-253

MSC-G-R-66-4
Supplemental Report 4

3150-6036-R8-000

NOTE NO. 66 FMT-224

G-14

GUIDANCE SYSTEM EVALUATION
TRAJECTORY RECONSTRUCTION (U)

Prepared by
Space Flight Analysis Section
TRW Systems

30 JUNE 1966

Issued as:
Supplemental Report 4
To:
Gemini Program Mission Report
Gemini VIII
MSC-G-R-66-4
By:
Gemini VIII Mission Evaluation Team
National Aeronautics and Space Administration
Manned Spacecraft Center
Houston, Texas

MISSION PLAN
NATIONAL AERONA
MANN

C67-7850

[redacted]

MSC-G-R-66-4
Supplemental Report 4

TRW NOTE NO. 66 FMT-224

3150-6036-R8-000
Total Pages: 162

PROJECT GEMINI
TASK MSC/TRW G-14

GEMINI 8 INERTIAL GUIDANCE SYSTEM EVALUATION AND TRAJECTORY RECONSTRUCTION (U)

30 JUNE 1966

Prepared for
MISSION PLANNING AND ANALYSIS DIVISION
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
NAS 9-4810

Issued as:
Supplemental Report 4
To:
Gemini Program Mission Report
Gemini VIII
MSC-G-R-66-4
By:
Gemini VIII Mission Evaluation Team
National Aeronautics and Space Administration
Manned Spacecraft Center
Houston, Texas

Approved by ____________
R. J. Boyles, Task Manager

Approved by ____________
J. W. McCarthy, Manager
Systems Engineering Department

Approved by ____________
C. W. Pittman, Manager
Mission Planning and Operations
Mission Trajectory Control Program

GROUP-4
DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS

TRW SYSTEMS

[redacted]

LIST OF CONTRIBUTORS

Electronics Division

T. Bower

R.J. Boyles

A.R. Dennis

R.G. Fierro

P.M. Jackson

R.E. Sansom

Computation and Data Reduction Center

J.N. Bausch

ABSTRACT

The report contains a detailed evaluation of the Gemini 8 inertial guidance system accuracy during the ascent and reentry phases of the mission. An analysis of the external tracking instrumentation accuracy during ascent is also included. The results of the error analyses are used to construct a reference Gemini 8 trajectory for the ascent and reentry portions of the mission.

Postflight reconstructions of the Gemini and Agena trajectories during the rendezvous interval are differenced and compared with the onboard rendezvous radar relative position measurements in an attempt to evaluate the onboard radar accuracy.

(Reverse of this page blank)

CONTENTS

CONTENTS (Continued)

Total Pages: 162

ILLUSTRATIONS

ILLUSTRATIONS (Continued)

ILLUSTRATIONS(Continued)

(Reverse of this page blank)

TABLES

(Reverse of this page is blank)

1. INTRODUCTION AND SUMMARY

Gemini Flight No. 8 was launched on 16 March 1966 from Complex 19 at Cape Kennedy, Florida. The major objective accomplished on this flight was rendezvous and docking of the Gemini spacecraft with the Agena target vehicle. This report, submitted to the NASA Manned Spacecraft Center by TRW Systems in response to Task MSC/TRW G-14 of the Mission Trajectory Control Program, presents the results obtained from analysis of the inertial guidance system (IGS) performance during ascent and reentry flight phases and provides a reconstruction of the spacecraft trajectory during ascent and reentry.

The following is a brief summary of the analysis results:

a) The inertial guidance system (IGS) performance during ascent was satisfactory. Best estimates of the IGS errors at SECO +20 seconds are as follows:

$\Delta x = +896 \pm 50$ ft $\quad \Delta\dot{x} = +5.1 \pm 0.5$ ft/sec

$\Delta y = -617 \pm 200$ ft $\quad \Delta\dot{y} = -5.3 \pm 2.0$ ft/sec

$\Delta z = +985 \pm 100$ ft $\quad \Delta\dot{z} = +11.0 \pm 2.0$ ft/sec

b) A set of IGS and tracking system error source coefficients was derived from analysis of the position and velocity comparisons between IGS telemetry and tracking system data. Recovered IGS error sources that contributed significantly to the explanation of the observed differences were:

	Coefficient	Velocity error contribution in IGS coordinates (ft/sec)
x axis		$\Delta\dot{x}$
X accelerometer scale factor	+199 ±30 ppm	+5.0
y axis		$\Delta\dot{y}$
X accelerometer bias	+45.5 ±10 ppm g	-1.1
Z accelerometer bias	+84.1 ±10 ppm g	+0.9
Z accelerometer misalignment toward x	+38 ±37 $\widehat{\text{sec}}$	-4.6

	Coefficient	Velocity error contribution in IGS coordinates (ft/sec)
z axis		$\Delta \dot{z}$
X gyro spin axis unbalance	$-1.1 \pm 0.44^{\circ}$/hr/g	+10.6
Z gyro input axis unbalance	$-0.18 \pm 0.30^{\circ}$/hr/g	-6.3
IGS azimuth misalignment	+57 ±18 sec	+6.9

c) Significant tracking system bias errors recovered from analysis were:

	Coefficient	Velocity error contribution in IGS coordinates SECO +20 sec (ft/sec)
MISTRAM I		
P 100K bias	-2.2 ±0.5 ft	$\Delta \dot{y} = +28.5$
Refraction (P 100K)	+2 ±1 ppm	$\Delta \dot{y} = -10$
MISTRAM II		
P bias	+1.5 ±1.0 ft	$\Delta \dot{y} = -2.7$

GE Mod III

No GE Mod III bias errors were found to be significant relative to the random error in the system. The random error, though nominal, is very large (10-100 ft/sec) late in flight at the lower elevation angles.

d) A reentry IGS evaluation and trajectory reconstruction is attempted by comparing guidance system output with nominal trajectory characteristics during the terminal phase of descent. No major IGS errors are apparent; however, incorrect initial conditions used in the navigation contributed approximately 10 n mi of downrange miss. No reentry tracking data were available.

e) A comparison between rendezvous radar measurements and calculated values from a TRW reconstruction of the Gemini IX and Agena trajectories shows agreement within 1000 to 4000 feet. Inaccuracies in the trajectory reconstruction appear to be the limiting factor in this attempted onboard radar accuracy analysis.

Sections 2, 3, and Appendix D contain details of the ascent and reentry IGS analysis, while listings of the reconstructed trajectories are contained in Appendixes A and B. An analysis of the quality of the external tracking data obtained during ascent is contained in Section 4, and includes plots of the residuals of each system referenced to the reconstructed trajectory. Section 5 discusses a comparison made between telemetered rendezvous radar measurements and calculated values.

(Reverse of this page is blank)

2. INERTIAL GUIDANCE SYSTEM PERFORMANCE ANALYSIS

Comparisons of IGS telemetered navigation quantities and external tracking data were made for the purpose of evaluating the Gemini 8 IGS performance. The IGS evaluation was based in part on sensed velocity comparisons (Figure 2-1). These were generated by comparing external tracking data adjusted for gravity with the telemetered accelerometer accumulated count appropriately biased and scaled to engineering units. The residuals from these comparisons were attributed to inertial measurement unit (IMU) and tracking system errors.

Comparisons were also made between the telemetered total inertial position and velocity outputs from the airborne computer and external tracking data (Figures 2-2 and 2-3). These comparisons include airborne computer navigation errors caused by IMU position error feedback into the gravity calculation, gravity approximations, truncation errors, etc., as well as IMU and tracking errors. The difference between the sensed and inertial comparison sets, called delta-delta comparisons (Figure 2-4), provide a measure of the airborne computer computational error alone.

The sensed, inertial, and delta-delta comparisons are plotted in the IGS Computer Coordinate System, which is an inertial, orthogonal, right-handed system referenced to the center of the earth. The x and z axes lie in a plane parallel to the geodetic tangent plane at the launch site at platform release time, with the x axis nominally defined by the launch azimuth (actually by the misaligned azimuth), positive downrange. The y axis is positive down along the geodetic vertical, and the z axis is directed to complete the right-handed x, y, z set.

Position and velocity comparisons were also made in the external tracking measurement coordinates for the purpose of isolating IMU and tracker error coefficients by performing a statistical regression analysis on the difference. External tracking data used in the evaluation included Quick Look MISTRAM I 10K and 100K, GE Mod III Burroughs (2 per second), final MISTRAM, passive MISTRAM II, and AFETR BET. An analysis of these data sources is described in Section 4. Unless otherwise noted, the plots enclosed are referenced to liftoff time (16:41:02.389 GMT) which occurred 3.303 seconds after IGS "platform release."

CONFIDENTIAL

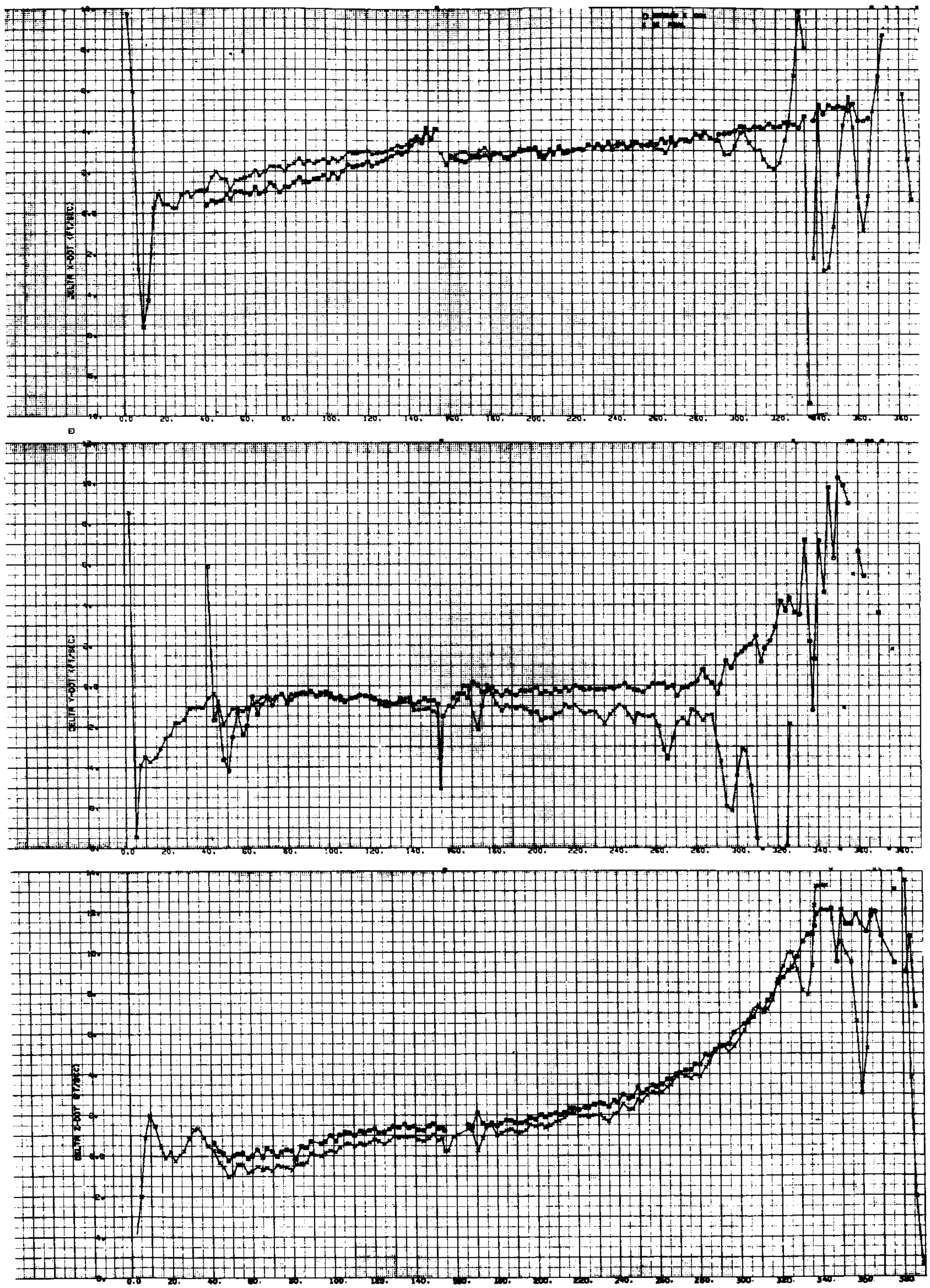


Figure 2-1. GE/Final and 100K MISTRAM ΔV Sensed Coordinates

CONFIDENTIAL

[redacted]

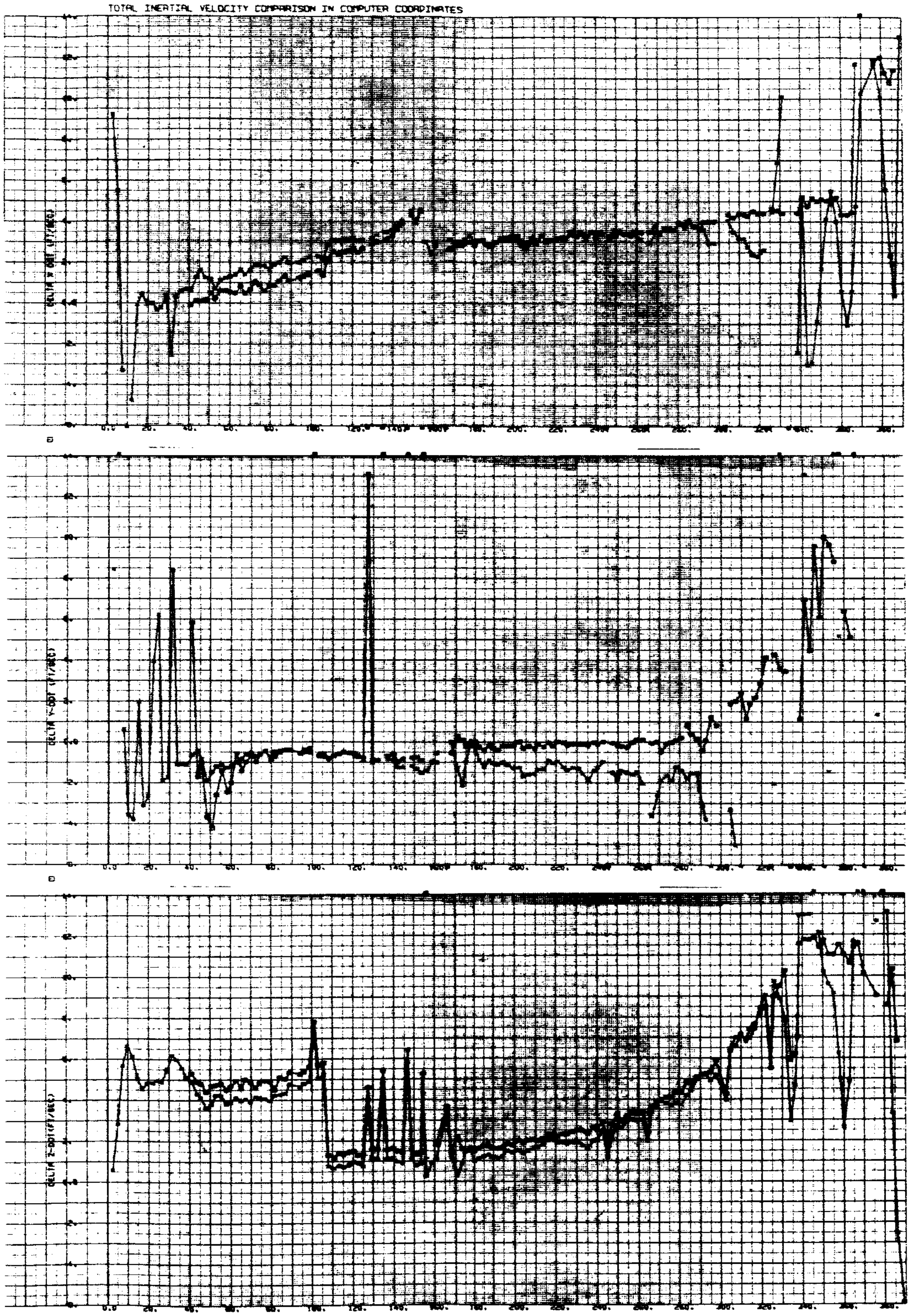


Figure 2-2. GE/Final and 100K MISTRAM ΔV Guidance Inertial Coordinates

[redacted]

CONFIDENTIAL

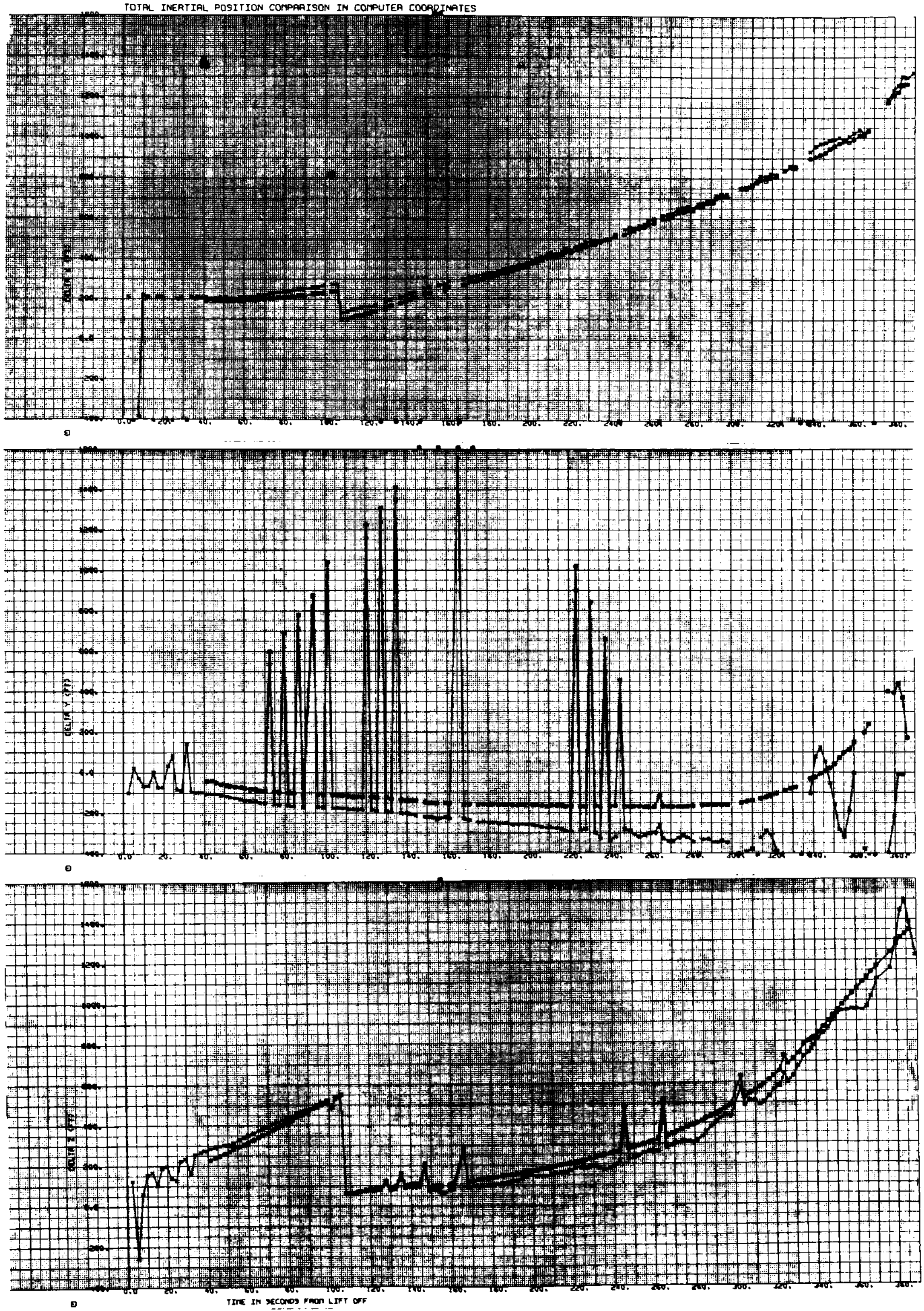


Figure 2-3. GE/Final and 100K MISTRAM ΔP Guidance Inertial Coordinates

CONFIDENTIAL

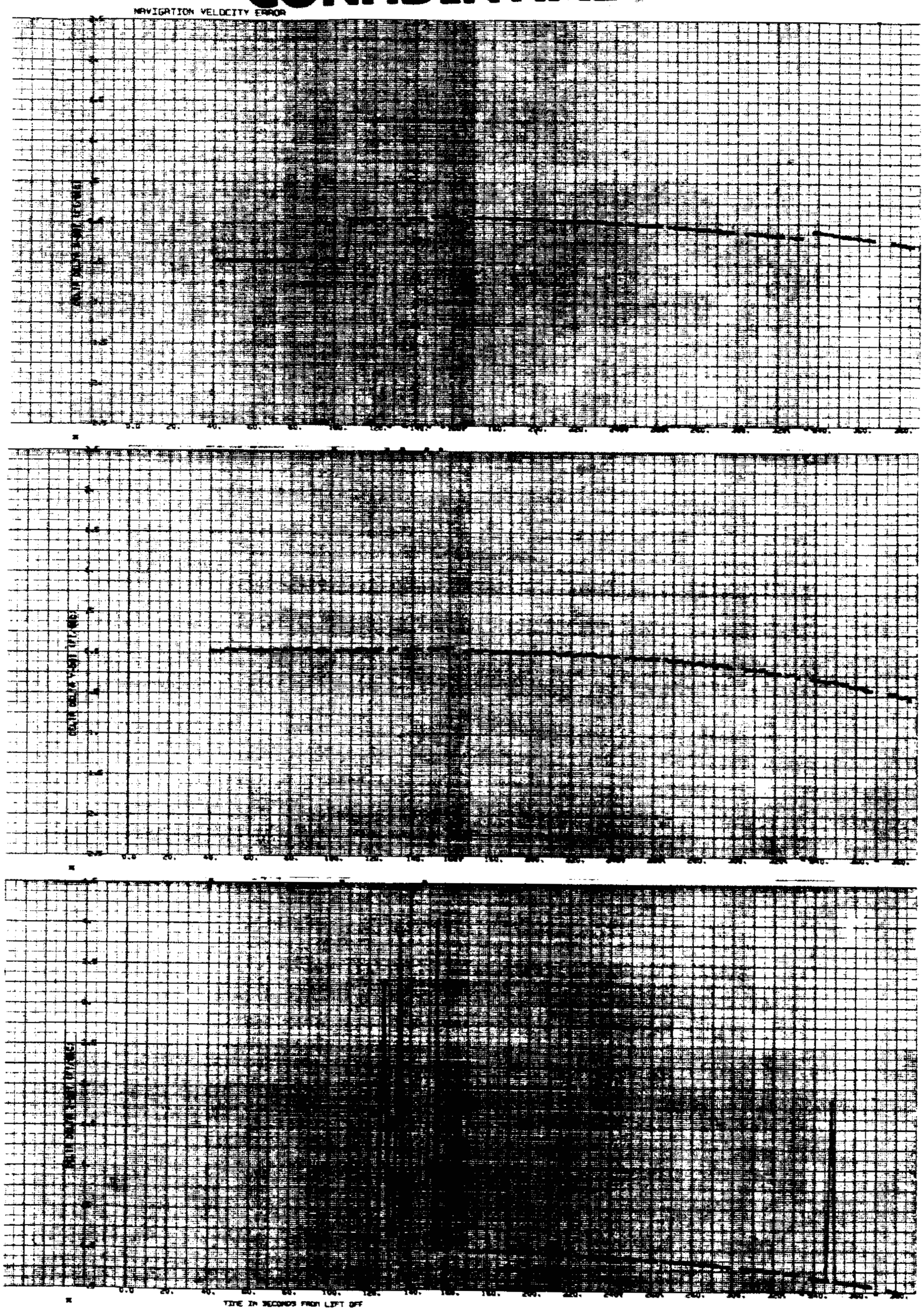


Figure 2-4. Navigation Velocity Error

2.1 TOTAL IGS ERROR

The IGS error at SECO +20 seconds determined from analysis of position and velocity comparisons is presented in Table 2-1. The column headed "IMU Error" represents the error contributed by the accelerometer, gyro, and platform initial alignment sources. The column headed "Navigation Equation Error" represents the contributions due to various approximations within the airborne computer. The columns headed "Total IGS Error" represent the composite of IMU and navigation equation errors.

Table 2-1(a) gives the IGS error based on the analysis of the ascent (MISTRAM and Mod III) tracking data. Table 2-1(b) lists the total error derived from the TRW reconstruction of the Revolution 1 free-flight trajectory propagated back to the time of ascent telemetry data. This reconstruction is based on the data from the Gemini network of radar tracking sites and is completely independent of the "ascent" tracking data (see Reference 1). The good agreement between the "Total IGS Error," indicated in Table 2-1(a and b), therefore gives considerable confidence in the error assignment. The total IGS error reported in the NASA 30-Day Report is given in Table 2-1(c) for reference. The IGS error magnitudes indicated in Table 2-1 give the following "trajectory" referenced errors:

Velocity magnitude error	= +4.1 ft/sec
Flight path angle error	= +0.015°
Out-of-plane velocity error	= +11.0 ft/sec

2.2 IMU ERROR

Analyses to recover inertial measurement unit (IMU) error source coefficients were performed by using procedures and data processing programs as documented in Reference 2. The error source recovery was accomplished in the following manner:

a) Accelerometer bias errors were determined from the slopes of the IGS sensed velocities during an interval of orbit flight when no thrusting was being applied.

b) A regression analysis in the tracking data velocity domain was performed on the IGS/tracker residuals after compensating for the previously determined accelerometer bias errors.

Table 2-1. Inertial Guidance System Error at SECO + 20 Seconds

Parameter	(a) TRW Ascent Data Analysis			(b) TRW Orbit 1 Reconstruction	(c) NASA 30-Day Report
	IMU Error	Navigation Equation Error	Total IGS Error	Total IGS Error	Total IGS Error
$\dot{x}$	+5.2 ±0.5	-0.13 ±0.2	+5.1 ±0.5	+5.4 ±1.	+5.0±1.
$\dot{y}$	-4.9 ±2.0	-0.39 ±0.1	-5.3 ±2.0	-3.2 ±1.	-4.9 ±2.
$\dot{z}$	+11.4 ±2.0	-0.38 ±0.1	11.0 ±2.0	+11.1 ±2.	+11.4 ±2.
x	+872. ±50.	+24. ±10.	+896. ±51.	+813. ±100.	+920. ±100.
y	-564. ±200.	-53. ±5.	-617. ±200.	-786. ±100.	+120. ±100.
z	+1000. +100.	-15 ±5.	+985. ±100.	+1021.±200.	+1015. ±200.

2.2.1 Accelerometer Bias Determination

The accelerometer biases are determined prelaunch by calibration, and the ascent accelerometer output is compensated for these predetermined estimates. However, the free-flight intervals of orbital flight offer an ideal test situation to recalibrate these biases. This test is carried out in real-time, and the computer bias constants are updated during orbit if they appear to be significantly different from the preflight values. Various segments of orbit IGS telemetry data are available to TRW, and a postflight determination of accelerometer bias is also made. Table 2-2 summarizes the various bias determinations. The difference between the TRW postflight value and the preflight value inserted into the IGS computer during ascent is listed in parts-per-million of gravity as an ascent IMU error in Table 2-3. A history of the prelaunch calibration values for bias is plotted in Appendix C.

Table 2-2. Gemini 8 Accelerometer Bias Estimation

X-Bias (counts/sec)	Y-Bias (counts/sec)	Z-Bias (counts/sec)	Source	Time of Measurement
1. 02997567	0.16331029	-0.09914397	Preflight calibration, ascent computer compensation	Prelaunch
1.040	0.163	-0.070	In-orbit update	Revolution 1
1.0446	0.1599	-0.0720	Postflight determination (TRW)	Revolution 4

2.2.2 Error Source Regression Results

The identification of individual error sources, in addition to accelerometer bias, was attempted mainly by a statistical error source regression, i.e., by a weighed least-square-fit of the probable IGS and tracker error sources to the (bias compensated) IGS/tracker differences. The regression was made in the coordinates of the external tracking systems and involved a simultaneous solution for IGS, MISTRAM I and II, and GE Mod III errors. A discussion of the regression technique and more details on various computer runs, problems, and limitations in the analysis are contained in Appendix D. The results of the IGS error source analysis are summarized in Tables 2-3 and 2-4. The tables also include the NASA/Honeywell preflight error source estimates as well as the postflight estimates included in the NASA 30-Day Report. The external tracker error source recovery results are presented in Table 4-1 of Section 4.

Table 2-3 lists the IGS error source magnitudes, and Table 2-4 lists their contributions to the total IGS error at SECO +20 seconds. The error sources are grouped primarily as to the type of error source and to a lesser extent in accordance with the velocity error propagation correlation among them.

Table 2-3. IGS Error Source Summary

Error source	Units	TRW analysis: Recovered coefficient	TRW analysis: Uncertainty (2)	Preflight measured coefficient (NASA/ Honeywell)	NASA 30-day report
I Accelerometer					
X accelerometer bias	ppm g	+45.5	10.	+10.9	+44.
Y accelerometer bias	ppm g	-10.5	10.	+45.	+10.
Z accelerometer bias	ppm g	+84.1	10.	-69.	-100.
X accelerometer scale factor	ppm	+200.0	30.	-80.	+200.
Z accelerometer scale factor	ppm	-58.	157.	+31.4	-150.
Z accelerometer misalignment toward X	$\widehat{\text{sec}}$	-38.	37.	-7.8	-30.
II Pitch drift					
Y gyro constant drift rate	°/hr	(1)	-	-0.043	-0.1
Y gyro input axis unbalance	°/hr/g	+0.002	0.30	-0.029	+0.12
III Roll and azimuth drift					
X gyro constant drift rate	°/hr	(1)	-	+0.085	+0.08
Z gyro constant drift rate	°/hr	(1)	-	-0.107	
X gyro input axis unbalance	°/hr/g	(1)	-	-0.221	-0.22
Z gyro input axis unbalance	°/hr/g	-0.18	0.30	+0.079	+0.08
X gyro spin axis unbalance	°/hr/g	-1.1	0.44	-0.41	-0.72
Z gyro spin axis unbalance	°/hr/g	(1)	-	-0.06	+0.1
IV System					
Platform azimuth misalignment	$\widehat{\text{sec}}$	+57.	18.		+43.
IGS time correlation	sec	+0.025	0.006		+0.029
IGS time scale factor	ppm	-90.	20.		-100.

(1) Not included in the statistical regression error model because of high correlation with other terms.

(2) Uncertainties are 1-sigma estimates.

CONFIDENTIAL

Table 2-4. IGS Error Source Contribution to Velocity Error at SECO +20 Seconds

Error source	TRW analysis			Preflight measured (NASA/Honeywell)			NASA 30-day report		
	$\dot{X}$	$\dot{Y}$	$\dot{Z}$	$\dot{X}$	$\dot{Y}$	$\dot{Z}$	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
I Accelerometer									
X accelerometer bias	+0.18	-1.1		+0.05	-0.27		+0.18	-1.1	
Y accelerometer bias			+0.16			-0.7			-0.1
Z accelerometer bias		+0.93			-0.80			-1.1	
X accelerometer scale factor	+4.97			-2.0			+4.9		
Z accelerometer scale factor		+0.40			-0.21			+1.0	
Z accelerometer misalignment toward X		-4.55			-0.94			-3.6	
Total I	+5.15	-4.32	+0.16	-1.95	-2.22	-0.7	+5.08	-4.8	-0.1
II Pitch drift									
Y gyro constant drift rate				-0.04	-1.15		-0.1	-2.7	
Y gyro input axis unbalance		+0.06		+0.10	+0.77		+0.1	+3.2	
Total II		+0.06		+0.06	-0.38		+0.0	+0.5	
III Roll and azimuth drift									
X gyro constant drift rate				-0.01	+0.01	-0.85			-0.8
Z gyro constant drift rate				+0.02	0	-1.47			
X gyro input axis unbalance				+0.02	+0.02	+2.80	+0.1		-2.7
Z gyro input axis unbalance	+0.09		-6.26	-0.04	0	+2.75			+2.7
X gyro spin axis unbalance	-0.06	-0.60	+10.60	-0.02	-0.20	+3.95		-0.2	+6.7
Z gyro spin axis unbalance						+0.47			+0.8
Total III	+0.03	-0.60	+4.34	-0.03	-0.17	+7.65	+0.1	-0.2	+6.7
IV System									
IGS azimuth misalignment			+6.85						+5.2
IGS time correlation									
IGS time scale factor									
Total IV			+6.85						+5.2
Total I+II+III+IV	+5.18	-4.86	+11.35	-1.93	-2.77	+6.95	+5.2	-4.5	+11.8
Navigation	-0.13	-0.39	-0.38				-0.2	-0.4	-0.4
Total IGS	+5.05	-5.25	+10.97				+5.0	-4.9	+11.4

CONFIDENTIAL

It must be emphasized at the outset that the complete separation of possible IMU and tracker error sources by analysis of the postflight IGS/tracker position and velocity comparison residuals is impossible. There is simply insufficient information in the comparison to differentiate among the great number of probable sources. In other words, there is too high a correlation or similarity among large groups of possible error sources to pick out the individual contribution of each error source. Various substitute procedures can be attempted, and the one general approach used in this analysis is to limit the regression error model to only one or two representative and probable error sources within each correlated group and solve for these. The coefficient recovered in the regression for this "representative" error source is in effect an equivalent coefficient standing for some linear combination of all the possible errors in the correlated group. The net effect then is that a unique separation of error sources is not possible or to be implied from the analysis included here. What is provided is a "statistically reasonable" explanation of the observed differences and an indication of the kind of error source that is causing a trajectory position and velocity measurement error on the flight.

There are some error sources, of course, that can be identified with much better confidence than others, e.g., X accelerometer scale factor error, because of their lack of similarity to other error terms or because of preferred directional propagation with respect to the external tracking system. Another most important aspect of the analysis is that, for the most part, this problem with correlation among error sources does <u>not</u> affect the assignment of total guidance system error (Section 2.1). Therefore, there is a large uncertainty as to what some of the individual error source coefficients are, but not in their net effect. There is accuracy of 0.5 to 2 ft/sec (depending on coordinate and time) in the specification of IGS error propagation as a result of analysis of the redundant tracking data. Whatever the proposed error solution, it must give an explanation of the observed differences to within these accuracies throughout the flight.

2.2.3 Discussion of Error Analysis

The dominant recovered errors that explain the x axis residuals are the IGS time correlation and scale factor errors and the X accelerometer scale factor error (see Tables 2-3 and 2-4). The X scale factor error of approximately 200 ppm is the cause of the main trend in the x axis residual and amounts to 5 ft/sec error at SECO + 20 seconds (see Figure 2-1). The velocity residuals resulting from timing errors are directly proportional to acceleration and are evidenced by -1.3 and +1.2 ft/sec jumps in the x velocity residuals at 160 and 337 seconds, respectively, corresponding to the abrupt acceleration changes at BECO and SECO. Although the timing errors cause no explicit IMU velocity error after SECO, these errors do cause approximately 1 ft/sec of IGS gravity integration error at burnout and position errors equal to the integral of the velocity error. The propagations of these major x axis error contributors are shown as dashed curves in Figure 2-5. Their combined effect, along with the effect of other minor error sources, is shown as a solid line on this plot.

The Z accelerometer scale factor and misalignment and the IGS timing errors could account for the major portion of the y axis trend. These error source propagations are shown in Figure 2-6. The X accelerometer bias error, which results in an initial misalignment about the Y accelerometer axis, and the Z accelerometer bias error both have contributions to the y axis residual, but their velocity errors propagate with opposite sign so as to nearly cancel their net effect.

