.2	.0	.0	4.	4.
Z	-19.	306.	197.	.0	.000	.0	.2	.0	0.	0.
G-SENS IA DRIFT										
X	313.	-1354.	-1464.	-.2	-.001	-.3	-1.8	.0	0.	0.
Y	19.	88.	-2.	-.0	.000	.0	.0	.0	0.	0.
Z	9.	216.	306.	-.0	.000	.0	.2	.0	-0.	-0.
G-SENS SA DRIFT										
X	-8.	100.	16.	.0	-.000	-.0	.0	.0	0.	0.
Y	-3977.	-921.	30.	4.5	-.006	-3.0	.1	.0	10.	10.
Z	-45.	429.	401.	.0	.000	.0	.3	.0	0.	0.
G-SENS OA DRIFT										
X	575.	-2558.	-2092.	-.4	-.001	-.4	-3.0	.0	-0.	-0.
Y	-3122.	1399.	12.	3.3	-.003	-1.4	.0	.0	4.	4.
Z	-19.	36.	-4.	.0	.000	-.0	.0	.0	0.	0.
G-SENS-SQ DRIFT										
X	-21.	23.	6.	.0	.000	.0	.0	.0	-0.	-0.
Y	37.	144.	1.	-.0	.000	.0	-.0	.0	0.	0.
Z	-43.	274.	365.	.0	.000	.0	.3	.0	0.	0.
ACCEL BIAS										
X	2310.	6293.	-29.	-3.7	.009	4.4	-.1	.0	-31.	-31.
Y	394.	-1775.	-1814.	-.3	-.001	-.3	-2.3	.0	-0.	-0.
Z	-10552.	43160.	-63.	8.8	.014	5.8	-.1	.0	21.	21.
ACCEL SCALE FAC										
X	136.	7277.	-15.	-.4	.002	.9	-.0	.0	2.	2.
Y	0.	73.	7.	.0	-.000	-.0	-.0	.0	0.	0.
Z	-8886.	40482.	-61.	7.5	.009	3.9	-.1	.0	4.	4.
ACCEL IA ALINE TOWARD OA										
X	10.	-69.	-1.	-.0	-.000	-.0	.0	.0	0.	0.
Y	655.	-3290.	-3445.	-.5	-.001	-.5	-3.8	.0	0.	0.
Z	-5475.	28474.	-51.	4.5	.006	2.7	-.1	.0	2.	2.
TOWARD SA										
X	3336.	16713.	-59.	-4.3	.010	4.5	-.1	.0	-7.	-7.
Y	227.	-1314.	-1586.	-.2	-.000	-.2	-1.0	.0	0.	0.
Z	-23.	93.	0.	.0	-.000	-.0	.0	.0	0.	0.
PERFORMANCE										
REB ACT	1138.	-76802.	13.	-.6	-.001	-.3	-.0	.0	16.	16.
S ISP	-1428.	-24192.	-188.	-.1	.009	4.1	.3	.0	-35.	-35.
S PROP	-409.	-6498.	-58.	-.0	.002	1.1	.1	.0	-10.	-10.
S INERT	-407.	-6180.	-53.	-.0	.002	1.1	.1	.0	-10.	-10.
O THRUST	2409.	-55646.	36.	-.5	-.009	-3.9	-.0	.0	50.	50.
O ISP	2555.	20591.	376.	.1	-.014	-6.6	-.5	.0	63.	63.
O INERT	-523.	-8942.	-129.	-.1	.003	1.5	.2	.0	-1135.	-80.
ET INERT	-455.	-4780.	-61.	-.0	.003	1.2	.1	.0	-11.	-11.
ET PROP	96.	43493.	94.	.4	-.004	-1.9	-.1	.0	9.	9.
AERODYNAMIC										
AX FR	-437.	-7754.	-65.	-.0	.003	1.2	.1	.0	-11.	-11.
B DRAG	-520.	-9188.	-74.	-.1	.003	1.5	.1	.0	-13.	-13.
RSS =	20774.	131731.	14843.	19.2	.032	14.4	16.6	.0	1139.	133.