Figure 2-1 shows that there is good agreement between MISTRAM and GE Mod III tracking data in the crossrange, z, direction and indicates an IGS error of 11 to 12 ft/sec. Also note that there is a residual error of 1.6 ft/sec at 140 seconds, which is the time the GE Burroughs/IGS update should zero out the cross-range IGS velocity error. This inexact update, which appears due to an approximation in the Burroughs computer, results in an equivalent 50-60 arc seconds IGS azimuth misalignment and accounts for approximately one-half the $\dot{z}$ burnout error. The remaining $\dot{z}$ error is accounted for in the regression by the Z gyro and X gyro g-dependent drift rate terms (see Tables 2-3 and 2-4). All the X and Z gyro drift terms as well as azimuth alignment contribute to the z axis residual in a highly correlated manner such that the regression is severely limited in its error source discrimination. This fact is mathematically represented in the large uncertainty associated with the recovered X and Z gyro drift error sources (see Table 2-3). However, from an analysis of all the regression runs (see Appendix D), and as further indicated by the preflight

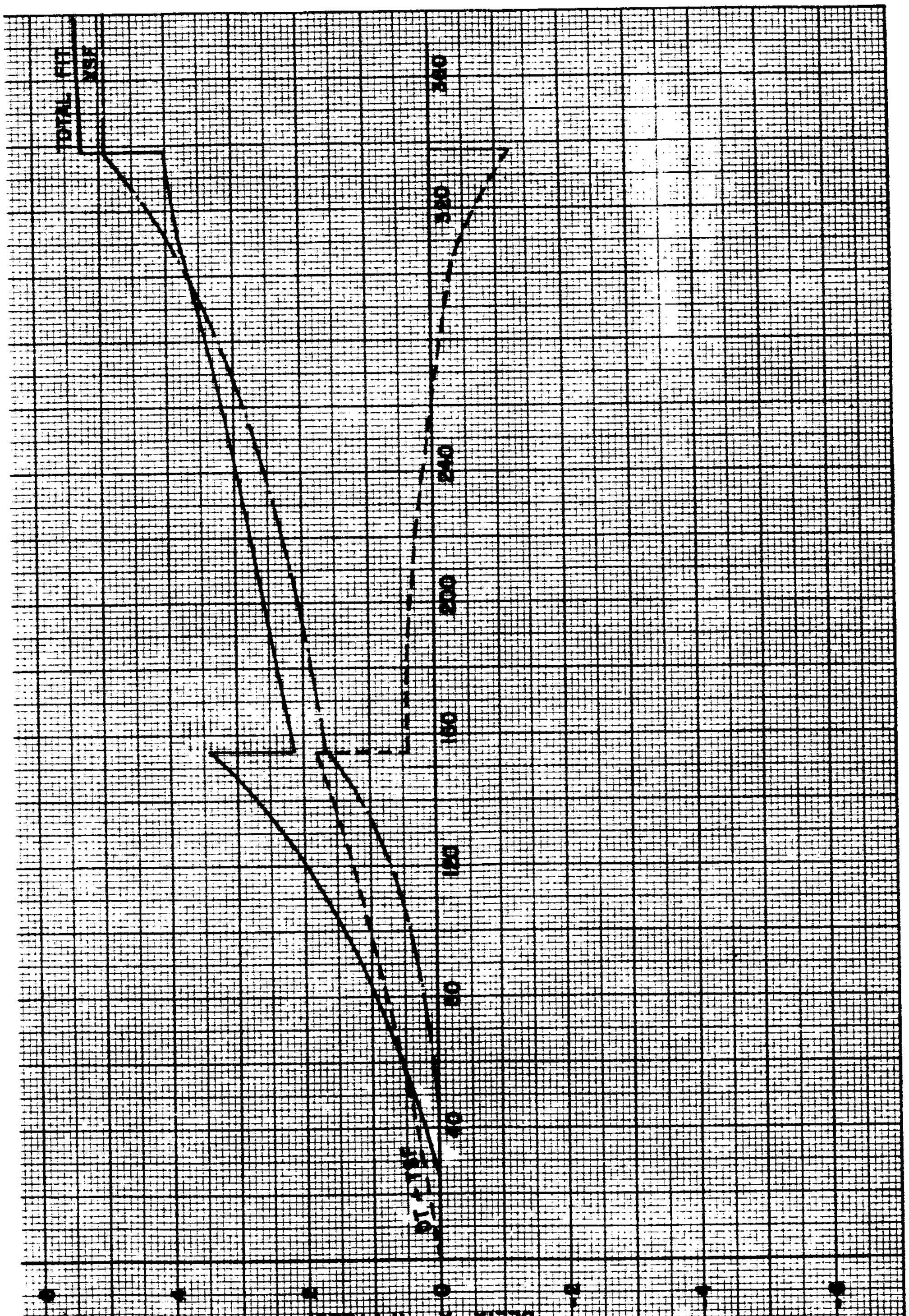


Figure 2-5. IGS Error Source Contribution to Sensed Velocity Differences - x Axis

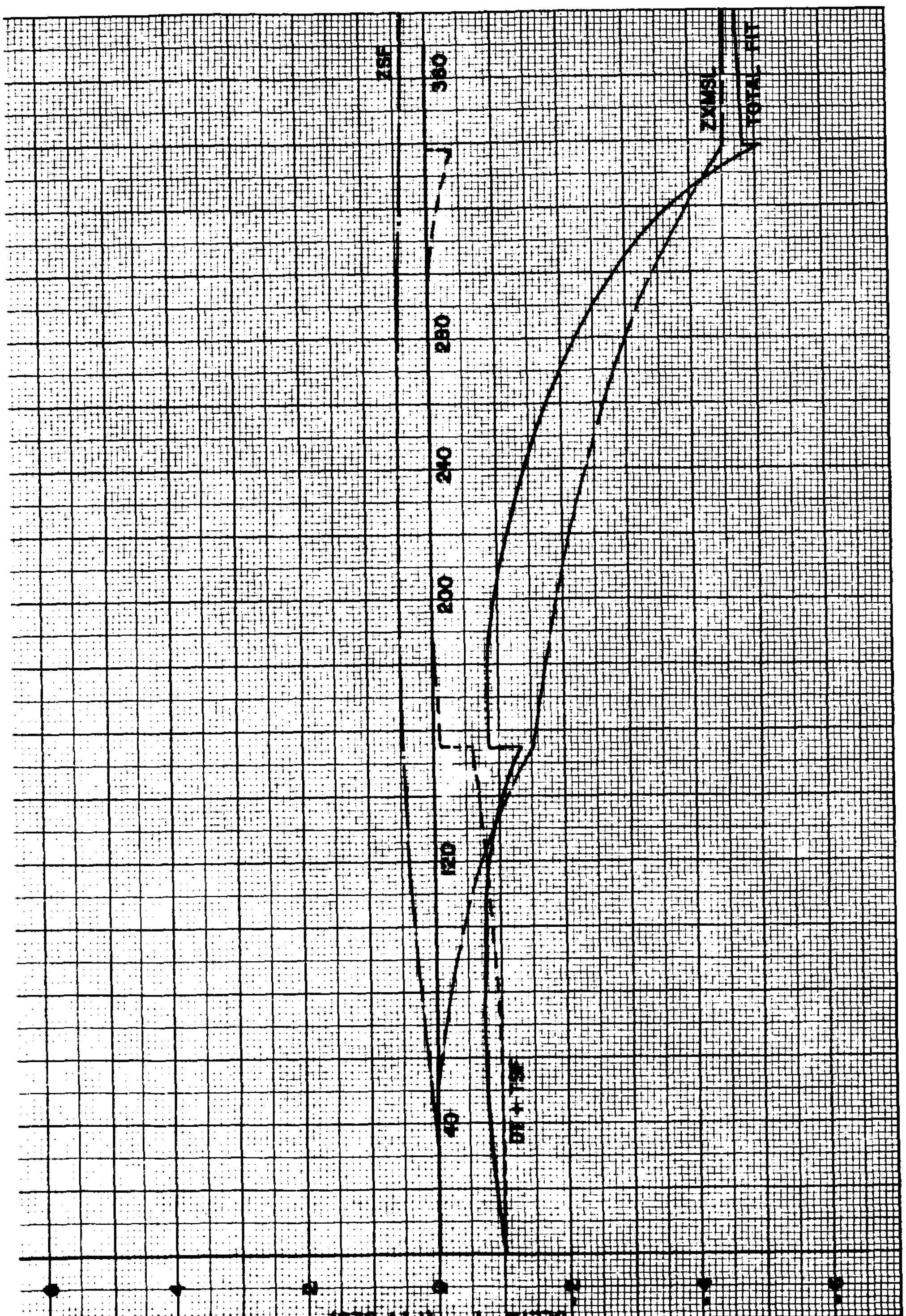


Figure 2-6. IGS Error Source Contribution to Sensed Velocity Differences - y Axis

calibration data, there appears to be a good reason to suspect a large X gyro spin axis unbalance drift error source. The velocity error propagation of each significant recovered error source is shown in Figure 2-7.

The net fit associated with all the recovered IGS error coefficients listed in Table 2-3 is shown as an overplot on the IGS/tracker differences in Figure 2-8. It is evident that the postulated IGS errors do not provide a satisfactory explanation of the y axis MISTRAM residuals, which show an increasing deviation from the fit-curve and the Mod III data starting at BECO and continuing beyond SECO. A MISTRAM P bias of 2.2 feet and P 100K refraction error of two parts per million in the index of refraction (2 n units) were recovered from the error analysis of the tracking data (see Section 4). Combining these errors with the recovered IGS errors provides an explanation of both the MISTRAM and Mod III residuals to within 0.5 to 1 ft/sec throughout flight in all coordinates.

2.2.4 Preflight Measurement of IMU Errors

A set of preflight-measured IMU error source coefficients obtained from NASA/Honeywell are also presented in Tables 2-3 and 2-4. Figure 2-9 illustrates the velocity error propagation curve associated with these coefficients. It is observed that the preflight error estimates (adjusted for the incorrect azimuth update) provide an explanation of the y and z axis residuals to within a few feet per second throughout flight. This is considered a reasonably good flight verification of the preflight estimates. However, the $\dot{x}$ residual is poorly compensated by the preflight estimate. The difference of approximately 8 ft/sec in burnout error is most likely due to a change from the preflight calibration of the X accelerometer scale factor and amounts to a 300-parts per million error. A time history of calibration values for gyro drifts and accelerometer bias and scale factor is presented in Appendix C.

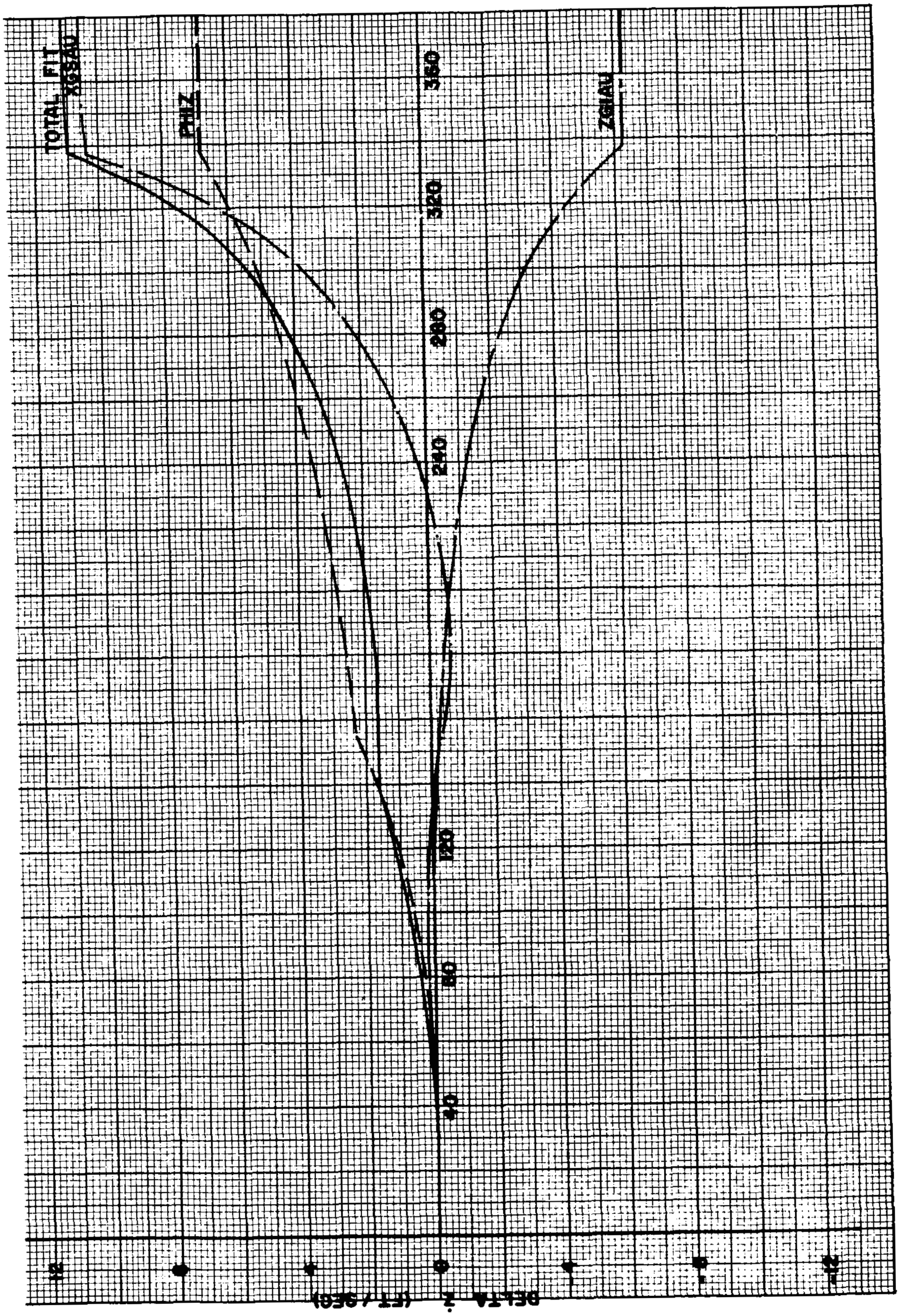


Figure 2-7. IGS Error Source Contribution to Sensed Velocity Differences - z Axis

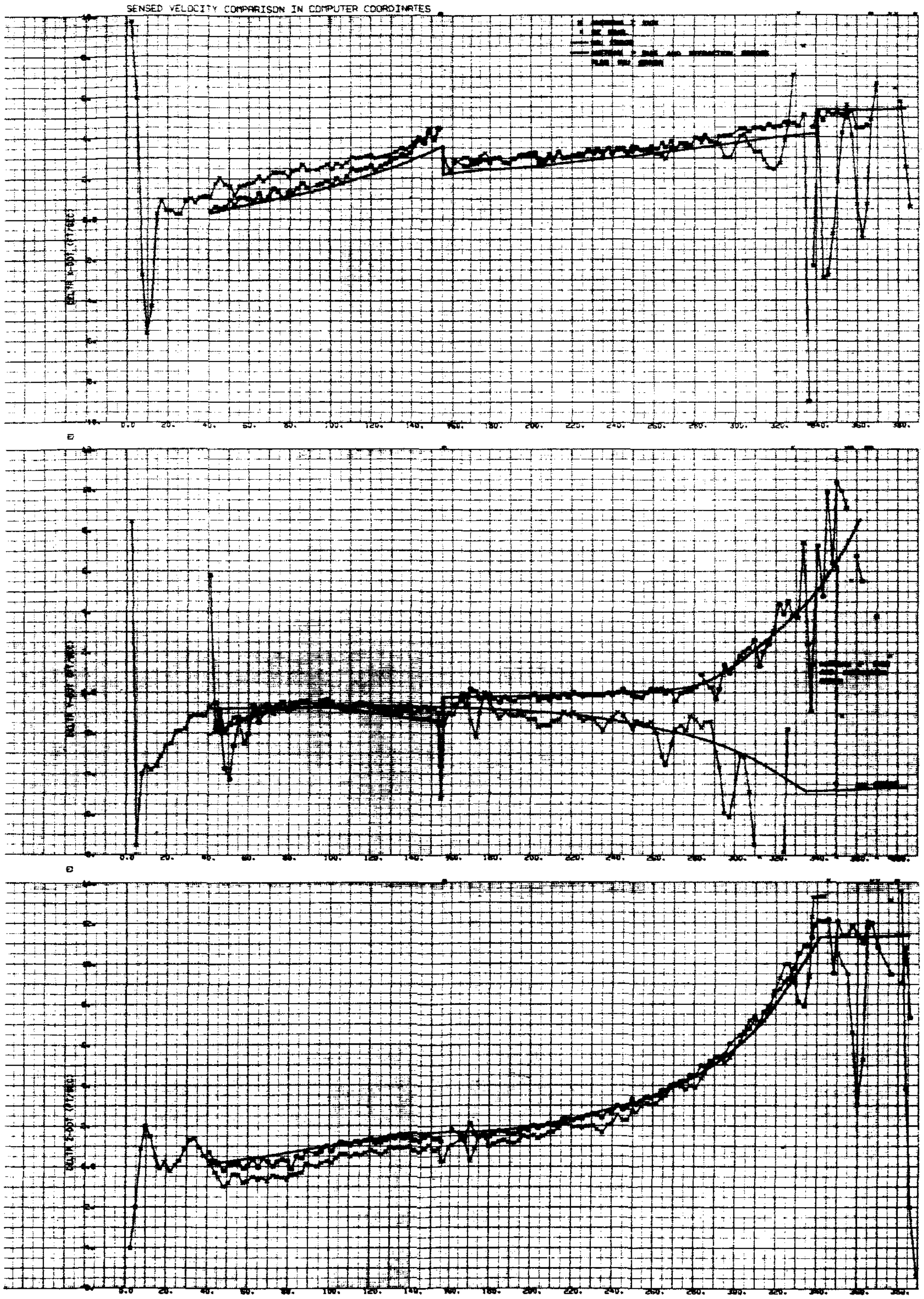


Figure 2-8. Sensed Coordinates ΔV With Recovered IMU Error Source Fit

CONFIDENTIAL

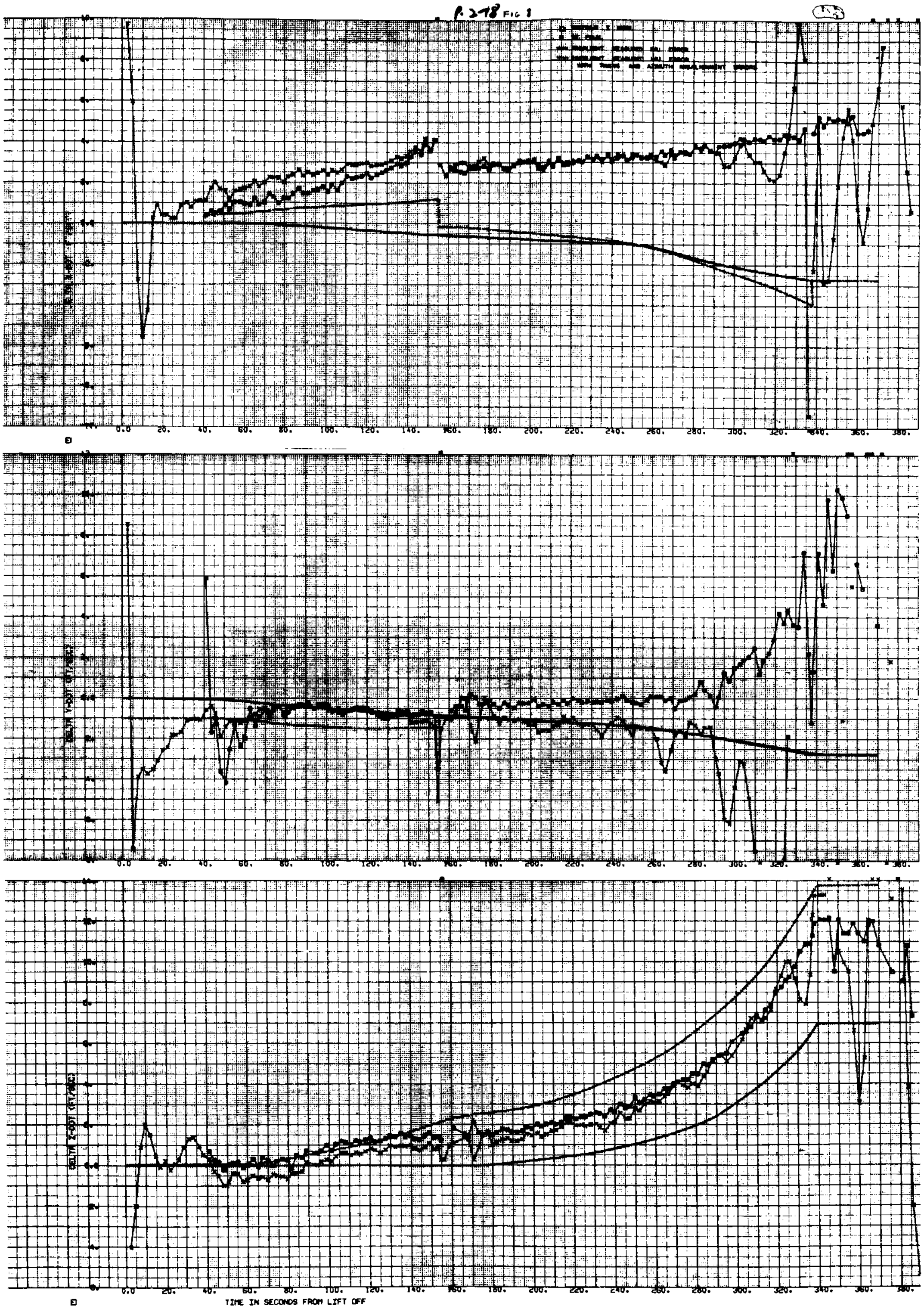


Figure 2-9. Sensed Coordinate ΔV With Preflight Measured Error Source Fit

CONFIDENTIAL

2.3 AZIMUTH UPDATE

An IGS azimuth correction is calculated at three separate times by the onboard computer. On the first pass through the navigation equations after platform release, the roll gimbal angle reading is compared to the desired value, and the difference is used as a correction to the intended flight azimuth. This correction is called $\Delta\eta_x$, where a positive value implies that the platform is rotated clockwise from the desired azimuth.

Additional azimuth corrections are made during flight at 100 and 140 seconds after liftoff. These are calculated by comparing the cross-range (z direction) velocity, as measured by GE/Burroughs, with that derived from the airborne system and attributing the residual to an IGS azimuth misalignment. The calculated updates were telemetered on the Gemini 8 mission for the first time and are presented in Table 2-5. The update values determined during the postflight data analysis are also presented as determined by the following methods:

a) Calculated from the telemetry data, and simulating the in-flight calculations

b) Calculated from the jumps in the inertial velocity comparisons and the delta-delta curve

Table 2-5. Azimuth Update

Time (sec from liftoff)	Onboard computer	Postflight data analysis		Units
		Flight calculation simulation	Delta-delta	
0	+0.0018382	+0.001942	+0.001942	rad
100	-0.0014965	-0.001009	-0.001402	rad
140	-0.0001249	-0.000733	-0.000135	rad
TOTAL	-0.0016214	-0.001742	-0.001537	rad
(100 and 140)	-0.092899	-0.0998	-0.08806	deg

The values indicated at 100 seconds include those at 0 seconds. The postflight value for 0 seconds was determined from an observable jump in the IGS z velocity after platform release. This jump corresponds to the first IGS correction. The telemetered total azimuth correction of -0.0929° has been included in all plots contained in this report. This is the smallest correction required of all the Gemini flights. A brief history of updates follows.

Flight Number	Azimuth Update (deg)	Mean Value	NASA/Honeywell Specification
2	-0.29		
3	-0.52		
4	-0.12		
5	-0.27	-0.033	±0.75
6	-0.53		
7	-0.48		
8	-0.09		

2.4 REFERENCE ASCENT TRAJECTORY

Appendix A contains a reconstruction of the ascent trajectory generated by correcting IGS output for those recovered errors listed in Table 2-3. The trajectory is provided in Cartesian earth-centered inertial coordinates and in earth-referenced coordinates. A plot of the sensed acceleration obtained by differentiation of the IGS accelerometer output is also included.

[redacted]

3. REENTRY IGS EVALUATION

There was no post retrofire tracking data available for direct comparison with IGS output during reentry. However, a trajectory reconstruction using ground tracking data during the two orbits preceding retrofire has permitted an accurate estimate of reentry initial conditions, and a span of IGS data beyond main chute deployment makes possible an evaluation of IGS platform misalignment.

Table 3-1 presents a summary of spacecraft impact measured by the IGS, the recovery ship, the sighting aircraft, and the TRW postflight reconstruction. The same information is displayed in Figure 3-1. The large crossrange motion of the telemetered IGS ground trace is due to one of the obvious IGS errors recovered in the TRW analysis. The best estimate of total IGS error at drogue chute deployment is:

7.6 ± 1 n mi right
8.1 ± 1 n mi long
3.7 ± 1 n mi low

As seen in Table 3-2, which summarizes recovered error sources and their effects, most of the downrange error is attributable to the error in initial conditions, the altitude error is primarily due to IGS platform pitch misalignment, and the crossrange error is caused by both roll and azimuth misalignments. Figure 3-2, which presents a plot of ground traces of the uncorrected IGS trajectory, the IGS trajectory with initial conditions corrected, and the IGS trajectory with both initial conditions and misalignments corrected, provides an indication of the contribution of the various errors.

3.1 INITIAL CONDITIONS

Table 3-3 presents the retrofire state vector from the Real-Time Computer Complex (RTCC) used by the IGS for reentry initialization and the retrofire state vector recovered by the TRW orbital reconstruction program (ESPOD)(see Reference 1). It is also shown that the difference is primarily due to inaccuracies in the RTCC vector. To obtain retrofire conditions, this RTCC vector was propagated through approximately two orbits from the Hawaii 05 differential correction; ESPOD, on the

[redacted]

Table 3-1. Estimated Impact Summary

Description		Latitude (deg)	Longitude (deg)	Crossrange miss distance (n mi)	Downrange miss distance (n mi)
Intended target		+25.25	+136.0	--	--
Ship pickup		+25.37	+135.93	+6.18	-5.28
Aircraft sight.		+25.23	+135.90	-2.36	-5.0
Telemetered IGS*	Drogue chute	+25.19	+136.081	-2.59	+3.27
	Main chute	+25.10	+136.094	-7.5	+6.9
	Final point ~8000 ft	+24.97	+136.031	-16.01	+5.34
TRW Trajectory Reconstruction	Drogue chute	+25.349	+135.941	+4.99	-4.86
	Main chute	+25.352	+135.967	+5.58	-3.09
	Final point ~8000 ft	+25.349	+135.973	+5.47	-2.73

The "drogue chute" impact estimate should be used for IGS accuracy evaluation, since IGS guidance capability essentially ends at this time.

Note: A positive value indicates, respectively, North latitude, East longitude, a long downrange miss, or a crossrange miss to the left of the intended target.

Table 3-2. Reentry Error Source Summary

Error Source	Recovered error (sec)	Position error at drogue: Downrange (ft)	Crossrange (ft)	Up (ft)
Initial conditions	*	54000	-4000	-8000
Platform misalignment				
About X accelerometer axis	-1565±300**	-4000	-19000	-300
About Y accelerometer axis	-1325±100	+2500	-4000	-20000
About Z accelerometer axis	-2220±300	-3000	-14000	+500

*See differences in Table 3-3.

**The ± numbers are 1σ estimates.

Note: The position error values listed here are only approximate. Other, less significant errors were caused by those sources found during the ascent analysis which were also assumed present during reentry.

[redacted]

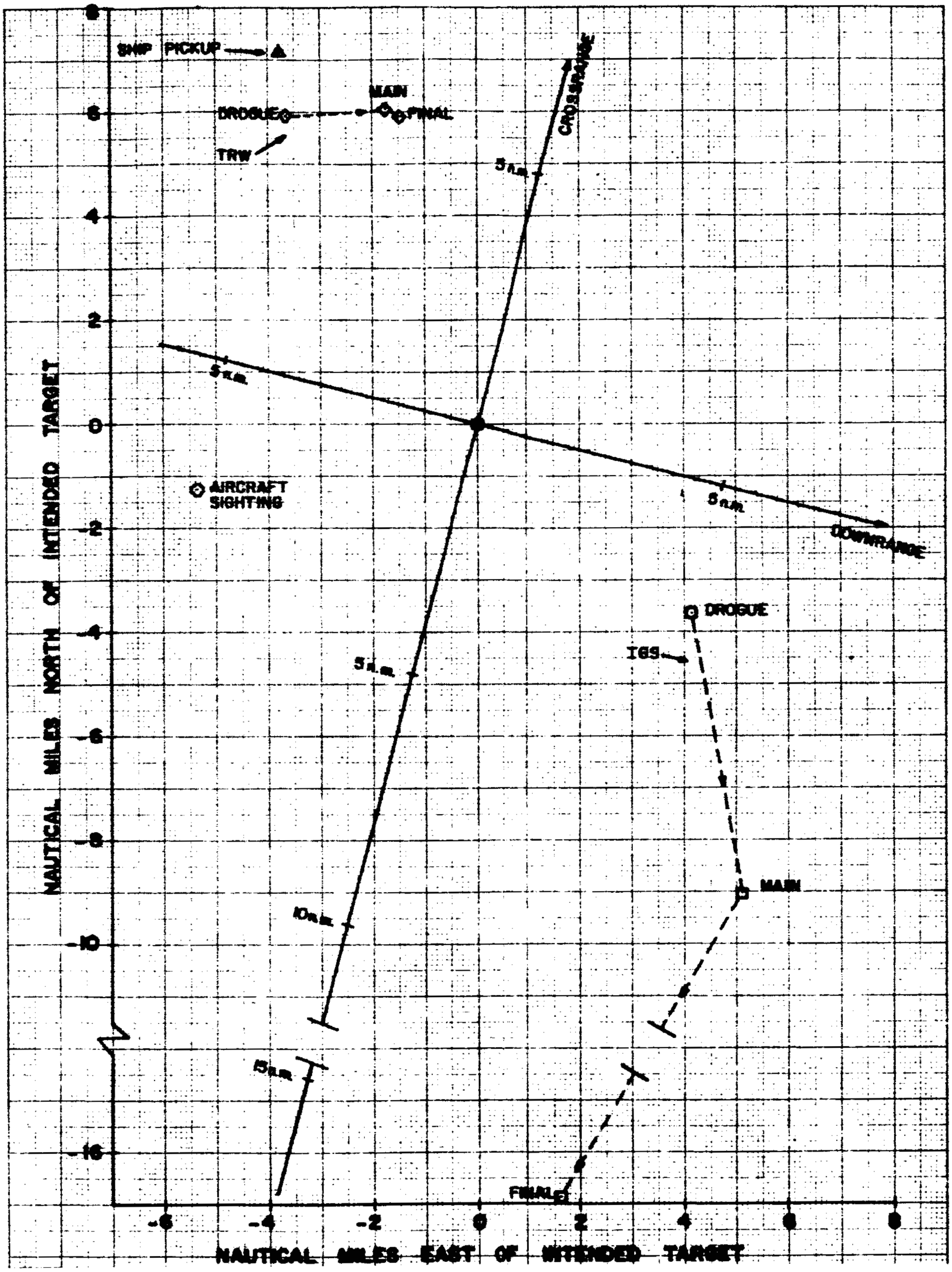


Figure 3-1. Map of Estimated Impact Points

[redacted]

CONFIDENTIAL

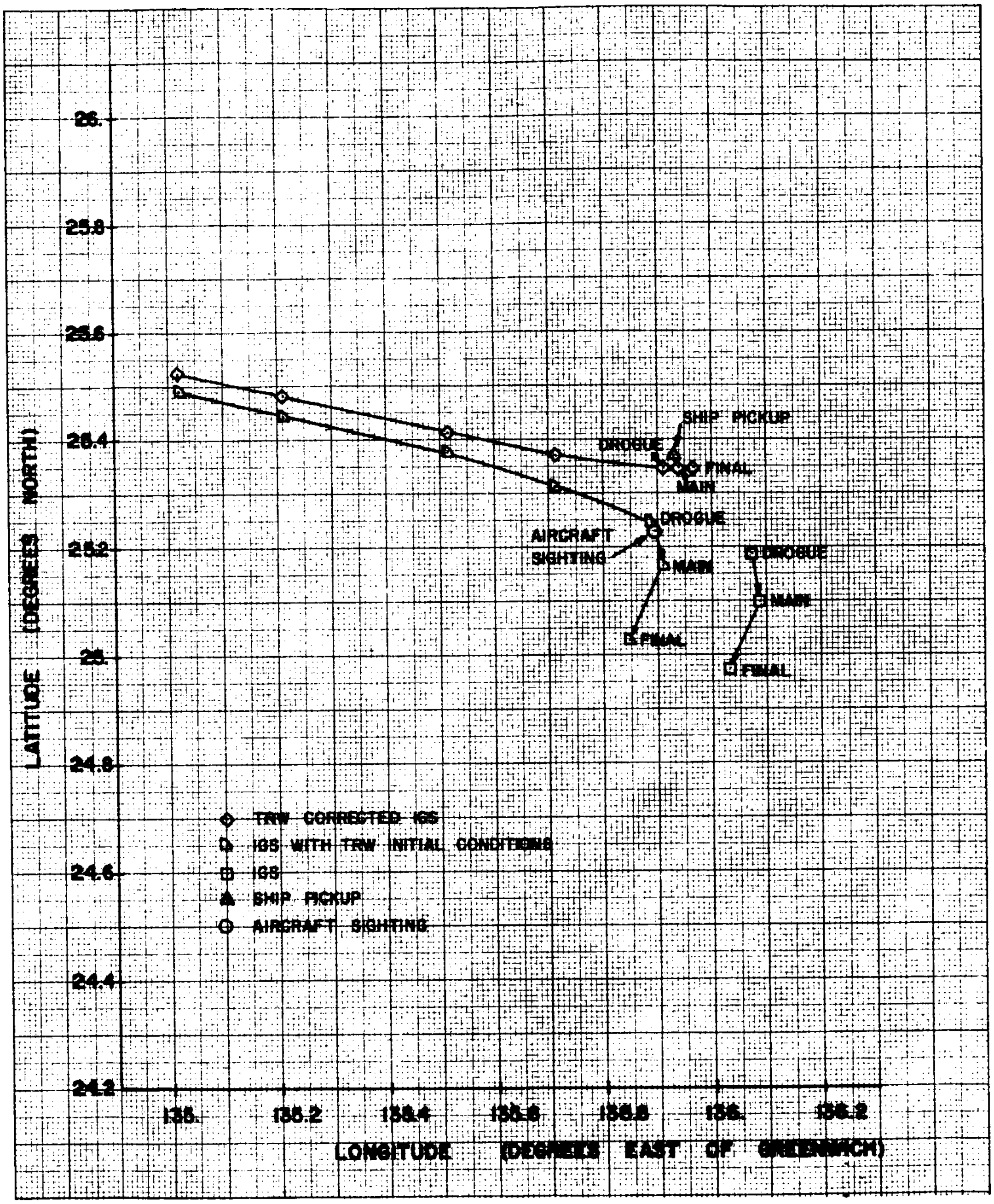


Figure 3-2. Effects of Initial Condition and IMU Corrections Upon IGS Trajectory

CONFIDENTIAL

other hand, used all available data including the Ascension 07 radar pass, which occurred less than 8 minutes before retrofire. Moreover, the RTCC Ascension 07 fit agrees closely with the ESPOD fit. The coordinate system of the state vector shown in Table 3-3 is ECI with x through Greenwich at 0^h day of launch.

Table 3-3. IGS (RTCC) and TRW (ESPOD) Retrofire Conditions*

	IGS vector	TRW vector	Difference: IGS - TRW
X	+10,094,700 ft	+10,131,910 ft	-37,210 ft
Y	+19,407,000 ft	+19,393,020 ft	+13,980 ft
Z	-317,700 ft	-338,502 ft	+20,802 ft
$\dot{X}$	-19,638.0 ft/sec	-19,609.7 ft/sec	-28.3 ft/sec
$\dot{Y}$	+10,417.8 ft/sec	+10,461.0 ft/sec	-43.2 ft/sec
$\dot{Z}$	+12,259.8 ft/sec	+12,259.7 ft/sec	+0.1 ft/sec

*Time = $1^d\ 2^h\ 45^m\ 49^s$ from 0^h day of launch

3.2 PLATFORM MISALIGNMENT

An accurate set of trajectory measurements against which the IGS may be calibrated is necessary for recovery of IGS error sources. On Gemini 8, this condition was partially met by the extension of IGS data into the lower atmosphere where the main chute was deployed. Due to the lack of conventional trajectory measurements during main chute descent, nominal steady-state conditions were used for comparison with IGS indicated values. These are listed in Table 3-4. The assumption of nominal conditions was primarily based upon postflight reporting that a smooth Gemini 8 splash-down occurred. Nevertheless, had the actual main chute velocity been as large as twice nominal, the assumption would have been approximately five times more accurate than the IGS indicated value.

Table 3-4. Assumed Steady-State Reentry Conditions

Event	Time from retrofire (sec)	Altitude (ft)	Velocity crossrange	Velocity downrange	Velocity vertical (ft/sec)
Drogue chute	1909	50,000	0	*	*
Main chute	2005	10,000	0	*	*
Main chute plus 2.37 minutes	2147	*	0	0	-32

*No assumption made

As noted, asterisks in Table 3-4 indicate no assumption was made for the given quantity. In fact, the three velocity components at the final point and the zero crossrange velocity at 50,000 feet were used to compute the misalignments, and the other values were used only to check the reasonableness of the resulting trajectory. The final horizontal components of velocity could be in error by tens of feet per second due to surface winds at reentry, but this is small compared to the nearly 400 ft/sec indicated IGS horizontal velocity that was probably due to platform misalignment.

The error model used to fit the observed velocity differences consisted of only platform alignment errors for the following reasons:

a) No other error source could supply a significant portion of the observed error without being grossly out of tolerance.

b) Nominal IGS performance was seen during the ascent flight, which was only 10 hours before reentry.

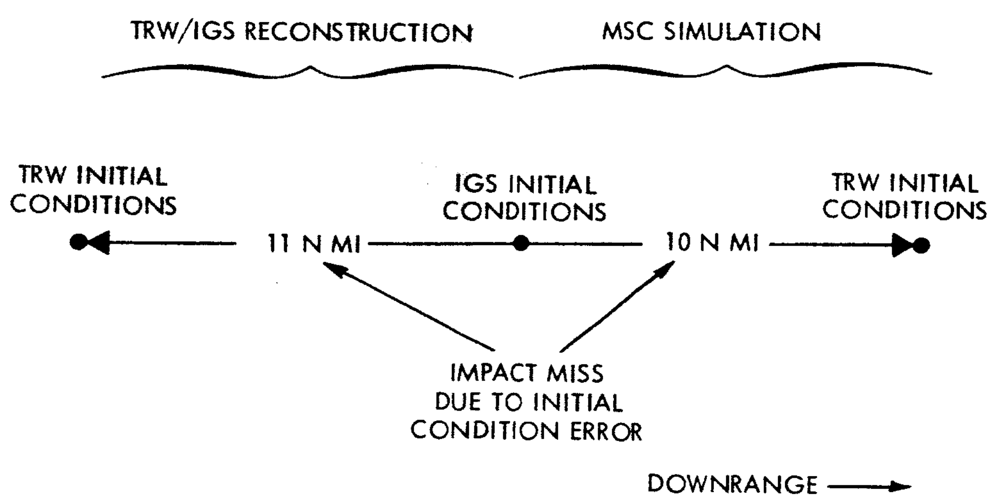
c) The recovered misalignments are all of reasonable size relative to expected values.

Although their effect was relatively small on the reentry error, the ascent-recovered IMU errors were also removed from the IGS indicated reentry trajectory.

3.3 SIMULATION RESULTS

3.3.1 MSC Simulation

Two point-mass reentry simulation runs were made by MSC, one using the same retrofire state vector as the IGS and the other the retrofire state vector recovered by the TRW orbital trajectory reconstruction. The simulation impacts were then compared with the two trajectory impacts formed by integrating the IGS accelerometer data from each of the retrofire state vectors, as was done in the TRW reentry reconstruction. The position difference between the two impact points was of the same magnitude in simulation and integration of IGS, but of opposite direction (see diagram below).



The explanation of this somewhat unexpected result is that, in simulation, drag acceleration is a function of computed altitude and depends directly upon initial conditions. On the other hand, in integration of IGS data, drag acceleration is given by accelerometer output and is independent of both computed altitude and initial conditions. Note that the actual reentry navigation and guidance encompasses use of IGS data for navigation and simulation results for guidance from the indicated position to the intended target. There is, therefore, a complicated tradeoff among initial condition error, navigation error, and resulting guidance or steering errors. It was beyond the scope of this analysis to demonstrate how each of these add together to give an effective total system miss from the intended target.

3.3.2 McDonnell 6-Degree-of-Freedom Simulation

The position and velocity differences between the McDonnell simulation and the TRW reconstruction of reentry are presented in Figures 3-3 through 3-5. These plots appear in IGS coordinates.

The differences are large primarily because the McDonnell simulation begins with the RTCC retrofire state vector used by the IGS rather than the updated one used by TRW. The in-plane differences observed (x and y) are consistent with the differences in initial conditions and their resulting propagation through reentry in a strictly simulation sense. That is, from the MSC point-mass results, it is expected that a simulation using IGS initial conditions will impact approximately 10 miles short of the same simulation using the TRW initial conditions. Actually the position error indicated at the end of the comparison (Figures 3-3 through 3-5), which corresponds to an altitude of 80,000 feet, is about 20 miles short of the TRW reconstruction at that point. The additional error may be due to what amounts to an effective timing error between the two trajectories near the end (the velocity difference has not get gone to zero, and the position error is getting smaller). It is also expected that there is some true simulation error in addition to the initial condition error, and this error will also appear in this comparison.

The peak crossrange error at 1800 seconds (see the plot of delta z in Figure 3-5) may also be partly due to the different crossrange acceleration profile resulting from the incorrect initial altitude. Due to the TRW analysis uncertainty in dividing main chute crossrange velocity error between IGS platform yaw and roll alignment error, it is believed that not more than 50 percent of this error is also in the TRW reconstruction.

3.4 REFERENCE REENTRY TRAJECTORY

The reentry trajectory was reconstructed by integrating the equations of motion using corrected IGS measurement of sensed velocity and the TRW estimate of the initial conditions. The corrections applied to the IGS output were for the ascent recovered IGS errors defined in Section 2 and for the initial platform misalignment errors recovered during the reentry phase evaluation. Plots of spacecraft sensed velocity and acceleration, relative velocity magnitude, flight path angle, and altitude follow (see Figures 3-6 through 3-16).

Appendix B contains a complete listing of the reentry trajectory reconstruction in an earth-referenced coordinate system.

CONFIDENTIAL

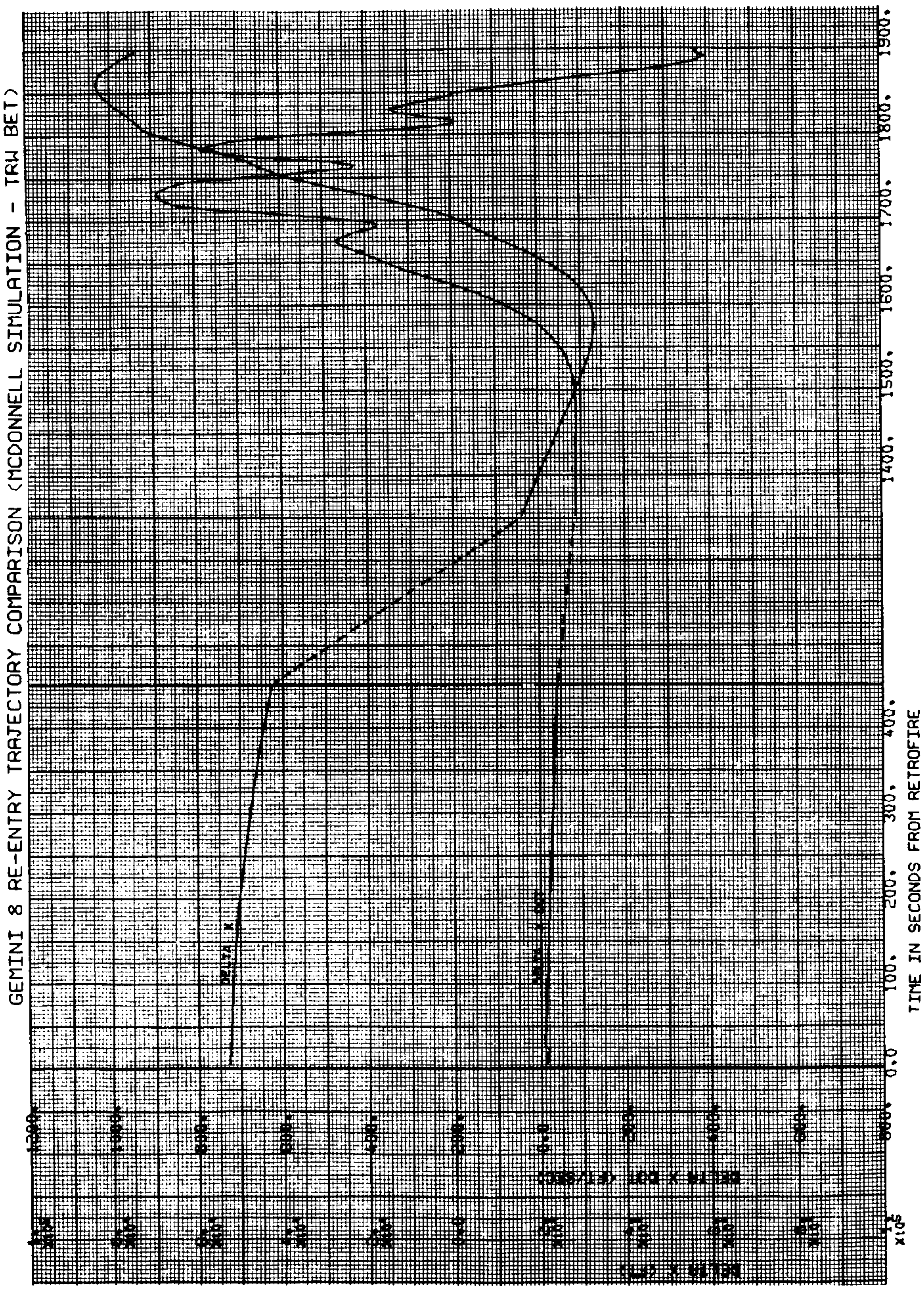


Figure 3-3. Reentry Trajectory Comparison (Simulation-TRW/BET)
x Axis

CONFIDENTIAL

[redacted]

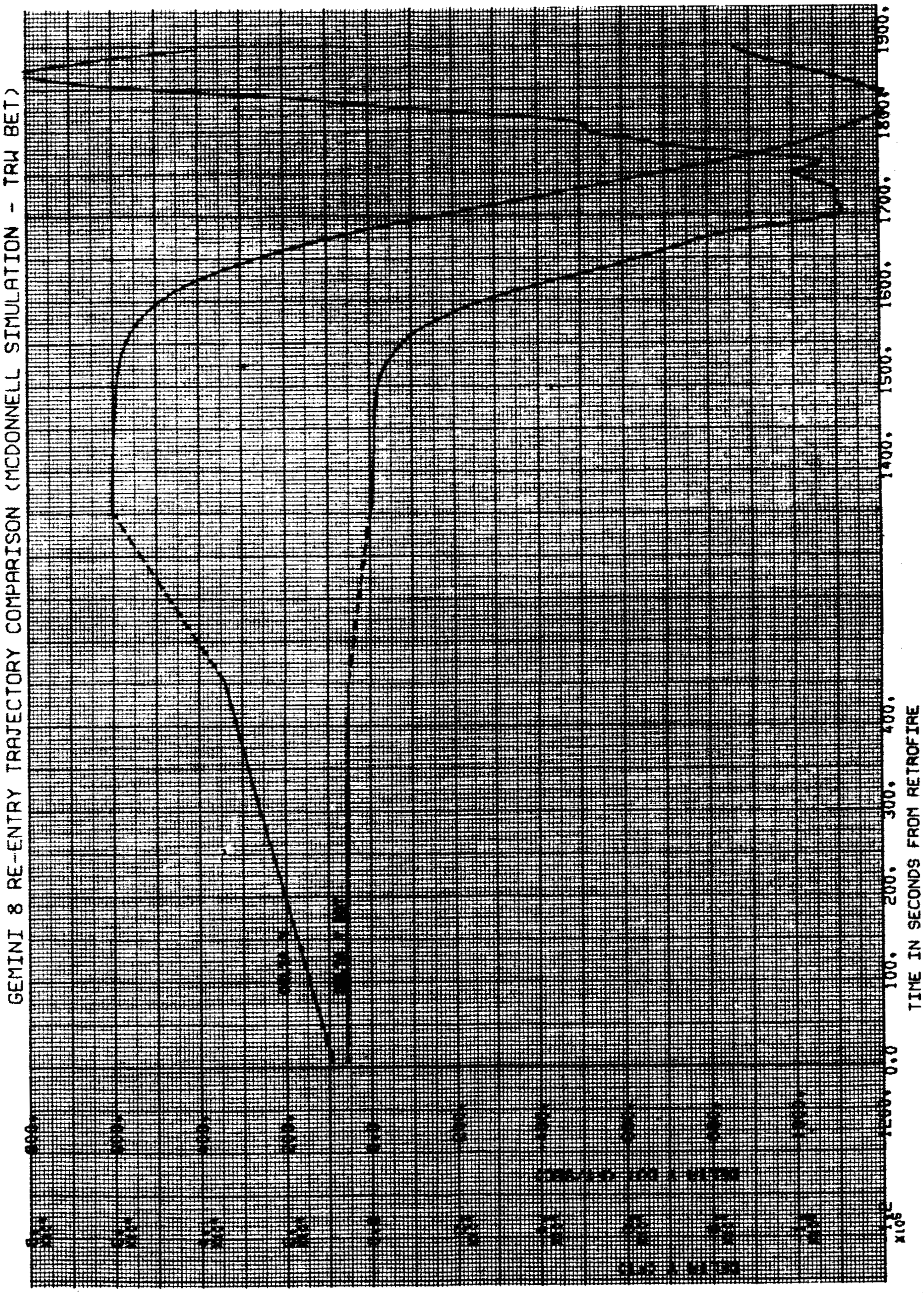


Figure 3-4. Reentry Trajectory Comparison (Simulation -TRW/BET)
y Axis

[redacted]

CONFIDENTIAL

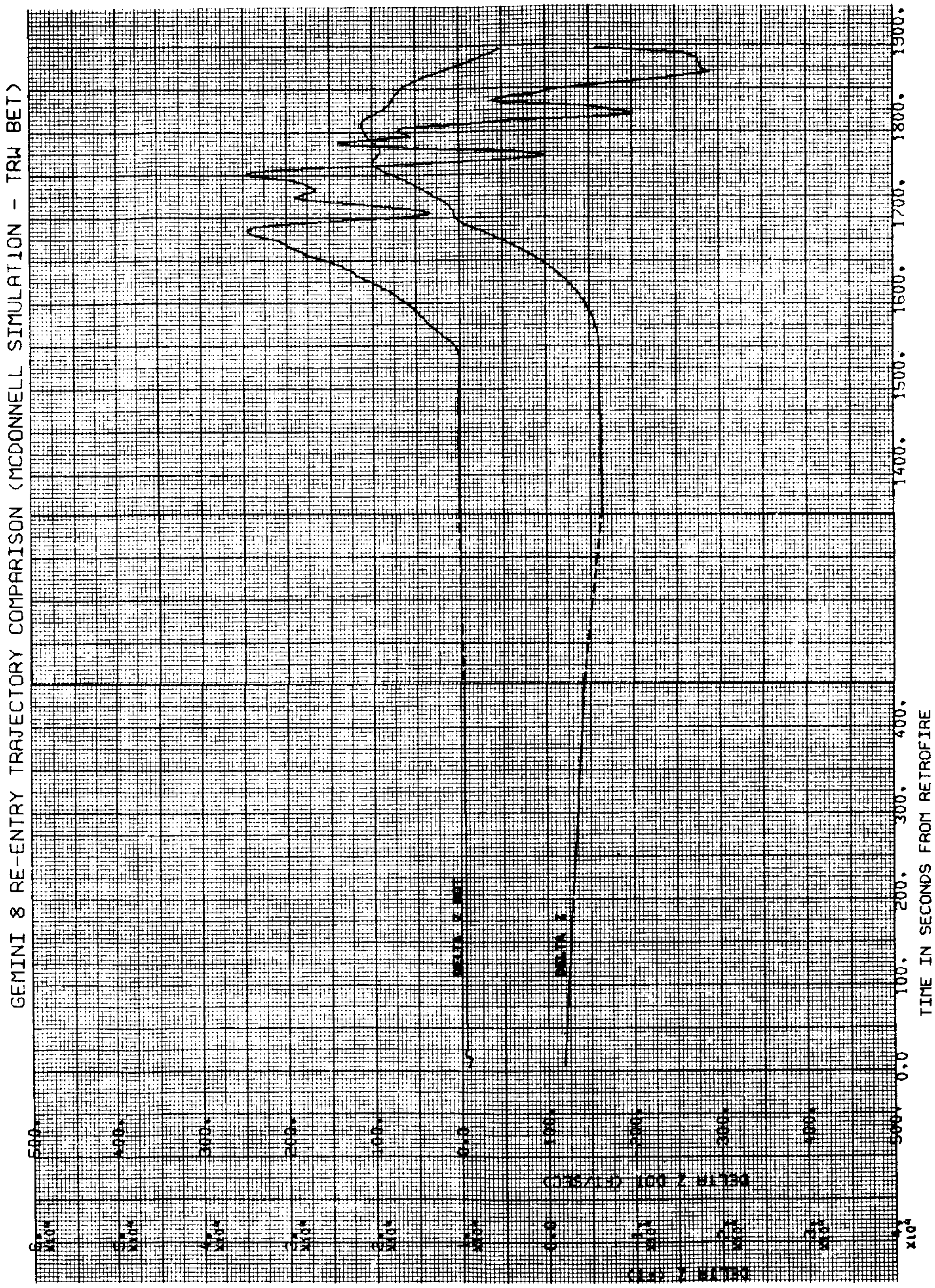


Figure 3-5. Reentry Trajectory Comparison (Simulation -TRW/BET)
z Axis

CONFIDENTIAL

[redacted]

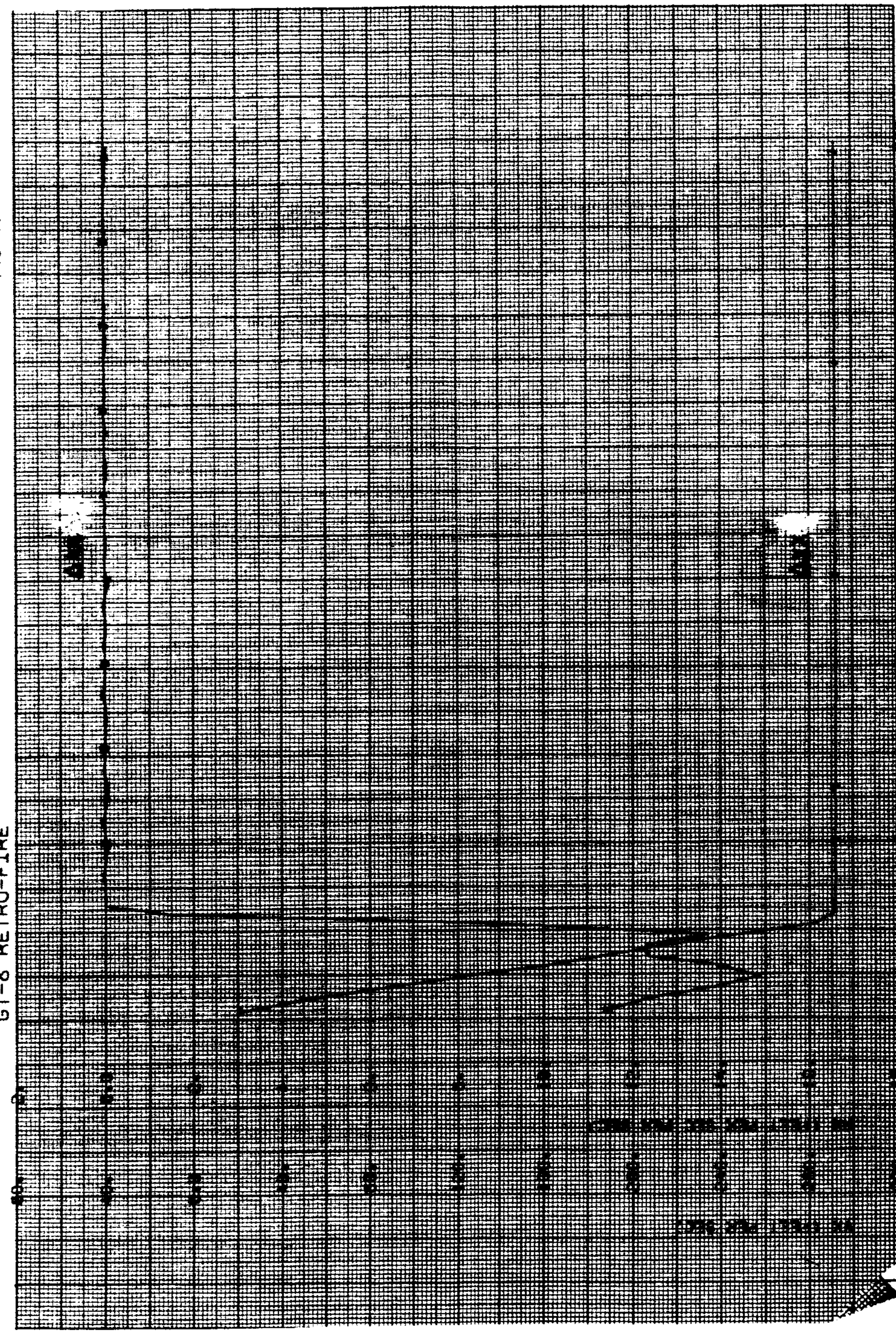


Figure 3-6. Gemini 8 Retrofire—IGS Measured Sensed Velocities and Accelerations (x Axis)

[redacted]

CONFIDENTIAL

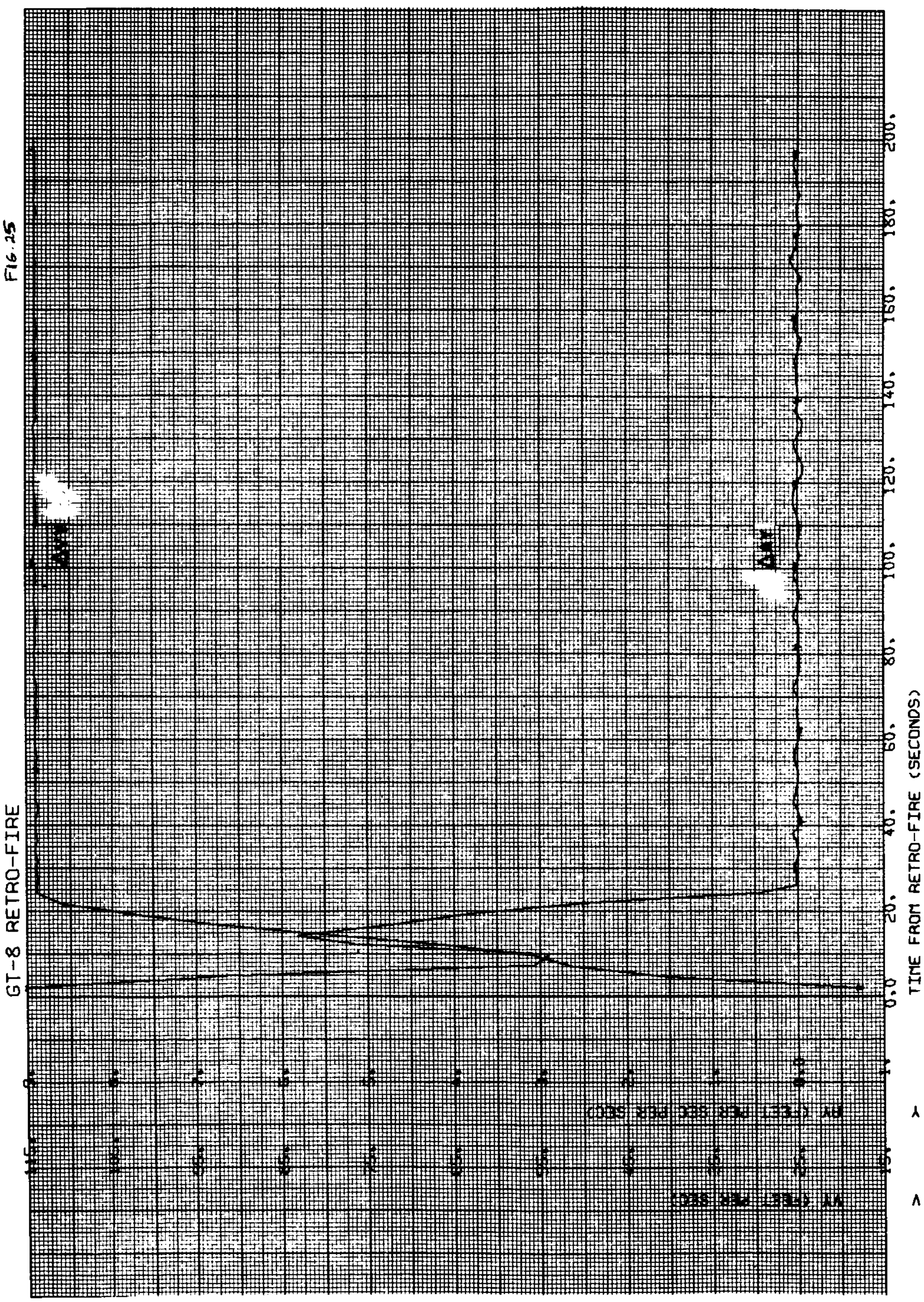


Figure 3-7. Gemini 8 Retrofire—IGS Measured Sensed Velocities and Accelerations (y Axis)

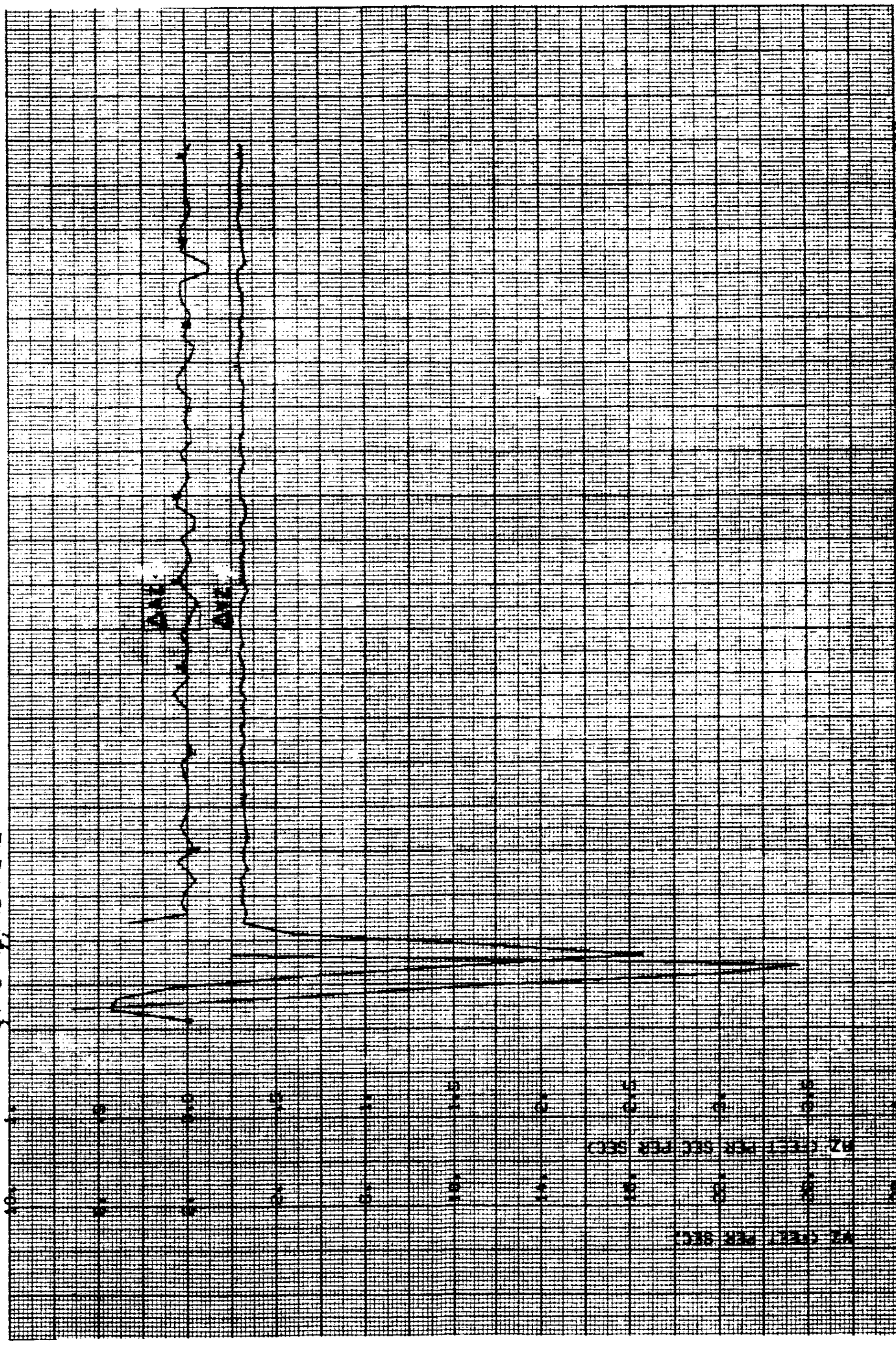


Figure 3-8. Gemini 8 Retrofire—IGS Measured Sensed Velocities and Accelerations (z Axis)

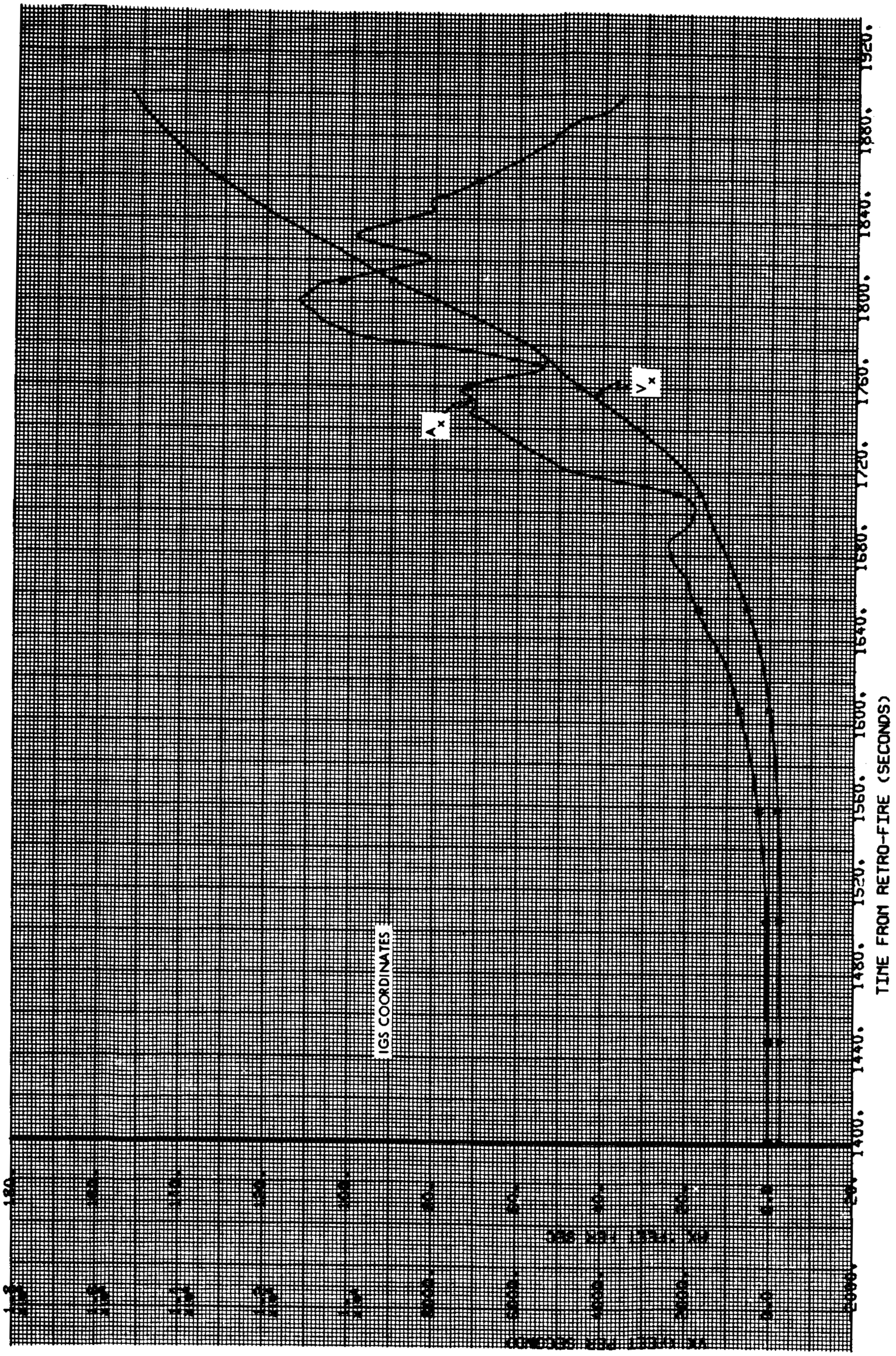


Figure 3-9. Gemini 8 Reentry—IGS Measured Sensed Velocities and Accelerations (x Axis)

[redacted]

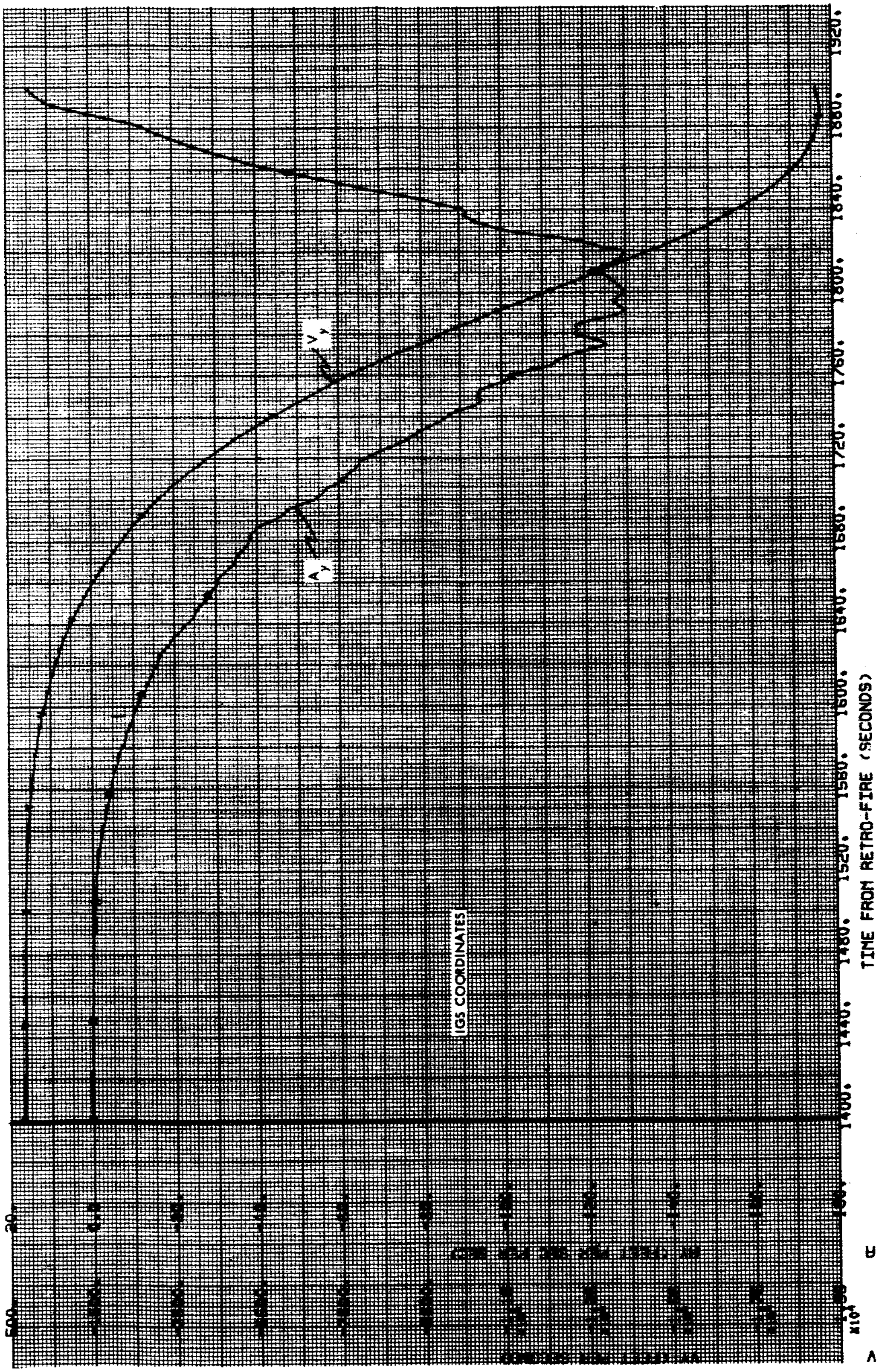


Figure 3-10. Gemini 8 Reentry—IGS Measured Sensed Velocities and Accelerations (y Axis)

[redacted]

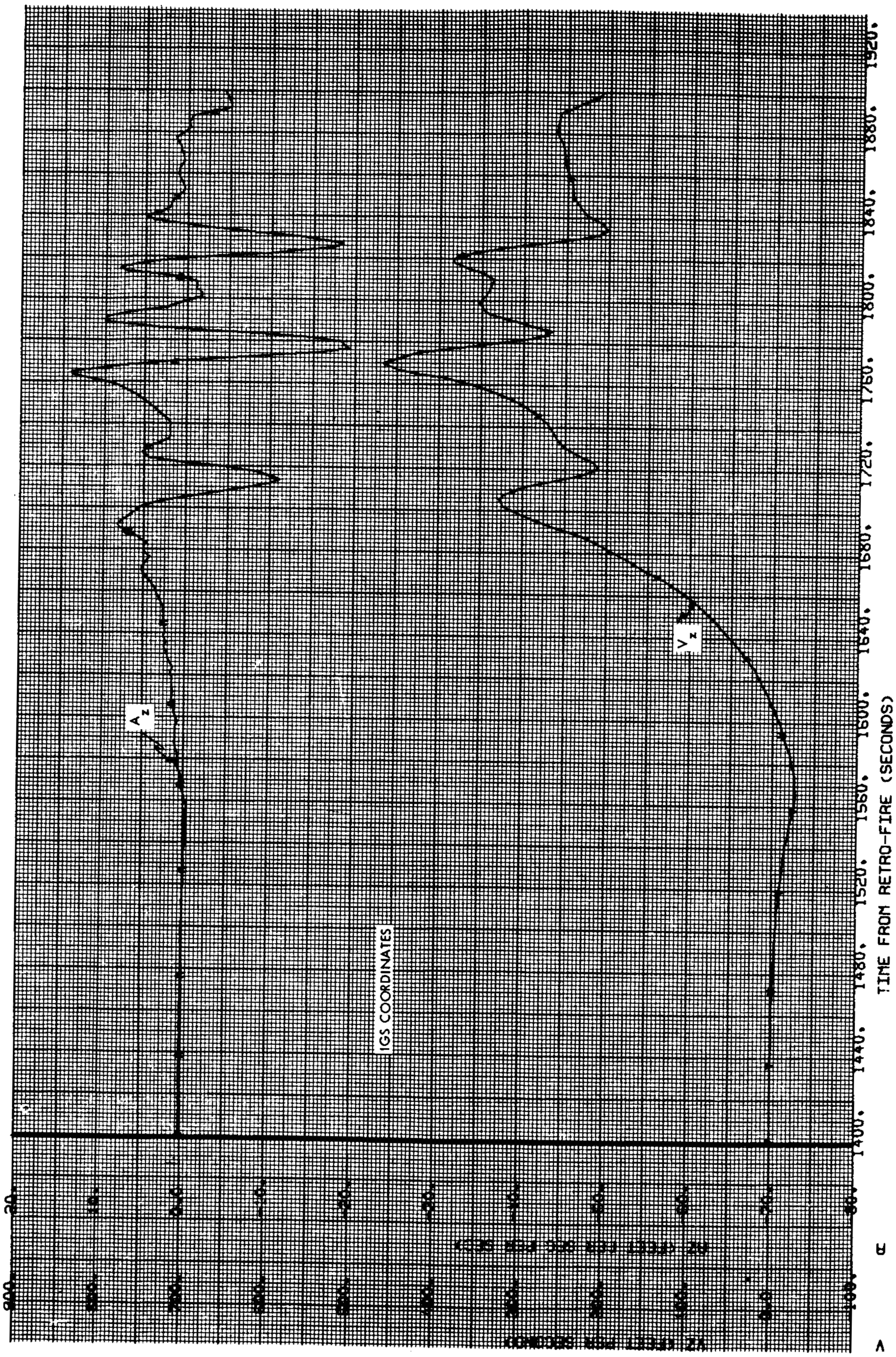


Figure 3-11. Gemini 8 Reentry—IGS Measured Sensed Velocities and Accelerations (z Axis)