TABLE XII-B

COVARIANCE MATRIX

AT 10 MIN PRIOR TO NOMINAL ENTRY INTERFACE

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	4.7950836+07						
V ACT	-1.3768023+08	1.9281057+09					
W ACT	-4.3619320+06	2.4298368+07	2.4479547+07				
U-DOT ACT	1.5230091+05	-2.2234078+06	-2.5951707+04	2.5846154+03			
V-DOT ACT	-4.1903066+04	1.0038521+05	3.3171797+03	-1.1609268+02	3.8992164+01		
W-DOT ACT	-5.3066955+03	2.2122465+04	2.7110064+04	-2.2016888+01	3.7534504+00	3.0455708+01	
U NAV	-4.9709155+07	1.2334619+08	4.3288139+06	-1.3991515+05	4.2703751+04	4.8429814+03	4.7514725+07
V NAV	1.2057465+08	-5.6360291+08	-2.3011197+07	5.9668163+05	-9.3987317+04	-2.5296478+04	-1.1842343+08
W NAV	4.7141646+06	-2.3263972+07	-2.5534957+07	2.4164162+04	-3.4607611+03	-2.9376358+04	-4.5008914+06
U-DOT NAV	-1.3434807+05	6.0166697+05	2.4450982+04	-6.3982321+02	1.0651490+02	2.6902760+01	1.3245172+05
V-DOT NAV	4.1838340+04	-9.8607041+04	-3.3230207+03	1.1423499+02	-3.9040958+01	-3.7393548+00	-4.2760099+04
W-DOT NAV	4.8209746+03	-2.3525704+04	-2.5635707+04	2.4451882+01	-3.5543178+00	-2.8686184+01	-4.6043628+03
WT	-8.4780525+04	-1.1348641+06	-9.5973970+03	1.4287147+03	6.0015531+01	1.9489140+01	8.2623395+04

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	5.5929293+08					
W NAV	2.3864663+07	2.6667545+07				
U-DOT NAV	-5.9594628+05	-2.5361668+04	6.3679388+02			
V-DOT NAV	9.3971578+04	3.4581848+03	-1.0651687+02	3.9099360+01		
W-DOT NAV	2.4114297+04	2.6794253+04	-2.5641507+01	3.5517636+00	2.7067250+01	
WT	-1.0312496+05	-2.6794777+03	1.2225819+02	-5.9916939+01	-2.7517697+00	1.4424784+05