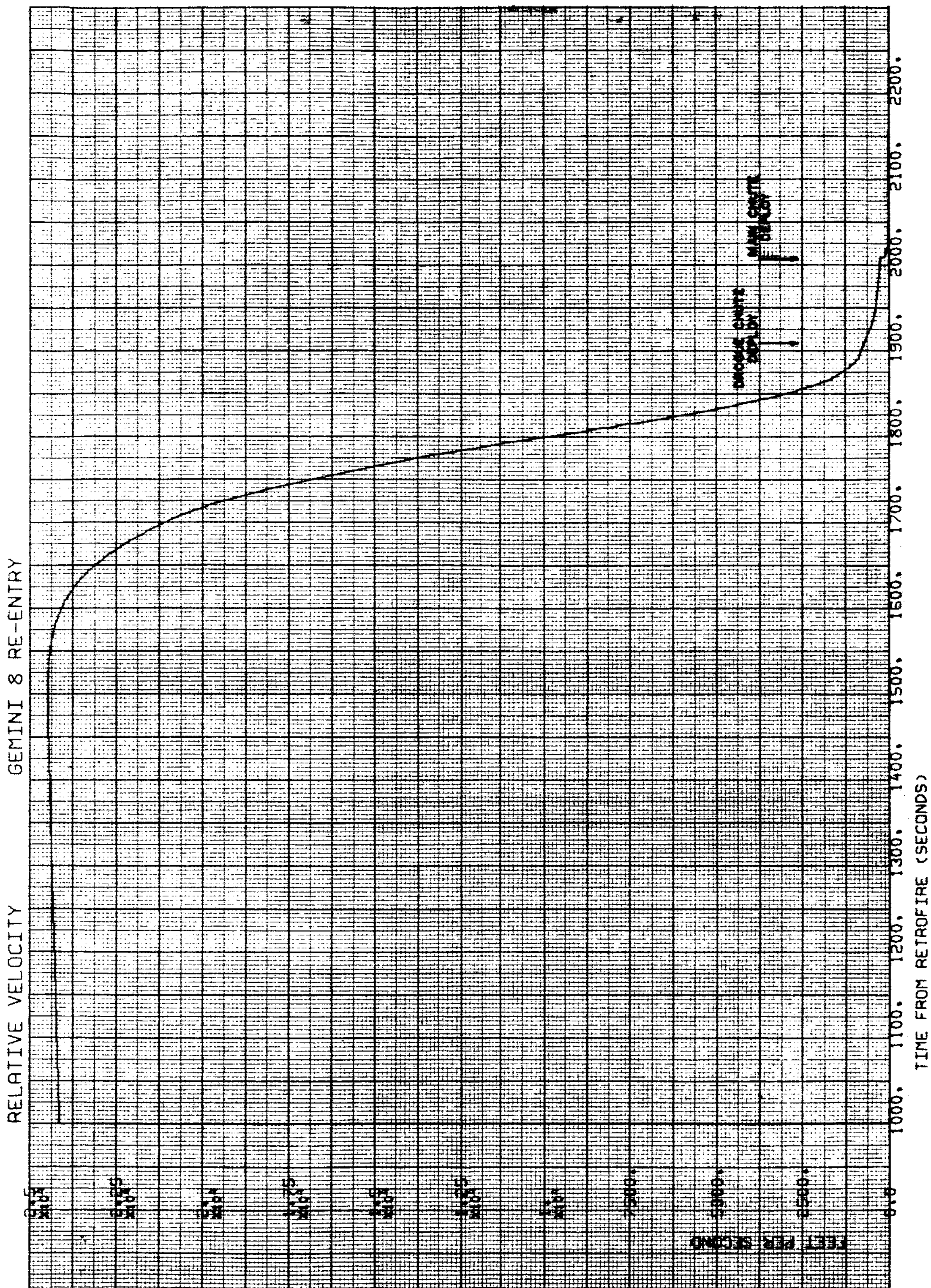


Figure 3-12. Gemini 8 Reentry—Relative Velocity Magnitude

CONFIDENTIAL

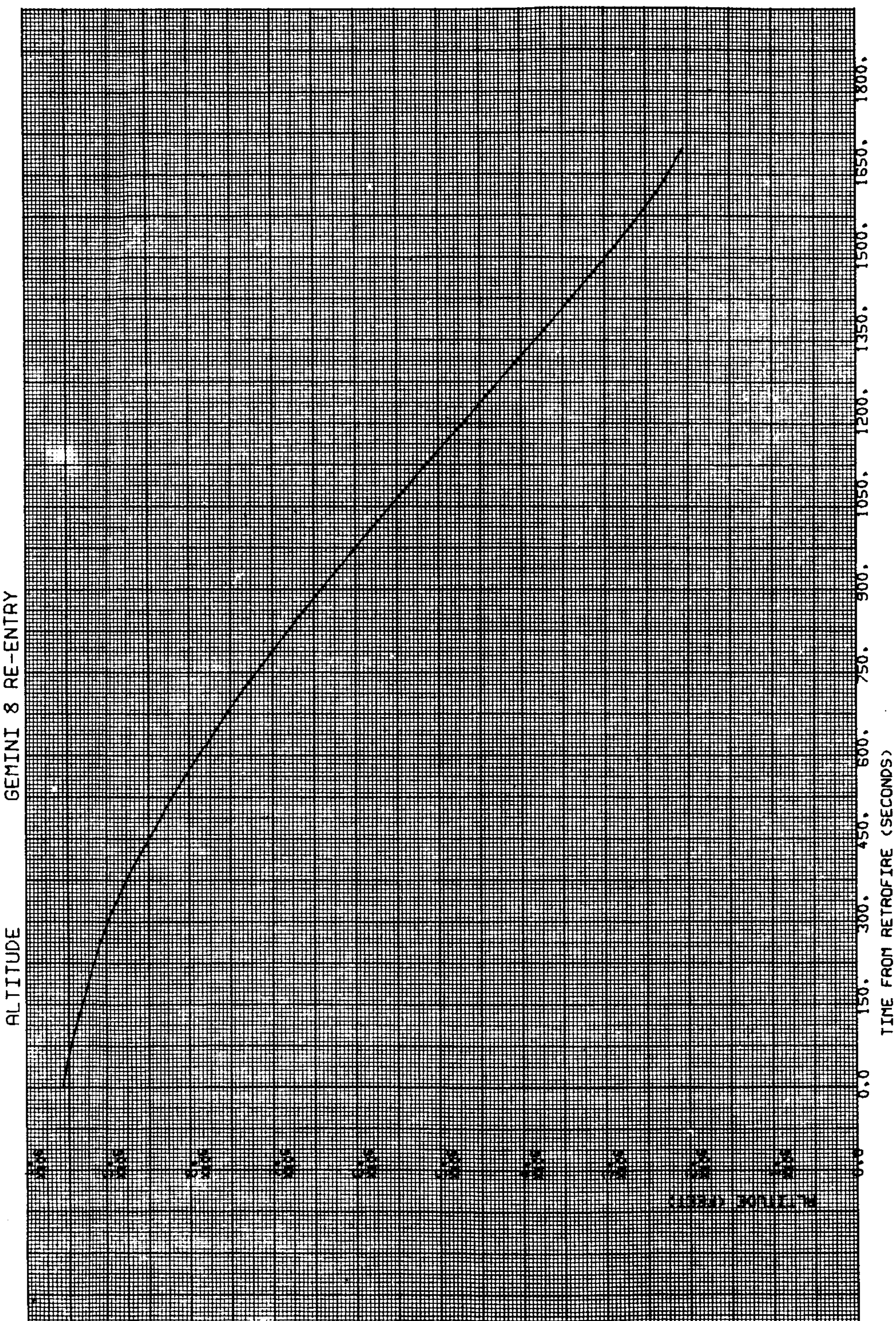


Figure 3-13. Gemini 8 Reentry—Altitude

CONFIDENTIAL

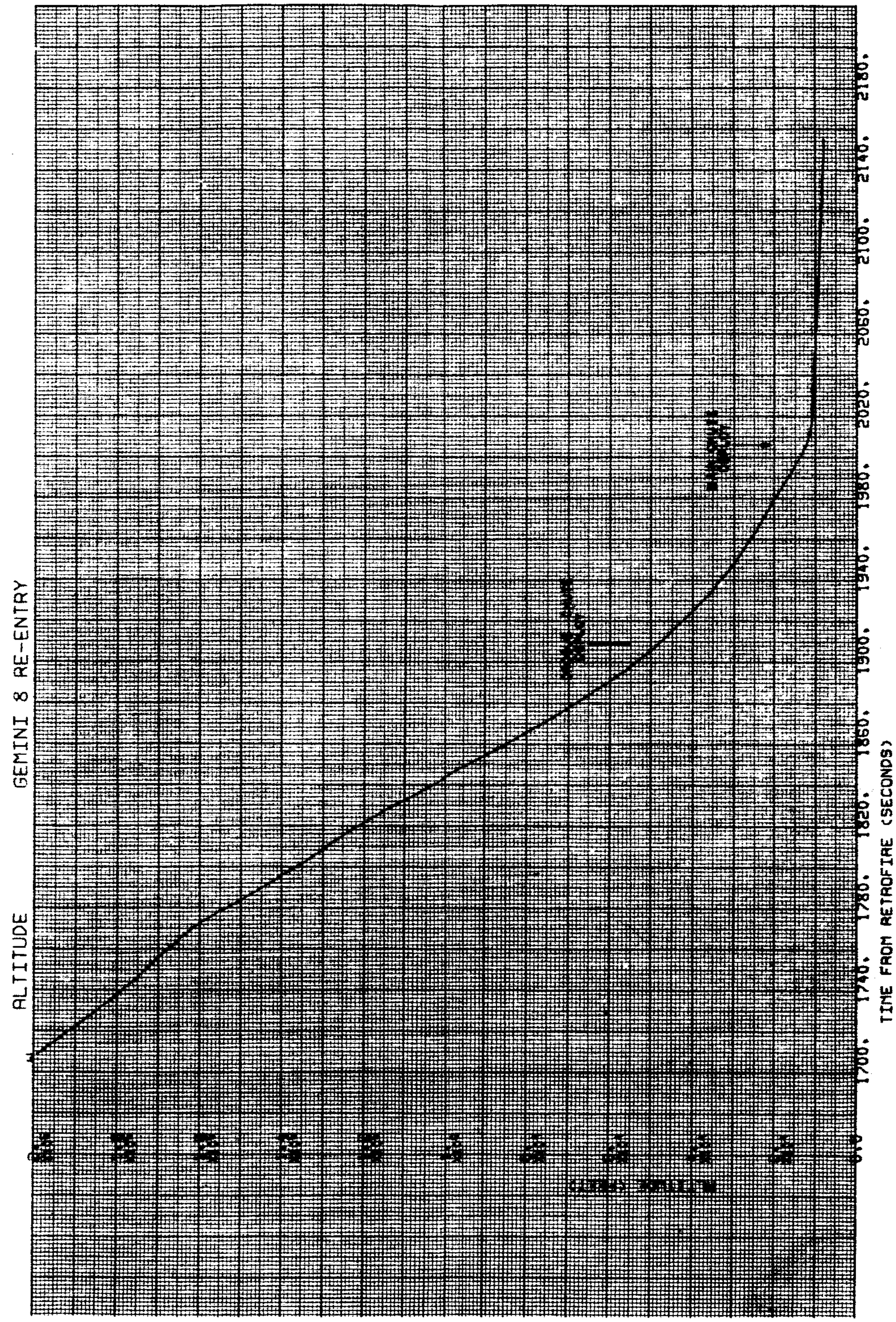


Figure 3-14. Gemini 8 Reentry—Altitude (Terminal Phase)

CONFIDENTIAL

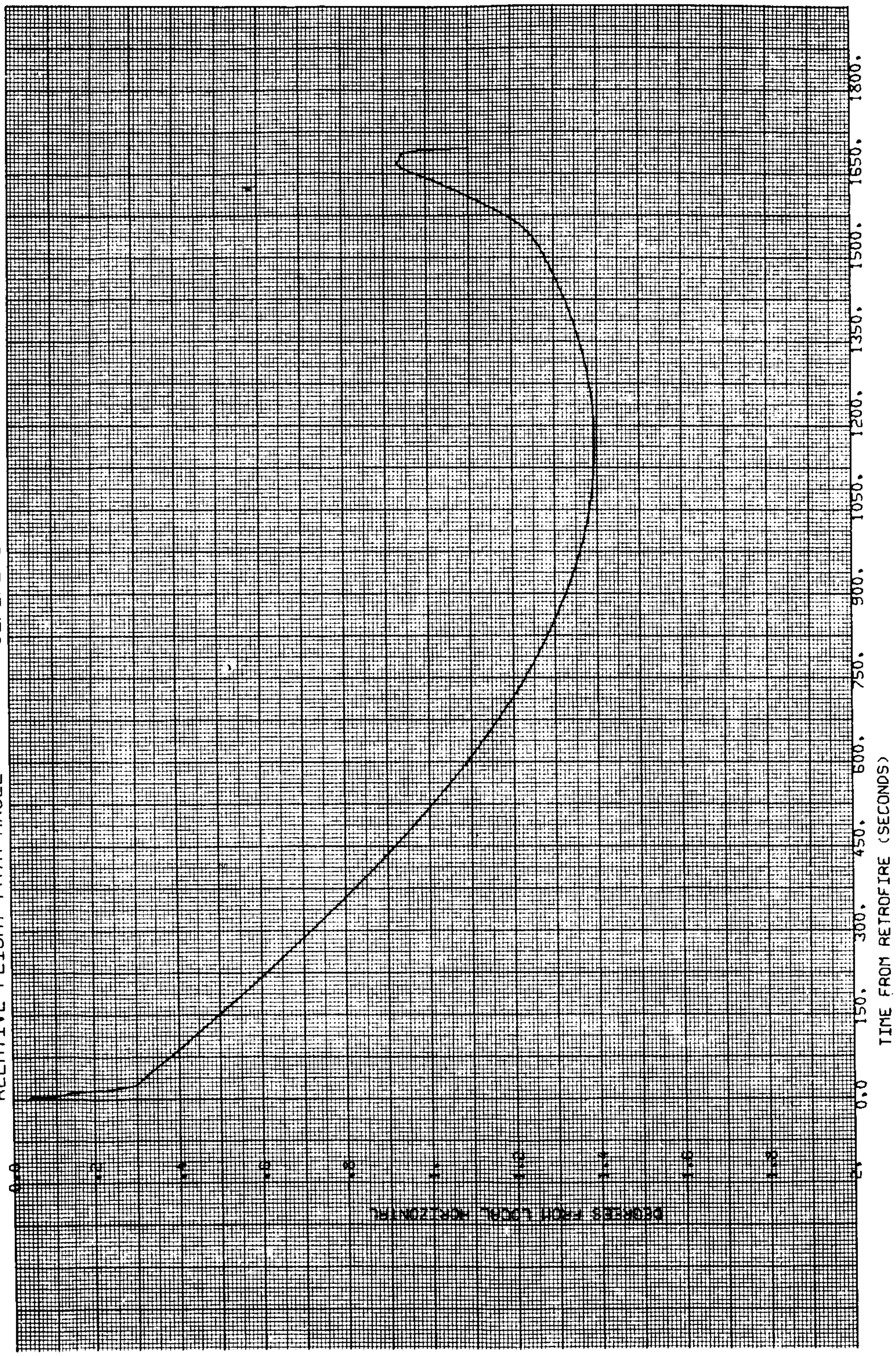


Figure 3-15. Gemini 8 Reentry—Relative Flight Path Angle

CONFIDENTIAL

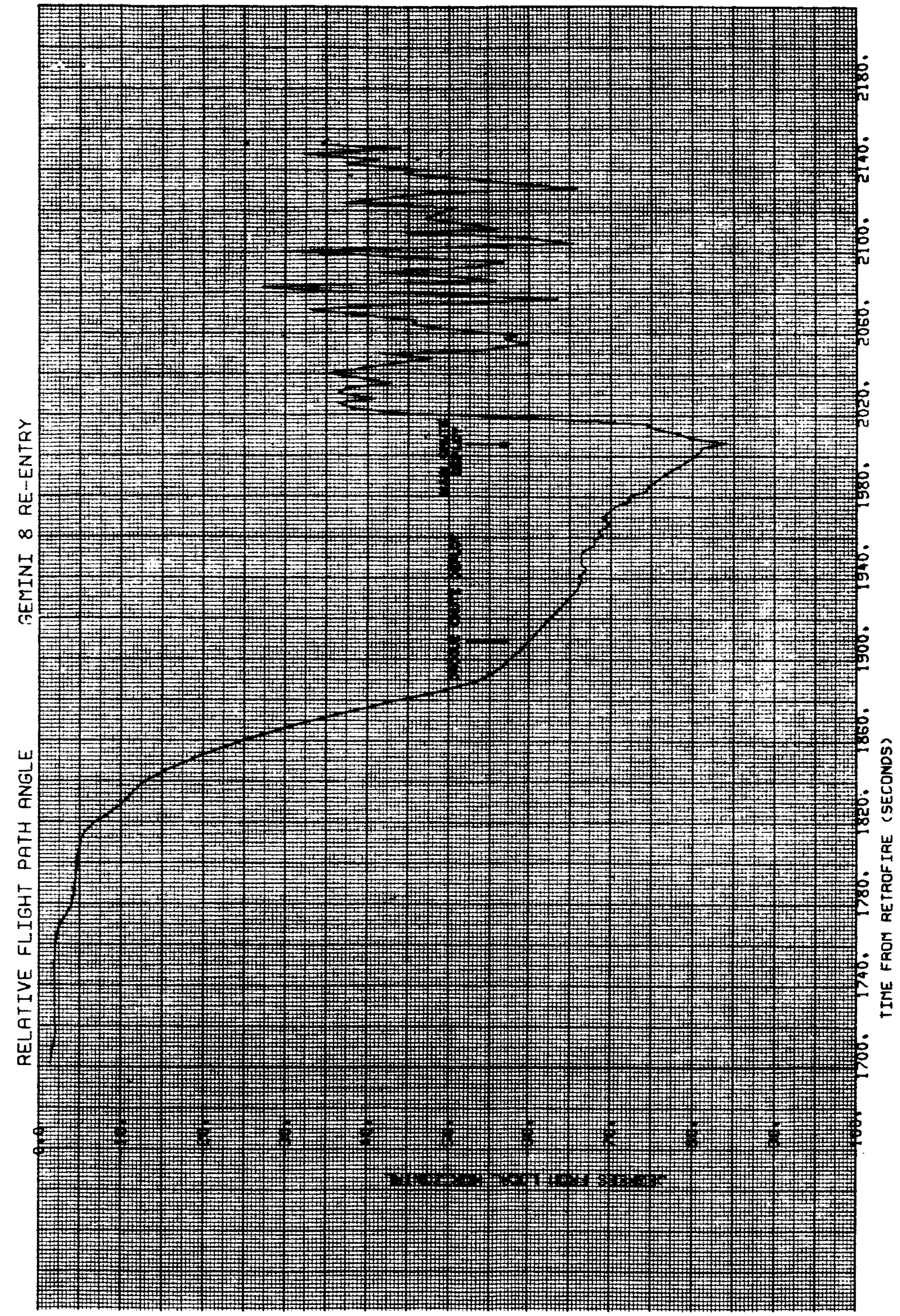


Figure 3-16. Gemini 8 Reentry—Relative Flight Path Angle (Terminal Phase)

(Reverse of this page is blank)

4. TRACKING SYSTEM PERFORMANCE

Tracking data available for analysis of the Gemini 8 IGS performance included the following:

a) GE Mod III/Burroughs (TRW-processed)
b) GE Mod III/Burroughs (GE-processed)
c) MISTRAM I Quick Look 10K and 100K
d) MISTRAM II (passive mode)
e) AFETR MISTRAM-only BET
f) AFETR final BET

Each of the above sets was used for position and velocity comparisons, as described in Section 2. The TRW-processed GE Mod III/Burroughs data were used for quick look analyses; however, detailed analyses were subsequently accomplished with the remaining sources. A TRW program (TOPS), which is used to produce powered flights best estimates of trajectory (BET), was also used to aid in the tracking data analysis. The results of the ensemble IMU/tracking system analysis accomplished on this flight are presented in Table 4-1. Also presented are error sources obtained by AFETR, GLAD, and BET programs.

For a clear picture of what portion of the observed differences are considered a tracking error, tracking system data were compared with inertial guidance data that had been corrected for guidance system errors derived from the regression analysis results of Section 2.

In general, the most significant tracking system error was an approximate 2-foot bias in the MISTRAM I 100K P channel measurements (because of forced internal consistency, there was about 0.2-foot bias also in the 10K P channel). The GE Mod III system performance was nominal, as was the performance of the MISTRAM II system. The AFETR MISTRAM-only BET agreed well with the final TRW trajectory, while the AFETR final BET contained a small difference in the vertical direction, amounting to about 3 ft/sec at SECO.

[redacted]

4.1 GE MOD III

4.1.1 GE Mod III/Burroughs (TRW-Processed)

The Burroughs data received at TRW consisted of raw counts recorded on punched paper tape at a rate of two samples per second. The data were transferred to magnetic tape at TRW and processed in the data reduction programs.

Figures 4-1 and 4-2 show GE/Burroughs (TRW)-compensated IGS comparisons in guidance coordinates. No major errors are evident, and differences are within the uncertainties of both the GE system and the compensated IGS data (see Section 2). The regression analyses using the GE-processed Burroughs data (Section 4.1.2) resulted in estimated azimuth and elevation biases of -0.000015 radian and -0.00005 radian, respectively, and a range bias of about -75 feet, all of which are nominal values for the GE Burrough tracker measurements. The analysis, including the GE rate ($\dot{r}$, $\dot{p}$, $\dot{q}$) measurements (Section 2), showed some remaining residual errors in these data, although their level was generally within the expected uncertainties.

4.1.2 GE Mod III/Burroughs (GE-Processed)

The General Electric Company processes essentially the same two per second Burroughs data which are transmitted to Syracuse in near real-time via hardwire. The primary differences between the two processing techniques (TRW and GE) are the amount of filtering applied to the data and the method of correcting for refraction effects.

Figures 4-3 and 4-4 show the GE-processed Burroughs data-compensated IGS comparisons. Comparison with Figure 3-3 clearly shows the heavier degree of filtering in the GE-processed data. These results disagree with the TRW data (Figure 4-1) in the y direction by approximately 1.5 ft/sec at SECO because of differences in refraction corrections applied.

4.2 MISTRAM

The MISTRAM data received at TRW are fully scaled and corrected raw range sum, P, and Q measurements. These data were processed through the TRW transformation and comparison programs in the usual manner.

[redacted]

Table 4-1. Tracking Data Errors

System error		Units	TRW analysis		AFETR MISTRAM-only BET		AFETR final BET	
			Estimated bias	1σ uncertainty	Estimated bias	1σ uncertainty	Estimated bias	1σ uncertainty
MISTRAM I	RSUM	ft	-5.	6.0	+0.68	0.76	-3.9	0.4
	P 10K	ft	+0.19 (post-BECO)	0.05	+0.21	0.006	+0.10	0.005
	Q 10K	ft	0.0 (post-BECO)	0.05	+0.08	0.007	-0.036	0.006
	P 100K	ft	+2.2 (post-BECO)	0.5	+2.46	0.06	+1.2	0.05
	Q 100K	ft	+0.06 (post-BECO)	0.5	+0.81	0.07	-0.50	0.06
	Refraction (central site)	n-units	-1.71	3.3				
	Refraction (P 100K)	n-units	+2	1.				
MISTRAM II	RSUM	ft	+2	5.	-0.09	0.4	-1.13	0.4
	P	ft	+1.5	1.	2.15	0.1	+0.095	0.1
	Q	ft	+0.5	0.5	1.08	0.04	+0.651	0.04
	$\dot{R}$SUM	ft/sec	+0.22	0.1	0.002		+0.005	0.002
	Refraction	n-units	-3.2	5.				
	Timing	sec	-0.00088	0.002				
GE Mod III	R	ft	-74.3	12.				
	A	millirad	-0.015	0.010				
	E	millirad	-0.050	0.020				
	Refraction	n-units	-15.3	3.				
	Timing	sec	+0.0	0.0004				

1) TRW results obtained from regression and TOPS analysis
2) AFETR MISTRAM only BET results from Reference 3
3) AFETR Final BET results from Reference 4

4.2.1 MISTRAM I

Figures 4-5 through 4-8 show the MISTRAM I 10K and 100K-compensated IGS comparisons.

Except for noise levels, these results agree with each other because of forced internal consistency between the 10K and 100K systems. The primary error found to be present in MISTRAM (Section 4.3 and 4.4) was an approximate +2-foot bias and 2 n-unit refraction error in the P 100 channel, the effect of which is most noticeable in the IGS y (vertical) coordinate (Figure 4-7) where a positive trend culminating in about +16 ft/sec at SECO +20 seconds is apparent. This P bias error also propagates somewhat into the x and z coordinates, although at a greatly reduced level. Subsequent analyses by AFETR (Section 4.3) and TRW (Section 4.4) indicated that there were no other significant errors in the MISTRAM I measurements.

4.2.2 MISTRAM II (Passive Mode)

Figures 4-9 and 4-10 show the MISTRAM II-compensated IGS comparisons in IGS coordinates. These results in general represent the best performance of MISTRAM II observed thus far in the Gemini series. Except for an initially high noise level due to the low elevation angle at acquisition, these differences agree quite well with those of the BET analyses (Sections 4.3 and 4.4). These same analyses showed no large errors in the MISTRAM II measurements. This fact, coupled with the improved geometry of the Gemini 8 trajectory relative to MISTRAM II, resulted in the overall good performance of this system for this flight.

4.3 AFETR BEST ESTIMATE OF TRAJECTORY

4.3.1 MISTRAM-Only BET

The MISTRAM-only BET is computed by means of the AFETR "GLAD" program using MISTRAM I (10K and 100K) and MISTRAM II measurements. The solution is obtained from a conventional least-square adjustment of measurement biases and Cartesian trajectory values. A rate bias term is included in the MISTRAM II (passive) range sum error model. No refraction terms are solved for.

Figures 4-11 and 4-12 show the final MISTRAM BET-compensated IGS comparisons. These differences imply that the GLAD trajectory adjustment agrees well with the results of the IGS regression of Section 2. The biases estimated by GLAD were +2.46 feet for MISTRAM I P 100 (0.21 for P 10), +0.81 foot for Q 100 (0.08 for Q 10), +2.15 feet for MISTRAM II P, and +1.08 feet for MISTRAM II Q. Range sum estimated biases were 0.68 foot for MISTRAM I and -0.09 foot for MISTRAM II. These values also agree well with those estimated by the TRW TOPS analysis (Section 4.4).

4.3.2 Final BET

The AFETR final BET is a conventional weighted least-square adjustment using measurements from MISTRAM, GE, FPQ-6 radars, and x-band GLOTRAC stations.

Figures 4-13 and 4-14 show the final BET-compensated IGS comparisons. The most significant difference is the trend in the y coordinate, which implies that the BET incorrectly estimated tracker bias errors by an amount sufficient to cause about 3 ft/sec vertical velocity error at SECO. For example, this is reflected in the final BET's estimate of MISTRAM I P100 bias, which was +1.2 feet, a figure low about 1 foot (Section 4.4 and 4.4.1). This same type of final BET error was noted during the analysis of the Gemini 6 IGS.

4.4 TRW TOPS BET

Input to the TRW TOPS program consisted of MISTRAM I and II and GE Mod III (track and rate) measurements. Figures 4-15 and 4-16 show the TOPS-compensated IGS comparisons. These results generally agree with those of the preceding analyses and help to verify the estimates of guidance system errors. In terms of MISTRAM I 100K, the TOPS estimates of P and Q biases at SECO were approximately +2.1 and +0.12 feet, respectively. Estimated range sum bias was approximately -5 feet. A 2 n-unit P 100K refraction error was also estimated in the TOPS analysis. Estimated errors for the MISTRAM II and GE Mod III systems were nominal and agreed well with the regression results of Section 2.

[redacted]

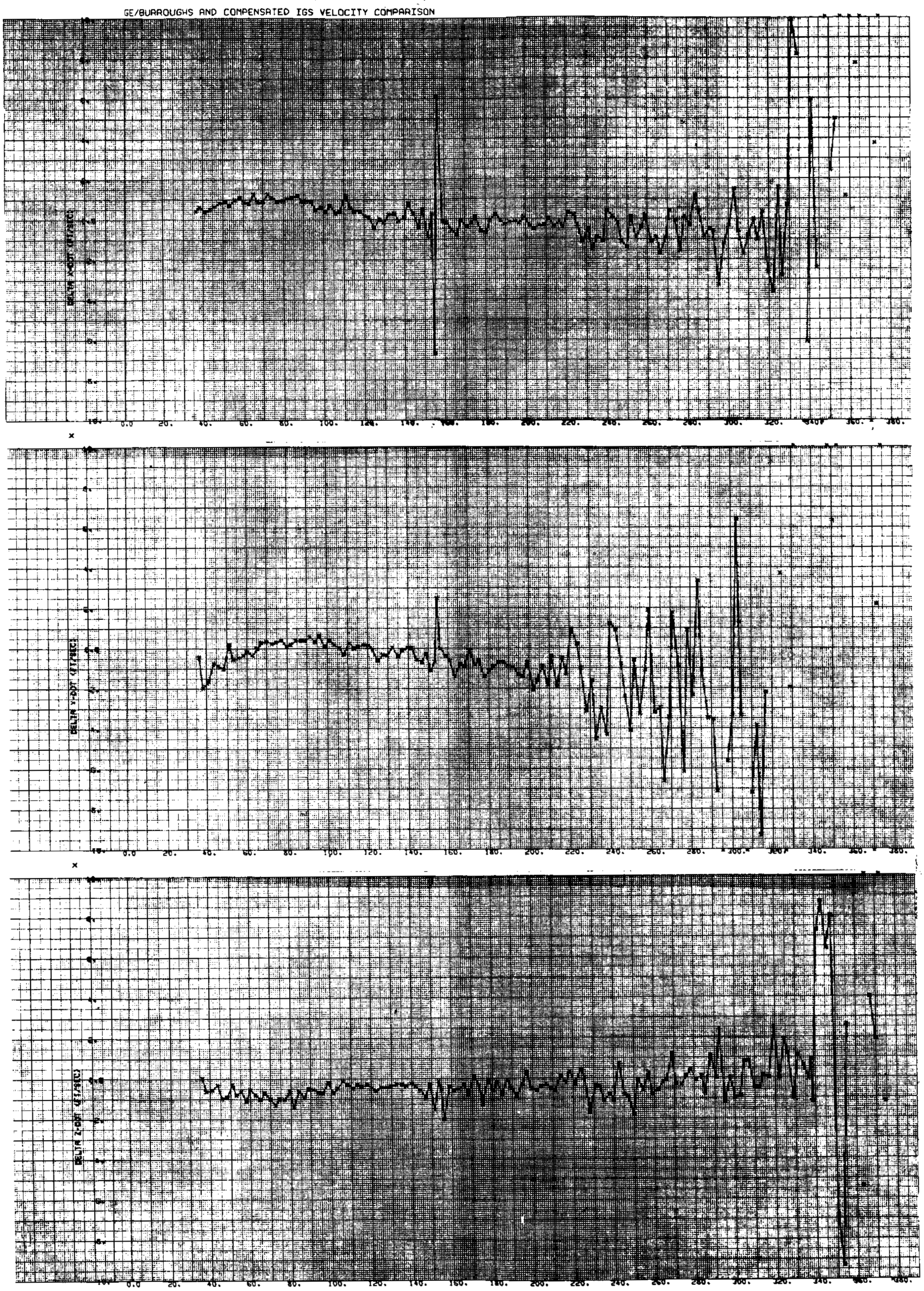


Figure 4-1. GE Burroughs and Compensated IGS ΔV in Sensed Coordinates

[redacted]

[redacted]

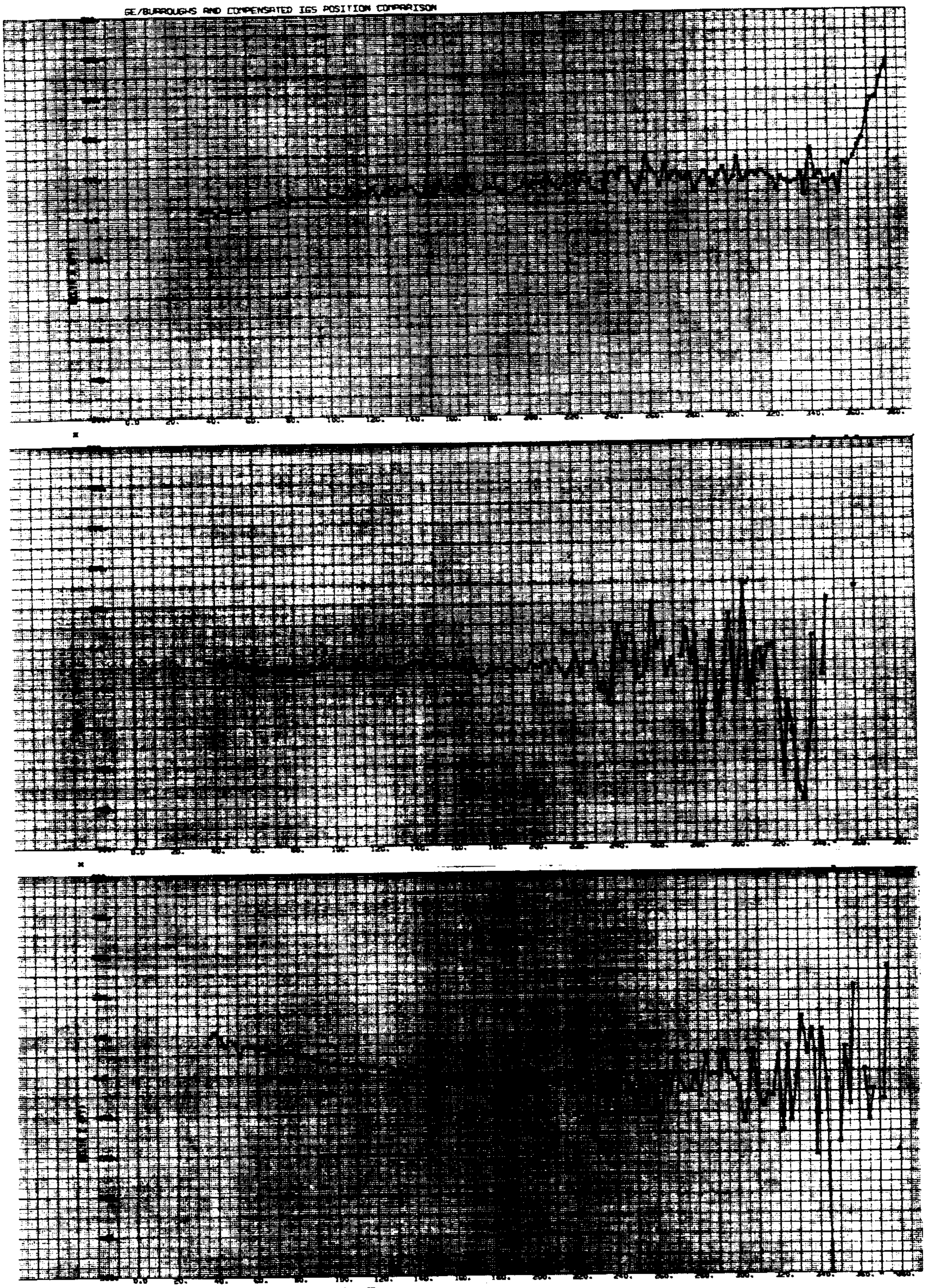


Figure 4-2. GE Burroughs and Compensated IGS ΔP in Sensed Coordinates

[redacted]

CONFIDENTIAL

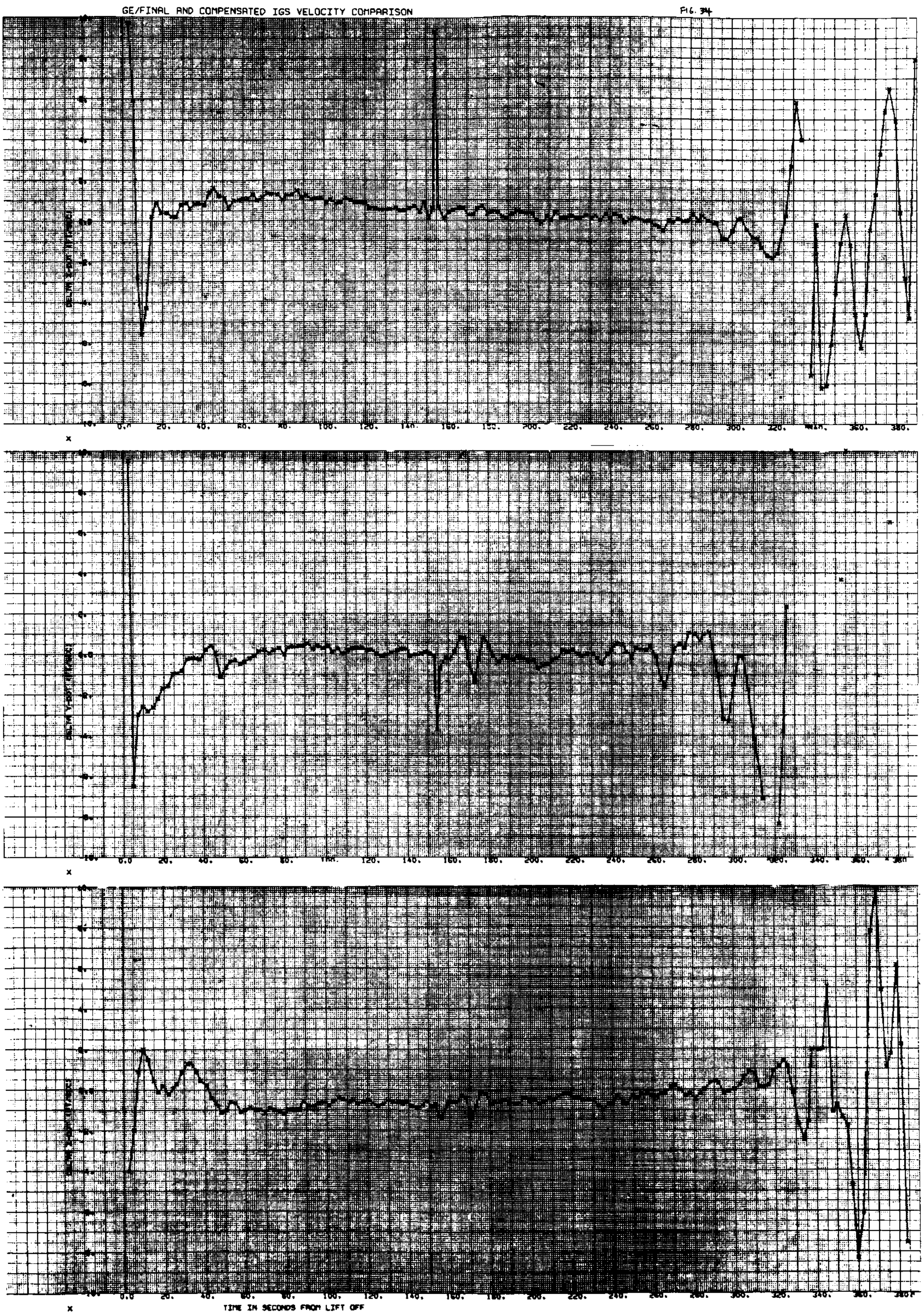


Figure 4-3. GE Final and Compensated IGS ΔV in Sensed Coordinates

CONFIDENTIAL

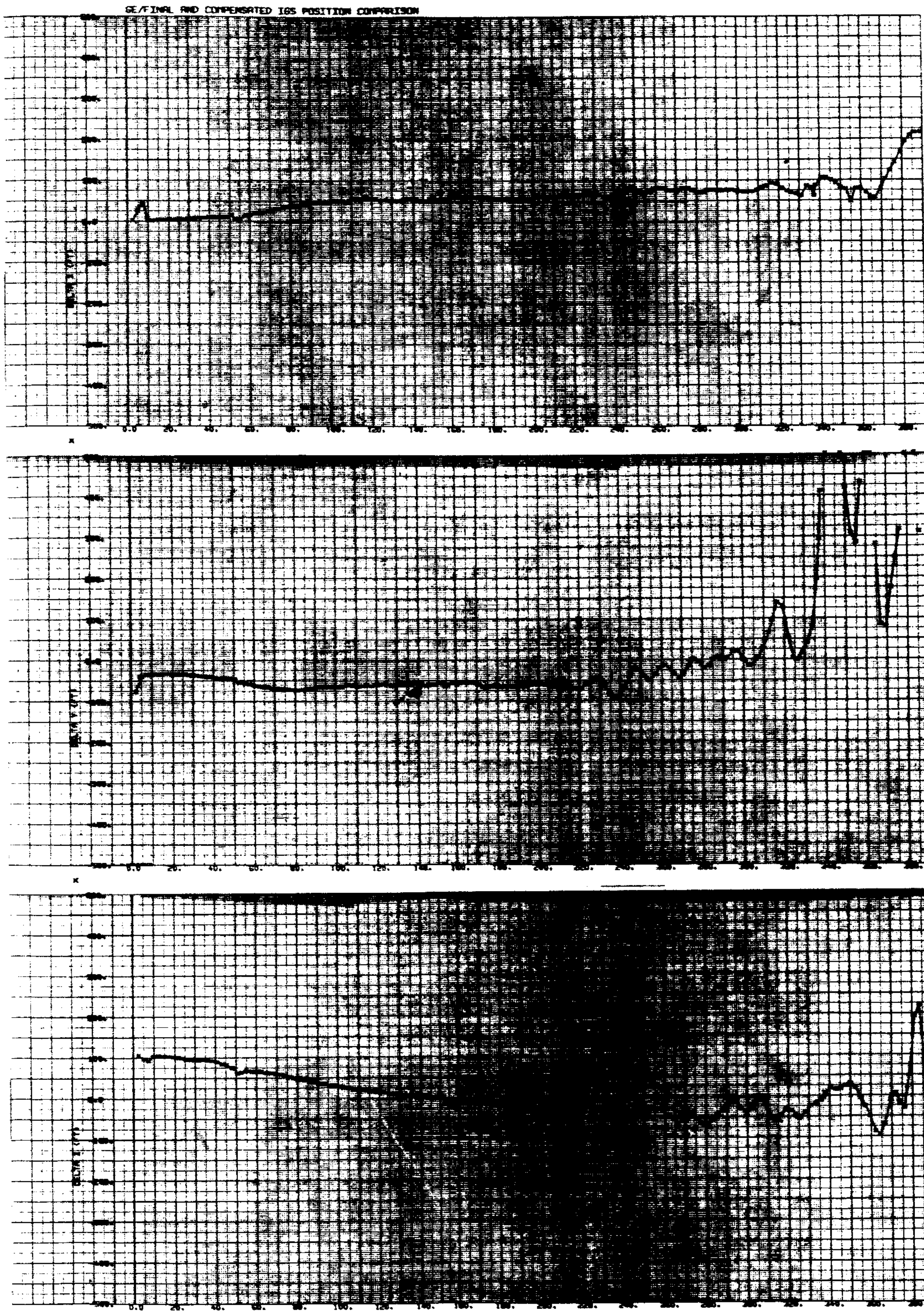


Figure 4-4. GE Final and Compensated IGS ΔP in Sensed Coordinates

CONFIDENTIAL

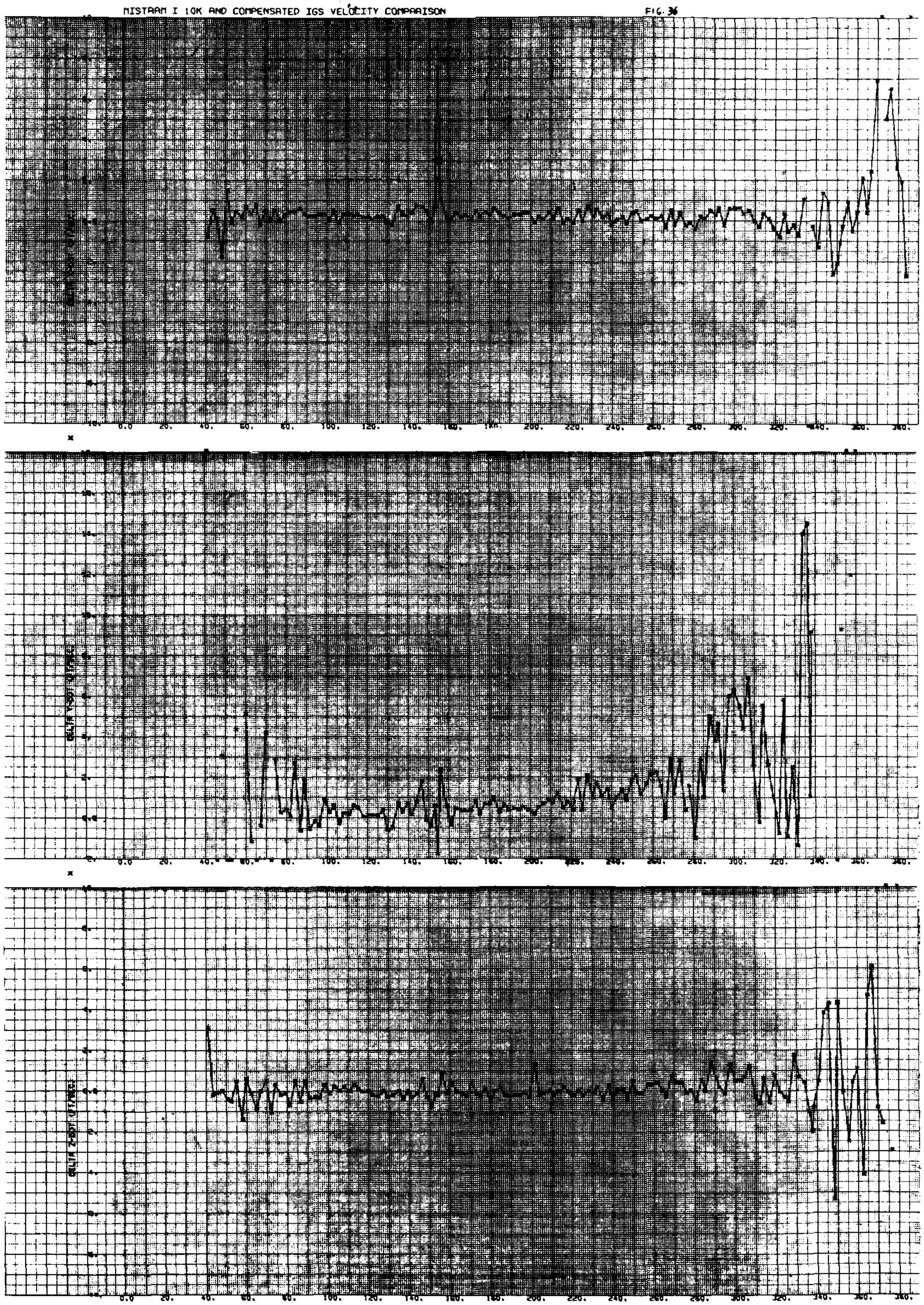


Figure 4-5. MISTRAM I 10 K and Compensated IGS ΔV in Sensed Coordinates

CONFIDENTIAL

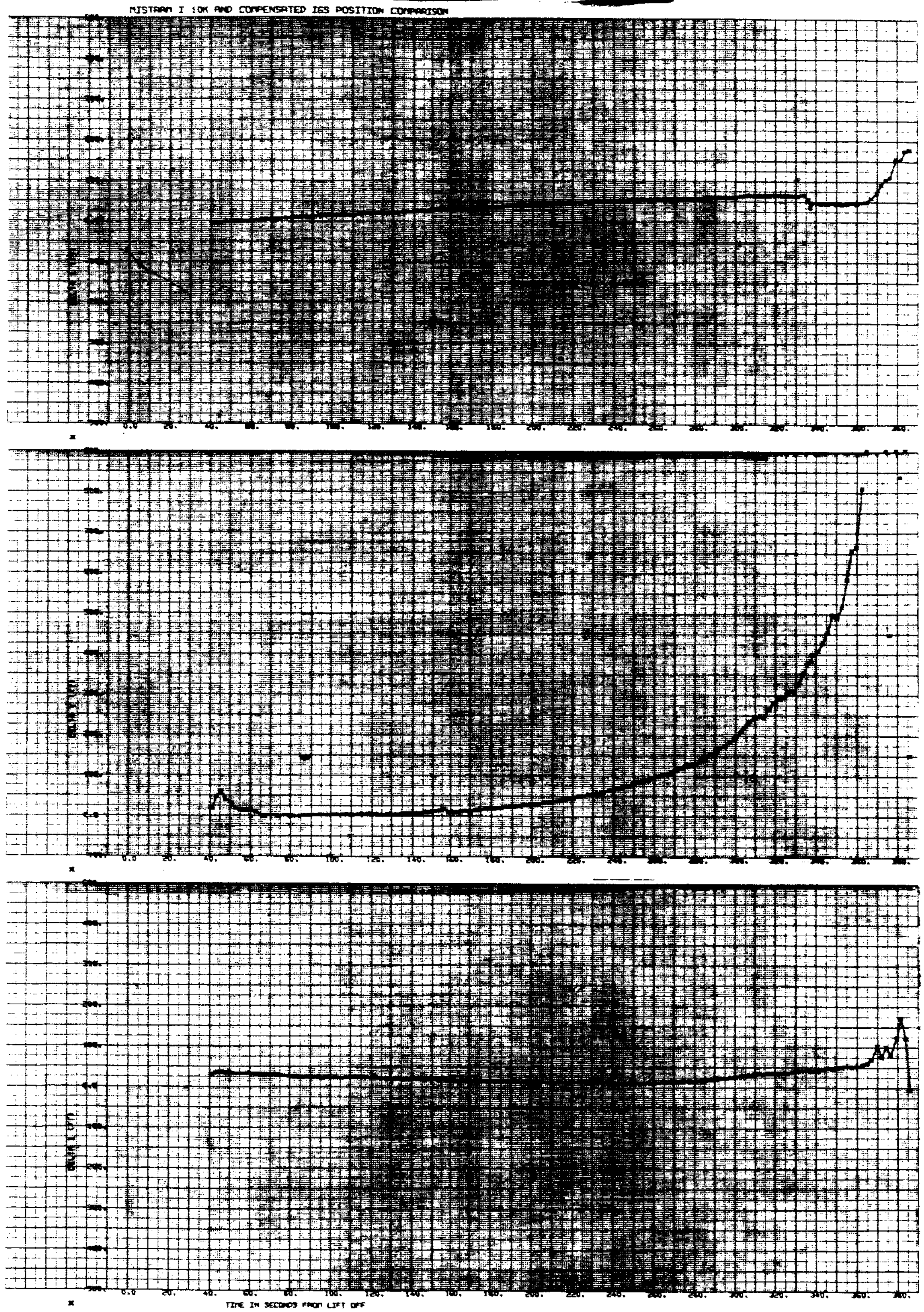


Figure 4-6. MISTRAM I 10 K and Compensated IGS ΔP in Sensed Coordinates

CONFIDENTIAL

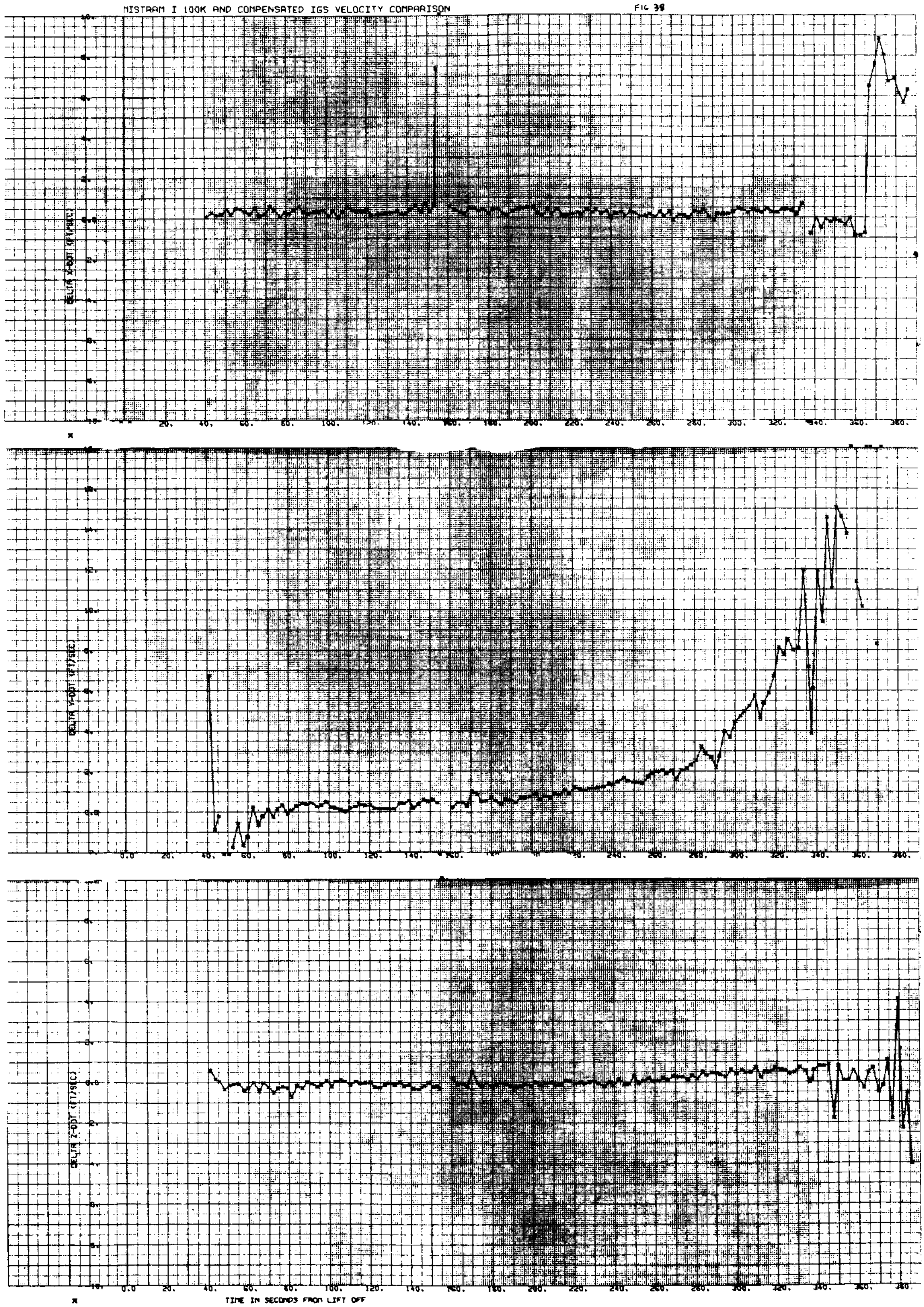


Figure 4-7. MISTRAM I 100K and Compensated IGS ΔV in Sensed Coordinates

CONFIDENTIAL

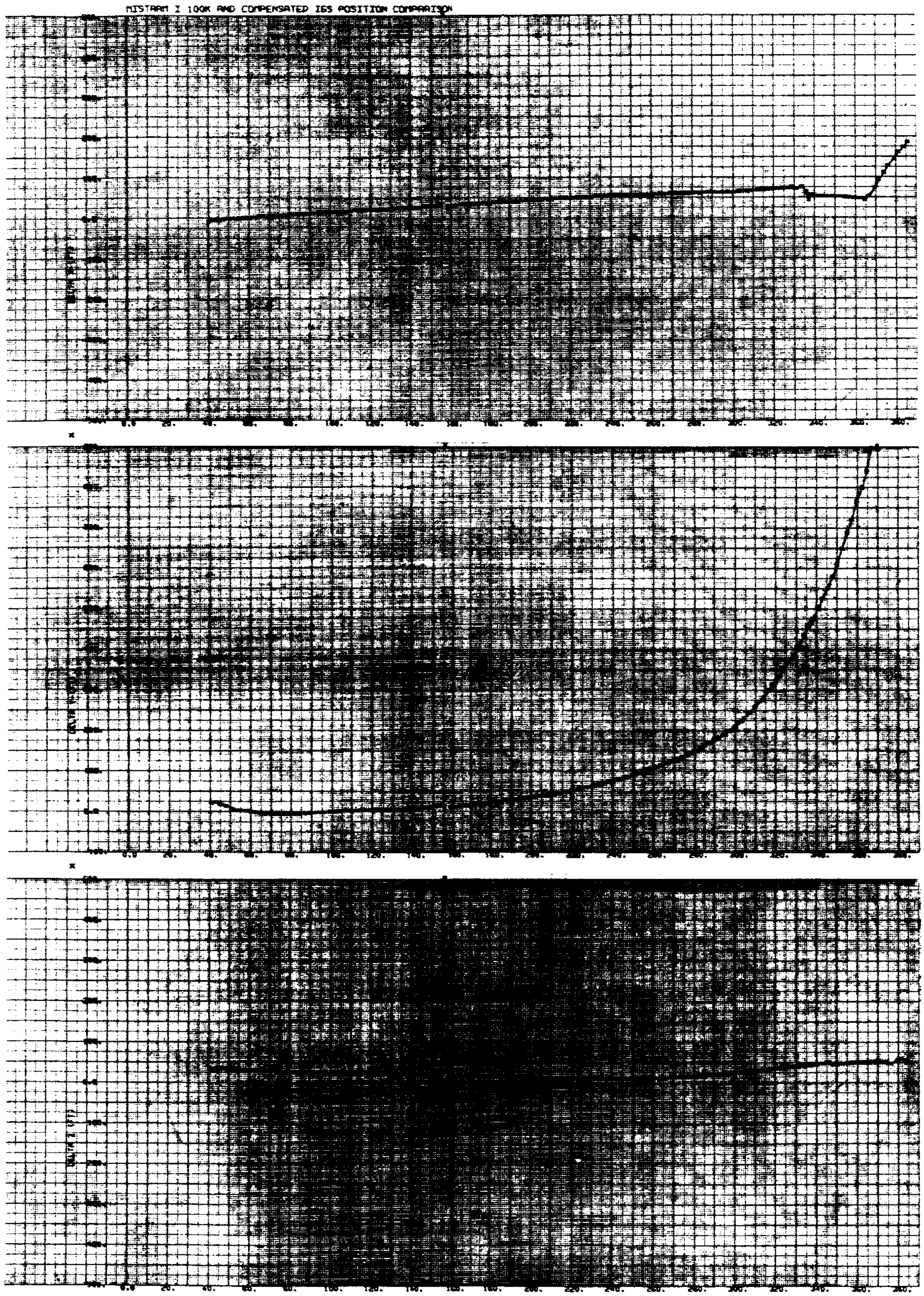


Figure 4-8. MISTRAM I 100K and Compensated IGS ΔP in Sensed Coordinates

[redacted]

[redacted]

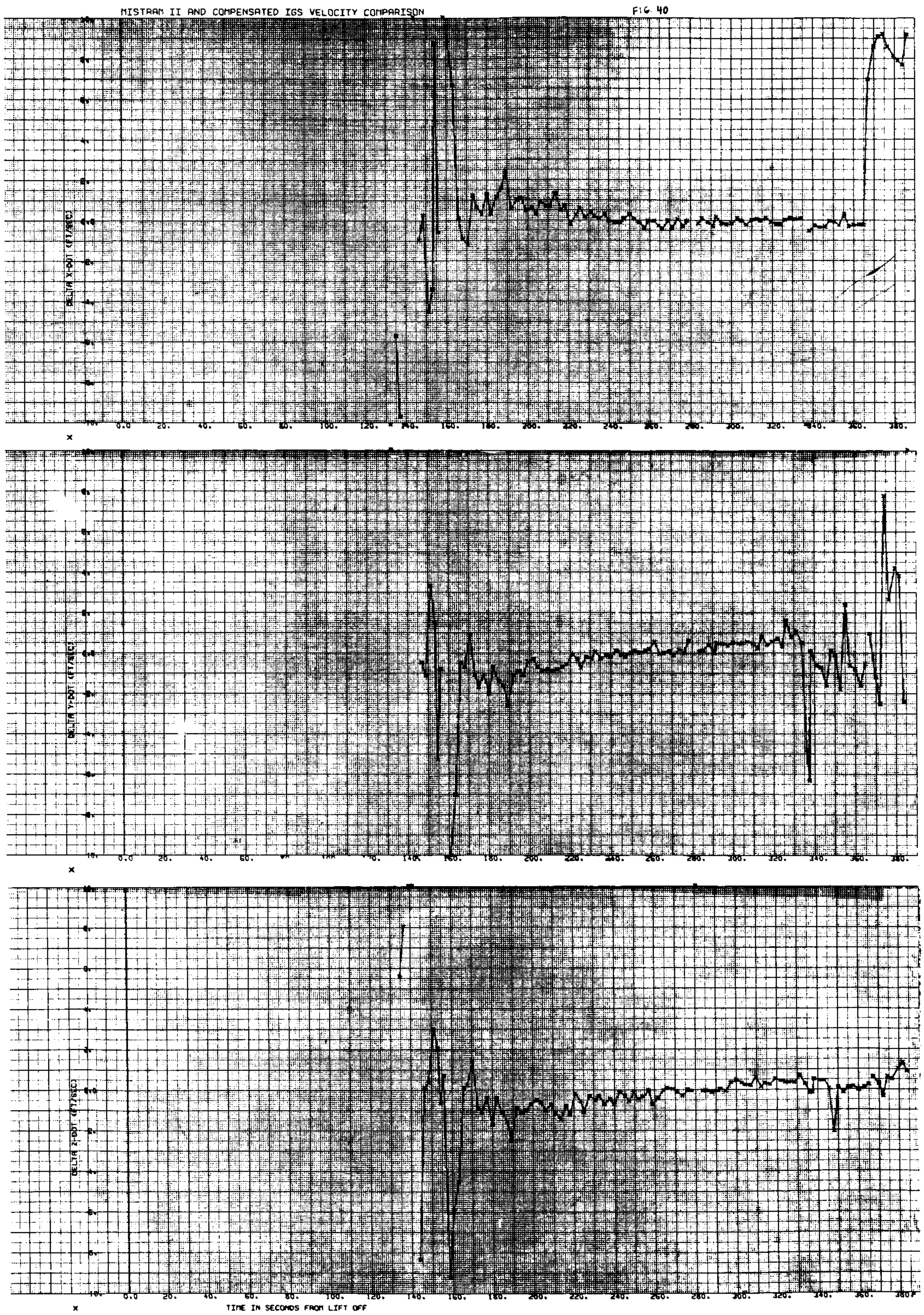


Figure 4-9. MISTRAM II Passive and Compensated IGS ΔV in Sensed Coordinates

[redacted]

[redacted]

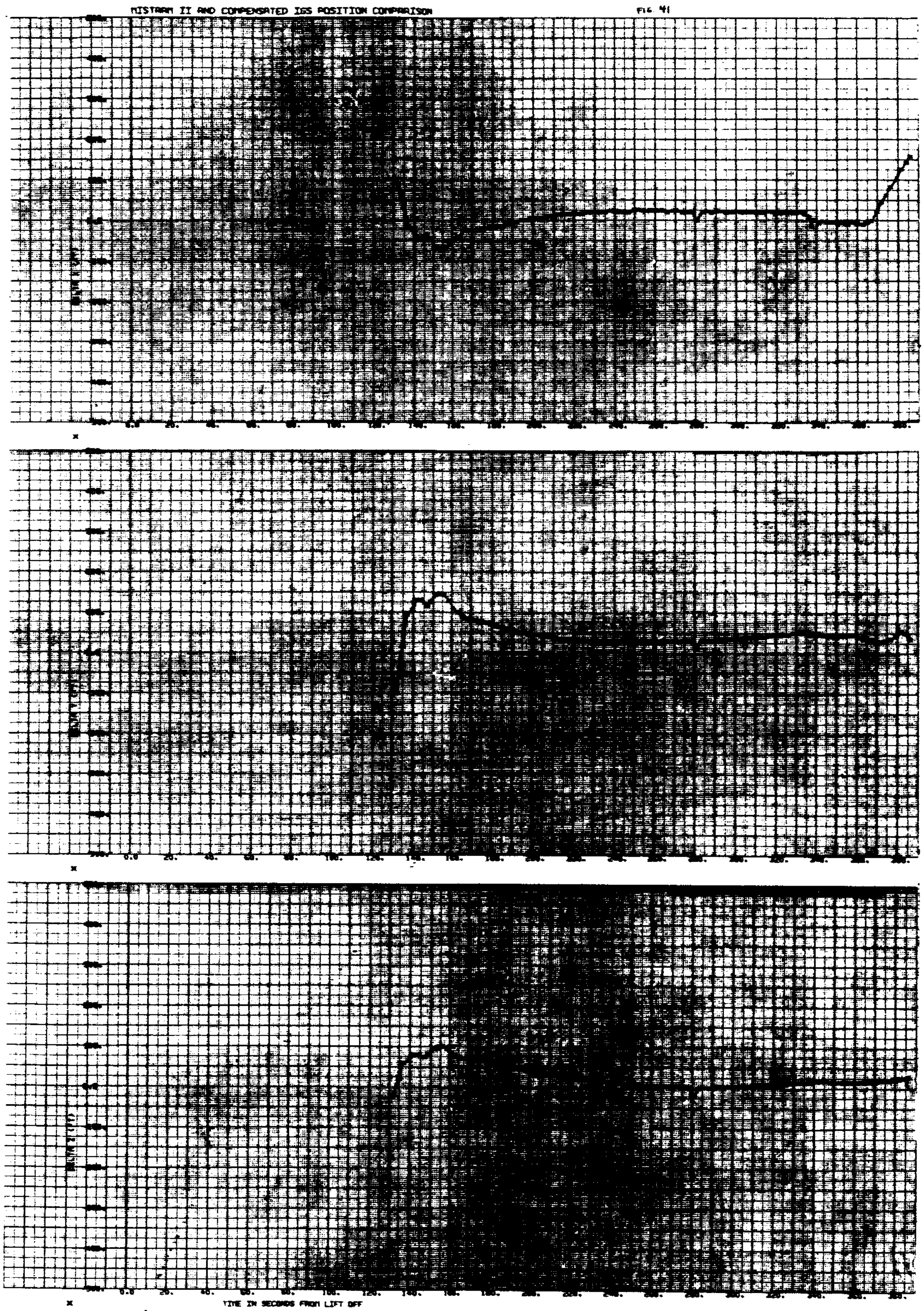


Figure 4-10. MISTRAM II Passive and Compensated IGS ΔP in Sensed Coordinates

[redacted]