TABLE XIII-A

LINEAR ERROR ANALYSIS

RSS DATA AT ENTRY INTERFACE (EVENT)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	DMS PROP LB
PLATFORM ALINE										
AZIMUTH	1421.	-15961.	-13856.	-.6	-.009	-1.8	-.7	-.0	-2.	-2.
TILT	-10899.	29149.	30.	10.8	.011	-1.8	.0	.1	10.	10.
ROLL	-151.	2022.	2306.	-.1	.001	.2	-.7	.0	-0.	-0.
DRIFT BIAS										
X	107.	-1223.	-1419.	-.0	-.000	-.2	-.2	-.0	1.	1.
Y	-2221.	3062.	17.	2.5	.001	-1.1	.0	.0	4.	4.
Z	-4.	123.	259.	-.0	.000	.0	-.0	-.0	0.	0.
G-SENS IA DRIFT										
X	152.	-1645.	-2092.	-.1	-.001	-.3	-.2	-.0	0.	-0.
Y	29.	80.	-0.	-.0	.000	.0	.0	.0	0.	-0.
Z	24.	211.	333.	-.0	.000	.0	-.1	.0	-0.	-0.
G-SENS SA DRIFT										
X	-11.	58.	27.	.0	.000	-.0	.0	-.0	0.	0.
Y	-4644.	9230.	51.	5.3	.002	-2.8	.0	-.0	10.	10.
Z	-24.	433.	452.	.0	.000	.0	-.1	-.0	0.	0.
G-SENS OA DRIFT										
X	304.	-3029.	-3252.	-.1	-.001	-.4	-.6	-.0	-0.	-0.
Y	-3213.	5299.	24.	3.4	.002	-1.2	.0	-.0	4.	4.
Z	-18.	129.	-2.	.0	.000	.0	.0	.0	0.	0.
G-SENS-SG DRIFT										
X	-12.	117.	15.	-.0	-.000	.0	.0	-.0	-0.	-0.
Y	37.	14.	-0.	-.0	-.000	.0	-.0	-.0	0.	0.
Z	-23.	411.	425.	.0	.000	.0	-.1	.0	0.	0.
ACCEL BIAS										
X	3717.	1790.	-53.	-5.4	.000	4.3	-.0	.0	-31.	-31.
Y	181.	-2065.	-2491.	-.0	-.001	-.4	-.3	-.0	-0.	-0.
Z	-6236.	51654.	-107.	3.7	.018	6.1	-.0	-.0	21.	21.
ACCEL SCALE FAC										
X	484.	6119.	-19.	-.8	.001	.9	.0	-.0	2.	2.
Y	-4.	-2.	-1.	.0	-.000	-.0	-.0	-.0	0.	0.
Z	-5798.	47959.	-105.	3.8	.013	4.2	-.0	-.0	4.	4.
ACCEL IA ALINE										
-TORARD OA										
X	10.	-70.	0.	-.0	.000	-.0	.0	.0	0.	0.
Y	343.	-3876.	-4714.	-.1	-.001	-.5	-.2	-.0	0.	0.
Z	-3404.	32295.	-70.	2.1	.009	2.8	-.0	-.0	2.	2.
-TORARD SA										
X	4768.	10585.	-93.	-6.1	.000	4.3	-.0	.0	-7.	-7.
Y	118.	-1563.	-1728.	-.0	-.000	-.2	.5	-.0	0.	0.
Z	-25.	65.	1.	.0	.000	-.0	.0	-.0	0.	0.
PERFORMANCE										
REB ACT	-7.	-98.	2.	.9	-.002	-.3	-.0	3.0	16.	16.
S ISP	-5.	47.	1.	-1.8	.003	4.0	.3	1.0	-35.	-35.
S PROP	-19.	156.	0.	-.5	.001	1.1	.1	.3	-10.	-10.
S INERT	-11.	131.	1.	-.5	.001	1.1	.1	.2	-10.	-10.
O THRST	3.	-9.	0.	2.5	-.005	-3.9	-.1	2.2	50.	50.
O ISP	10.	-80.	1.	3.1	-.006	-6.5	-.7	-.8	63.	63.
O INERT	9.	-50.	-0.	-.7	.001	1.5	.2	.4	1135.	-80.
ET INERT	-9.	64.	1.	-.5	.001	1.2	.1	.2	-11.	-11.
ET PROP	-19.	158.	2.	.6	-.001	-1.8	-.2	-1.7	9.	9.
ERODYNAMIC										
AX FR	-7.	-34.	1.	-.6	.001	1.2	.1	.3	-11.	-11.
P DRAG	0.	8.	-0.	-.7	.001	1.5	.1	.4	-13.	-13.
RSS =	19680.	85718.	20264.	16.9	.028	19.3	1.6	4.9	1139.	130.

TABLE XIII-B

COVARIANCE MATRIX

AT ENTRY INTERFACE

	U ACT	V ACT	W ACT	U-DOT ACT	V-DOT ACT	W-DOT ACT	U NAV
U ACT	3.0914770+07						
V ACT	-1.1491925+08	8.1640342+08					
W ACT	-3.4151143+06	3.6153251+07	4.5623724+07				
U-DOT ACT	1.2058887+05	-8.6863741+05	-3.8762094+04	9.2633828+02			
V-DOT ACT	-2.7123495+04	6.7563364+04	9.0864520+02	-7.2038262+01	2.9212538+01		
W-DOT ACT	-1.6206191+02	1.1506199+03	1.7253982+03	-8.9863863-01	-3.0233408-01	2.9747909-01	
U NAV	-3.0904983+07	1.1485206+08	3.4115371+06	-1.2051729+05	2.7117411+04	1.6197183+02	3.0895202+07
V NAV	1.1523329+08	-8.2529143+08	-3.6382705+07	8.7800316+05	-6.7095312+04	-1.1604085+03	-1.1516537+08
W NAV	3.4138682+06	-3.6144506+07	-4.5603228+07	3.8752645+04	-9.0770507+02	-1.7234618+03	-3.4102917+06
U-DOT NAV	-1.1996315+05	8.7967893+05	3.9297289+04	-9.3629995+02	6.8129013+01	1.2430032+00	1.1989080+05
V-DOT NAV	2.5956168+04	-6.8163731+04	-1.2374990+03	7.0652627+01	-2.5215601+01	-9.9250819-02	-2.5950217+04
W-DOT NAV	-2.7645669+01	6.8561128+02	1.0175426+03	-7.4390095-01	-2.2931011-02	-7.2443463-02	2.7562660+01
WT	-5.3271172+04	1.7254840+05	3.5024719+03	-1.4833486+02	1.3186629+01	2.2227407+01	5.3262829+04