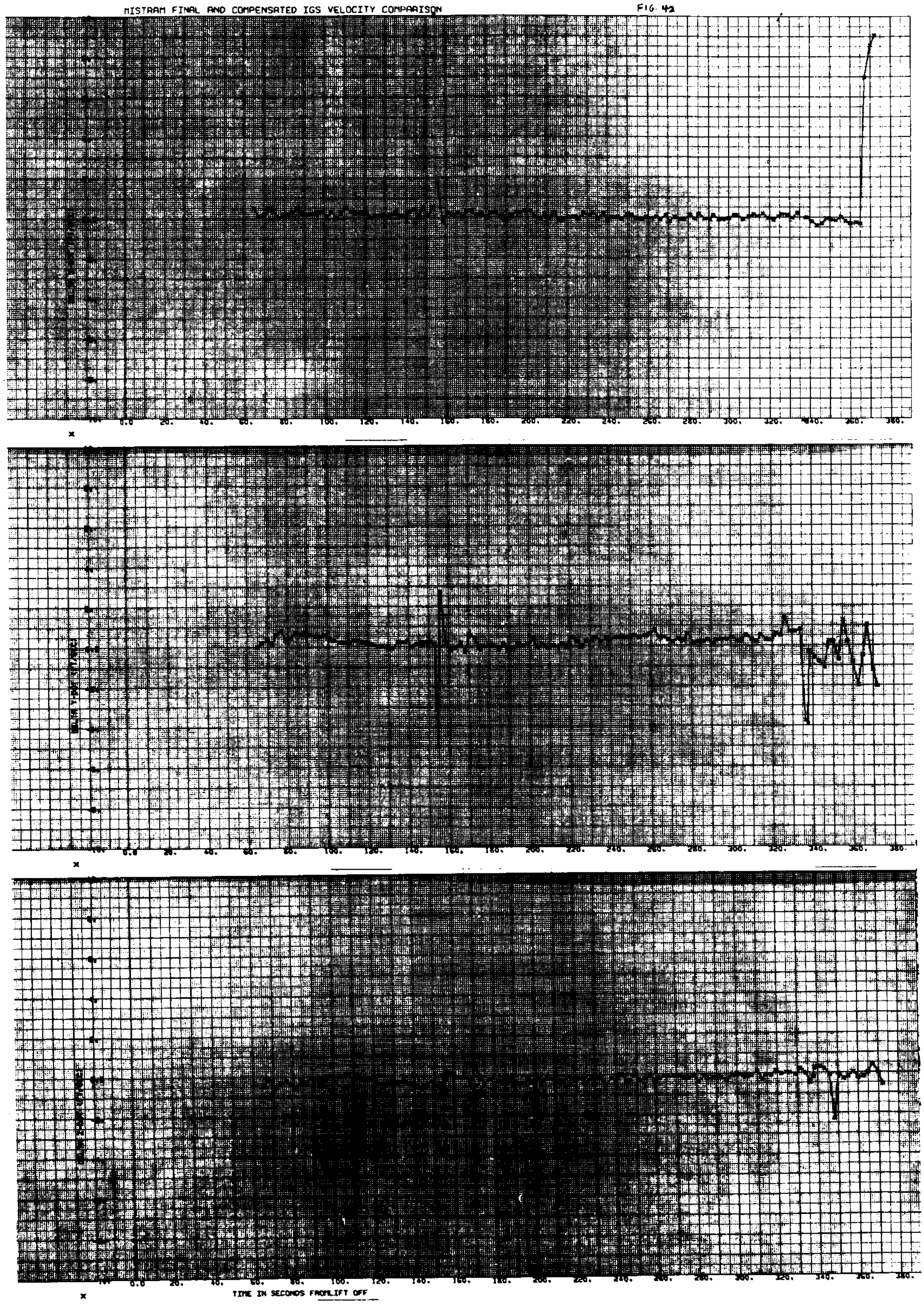


Figure 4-11. MISTRAM Final BET and Compensated IGS ΔV in Sensed Coordinates

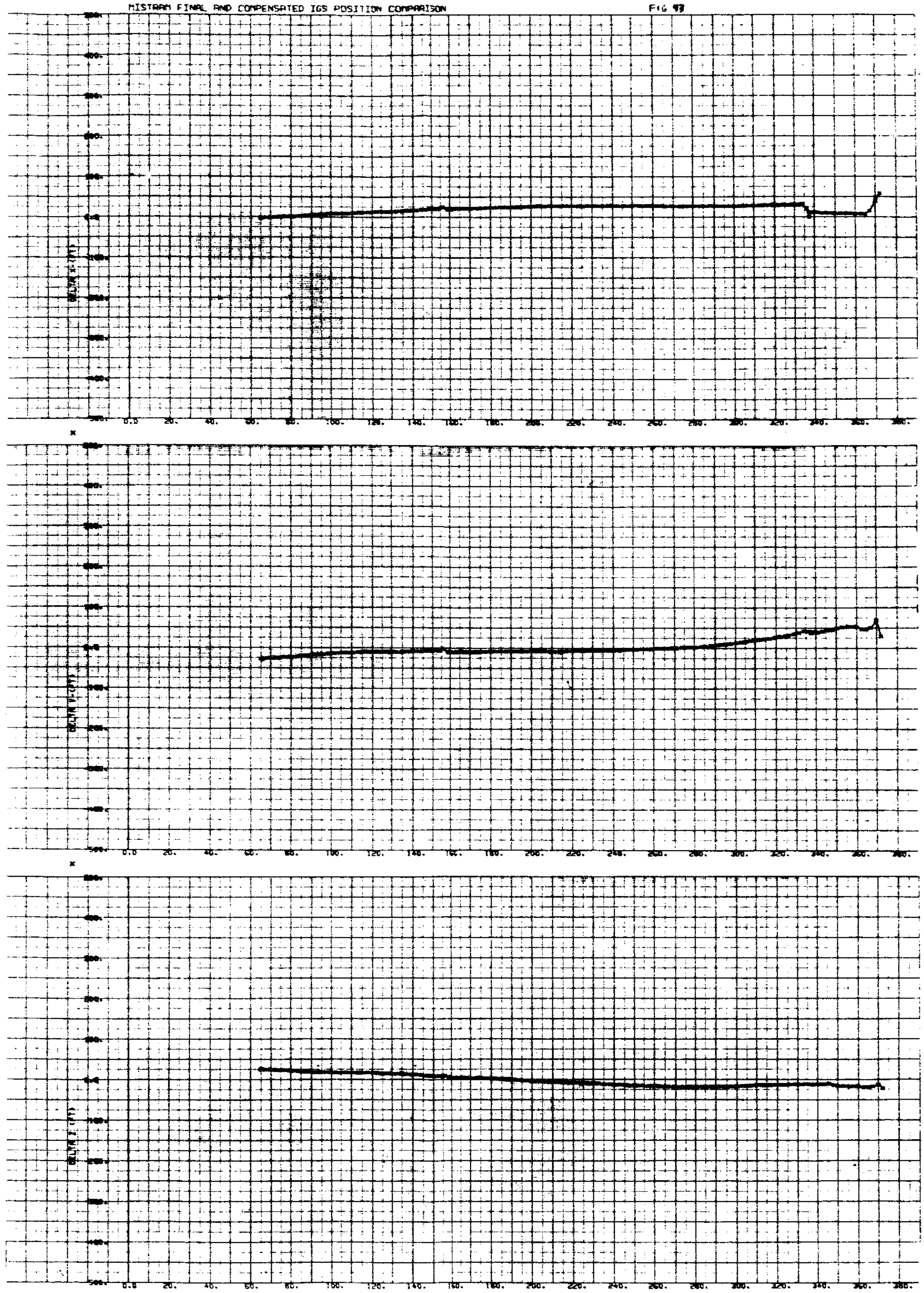


Figure 4-12. MISTRAM Final BET and Compensated IGS ΔP in Sensed Coordinates

CONFIDENTIAL

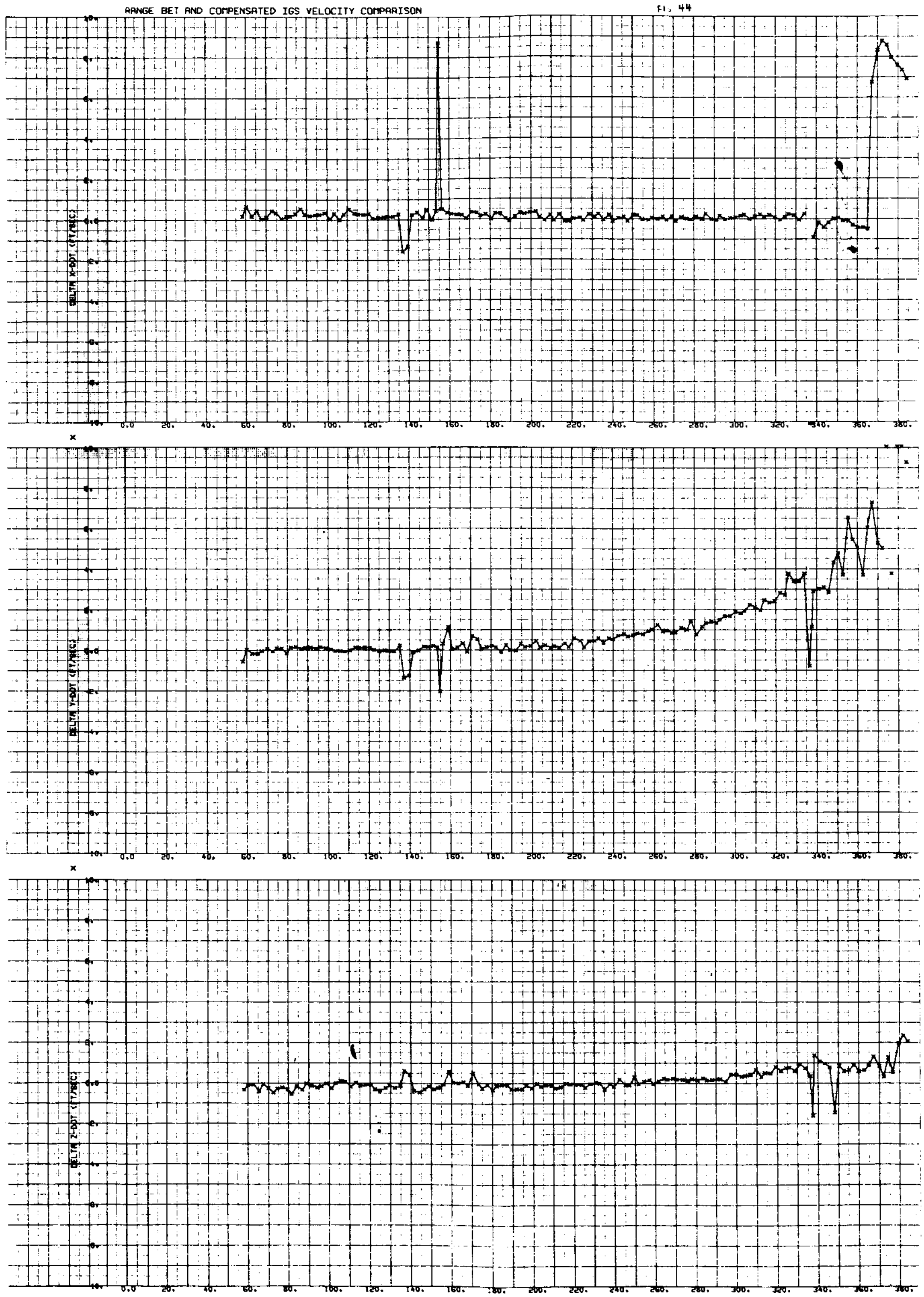


Figure 4-13. AFETR BET and Compensated IGS ΔV in Sensed Coordinates

CONFIDENTIAL

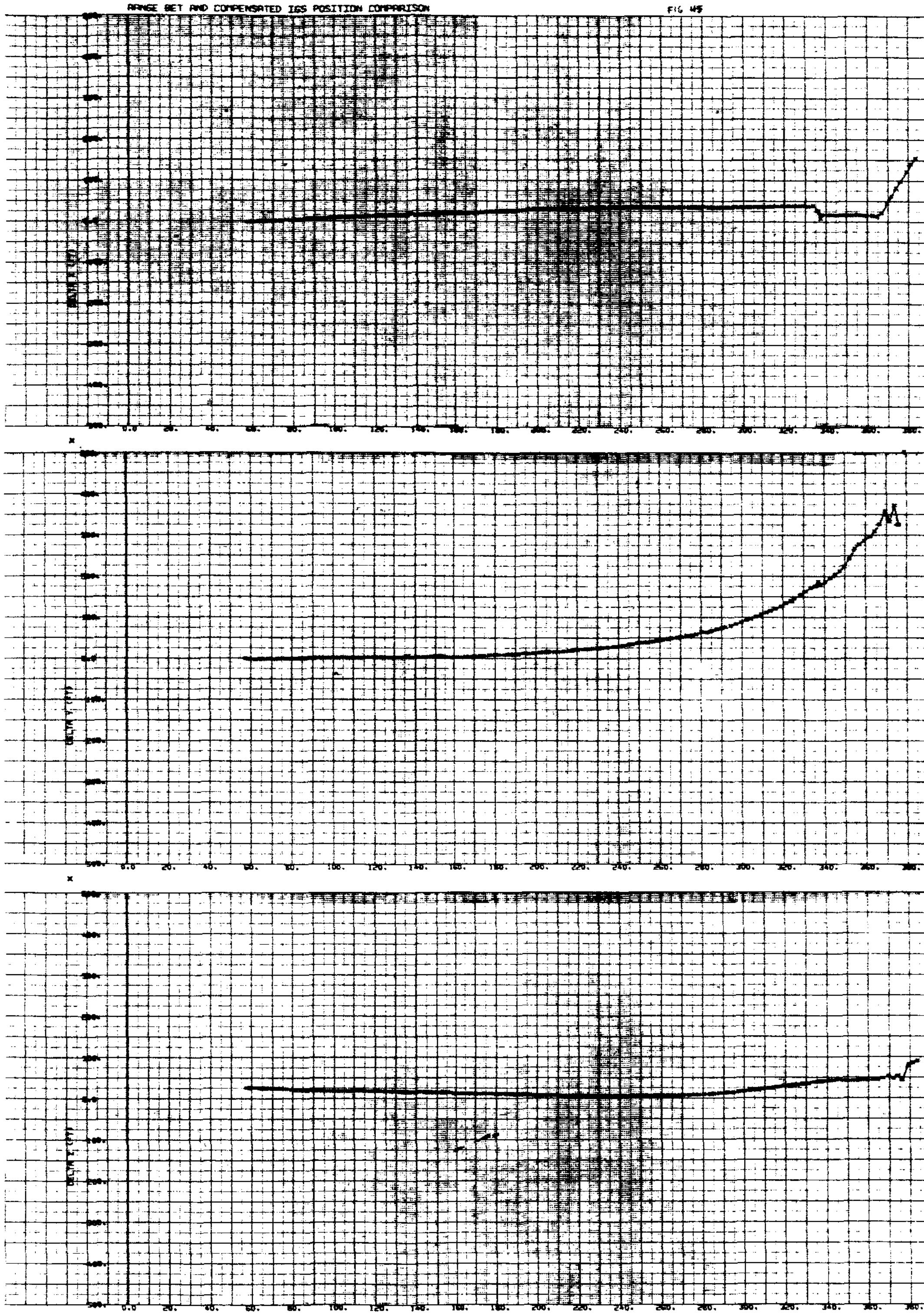


Figure 4-14. AFETR BET and Compensated IGS ΔP in Sensed Coordinates

CONFIDENTIAL

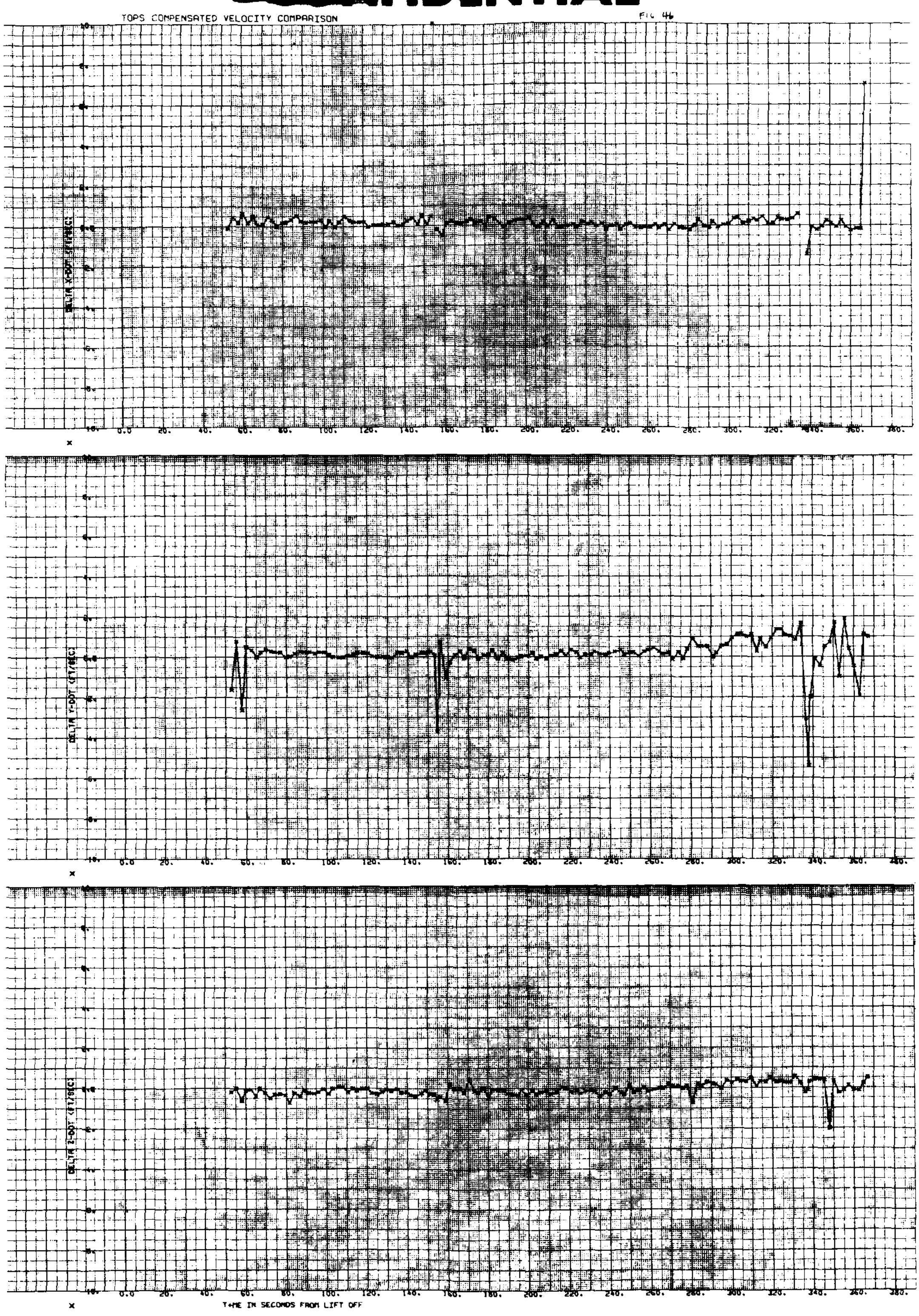


Figure 4-15. TOPS BET and Compensated IGS ΔV in Sensed Coordinates

CONFIDENTIAL

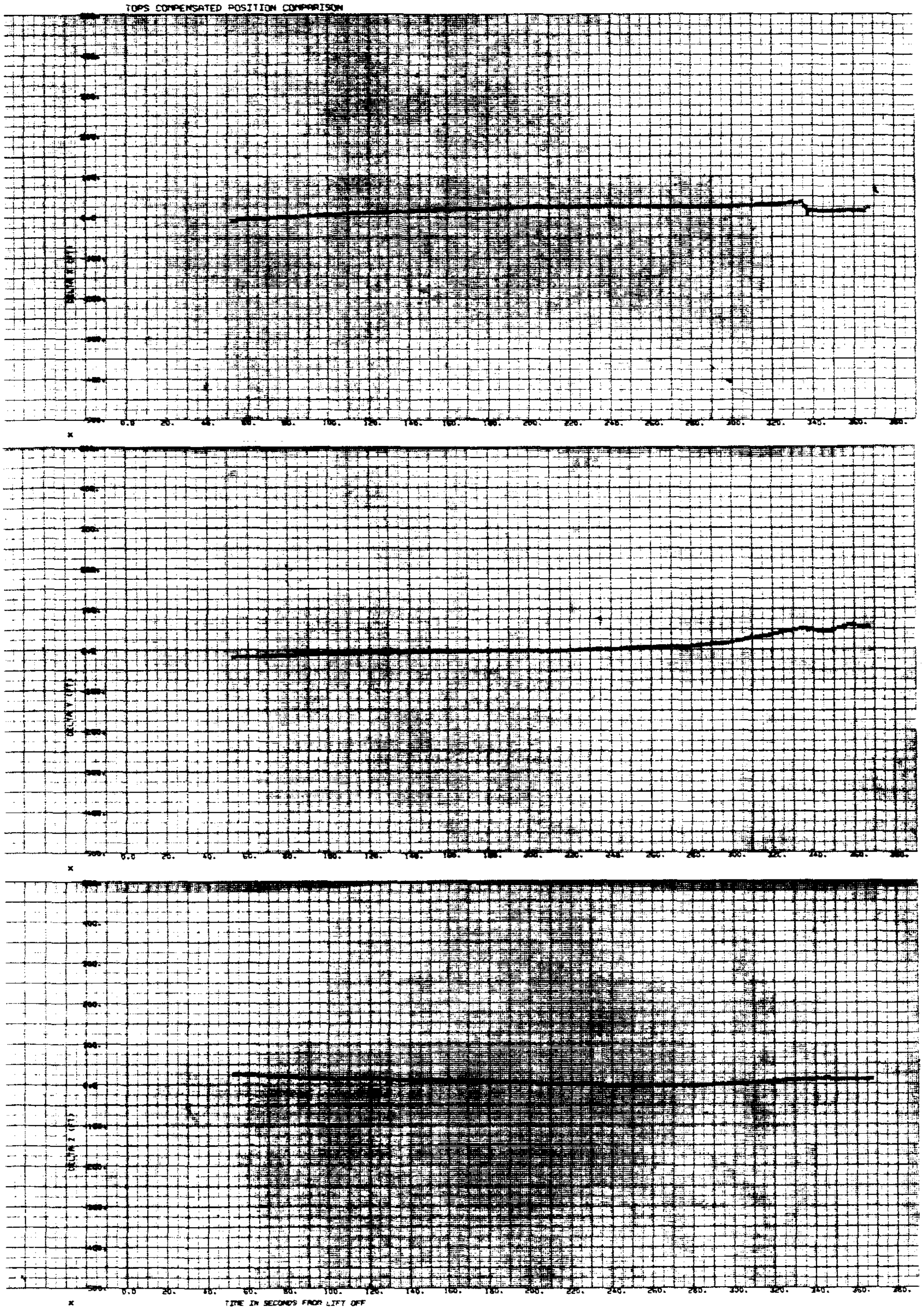


Figure 4-16. TOPS BET and Compensated IGS ΔP in Sensed Coordinates

(Reverse of this page is blank)

5. RENDEZVOUS RADAR EVALUATION

The rendezvous analysis for the flight consisted of comparing the onboard radar measurements (R, A, E) with a set of calculated measurements. The calculated values were obtained by reconstructing the trajectories for both the Agena Target Vehicle (ATV) and the Gemini spacecraft during the rendezvous sequence and then differencing the trajectories to obtain a relative position vector.

5.1 TRW/RENDEZVOUS RADAR COMPARISON

The ATV and Gemini trajectories were reconstructed using the ground radar data detailed in Table 5-1. Gemini 8 IGS accelerometer data were used in the TRW orbit prediction program to propagate the Gemini trajectory through the terminal maneuvers preceding docking.

Table 5-1. Ground Tracking Coverage

Flight phase	Comparison interval GET (min)	Tracking data used in orbit determination	
		Gemini	Agena
Pre NSR	212	CALC 02	CYIC 01
	to	WHSC 02	CYIS 01
	220	GTIC 03	CROC 01
		PREC 03	HAWC 01
			HAWS 01
			CALC 01
			GYMS 01
Post NSR	270	CALC 03	WHSC 01
to	to	HAWC 03	TEXS 01
TPI	315	PREC 04	HAWS 02
			CALS 02
			EGLC 03
			MLAC 03
TPI	316	Pre TPI	GBIC 04
to	to	fit propagated	CALS 04
rendezvous	355	through burns	

[redacted]

The results of the comparison between observed and calculated rendezvous radar measurements are presented in Figures 5-1 through 5-3. These plots show the range, azimuth, and elevation residuals over the data span from 210 to 344 minutes from launch. Figures 5-4 through 5-6 are plots of the rendezvous radar measurements themselves.

There appears to be an inability to reconstruct the trajectories, most probably the Gemini trajectory, to better than a mile or so over this rendezvous interval. The quality of the Gemini orbit reconstruction over the main period of interest, NSR to TPI, depends primarily on the quality of three radar passes:

HAW 03, maximum elevation 16°

CAL 03, maximum elevation 5°

PRE 04, maximum elevation 9°, which represents the pre-TPI burn portion of this pass

Fifty minutes of orbit must be determined by this tracking, and the conclusion must be that the tracking data quality is not adequate for a better overall orbit determination than the 1000 to 4000-foot residuals shown in the comparisons. (The assumption here is that the rendezvous radar is relatively accurate, which appears justified in this case since the radar measurements successfully accomplished the rendezvous, and no major radar biases were noted by the astronauts when the Gemini and ATV were relatively close together.)

The lack of a precision reconstruction means that a detailed rendezvous radar evaluation cannot be done. However, the comparisons (Figures 5-1 through 5-3) can and do demonstrate grossly adequate radar accuracy and provide good estimates of system noise (the reconstruction is smooth, if biased). A comparison of this accuracy would be very useful in the event of a system malfunction.

Both the tracking coverage and maneuver telemetry data on Gemini 8 were better than for the rendezvous interval of Gemini 7/6, and a considerably better comparison was obtained. Gemini IX will rendezvous a full orbit earlier, which should provide better ground tracking coverage than either of the previous missions. Therefore, an improved relative position determination should be possible. The analysis procedure is also being examined in an effort to improve the accuracy of this comparison.

[redacted]

5.2 RTCC/RENDEZVOUS RADAR COMPARISON

It is desired to generate a comparison which demonstrates the accuracy with which the MSC RTCC real-time operation computes the Gemini/Agena relative trajectory in the post-coeliptical (NSR) maneuver interval. A comparison identical to that just presented (Figures 5-1 to 5-3), but substituting an RTCC-calculated trajectory for the TRW-calculated values is an attempt to show this accuracy.

Figures 5-7 to 5-9 are plots of the comparison between observed onboard radar measurements and predicted parameters using RTCC-initialized Gemini and Agena orbits. The RTCC vector nearest NSR was taken for Agena; the first vector print after the NSR maneuver was taken for the Gemini initialization. No subsequent updating by the RTCC is reflected in this trajectory; that is, the RTCC vectors at the indicated times were simply propagated forward using the TRW reconstruction program, and the resulting Gemini/Agena trajectory differenced and compared with telemetered radar values.

The Gemini orbit was constructed using initial conditions provided by the RTCC program at $20^h15^m0^s$GMT. (The vector was taken from the RTCC on-line print.) The Agena orbit was constructed using initial conditions provided by the RTCC program at $20^h33^m0^s$GMT. The comparison span was limited to the interval of time between the NSR and TPI maneuvers.

It is apparent that utilizing RTCC initialized orbits leads to somewhat greater residuals in relative range than the TRW reconstruction presented here; however, no significant differences exist in azimuth and elevation angle residuals.

[redacted]

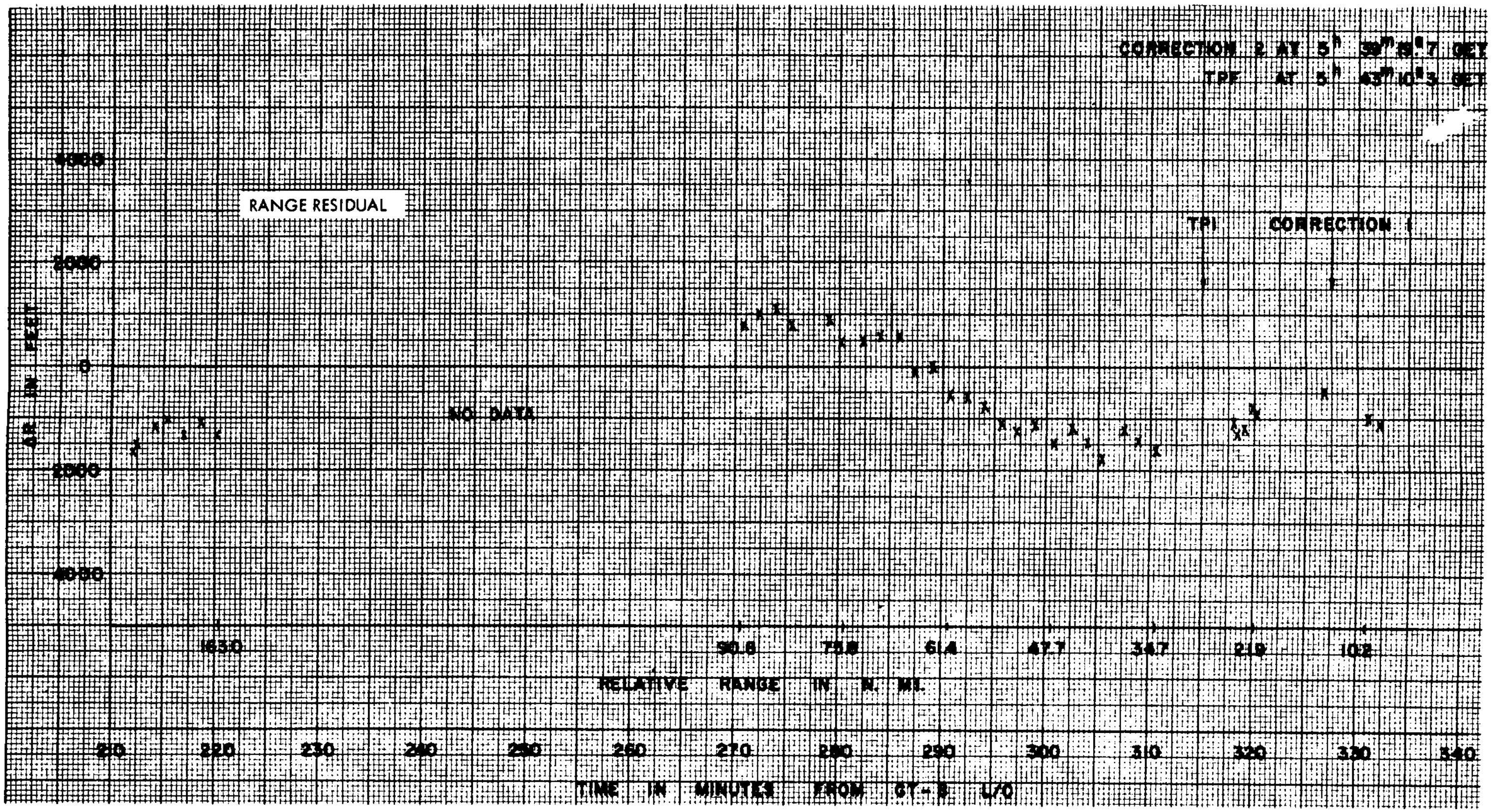


Figure 5-1. Rendezvous Radar Residuals ΔR, Radar Minus TRW Calculations

[redacted]

[redacted]

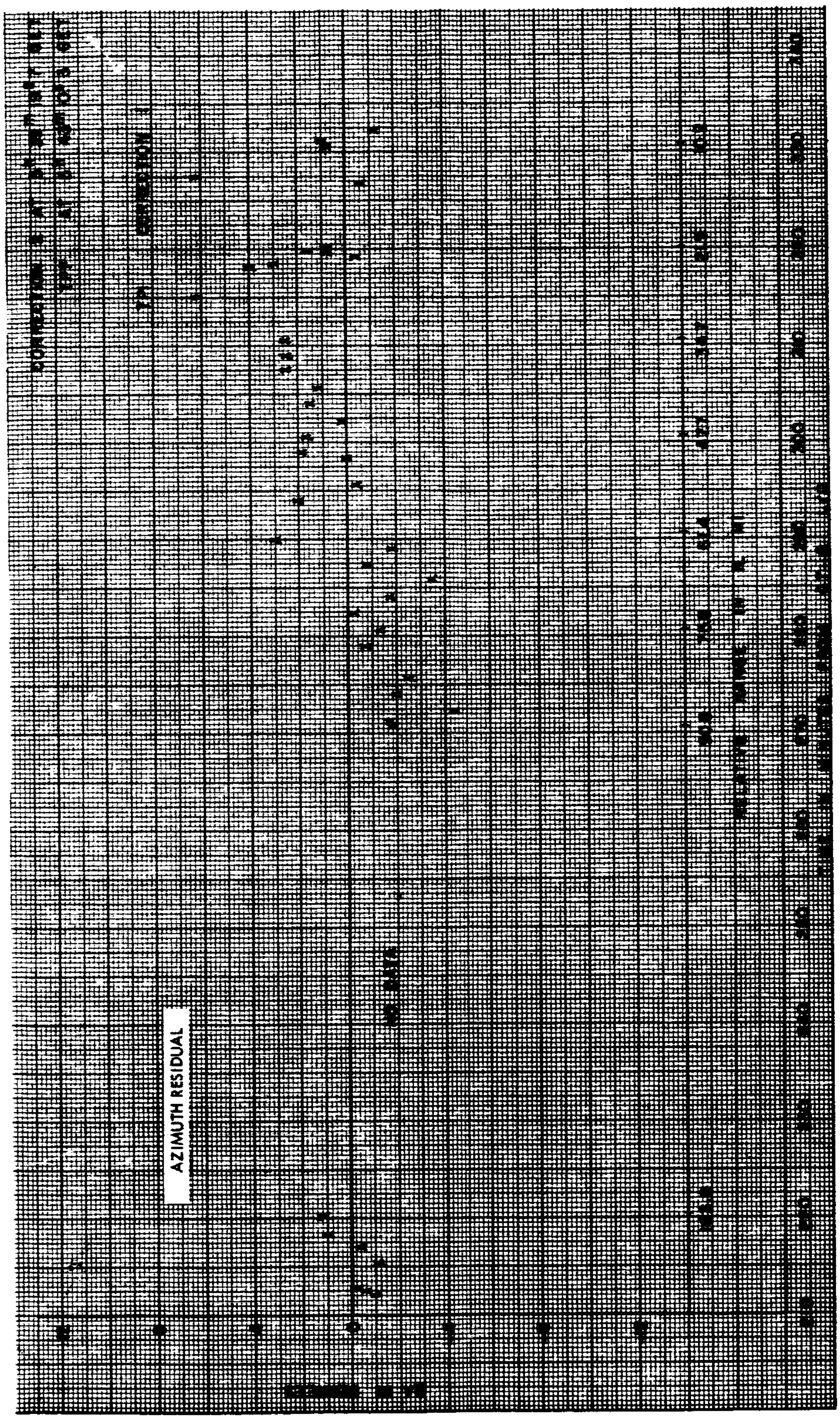


Figure 5-2. Rendezvous Radar Residuals ΔA, Radar Minus TRW Calculations

[redacted]