	V NAV	W NAV	U-DOT NAV	V-DOT NAV	W-DOT NAV	WT
V NAV	8.3459760+08					
W NAV	3.6373744+07	4.5582822+07				
U-DOT NAV	-8.8968534+05	-3.9287712+04	9.4902422+02			
V-DOT NAV	6.7862867+04	1.2367006+03	-6.9144925+01	2.3869585+01		
W-DOT NAV	-6.8472105+02	-1.0175254+03	7.4745218-01	1.7045703-02	1.0807202-01	
WT	-1.7860786+05	-3.5148113+03	1.8397881+02	-4.7426700+01	5.9287074-02	1.4424784+03

TABLE XIV

Exchange Ratio at Nominal MECO

Parameter VAried	Δ ET Propellant Δ Parameter	
Web Action Time (constant ISP)	-763.	lb/%
SRB Vacuum ISP (constant $\dot{w}$)	2190.	lb/%
SRB Propellant Loading	1386.	lb/%
SRB Inert Weight	-.10	lb/lb
Orbiter Thrust (constant ISP)	.06	lb/lb*
Orbiter ISP (constant $\dot{w}$)	1090.	lb/sec**
Orbiter Inert Weight	-.93	lb/lb
External Tank Inert Weight	-.93	lb/lb
External Tank Propellant Loading	.07	lb/lb

* Trade factor based on total system thrust variation (LB/3 ENG).

** Trade factor based on total system ISP variation (SEC/3 ENG).

TABLE XV - RSS SUMMARY DATA (Actual Perturbed State - Nominal State)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROP LB	OMS PROP LB
SRB SEPARATION	2120.	4955.	5601.	55.4	.613	48.3	17.1	5.6	20732.	20475.	-
MECO	1888.	45919.	4502.	6.2	.025	11.0	22.1	4.6	4163.	4348.	-
NOMINAL MECO + 25 SEC	2363.	112555.	5044.	6.5	.026	11.0	21.9	.0	1215.	-	0.
INSERTION	4520.	61116.	10016.	8.3	.023	11.3	19.4	5.0	1168.	-	56.
NOMINAL INSERTION + 25 SEC	4851.	114082.	10487.	8.5	.023	10.5	19.0	.0	1168.	-	56.
10 SEC PRIOR TO END OF NOMINAL COAST	21287.	129455.	12080.	19.5	.023	10.4	17.4	.0	1168.	-	56.
END OF NOMINAL DE-ORBIT BURN + 25 SEC	20956.	130975.	14133.	19.2	.032	13.8	17.4	.0	1139.	-	130.
10 MIN PRIOR TO NOMINAL ENTRY INTERFACE	20774.	131731.	14843.	19.2	.032	14.4	16.6	.0	1139.	-	130.
ENTRY INTERFACE	16680.	85718.	20264.	16.9	.028	14.3	1.6	4.4	1139.	-	130.

NOTE: These dispersions are indicative of 3σ evaluations of the simulated uncertainties.