CONFIDENTIAL

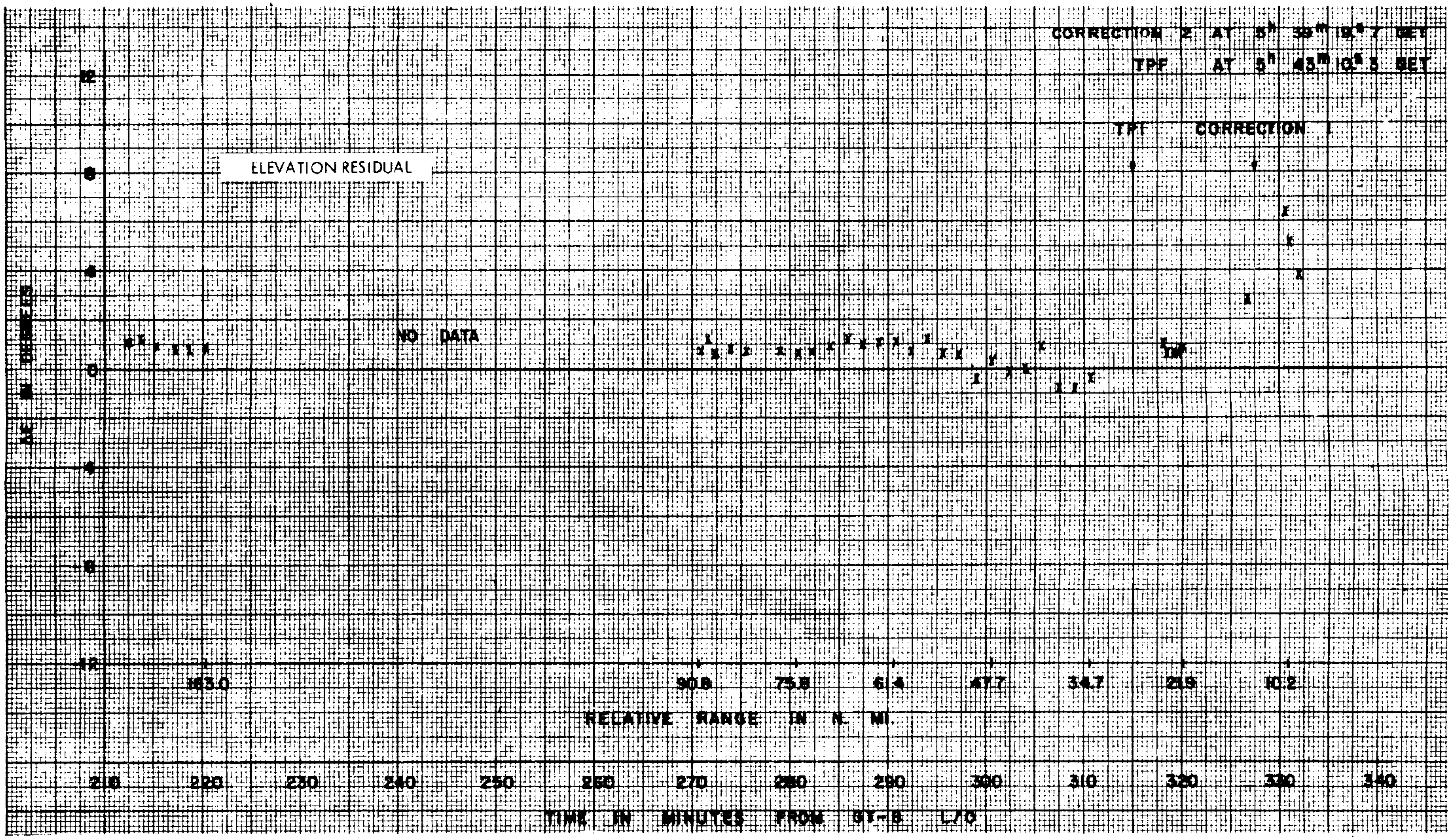


Figure 5-3. Rendezvous Radar Residuals ΔE, Radar Minus TRW Calculations

CONFIDENTIAL

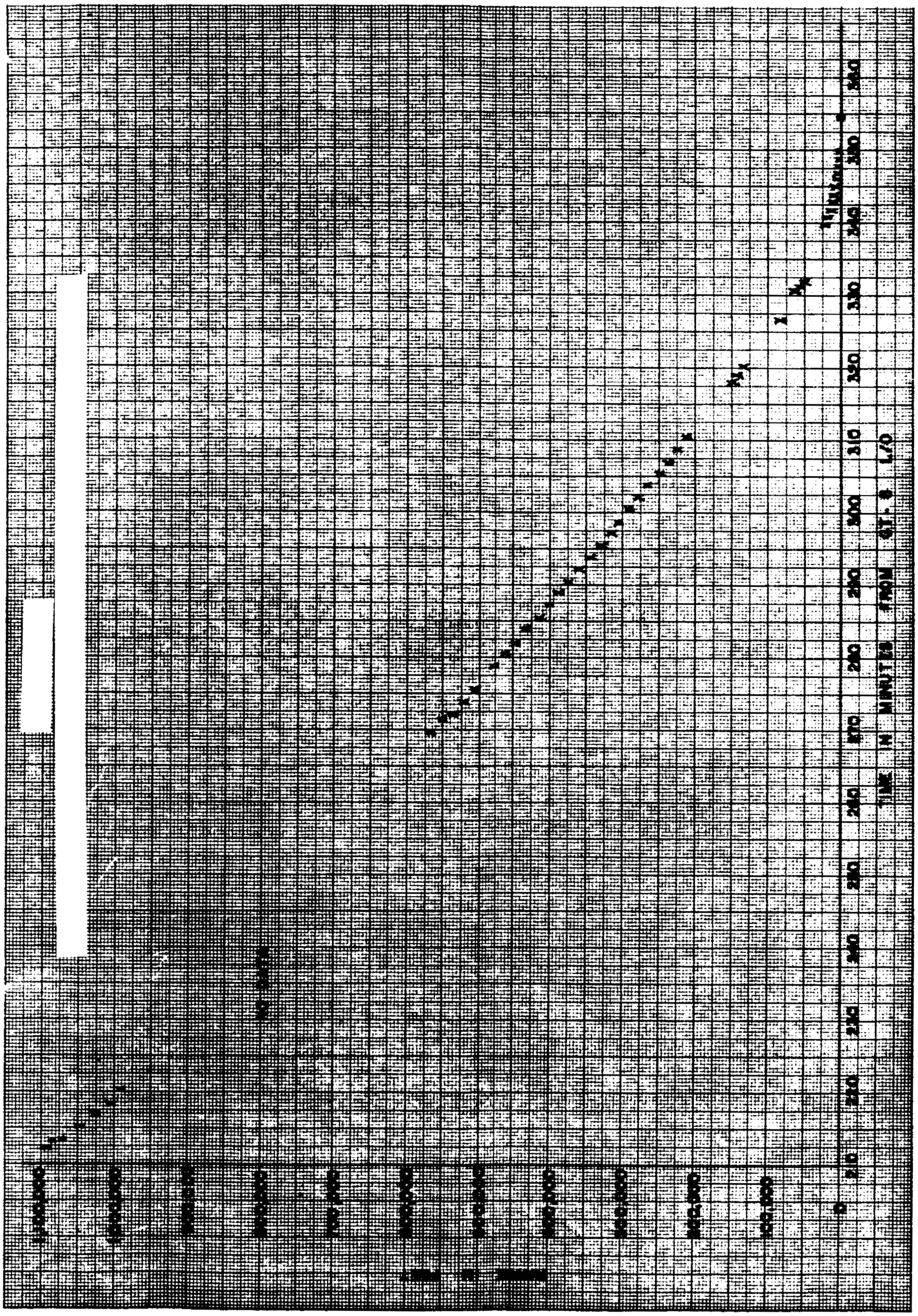


Figure 5-4. Rendezvous Radar Telemetered Relative Range

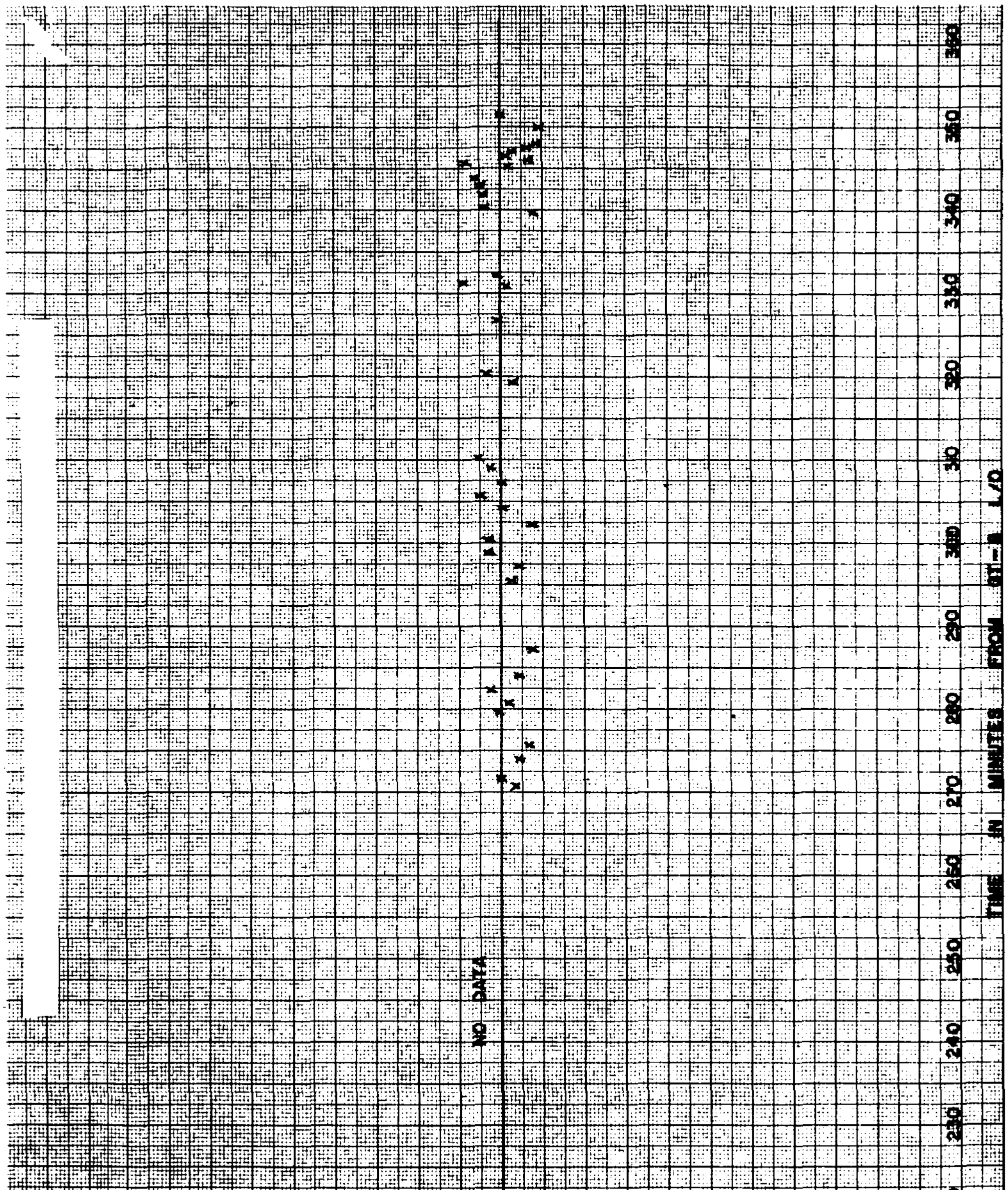


Figure 5-5. Rendezvous Radar Telemetered Relative Azimuth

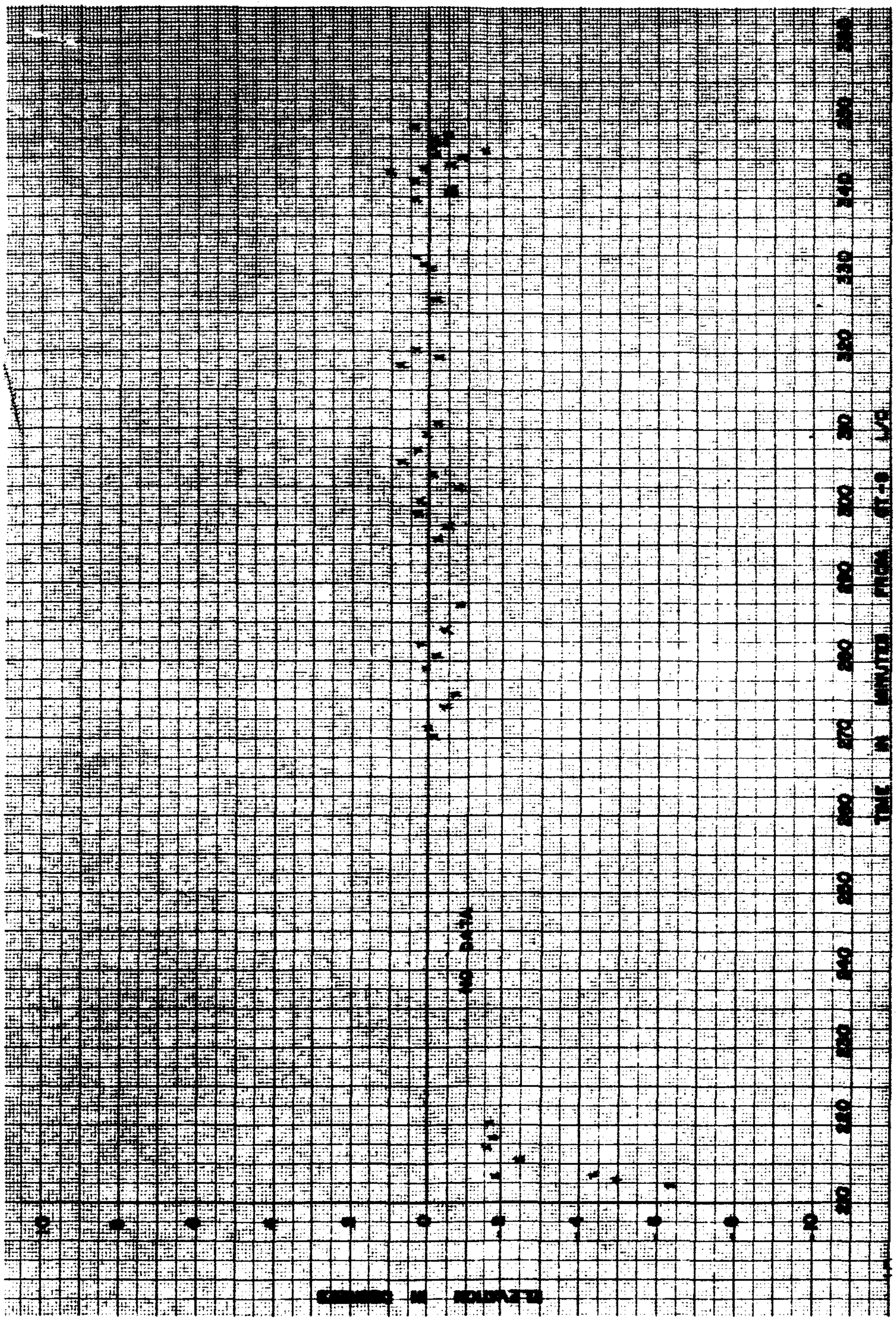


Figure 5-6. Rendezvous Radar Telemetered Relative Elevation

CONFIDENTIAL

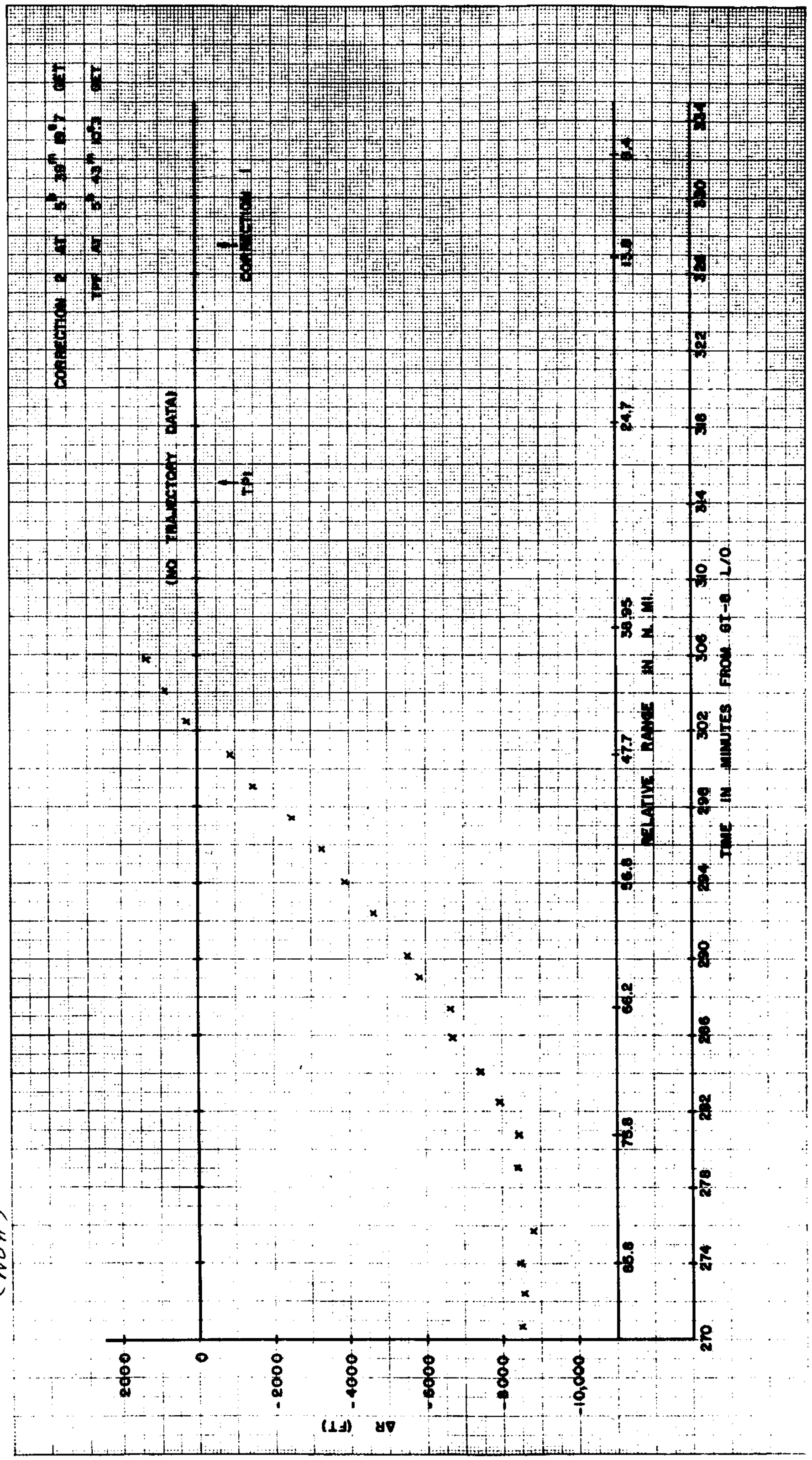


Figure 5-7. Rendezvous Radar Residuals ΔR, Radar Minus RTCC Trajectory

CONFIDENTIAL

[redacted]

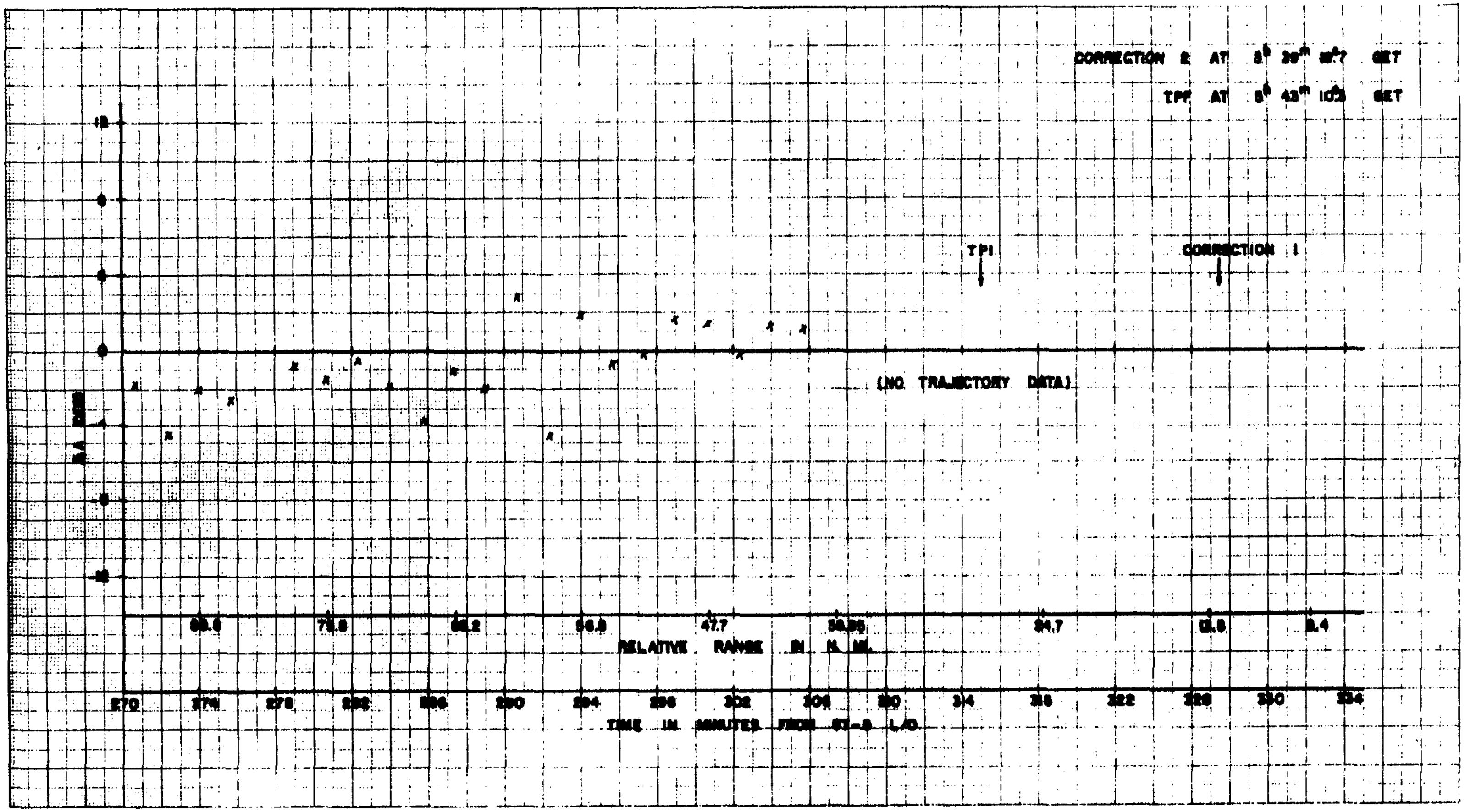


Figure 5-8. Rendezvous Radar Residuals ΔA, Radar Minus RTCC Trajectory

[redacted]

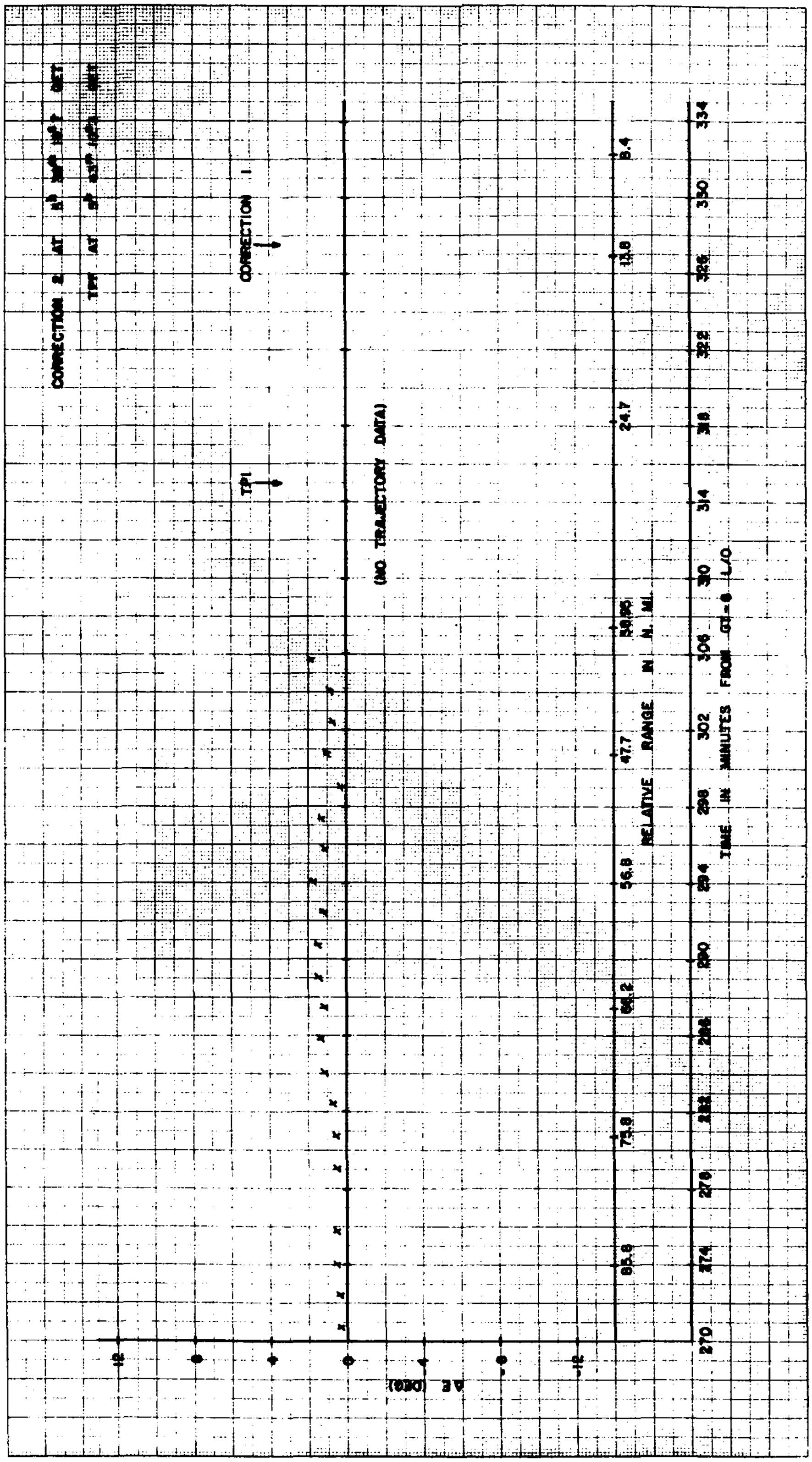


Figure 5-9. Rendezvous Radar Residuals ΔE, Radar Minus RTCC Trajectory

APPENDIX A
ASCENT TRAJECTORY

The ascent trajectory is provided in three separate forms: a) guidance coordinates as sensed by the accelerometers (these data are uncorrected for errors determined during flight); b) an earth-centered inertial coordinate set; and c) various special earth-referenced parameters. The latter two have been corrected for apparent IGS errors and therefore represent the TRW best estimate of the ascent trajectory.

The earth-centered inertial coordinate system has the z axis aligned with the earth's rotational axis, positive north, and the x-y plane is in the equatorial plane with the x-z plane containing the Greenwich meridian at platform release time.

CONFIDENTIAL

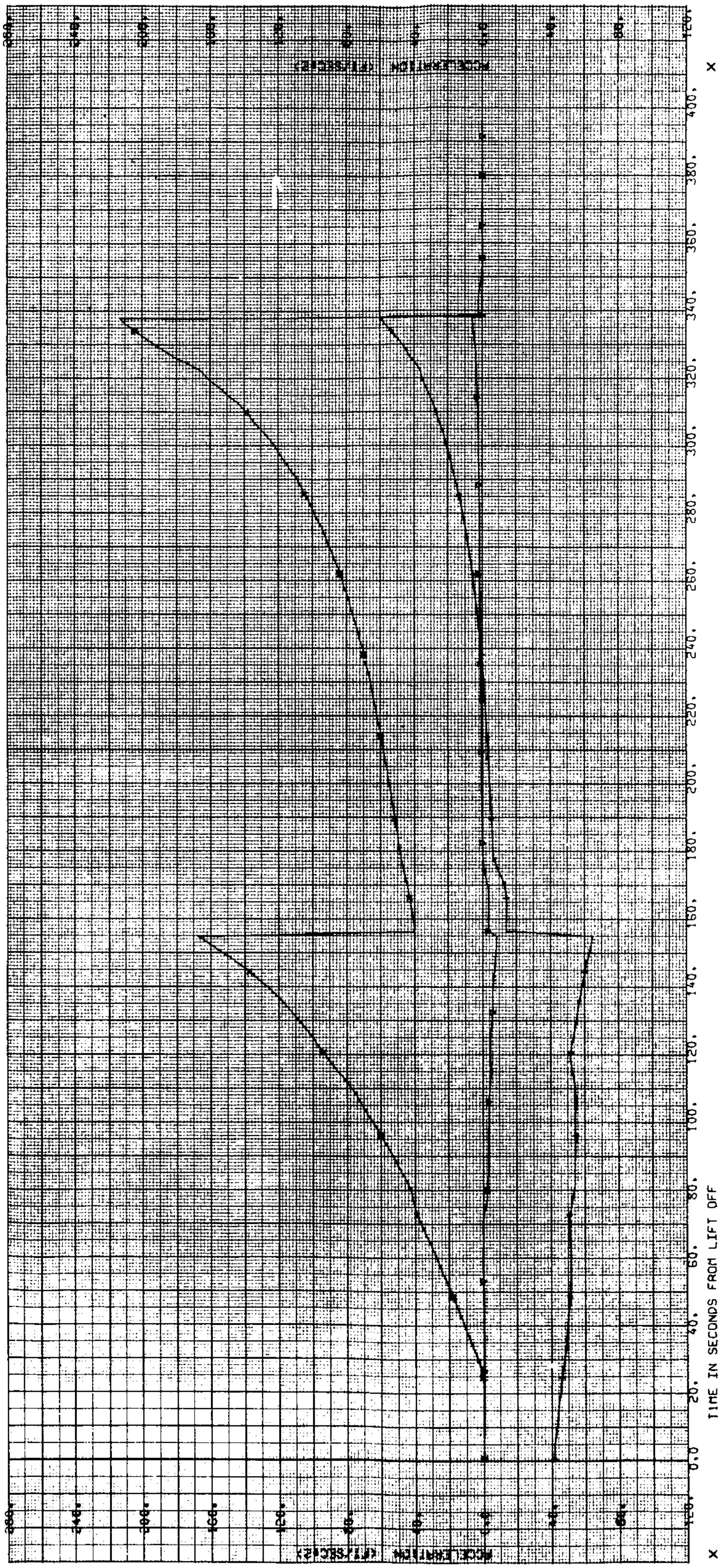


Figure A-1. Sensed Acceleration in IGS Coordinates

CONFIDENTIAL

Table A-1. Sensed Trajectory Listing for the Ascent Flight Phase

GEMINI EDIT PROGRAM

TIME IN SECONDS FROM LIFTOFF

COMPUTED POSITION VELOCITY AND ACCELERATION IN GUIDANCE THRUST COORDINATES

TIME FROM LIFTOFF (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)	XDDOT (FT/SEC*2)	YDDOT (FT/SEC*2)	ZDDOT (FT/SEC*2)
.475	-	-231	-	-.29	-127.22	-.23	-.11	-41.22	-.02
2.578	-1	-589	-	-.26	-213.27	-.20	-.04	-41.47	-.06
5.121	-1	-1265	-1	-.26	-319.01	-.55	.02	-41.76	-.14
7.663	-2	-2211	-3	-.05	-425.75	-1.09	.00	-42.28	-.22
9.736	-2	-3165	-6	-.10	-513.41	-1.45	-.01	-42.68	-.26
12.286	-2	-4635	-11	-.29	-625.54	-2.28	-.07	-43.19	-.36
14.839	-3	-6367	-18	-.28	-734.26	-3.20	-.12	-43.72	-.42
16.914	-4	-7585	-26	-.73	-825.33	-4.43	-.17	-44.18	-.45
19.471	-6	-10240	-38	-1.22	-938.97	-5.36	-.23	-44.75	-.45
22.022	-10	-12782	-53	-2.01	-1054.10	-6.67	-.04	-45.39	-.44
24.453	-16	-15576	-71	-2.39	-1166.64	-7.60	.67	-46.06	-.49
26.487	-20	-17544	-87	-.95	-1259.17	-8.63	1.58	-46.56	-.51
29.094	-25	-21366	-112	5.10	-1391.73	-10.14	3.21	-47.26	-.53
31.700	11	-25148	-140	15.74	-1505.48	-11.56	5.14	-47.85	-.53
33.656	53	-28249	-164	27.22	-1601.64	-12.41	6.67	-48.30	-.50
36.306	149	-32594	-198	47.49	-1728.39	-13.93	8.75	-48.83	-.44
38.295	262	-36129	-227	66.49	-1826.05	-14.69	10.34	-49.18	-.36
40.908	474	-41069	-266	96.17	-1955.01	-15.45	12.37	-49.61	-.22
43.519	770	-46342	-307	131.27	-2085.18	-15.83	14.41	-50.05	-.22
45.508	1060	-50589	-335	161.23	-2184.95	-16.02	16.01	-50.34	-.23
48.121	1535	-56472	-392	205.72	-2317.32	-15.99	18.07	-50.72	-.22
50.729	2139	-62686	-428	256.06	-2449.70	-17.76	20.15	-51.07	-.03
52.720	2689	-67666	-465	297.22	-2551.88	-17.48	21.74	-51.31	.14
55.330	3542	-74562	-507	358.77	-2686.76	-16.53	23.66	-51.59	.37
57.938	4555	-81665	-549	421.74	-2821.25	-15.48	26.07	-51.67	.45
59.929	5448	-87403	-579	475.53	-2924.25	-14.43	27.72	-51.65	.34
62.540	6787	-95215	-614	550.72	-3059.04	-13.11	29.92	-51.47	.09
65.147	8326	-103363	-645	631.33	-3193.05	-13.91	32.34	-51.18	.10
67.138	9648	-109823	-678	697.14	-3294.65	-14.71	34.30	-50.98	.30
69.747	11587	-118592	-715	790.57	-3427.07	-12.63	36.52	-50.75	.50
72.362	13784	-127725	-742	890.82	-3559.49	-9.20	39.09	-50.90	-.33
74.354	15638	-134917	-761	970.77	-3660.41	-10.99	45.27	-51.43	-1.16
76.965	18314	-144645	-756	1076.44	-3795.03	-17.60	41.52	-52.40	-2.32
79.572	21266	-154726	-854	1186.91	-3934.26	-24.80	42.94	-53.39	-2.82
81.565	23716	-162670	-908	1273.19	-4041.48	-29.57	44.44	-53.68	-2.97
84.177	27195	-173413	-997	1391.67	-4193.12	-38.72	47.01	-54.08	-3.08
86.766	30993	-184513	-1109	1518.19	-4324.36	-46.99	49.94	-54.05	-3.20
88.779	34115	-193235	-1208	1619.69	-4431.79	-52.36	52.14	-54.14	-3.19
91.392	38521	-205000	-1357	1760.44	-4572.85	-61.52	54.94	-54.32	-3.26
94.002	43215	-217123	-1525	1906.60	-4715.70	-70.30	57.81	-54.55	-3.35
95.994	47230	-226626	-1675	2024.04	-4824.45	-76.55	60.12	-54.60	-3.35
98.609	52728	-239420	-1887	2185.24	-4967.33	-85.54	63.34	-54.55	-3.42
101.255	58739	-252762	-2126	2357.16	-5111.51	-94.62	66.66	-54.47	-3.49
103.250	63576	-263165	-2322	2492.53	-5220.17	-101.76	69.11	-54.55	-3.52
105.871	70352	-276537	-2601	2678.59	-5362.47	-110.96	72.25	-54.86	-3.71
107.922	75999	-288050	-2836	2826.80	-5475.94	-119.40	74.64	-54.86	-4.03
110.535	83649	-302551	-3159	3027.68	-5620.85	-129.54	78.47	-54.53	-4.51
113.149	91833	-317425	-3514	3237.99	-5761.96	-142.43	82.57	-53.57	-4.74
115.147	98470	-329043	-3809	3406.54	-5867.76	-152.49	85.90	-52.73	-4.67
117.769	107739	-344609	-4225	3637.09	-6004.89	-164.43	90.03	-51.93	-4.39
120.368	117542	-360514	-4670	3876.47	-6139.64	-175.03	93.92	-51.80	-4.33
122.428	125657	-373145	-5035	4073.59	-6243.96	-183.47	96.86	-52.13	-4.46
125.046	136654	-389672	-5532	4331.79	-6391.52	-195.83	100.54	-53.02	-4.85
127.663	148338	-406557	-6062	4595.33	-6522.19	-209.15	104.38	-54.09	-5.31
129.665	157757	-419723	-6491	4811.29	-6631.12	-219.83	107.65	-54.81	-5.61
132.284	170732	-437260	-7057	5096.37	-6775.90	-235.49	112.05	-55.66	-5.91
134.903	184469	-455213	-7724	5357.59	-6922.80	-251.35	116.86	-56.48	-6.07
136.904	195505	-469176	-8239	5635.03	-7036.35	-263.40	120.91	-57.13	-6.18
139.524	210651	-487611	-8951	5938.58	-7186.96	-279.67	126.47	-58.03	-6.44
141.563	223107	-502587	-9534	6220.85	-7306.14	-293.00	131.09	-58.79	-6.72
144.186	239682	-521555	-10327	6572.29	-7461.58	-311.23	137.39	-59.83	-7.10
146.873	258047	-542225	-11185	6949.69	-7623.75	-330.83	144.26	-60.93	-7.50
148.874	272246	-557662	-11866	7244.04	-7746.54	-346.02	150.04	-61.87	-7.82
151.496	291709	-578128	-12803	7646.61	-7913.22	-367.19	159.05	-63.16	-8.23
153.493	307354	-594052	-13551	7968.33	-8037.34	-383.95	164.14	-64.15	-8.55
154.600	316273	-602966	-13961	8151.84	-8106.63	-393.51	167.52	-64.70	-8.73
156.117	[illegible]	[illegible]	-14580	8210.49	-8130.70	-397.05	40.29	-14.12	-3.30
158.736	350320	-636643	-15630	8314.87	-8167.96	-405.60	40.93	-14.19	-3.39
160.774	367352	-652320	-16464	8356.88	-8197.29	-412.60	41.43	-14.25	-3.47
163.396	389519	-674862	-17558	8508.89	-8234.26	-421.92	42.34	-14.33	-3.60
166.013	411973	-696462	-18675	8620.85	-8271.82	-431.44	43.12	-14.41	-3.62
167.946	428663	-712463	-19516	8704.81	-8300.27	-438.72	43.69	-14.08	-3.23
170.554	451533	-734175	-20673	8820.23	-8337.94	-447.66	45.11	-12.79	-2.38
173.172	474779	-756050	-21852	8940.06	-8369.61	-451.98	46.44	-10.35	-1.22
174.572	490549	-771126	-22666	9024.98	-8385.36	-452.51	47.38	-8.83	-.51
177.607	514891	-793247	-23858	9151.71	-8403.54	-452.57	48.46	-7.00	-.03
180.263	539331	-815593	-25061	9281.45	-8421.12	-452.64	49.27	-6.38	.11
182.134	556825	-831360	-25907	9374.37	-8432.88	-452.21	49.85	-6.16	.19
184.819	582172	-854021	-27121	9505.22	-8448.97	-451.51	50.59	-5.81	.29
187.499	607845	-876690	-28330	9643.66	-8463.86	-450.62	51.32	-5.49	.37
189.332	625612	-892213	-29155	9740.30	-8473.93	-450.00	51.96	-5.39	.41
192.017	651949	-914561	-30362	9880.95	-8488.02	-448.73	52.79	-5.08	.51
194.697	678627	-937752	-31563	10023.61	-8501.12	-447.26	53.58	-4.76	.59
196.530	697281	-953339	-32381	10122.25	-8509.78	-445.96	54.05	-4.66	.61
199.215	724461	-976205	-33576	10266.92	-8521.89	-444.31	55.04	-4.39	.70
201.935	752595	-999367	-34782	10415.83	-8533.29	-442.18	55.84	-4.14	.75
203.765	771754	-1015021	-35590	10522.54	-8540.96	-440.88	56.56	-3.97	.79
206.449	800210	-1037964	-36770	10675.42	-8551.07	-438.65	57.45	-3.66	.81
209.129	829025	-1060951	-37943	10830.51	-8560.57	-436.43	58.39	-3.33	.85
210.961	848566	-1076579	-38741	10938.27	-8566.35	-434.95	59.15	-3.14	.88
213.645	878574	-1099579	-39905	11096.36	-8574.46	-432.53	60.02	-2.80	.91
216.325	908502	-1122574	-41061	11260.26	-8581.38	-429.92	60.95	-2.50	.93
218.157	929234	-1138299	-41847	11372.73	-8585.86	-428.25	61.85	-2.22	.93
220.843	960000	-1161364	-42994	11540.04	-8591.19	-425.84	62.83	-1.88	.95
223.561	991593	-1184720	-44144	11712.25	-8595.81	-423.15	63.82	-1.48	1.01
225.393	1013161	-1200473	-44921	11829.94	-8598.49	-421.29	64.74	-1.29	1.07
228.076	1045142	-1223549	-46048	12005.06	-8601.42	-418.31	65.80	-.95	1.13
230.757	1077581	-1246610	-47165	12182.79	-8603.55	-415.13	66.88	-.67	1.18
232.591	1100017	-1262389	-47924	12300.49	-8604.44	-412.99	67.76	-.49	1.22

Table A-1 Sensed Trajectory Listing for the Ascent Flight Phase (Continued)

TIME FROM LIFTOFF (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)	XDDOT (FT/SEC*	YDDOT (FT/SEC*2)	DDOT /SEC*2)
235.260	1137361	-1285532	-49021	12490.23	-8634.53	-405.72	69.03	.64	1.27
237.969	1167440	-1308833	-50135	12679.08	-8624.22	-405.98	70.19	.49	1.33
239.842	1191062	-1324760	-50866	12809.99	-8613.12	-403.65	70.83	.66	1.35
242.554	1225569	-1348452	-51991	13008.16	-8600.27	-399.72	72.66	1.32	1.33
245.301	1262068	-1371728	-53068	13206.83	-8595.93	-396.37	74.04	1.90	1.37
247.155	1286674	-1387657	-53801	13344.95	-8592.23	-393.85	75.17	2.27	1.35
249.864	1323117	-1410933	-54862	13550.84	-8585.29	-389.83	76.68	2.86	1.38
251.715	1348226	-1426815	-55582	13653.67	-8579.50	-387.61	78.06	3.28	1.38
254.428	1385763	-1450078	-56628	13906.67	-8569.87	-383.79	79.39	3.94	1.38
257.137	1422729	-1473278	-57663	14123.98	-8558.34	-379.97	81.04	4.67	1.43
258.987	1449353	-1489100	-58353	14275.13	-8549.26	-377.37	82.49	5.12	1.46
261.740	1489619	-1512623	-59297	14504.15	-8534.44	-373.27	84.15	5.73	1.50
264.446	1525175	-1535656	-60401	14734.49	-8519.12	-369.08	85.93	6.41	1.55
266.259	1556623	-1551465	-61082	14894.96	-8505.75	-366.29	87.46	6.95	1.57
269.011	1597341	-1574505	-62070	15135.01	-8485.75	-361.92	89.49	7.68	1.60
270.860	1625474	-1590179	-62736	15301.49	-8471.18	-358.94	91.22	8.27	1.62
273.571	1667252	-1613113	-63703	15551.17	-8447.98	-354.57	93.20	9.06	1.67
276.282	1709811	-1635989	-64659	15806.96	-8422.29	-350.02	95.35	9.99	1.70
278.132	1739212	-1651545	-65302	15985.06	-8402.54	-346.66	97.55	10.77	1.75
280.844	1782923	-1674258	-66237	16252.37	-8372.96	-342.12	99.86	11.70	1.7[illegible]
283.590	1827933	-1697245	-67165	16529.90	-8339.39	-336.90	102.34	12.74	1.8[illegible]
285.445	1858765	-1712688	-67791	16722.03	-8314.86	-333.56	104.78	13.69	1.9[illegible]
288.157	1904518	-1735194	-68685	17009.08	-8276.60	-328.26	107.39	14.65	1.9[illegible]
290.732	1948662	-1756456	-69527	17289.43	-8237.23	-323.15	109.96	15.82	2.0[illegible]
292.491	1979259	-1770920	-70093	17485.68	-8208.40	-319.62	112.88	16.82	2.0[illegible]
295.071	2024734	-1792033	-70911	17779.75	-8163.55	-314.35	116.18	18.18	2.2[illegible]
297.649	2070961	-1813039	-71713	18062.64	-8115.31	-308.27	119.40	19.39	2.30
300.225	2117945	-1833859	-72500	18354.56	-8063.68	-302.21	122.77	20.64	2.40
302.843	2166476	-1854875	-73282	18721.60	-8007.77	-295.87	126.61	22.07	2.50
304.604	2199654	-1868964	-73800	18948.11	-7967.77	-291.42	129.94	23.39	2.63
307.184	2249013	-1889441	-74543	19286.48	-7905.36	-284.43	134.88	25.25	2.79
309.763	2299217	-1909745	-75266	19640.87	-7838.37	-276.86	138.69	26.84	2.92
312.380	2351103	-1930165	-75981	20011.60	-7765.20	-269.22	143.70	28.82	3.07
314.144	2386323	-1943814	-76451	20266.97	-7712.73	-263.62	148.80	30.58	3.22
316.724	2439417	-1963610	-77120	20658.04	-7631.68	-255.12	154.49	32.81	3.40
319.302	2493194	-1983175	-77766	21062.23	-7544.74	-246.06	160.62	35.04	3.57
321.919	2548673	-2002758	-78398	21489.88	-7450.13	-236.73	165.40	36.46	3.69
324.495	2604797	-2021865	-78956	21929.85	-7351.03	-226.73	173.65	39.67	3.91
326.261	2643792	-2034781	-79390	22242.53	-7279.11	-219.63	181.84	42.80	4.19
328.840	2701765	-2053411	-79942	22717.58	-7166.45	-208.89	189.53	45.67	4.54
331.459	2761921	-2072022	-80474	23223.78	-7042.72	-196.72	197.69	49.[illegible]	5.08
334.033	2822374	-2089982	-80962	23747.32	-6909.50	-182.35	204.52	53.[illegible]	5.58
336.487	2881254	-2106766	-81392	24257.04	-6772.48	-168.07	211.04	57.[illegible]	6.06
337.510	2906189	-2113667	-81561	24474.42	-6712.43	-161.76	213.76	59.[illegible]	6.26
338.455	2929401	-2119590	-81712	24557.26	-6689.15	-159.51	2.31	.[illegible]	.14
341.065	2993493	-2137442	-82127	24567.01	-6686.94	-158.70	2.36	.[illegible]	.10
343.445	3051969	-2153354	-82504	24574.28	-6685.22	-157.90	2.41	.[illegible]	.06
345.842	3110891	-2169380	-82881	24578.65	-6684.40	-157.48	1.44	.31	.07
348.120	3166891	-2184605	-83244	24580.32	-6684.08	-159.45	.70	.14	.07
350.405	3223061	-2199883	-83605	24580.88	-6684.06	-157.12	.32	.03	.11
352.887	3284058	-2216465	-83995	24581.33	-6683.73	-157.27	.12	.03	.19
355.301	3343395	-2232604	-84374	24581.48	-6684.11	-157.23	.05	.04	-.00
357.594	3399764	-2247930	-84735	24581.54	-6683.79	-157.10	.11	.01	.00
359.905	3456585	-2263380	-85098	24581.60	-6683.66	-157.26	-.12	.02	.00
362.802	3527786	-2282739	-85553	24581.91	-6683.63	-157.21	.34	.11	.01
364.564	3581414	-2297320	-85856	24582.08	-6683.81	-157.18	.58	.11	.01
367.160	3634528	-2311866	-86238	24585.47	-6682.79	-157.05	.37	.20	-.02
370.030	3705469	-2331042	-86685	24587.07	-6682.67	-157.20	.52	.14	-.03
372.238	3759759	-2345797	-87036	24587.75	-6682.35	-157.36	.13	-.01	-.04
374.419	3813400	-2360376	-87380	24587.82	-6682.62	-157.32	.14	-.03	-.01
376.598	3866572	-2374935	-87723	24587.80	-6682.60	-157.48	.04	-.01	.00
379.523	3938885	-2394480	-88183	24587.80	-6682.47	-157.24	.00	.04	.02
381.853	3996175	-2410051	-88549	24587.76	-6682.45	-157.40	-.07	.04	.03
384.091	4051210	-2425008	-88901	24587.83	-6682.33	-157.17	.12	-.02	-.01
386.270	4104783	-2439567	-89244	24587.80	-6682.51	-157.23	.07	-.01	-.01
389.147	4175518	-2458752	-89656	24587.81	-6682.38	-157.38	-.04	.02	-.02
391.359	4229983	-2473567	-90044	24587.88	-6682.46	-157.35	-.00	.02	-.00
393.536	4283453	-2488125	-90387	24587.65	-6682.23	-157.31	.26	-.12	.01
396.412	4354164	-2507343	-90829	24587.86	-6682.31	-157.27	-.02	.02	.00
398.704	4410519	-2522659	-91200	24587.92	-6682.38	-157.33	-.02	-.00	-.00

Table A-2. Reconstructed Ascent Trajectory, ECI Coordinates

GEMINI 8 ASCENT TRAJECTORY (ECIG COORDINATES)