TABLE XVI - RSS SUMMARY DATA (Perturbed Navigated State - Actual Perturbed State)

	ALTITUDE FT	DOWN RANGE FT	CROSS RANGE FT	SPEED FPS	FLIGHT PATH ANGLE-DEG	ALTITUDE RATE-FPS	CROSS RANGE RATE-FPS	TIME SEC	WEIGHT LB	SSME PROP LB	OMS PROP LB
SRB SEPARATION	83.	147.	199.	2.1	.029	1.9	4.4	5.6	20734.	20475.	-
MECO	1892.	1749.	4512.	6.3	.023	10.0	23.5	4.6	4163.	4348.	-
NOMINAL MECO + 25 SEC	2133.	1940.	5088.	6.5	.022	10.7	23.3	.0	1215.	-	0.
INSERTION	4409.	4322.	10489.	8.2	.021	10.4	21.1	5.0	1168.	-	56.
NOMINAL INSERTION + 25 SEC	4631.	4617.	11002.	8.4	.021	9.7	20.7	.0	1168.	-	56.
10 SEC PRIOR TO END-OF NOMINAL COAST	21057.	66143.	12734.	19.2	.021	14.1	19.0	.0	1168.	-	56.
END OF NOMINAL DE-ORBIT BURN + 25 SEC	20804.	69695.	14818.	19.2	.021	9.4	16.5	.0	1139.	-	130.
10 MIN PRIOR TO NOMINAL ENTRY INTERFACE	20679.	70948.	15492.	19.2	.021	9.1	15.6	.0	1139.	-	130.
ENTRY INTERFACE	16675.	86668.	20255.	15.4	.027	11.6	1.0	4.4	1139.	-	130.

NOTE: These dispersions are indicative of 3σ evaluations of the simulated uncertainties.

TABLE XVII

Principal Error Contributors To Covariance Matrix at MECO

State Vector Component*	Principal Error Sources
u	Platform misalignment (tilt), and accelerometer input axis misalignment toward spin axis (X).
v	Web action time, orbiter thrust and external tank propellant loading.
w	Platform misalignment (azimuth and roll) and accelerometer input axis misalignment toward output axis (Y).
$\dot{u}$	Web action time and orbiter thrust.
$\dot{v}$	Platform misalignment (tilt), accelerometer bias (Z), accelerometer scale factor (Z) and accelerometer input axis misalignment toward output axis (Z).
$\dot{w}$	Platform misalignment (azimuth).

*Both the actual and navigated state vectors.

TABLE XVIII

Principal Error Contributors to Covariance Matrix
at Entry Interface

State Vector Component*	Principal Error Sources
u	Platform misalignment (tilt), accelerometer bias (Z), and accelerometer scale factor (Z)
v	Platform misalignment (tilt), accelerometer bias (Z), accelerometer scale factor (Z) and accelerometer input axis misalignment toward output axis (Z)
w	Platform misalignment (azimuth)
$\dot{u}$	Platform misalignment (tilt), accelerometer bias (Z), accelerometer scale factor (Z) and accelerometer input axis misalignment toward output axis (Z)
$\dot{v}$	Platform misalignment (tilt), accelerometer bias (Z) and accelerometer scale factor (Z)
$\dot{w}$	Platform misalignment (azimuth)

*Both the actual and navigated state vectors.

TABLE XIX

PEG and GLT Comparison for Orbiter ISP Uncertainty
(Actual Perturbed Orbit - Nominal Orbit)

	Argument of Perigee (Deg)	Flight Path Angle (Deg)	True Anomaly (Deg)	Descending Node (Deg)	Apogee (Ft)	Perigee (Ft)
GLT						
MECO	.08	.003	-.08	-.00002	287.	-203.
Begin Insertion Burn	.09	.003	-.11	-.00002	341.	-216.
Insertion	-.47	.002	.43	-.00005	-243.	-450.
10 Sec Prior to End of Coast	-.47	-.003	.49	-.00004	43.	-447.
Deorbit +25 Sec	.30	.004	-.28	-.00006	-1727.	-1787.
PEG						
MECO	-.30	-.009	.28	-.00079	-1013.	2507.
Begin Insertion Burn	-.38	-.011	.36	-.00090	-1236.	2763.
Insertion	1.57	-.009	-1.58	-.00094	-1.	1568.
10 Sec Prior to End of Coast	1.57	.008	-1.50	-.00093	3.	1564.
Deorbit + 25 Sec	-.90	-.015	.95	-.00028	5050.	5264.