TIME FROM LIFTOFF (SEC)	PX	PY	PZ	VX	VY	VZ	AX	AY	AZ
.4748	3024939.5	-18152177.0	9927951.0	1324.178	216.253	2.133	1.1822	-7.8158	4.3316
2.5783	3027727.6	-18151938.5	9927964.7	1326.732	200.435	10.992	1.2783	-8.0502	4.3831
5.1213	3031105.6	-18151455.0	9928006.9	1330.122	179.645	22.175	1.3698	-8.3220	4.4713
7.6633	3034491.5	-18151025.7	9928077.6	1333.843	157.896	33.657	1.4211	-8.8150	4.6587
9.7336	3037258.7	-18150717.7	9928157.6	1336.795	139.281	43.609	1.4636	-9.1914	4.8104
12.2863	3040673.0	-18150393.0	9928284.6	1340.450	115.159	56.081	1.4736	-9.6865	4.9784
14.8391	3044100.2	-18150131.0	9928444.5	1344.482	89.848	69.087	1.4914	-10.1749	5.1807
16.9143	3046893.2	-18149966.7	9928598.7	1347.404	68.241	79.706	1.4979	-10.6026	5.3778
19.4709	3050343.1	-18149827.2	9928820.6	1351.288	40.634	93.991	1.5226	-11.1062	5.6542
22.0217	3053794.9	-18149761.0	9929079.1	1355.092	11.339	108.773	1.7942	-11.6371	5.9517
24.4974	3057149.0	-18149768.2	9929366.4	1359.285	-17.687	123.928	2.5821	-12.1611	6.1614
26.4965	3059863.2	-18149828.2	9929625.7	1364.647	-42.602	136.411	3.5514	-12.5055	6.3019
29.1540	3063435.1	-18149982.7	9930003.1	1375.919	-76.092	153.039	5.2634	-12.9441	6.4564
31.7034	3067041.2	-18150225.2	9930423.6	1391.914	-110.102	169.898	7.2499	-13.2437	6.5576
33.6965	3069834.7	-18150471.7	9930776.4	1407.664	-136.875	183.362	8.8250	-13.4486	6.6520
36.3350	3073540.4	-18150875.0	9931277.0	1433.568	-172.407	200.600	10.9538	-13.6475	6.7635
38.7951	3076414.9	-18151245.2	9931680.6	1456.986	-199.810	214.249	12.5827	-13.7404	6.8425
40.9284	3080267.5	-18151814.2	9932272.9	1492.511	-235.744	232.249	14.6478	-13.8284	6.9804
43.5198	3084216.2	-18152477.0	9932903.1	1533.576	-272.024	250.690	16.7197	-13.9799	7.0032
45.5080	3087300.6	-18153045.7	9933416.0	1568.095	-299.783	264.805	18.3441	-14.0641	6.9893
48.1213	3091463.2	-18153878.0	9934131.9	1618.743	-337.152	282.845	20.4312	-14.1613	6.9765
50.7287	3095756.7	-18154865.9	9934892.0	1675.161	-373.965	300.587	22.5401	-14.1475	7.1136
52.7199	3099137.4	-18155578.0	9935505.0	1721.108	-402.306	315.167	24.1473	-14.0946	7.2252
55.3323	3103714.9	-18156675.7	9936352.9	1786.969	-438.935	334.460	26.2854	-14.0922	7.3562
57.9377	3108465.7	-18157868.2	9937250.0	1858.231	-475.539	353.660	28.4828	-13.7869	7.2606
59.9289	3112223.7	-18158842.5	9937968.6	1916.777	-502.839	368.103	30.1057	-13.6454	6.9938
62.5402	3117334.1	-18160201.2	9938954.5	1998.105	-537.923	386.438	32.2358	-13.3752	6.4837
65.1467	3122653.7	-18161649.0	9939987.7	2084.612	-572.908	402.095	34.5852	-12.8546	6.1281
67.1379	3126873.6	-18162815.7	9940794.1	2154.758	-598.603	413.125	36.4937	-12.3688	6.0231
69.7473	3132623.7	-18164418.7	9941892.4	2252.759	-629.331	429.283	39.0473	-11.7880	5.8387
72.3615	3138652.6	-18166101.7	9943038.0	2359.507	-658.519	445.915	41.1879	-12.0944	4.9843
74.3537	3143436.4	-18167437.0	9943935.4	2443.470	-682.512	454.424	42.4041	-12.8264	4.3992
76.9651	3149964.8	-18169264.0	9945132.4	2556.570	-717.773	462.682	43.7302	-14.1011	3.7384
79.5725	3156779.2	-18171187.2	9946351.1	2671.105	-757.352	472.615	45.2570	-15.0503	3.6450
81.5647	3162190.6	-18172725.7	9947301.2	2762.086	-797.621	480.928	46.7997	-15.3917	3.6071
84.1770	3169567.0	-18174837.7	9948569.6	2886.745	-829.039	489.309	49.3584	-15.3373	3.3667
86.7863	3177271.0	-18177053.7	9949855.9	3019.288	-868.914	497.549	52.2405	-15.0601	2.9791
88.7785	3183390.9	-18178813.7	9950853.9	3125.488	-897.999	503.999	54.4216	-14.8923	2.8212
91.3918	3191748.7	-18181210.2	9952178.6	3271.795	-936.517	510.002	57.2035	-14.7867	2.5789
94.0022	3200486.3	-18183706.7	9953518.6	3424.111	-975.866	516.702	60.0663	-14.7143	2.3478
95.9943	3207428.2	-18185679.7	9954553.0	3545.783	-1004.847	521.557	62.3486	-14.5193	2.1576
98.6076	3216910.7	-18188355.2	9955972.9	3712.696	-1042.635	526.653	65.5186	-14.1573	1.7698
101.2551	3226972.7	-18191164.7	9957322.5	3890.193	-1079.593	530.585	68.7760	-13.7606	1.3578
103.2532	3234872.8	-18193346.0	9958383.7	4030.091	-1106.756	533.016	71.1995	-13.5851	1.1414
105.8713	3245684.7	-18196291.7	9959783.4	4220.975	-1141.289	535.243	74.3048	-13.6132	.8351
107.9321	3254498.7	-18198661.0	9960883.4	4375.501	-1169.759	537.345	76.8686	-13.4869	.3093
110.5354	3266197.7	-18201766.5	9962289.6	4579.761	-1206.312	538.022	80.3817	-13.0448	-.6035
113.1496	3278444.3	-18204962.7	9963691.5	4794.679	-1239.204	534.295	84.2765	-11.8872	-1.6462
115.1467	3288194.8	-18207461.7	9964754.4	4966.332	-1261.799	529.534	87.4383	-10.7594	-2.3024
117.7688	3301521.6	-18210806.2	9966134.0	5200.607	-1288.349	522.697	91.4044	-9.4857	-2.8244
120.3879	3315460.8	-18214211.2	9967493.4	5445.256	-1311.078	514.925	95.2195	-8.9254	-3.1943
122.4279	3326769.9	-18216902.2	9968534.5	5642.709	-1327.554	507.744	98.1556	-8.9633	-3.4239
125.0461	3341883.8	-18220409.0	9969853.5	5904.292	-1351.783	498.237	101.8936	-9.5313	-3.6747
127.6633	3357689.0	-18223981.5	9971144.7	6175.469	-1378.206	488.518	105.8134	-10.2682	-3.9235
129.6652	3370265.9	-18226761.2	9972115.1	6390.264	-1399.029	480.619	109.1331	-10.6907	-4.1426
132.2644	3387381.3	-18230463.2	9973358.7	6681.189	-1428.005	468.985	113.5746	-11.0949	-4.4116
134.9025	3405267.9	-18234240.7	9974571.0	6984.353	-1457.632	457.070	118.4196	-11.3703	-4.6136
136.9035	3419482.7	-18237180.2	9975476.5	7224.833	-1480.416	447.829	122.5012	-11.5505	-4.7725
139.5236	3438878.5	-18241098.5	9976633.2	7552.487	-1510.779	435.040	128.1077	-11.8512	-5.0876
141.5627	3454507.7	-18244204.0	9977519.6	7818.036	-1535.301	424.469	132.7471	-12.1526	-5.3979
144.1858	3475477.9	-18248273.5	9978603.9	8173.750	-1567.695	409.637	139.0914	-12.5579	-5.8258
146.8733	3497953.3	-18252532.5	9979683.1	8555.651	-1601.971	393.405	146.0063	-12.9661	-6.2937
148.8742	3515369.2	-18255764.0	9980457.6	8853.433	-1628.121	380.535	151.8333	-13.2989	-6.6664
151.4963	3539112.8	-18260079.2	9981431.9	9260.597	-1663.561	362.318	159.8948	-13.7545	-7.1615
153.4934	3557929.3	-18263429.7	9982140.9	9585.937	-1691.348	347.646	166.0338	-14.1021	-7.5382
154.6900	3568640.2	-18265309.5	9982521.0	9771.495	-1707.043	339.194	169.4352	-14.2949	-7.7458
156.1174	3583509.1	-18267879.7	9983021.0	9825.870	-1680.760	318.395	36.4437	17.9367	-14.9500
158.7356	3609357.2	-18272217.7	9983804.0	9920.171	-1633.666	279.594	37.0505	17.8751	-15.0462
160.7736	3629652.7	-18275519.5	9984342.7	9996.253	-1597.508	248.978	37.5226	17.8273	-15.1211
163.2957	3655993.7	-18279637.7	9984943.0	10095.881	-1550.501	208.887	38.4008	17.7797	-15.2647
166.0129	3682548.9	-18283634.5	9985437.2	10197.401	-1514.011	168.709	39.1476	17.7509	-15.3061
167.9465	3702340.2	-18286509.7	9985735.1	10273.757	-1470.29	139.192	39.9485	18.3083	-15.1894
170.5539	3729264.2	-18290284.2	9986045.5	10378.675	-1423.708	99.368	40.8562	19.9292	-15.1521
173.1721	3756578.5	-18293947.7	9986255.2	10487.083	-1368.783	60.521	41.8197	22.7318	-15.4166
174.5719	3775521.6	-18296367.0	9986339.2	10563.274	-1324.443	32.732	42.5326	24.4864	-15.6047
177.6067	3803502.3	-18299765.5	9986270.0	10676.500	-1255.086	-9.671	43.3103	26.4059	-16.1392
180.2629	3832014.9	-18303004.7	9986286.2	10792.281	-1183.658	-53.314	43.9939	27.0737	-16.3794
182.1340	3852285.7	-18305172.0	9986157.9	10875.270	-1132.678	-83.923	44.5126	27.3460	-16.4571
184.8186	3881642.5	-18308113.7	9985873.2	10995.641	-1058.702	-128.255	45.1612	27.7604	-16.5859
187.4952	3911280.7	-18310851.2	9985469.5	11117.353	-983.588	-173.043	45.7996	28.1315	-16.7294
189.3327	3931736.2	-18312607.0	9985124.1	11201.822	-932.004	-203.816	46.3989	28.2944	-16.7850
192.0168	3961976.3	-18315066.5	9984516.5	11327.399	-855.550	-249.039	47.1333	28.6771	-16.9054
194.6575	3992511.5	-18317196.5	9983787.6	11454.738	-779.084	-294.664	47.8341	29.0535	-17.0481
196.5295	4013577.5	-18318573.0	9983219.4	11542.807	-724.657	-325.909	48.2888	29.0186	-17.0265
199.2150	4044751.5	-18320413.5	9982282.2	11673.765	-645.767	-372.125	49.1581	29.5566	-17.2450
201.9348	4076684.0	-18322059.5	9981206.1	11808.584	-564.702	-419.231	49.8813	29.8633	-17.3860
203.7649	4098378.3	-18323043.2	9980409.7	11900.286	-510.140	-451.132	50.5394	30.0913	-17.4880
206.4494	4130508.0	-18324303.5	9979125.4	12036.831	-429.742	-498.371	51.2209	30.4433	-17.6865

Table A-2. Reconstructed Ascent Trajectory, ECI Coordinates (Continued)

TIME ROM LIFTOFF (SEC)	PX	PY	PZ	VX	VY	VZ	AX	AY	AZ
209.1291	4162948.9	-18325343.0	9977726.2	12175.785	-346.730	-546.035	52.1724	30.8335	-17.8871
210.9611	4185342.9	-18325926.2	9976765.6	12271.660	-289.969	-579.081	52.8526	31.0775	-18.0125
212.6447	4218466.8	-18326592.2	9975086.5	12414.762	-206.139	-627.678	53.6403	31.4659	-18.2101
216.3254	4251939.7	-18327031.0	9973338.2	12559.383	-121.115	-676.769	54.4742	31.8140	-18.4155
218.1574	4275040.8	-18327199.5	9972067.4	12659.919	-62.680	-710.685	55.2914	32.1416	-18.6201
220.8420	4309239.7	-18327251.2	9970091.0	12809.426	24.263	-761.234	56.1701	32.5383	-18.8473
223.5618	4344261.5	-18327064.5	9967952.2	12963.371	113.296	-812.765	57.0476	32.9979	-19.0620
225.3928	4368166.9	-18326801.5	9966431.2	13068.585	173.851	-847.802	57.8994	33.2791	-19.1749
228.0764	4403387.3	-18326214.5	9964086.6	13225.179	263.807	-899.609	58.8567	33.6980	-19.3736
230.7570	4439051.8	-18325386.0	9961605.4	13384.134	354.702	-951.799	59.8402	34.0689	-19.5606
232.5916	4463695.4	-18324677.7	9959826.6	13494.803	417.568	-987.978	60.6543	34.3231	-19.6805
235.2805	4500213.2	-18323430.0	9957097.6	13659.205	510.697	-1041.489	61.7962	34.9359	-19.9959
237.9885	4537430.8	-18321918.0	9954203.9	13828.234	606.187	-1095.921	62.8257	35.4648	-20.2539
239.8420	4563169.9	-18320733.5	9952137.5	13945.387	672.091	-1133.793	63.3969	35.6776	-20.3685
242.5340	4601799.3	-18318747.2	9948939.7	14122.813	771.591	-1190.525	65.0641	36.4124	-20.8641
245.3016	4640261.2	-18316524.5	9945639.5	14300.665	870.915	-1247.842	66.2919	37.0746	-21.2247
247.1545	4666982.0	-18314846.5	9943290.0	14424.331	939.854	-1287.412	67.3204	37.4942	-21.5150
249.8645	4706220.5	-18312160.7	9939722.2	14608.708	1042.538	-1346.055	68.6797	38.1642	-21.8987
251.7150	4732273.2	-18310165.7	9937193.1	14736.577	1113.532	-1387.249	69.9423	38.6678	-22.2226
254.4279	4773609.7	-18307012.0	9933247.6	14927.333	1219.229	-1448.016	71.1151	39.3707	-22.6513
257.1369	4814310.2	-18303554.0	9929341.4	15121.957	1326.889	-1510.011	72.5810	40.1984	-23.0962
258.9865	4842404.8	-18301030.7	9926508.5	15257.326	1401.719	-1553.165	73.9170	40.7452	-23.4120
261.7414	4884703.3	-18297015.2	9922142.0	15462.506	1514.764	-1618.196	75.4203	41.4614	-23.8173
264.4465	4926824.2	-18292763.5	9917675.4	15669.948	1627.960	-1683.262	77.0190	42.2480	-24.2553
266.2990	4955584.2	-18289675.0	9914515.1	15812.762	1706.768	-1729.696	78.4154	42.8858	-24.6284
269.0139	4999158.1	-18284887.2	9909735.6	16027.984	1824.418	-1796.321	80.2665	43.7359	-25.1343
270.8596	5028925.4	-18281439.5	9906371.7	16177.280	1905.703	-1843.120	81.8475	44.4378	-25.5470
273.5735	5073083.4	-18276109.2	9901280.6	16401.293	2027.070	-1913.127	83.6385	45.3490	-26.0648
276.2824	5117872.4	-18270444.5	9895995.6	16630.826	2151.342	-1984.727	85.5650	46.3917	-26.6696
278.1320	5148780.1	-18266385.2	9892278.7	16790.631	2238.181	-2034.552	87.5945	47.3282	-27.1980
280.8440	5194639.1	-18260141.2	9886660.1	17030.660	2367.357	-2109.260	89.6795	48.3868	-27.8099
283.5900	5241747.2	-18253456.2	9880762.5	17279.868	2501.951	-2186.533	91.9185	49.5756	-28.4832
285.4445	5273952.2	-18248730.5	9876658.0	17452.447	2594.871	-2240.201	94.1613	50.6826	-29.1036
288.1574	5321646.8	-18241503.5	9870472.7	17710.351	2733.670	-2320.025	96.5407	51.8040	-29.7654
290.7317	5367559.9	-18234293.2	9864400.9	17962.351	2868.905	-2397.893	98.8517	53.1171	-30.5098
292.4914	5399324.2	-18229161.5	9860133.2	18138.800	2963.522	-2452.440	101.5457	54.3359	-31.1900
295.0705	5446445.3	-18221336.7	9853703.1	18403.275	3105.174	-2534.113	104.5648	55.9240	-32.0351
297.6486	5494240.9	-18213144.0	9847062.9	18675.843	3251.045	-2617.542	107.5085	57.3583	-32.8150
300.2248	5542712.7	-18204576.7	9840209.6	18956.685	3400.757	-2703.407	110.5886	58.8513	-33.6366
302.8400	5592672.1	-18195479.7	9833022.9	19251.392	3556.974	-2793.057	114.1201	60.5439	-34.5870
304.6037	5626804.7	-18189111.2	9828042.4	19455.605	3665.047	-2854.992	117.1733	62.1099	-35.4135
307.1838	5677355.3	-18179446.7	9820557.0	19762.557	3827.692	-2947.902	121.7339	64.3325	-36.6172
309.7629	5728772.5	-18169359.0	9812831.5	20080.570	3995.854	-3043.620	125.1989	66.1782	-37.6128
312.3801	5781762.7	-18159671.5	9804734.4	20415.346	4172.299	-3144.495	129.8026	68.5090	-38.8924
314.1438	5817972.7	-18151205.0	9799127.2	20647.852	4295.142	-3214.302	134.5490	70.6625	-40.0827
316.7238	5871696.7	-18139886.2	9790699.2	20999.629	4479.925	-3319.400	139.7834	73.3001	-41.5216
319.3020	5926304.6	-18128091.0	9782002.2	21365.358	4671.667	-3428.218	145.4490	75.9824	-43.0110
321.9192	5982724.6	-18115601.5	9772880.1	21752.635	4873.766	-3543.242	149.8956	77.7858	-44.0267
324.4952	6039273.3	-18102781.2	9763602.1	22151.637	5080.344	-3660.417	157.5276	81.5732	-46.1368
326.2609	6078634.0	-18093682.7	9757066.4	22435.438	5226.724	-3743.486	165.1293	85.3261	-48.1633
328.8420	6137649.1	-18079917.5	9747249.6	22866.807	5449.309	-3869.886	172.2437	88.8260	-49.9423
331.4592	6197536.0	-18065337.7	9736939.7	23326.865	5686.640	-4003.877	179.6577	93.4852	-52.1695
334.0334	6258193.6	-18050383.5	9726457.0	23802.936	5933.973	-4141.497	185.7511	98.0759	-54.3554
336.4865	6317152.2	-18035526.7	9716131.0	24265.651	6179.836	-4277.978	191.5559	102.4502	-56.4383
337.5100	6342085.9	-18029148.5	9711722.9	24462.908	6285.581	-4336.443	193.9772	104.2751	-57.3073
338.4553	6365278.4	-18023167.2	9707601.0	24531.812	6339.998	-4366.541	-6.8912	26.5691	-14.2788
341.0647	6429272.4	-18006531.7	9696158.6	24517.307	6410.548	-4404.110	-6.9255	26.5099	-14.2964
343.4445	6487603.4	-17991199.2	9685636.7	24502.309	6474.425	-4437.975	-6.9568	26.4556	-14.3124
345.8420	6546325.7	-17975630.7	9674957.5	24484.188	6537.413	-4471.675	-7.9730	26.1403	-14.0872
348.1203	6602086.2	-17960641.0	9664729.9	24464.329	6595.396	-4505.278	-8.7577	25.8918	-13.9231
350.4055	6657967.0	-17945501.0	9654401.5	24443.304	6655.214	-4534.939	-9.1942	25.7553	-13.7840
352.8869	6718592.9	-17928907.0	9643105.1	24419.979	6719.054	-4569.580	-9.4753	25.7419	-13.6775
355.3010	6777516.4	-17912612.7	9632033.9	24396.908	6780.562	-4602.723	-9.6423	25.6270	-13.8303
357.5940	6833432.2	-17896997.2	9621443.7	24374.633	6839.561	-4634.397	-9.6585	25.5875	-13.7976
359.9055	6889748.6	-17881119.2	9610694.1	24352.008	6898.669	-4666.451	-9.9687	25.5470	-13.7668
362.8020	6960243.4	-17861029.7	9597119.9	24323.648	6972.695	-4705.317	-9.6254	25.6514	-13.8294
364.9836	7013284.3	-17845757.7	9586820.0	24302.072	7028.216	-4736.207	-9.4572	25.6650	-13.8399
367.1504	7066164.2	-17830397.0	9576477.0	24283.372	7085.008	-4766.795	-9.7589	25.6766	-13.8675
370.0295	7135757.3	-17809964.2	9562743.6	24255.838	7158.261	-4806.487	-9.6978	25.6135	-13.8441
372.2375	7189330.2	-17794096.2	9552096.9	24233.854	7214.688	-4837.084	-10.1415	25.4073	-13.7334
374.4192	7242175.4	-17778296.2	9541511.9	24211.477	7269.904	-4866.775	-10.2067	25.3835	-13.6808
376.5579	7294900.5	-17762397.0	9530875.9	24188.816	7325.154	-4896.695	-10.3808	25.3718	-13.6565
379.5227	7365603.3	-17740863.5	9516496.1	24158.168	7399.554	-4936.465	-10.5282	25.3915	-13.6442
381.8527	7421864.9	-17723553.2	9504956.5	24133.504	7458.519	-4968.366	-10.6834	25.3656	-13.6147
384.0910	7475855.9	-17706795.2	9493801.9	24109.742	7515.389	-4998.701	-10.5552	25.2915	-13.6136
386.2697	7528358.7	-17690361.7	9482879.0	24086.386	7571.291	-5028.294	-10.6844	25.2780	-13.6009

Table A-3a. Reconstructed Ascent Trajectory, Special Parameters

GEMINI 8 ASCENT BET 1

TIME FROM LIFTOFF (SECONDS)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
2.578	1341.8	23.3	.996	90.004	48.0	28.507	-80.555
5.121	1342.4	47.4	2.023	90.016	137.7	28.507	-80.555
7.663	1343.6	72.5	3.093	90.037	289.7	28.507	-80.555
9.736	1344.7	94.6	4.007	90.049	462.2	28.507	-80.555
12.286	1346.6	121.6	5.181	90.080	736.7	28.507	-80.555
14.835	1349.3	150.6	6.406	90.116	1083.7	28.507	-80.555
16.914	1351.5	175.0	7.437	90.163	1421.2	28.507	-80.555
19.471	1355.2	206.5	8.763	90.196	1908.5	28.507	-80.555
22.022	1359.5	239.8	10.154	90.244	2477.2	28.507	-80.555
24.493	1365.0	273.0	11.530	90.278	3110.0	28.507	-80.555
26.487	1372.1	301.5	12.689	90.325	3682.0	28.507	-80.555
29.094	1386.5	340.4	14.205	90.411	4518.2	28.507	-80.555
31.700	1406.6	380.7	15.688	90.513	5456.7	28.507	-80.555
33.696	1426.1	413.3	16.810	90.594	6247.7	28.507	-80.555
36.306	1457.8	457.8	18.207	90.736	7379.7	28.507	-80.555
38.295	1486.1	493.5	19.226	90.839	8319.0	28.507	-80.554
40.908	1528.8	542.6	20.468	90.980	9656.2	28.506	-80.554
43.519	1577.6	594.8	21.615	91.119	11112.5	28.506	-80.553
45.508	1618.3	636.7	22.420	91.229	12304.0	28.506	-80.552
48.121	1677.5	695.3	23.391	91.410	13980.5	28.506	-80.551
50.729	1742.5	757.2	24.224	91.592	15780.2	28.506	-80.549
52.720	1795.4	807.4	24.816	91.701	17242.0	28.505	-80.547
55.330	1870.2	876.8	25.480	91.832	19274.7	28.505	-80.545
57.938	1950.4	950.5	26.045	91.966	21439.5	28.505	-80.542
59.929	2015.5	1009.6	26.392	92.064	23184.0	28.504	-80.539
62.540	2105.0	1090.4	26.754	92.197	2555[illegible].5	28.504	-80.535
65.147	2199.0	1175.0	27.012	92.394	28126.7	28.503	-80.530
67.138	2274.2	1242.3	27.131	92.548	30153.2	28.503	-80.526
69.747	2379.0	1335.4	27.181	92.665	32923.2	28.502	-80.520
72.362	2489.9	1434.3	27.154	92.749	35829.0	28.501	-80.514
74.354	2577.4	1513.0	27.104	92.924	38129.7	28.501	-80.508
76.965	2695.4	1621.3	27.066	93.242	41261.7	28.500	-80.500
79.572	2816.3	1735.1	27.112	93.550	44532.7	28.499	-80.491
81.565	2912.2	1825.6	27.131	93.755	47133.2	28.498	-80.484
84.177	3043.0	1949.7	27.129	94.073	50678.5	28.497	-80.473
86.786	3181.0	2080.3	27.060	94.353	54375.5	28.495	-80.462
88.779	3290.8	2184.2	26.967	94.537	57302.2	28.494	-80.452
91.392	3441.2	2326.8	26.806	94.805	61277.2	28.492	-80.439
94.002	3597.7	2476.2	26.648	95.047	65407.2	28.490	-80.424
95.994	3722.1	2594.9	26.457	95.213	68666.7	28.489	-80.412
98.608	3892.1	2757.4	26.273	95.431	73085.7	28.486	-80.396
101.255	4071.9	2929.7	26.009	95.639	77727.0	28.484	-80.378
103.259	4213.1	3065.2	25.792	95.786	81335.2	28.482	-80.363
105.871	4405.2	3249.6	25.486	95.967	86217.7	28.479	-80.343
107.922	4560.9	3400.2	25.266	96.132	90155.2	28.476	-80.326
110.535	4766.4	3599.2	24.976	96.286	95325.7	28.473	-80.303
113.149	4981.0	3806.8	24.622	96.479	100664.0	28.470	-80.278
115.147	5151.4	3971.7	24.319	96.619	104853.7	28.467	-80.258
117.769	5383.2	4196.5	23.858	96.775	110490.5	28.463	-80.230
120.388	5624.5	4430.2	23.452	96.905	116274.0	28.459	-80.200
122.428	5819.0	4619.1	23.102	97.001	120881.7	28.455	-80.176
125.046	6077.5	4871.4	22.695	97.133	126934.5	28.450	-80.143
127.663	6346.2	5134.4	22.322	97.264	133151.5	28.445	-80.108
129.665	6559.2	5343.4	22.050	97.362	138024.5	28.441	-80.079
132.284	6848.2	5627.4	21.713	97.497	144560.5	28.435	-80.040
134.903	7149.5	5924.1	21.351	97.625	151283.7	28.429	-79.999
136.904	7388.5	6159.8	21.154	97.715	156555.0	28.424	-79.966
139.524	7714.4	6481.5	20.853	97.829	163637.5	28.417	-79.921
141.563	7978.7	6742.7	20.628	97.917	169297.2	28.412	-79.883
144.186	8332.8	7093.1	20.349	98.031	176775.5	28.404	-79.833
146.873	8713.2	7469.9	20.076	98.146	184679.0	28.396	-79.779
148.874	9009.9	7764.0	19.878	98.229	190729.2	28.389	-79.736
151.496	9415.8	8166.6	19.629	98.339	198882.2	28.380	-79.678
153.493	9740.2	8488.7	19.445	98.421	205270.5	28.373	-79.631
154.600	9925.3	8672.5	19.345	98.466	208879.7	28.369	-79.605
156.117	9973.6	8718.7	19.142	98.499	213850.2	28.363	-79.568
158.736	10057.7	8799.2	18.786	98.573	222361.2	28.353	-79.503
160.774	10126.2	8864.9	18.512	98.627	228930.2	28.345	-79.452
163.396	10216.4	8951.8	18.160	98.701	237309.0	28.335	-79.386
166.013	10309.1	9041.2	17.818	98.776	245592.5	28.325	-79.320
167.946	10379.4	9109.1	17.572	98.832	251664.0	28.317	-79.270
170.554	10476.3	9203.0	17.242	98.903	259787.0	28.306	-79.202
173.172	10576.2	9299.5	16.881	98.945	267863.7	28.295	-79.133
174.972	10646.0	9366.8	16.603	98.960	273357.5	28.287	-79.085
177.607	10750.0	9466.9	16.180	98.980	281299.7	28.275	-79.014
180.263	10857.1	9570.2	15.753	99.000	289181.0	28.264	-78.942
182.134	10934.4	9645.0	15.456	99.011	294656.2	28.255	-78.890
184.819	11047.2	9754.2	15.033	99.029	302401.7	28.243	-78.816
187.499	11162.1	9865.6	14.615	99.046	310004.7	28.231	-78.740
189.332	11242.4	9943.5	14.333	99.057	315128.2	28.223	-78.687
192.017	11362.4	10060.3	13.926	99.074	322522.0	28.210	-78.610
194.697	11484.9	10179.6	13.523	99.093	329773.7	28.197	-78.531
196.530	11570.1	10262.7	13.253	99.100	334654.7	28.189	-78.477
199.215	11697.5	10387.2	12.861	99.116	341699.2	28.175	-78.396

CONFIDENTIAL

Table A-3a. Reconstructed Ascent Trajectory, Special Parameters (Continued)

TIME FROM LIFTOFF (SECONDS)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
201.935	11829.5	10516.3	12.470	99.132	348699.2	28.162	-78.313
203.765	11919.8	10604.7	12.213	99.143	353334.7	28.153	-78.257
206.449	12054.8	10737.0	11.838	99.160	360025.0	28.139	-78.174
209.129	12193.0	10872.7	11.471	99.177	366573.5	28.126	-78.089
210.961	12288.7	10966.8	11.222	99.189	370975.7	28.116	-78.030
213.645	12432.3	11108.0	10.865	99.207	377315.2	28.102	-77.944
216.325	12578.2	11251.6	10.513	99.225	383517.7	28.088	-77.856
218.157	12680.0	11351.9	10.277	99.239	387682.5	28.078	-77.795
220.843	12832.0	11501.9	9.935	99.259	393678.0	28.063	-77.705
223.561	12989.3	11657.1	9.595	99.280	399613.0	28.048	-77.613
225.393	13097.2	11763.7	9.370	99.295	403539.2	28.038	-77.549
228.076	13258.4	11922.9	9.045	99.316	409181.5	28.023	-77.456
230.757	13422.6	12085.4	8.727	99.337	414689.2	28.007	-77.361
232.591	13537.4	12199.0	8.513	99.352	418383.7	27.997	-77.296
235.280	13708.4	12368.3	8.205	99.375	423693.7	27.981	-77.198
237.988	13884.8	12543.2	7.901	99.397	428910.2	27.965	-77.099
239.842	14007.5	12664.8	7.696	99.414	432406.5	27.953	-77.030
242.594	14193.9	12849.7	7.397	99.438	437485.0	27.936	-76.926
245.301	14381.4	13035.8	7.107	99.465	442349.7	27.919	-76.823
247.155	14512.1	13165.6	6.913	99.483	445605.2	27.908	-76.751
249.864	14707.6	13359.8	6.631	99.510	450256.0	27.890	-76.645
251.715	14843.6	13494.9	6.442	99.530	453356.2	27.878	-76.571
254.428	15046.9	13697.0	6.169	99.560	457790.2	27.860	-76.462
257.137	15255.0	13904.0	5.901	99.590	462086.7	27.842	-76.352
258.987	15400.1	14048.4	5.720	99.612	464944.0	27.829	-76.275
261.740	15620.6	14267.8	5.457	99.644	469083.5	27.810	-76.160
264.446	15843.0	14489.2	5.203	99.677	473018.0	27.791	-76.045
266.299	15998.3	14643.8	5.032	99.700	475635.5	27.778	-75.965
269.011	16231.2	14875.8	4.786	99.735	479354.2	27.758	-75.847
270.860	16393.1	15037.1	4.621	99.759	481813.0	27.744	-75.765
273.571	16636.5	15279.7	4.385	99.796	485307.0	27.724	-75.643
276.282	16886.4	15528.9	4.152	99.833	488669.2	27.703	-75.520
278.132	17060.9	15702.8	3.995	99.858	490884.7	27.689	-75.434
280.844	17323.3	15964.5	3.771	99.898	494020.0	27.667	-75.307
283.590	17596.4	16237.0	3.546	99.938	497056.7	27.645	-75.176
285.445	17785.9	16426.0	3.397	99.967	499028.0	27.630	-75.087
288.157	18069.7	16709.1	3.183	100.008	501795.7	27.607	-74.954
290.732	18347.4	16986.3	2.983	100.049	504294.2	27.585	-74.826
292.491	18542.2	17180.8	2.848	100.077	505929.7	27.570	-74.737
295.071	18834.7	17472.7	2.654	100.120	508219.5	27.547	-74.605
297.649	19136.6	17774.1	2.464	100.162	510381.5	27.524	-74.471
300.225	19448.1	18085.3	2.278	100.206	512413.0	27.501	-74.334
302.846	19775.5	18412.2	2.094	100.251	514344.0	27.476	-74.193
304.604	20002.6	18639.0	1.972	100.282	515571.5	27.460	-74.097
307.184	20344.5	18980.6	1.796	100.328	517257.2	27.435	-73.954
309.763	20699.3	19335.0	1.623	100.374	518810.2	27.409	-73.808
312.380	21073.3	19708.6	1.451	100.422	520250.2	27.383	-73.657
314.144	21333.4	19968.5	1.337	100.455	521141.5	27.364	-73.554
316.724	21727.2	20362.1	1.173	100.504	522331.2	27.337	-73.401
319.302	22137.2	20771.8	1.013	100.553	523382.0	27.310	-73.245
321.919	22571.8	21206.1	.855	100.605	524306.2	27.281	-73.083
324.495	23019.6	21653.7	.705	100.657	525076.0	27.252	-72.920
326.261	23338.4	21972.3	.605	100.693	525523.5	27.231	-72.807
328.840	23823.6	22457.2	.459	100.747	526057.0	27.201	-72.638
331.459	24341.6	22975.0	.313	100.802	526450.0	27.169	-72.463
334.033	24878.6	23511.9	.169	100.854	526684.2	27.137	-72.288
336.487	25403.0	24036.1	.028	100.904	526759.2	27.106	-72.116
337.510	25627.1	24260.1	-.031	100.926	526745.5	27.093	-72.044
338.455	25711.3	24344.3	-.053	100.954	526711.0	27.081	-71.976
341.065	25721.4	24354.4	-.053	101.041	526615.2	27.046	-71.790
343.445	25728.9	24362.0	-.053	101.121	526527.5	27.015	-71.619
345.842	25733.4	24366.5	-.052	101.202	526439.7	26.983	-71.448
348.120	25735.2	24368.3	-.051	101.285	526357.0	26.952	-71.286
350.405	25735.8	24369.0	-.049	101.357	526275.7	26.921	-71.122
352.887	25736.4	24369.6	-.048	101.442	526188.0	26.887	-70.945
355.301	25736.6	24369.7	-.046	101.524	526104.5	26.854	-70.773
357.594	25736.8	24370.0	-.045	101.602	526026.5	26.822	-70.610
359.905	25736.9	24370.1	-.044	101.683	525948.0	26.790	-70.445
362.802	25737.3	24370.6	-.043	101.778	525851.5	26.749	-70.239
364.984	25737.5	24370.8	-.041	101.852	525780.5	26.718	-70.084
367.160	25741.1	24374.4	-.040	101.925	525710.5	26.687	-69.929
370.030	25742.8	24376.1	-.038	102.022	525619.2	26.646	-69.726
372.238	25743.5	24376.9	-.037	102.097	525550.5	26.614	-69.569
374.419	25743.6	24377.0	-.035	102.170	525484.0	26.583	-69.414
376.598	25743.6	24377.1	-.034	102.243	525419.0	26.551	-69.260
379.523	25743.7	24377.2	-.033	102.340	525333.2	26.508	-69.052
381.853	25743.8	24377.2	-.031	102.418	525265.7	26.473	-68.887
384.091	25743.9	24377.4	-.030	102.492	525202.2	26.440	-68.729
386.270	25743.9	24377.4	-.029	102.565	525142.0	26.407	-68.575
389.147	25744.0	24377.5	-.027	102.661	525063.5	26.364	-68.372

Table A-3b. Reconstructed Ascent Trajectory, Special Parameters

GEMINI 8 ASCENT SET

TIME FROM LIFTOFF (SECONDS)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
2.578	89.185	-116.984	-80.530	28.346	20909913.5
5.121	89.332	-141.238	-80.520	28.346	20910003.2
7.663	89.267	-162.239	-80.509	28.346	20910155.2
9.736	89.231	-159.658	-80.500	28.346	20910327.7
12.286	89.014	-157.074	-80.490	28.346	20910602.2
14.835	88.873	-159.229	-80.479	28.346	20910949.2
16.914	88.602	-155.855	-80.470	28.346	20911286.7
19.471	88.519	-152.130	-80.460	28.346	20911774.0
22.022	88.346	-148.492	-80.449	28.346	20912343.0
24.453	88.320	-147.189	-80.439	28.346	20912975.7
26.487	88.401	-156.867	-80.431	28.346	20913547.7
29.094	88.346	170.226	-80.420	28.346	20914384.2
31.700	87.452	138.159	-80.409	28.346	20915322.7
33.696	86.281	123.907	-80.400	28.346	20916113.7
36.306	84.254	114.298	-80.389	28.346	20917245.7
38.295	82.547	109.891	-80.380	28.346	20918185.2
40.908	80.157	106.202	-80.369	28.345	20919522.7
43.519	77.477	103.758	-80.357	28.345	20920979.0
45.528	75.797	102.470	-80.348	28.345	20922178.7
48.121	73.285	101.446	-80.336	28.345	20923847.5
50.729	70.768	100.649	-80.323	28.344	20925647.5
52.720	68.959	100.020	-80.313	28.344	20927109.5
55.330	66.584	99.280	-80.300	28.344	20929142.7
57.938	64.287	98.712	-80.286	28.343	20931308.0
59.929	62.551	98.339	-80.275	28.343	20933052.7
62.540	60.345	97.955	-80.260	28.343	20935459.7
65.147	58.209	97.854	-80.244	28.342	20937996.5
67.138	56.595	97.802	-80.232	28.342	20940023.5
69.747	54.465	97.507	-80.215	28.341	20942794.2
72.362	52.400	97.181	-80.197	28.340	20945700.5
74.354	50.907	97.242	-80.184	28.340	20948002.0
76.965	49.152	97.540	-80.165	28.339	20951135.0
79.572	47.709	97.815	-80.145	28.338	20954407.0
81.565	46.673	97.957	-80.129	28.337	20957008.2
84.177	45.373	98.234	-80.107	28.335	20960555.0
86.786	44.076	98.426	-80.085	28.334	20964253.5
88.779	43.096	98.514	-80.067	28.333	20967181.5
91.352	41.632	98.677	-80.043	28.331	20971158.2
94.002	40.667	98.800	-80.018	28.329	20975290.2
95.994	39.790	98.864	-79.998	28.328	20978551.5
98.608	38.667	98.953	-79.970	28.325	20982972.7
101.255	37.553	99.029	-79.941	28.323	20987616.5
103.255	36.731	99.074	-79.918	28.321	20991226.7
105.871	35.681	99.123	-79.886	28.318	20996112.2
107.922	34.926	99.160	-79.861	28.316	21000052.0
110.535	33.999	99.230	-79.827	28.312	21005226.0
113.149	33.034	99.316	-79.791	28.309	21010568.0
115.147	32.285	99.374	-79.763	28.306	21014760.5
117.769	31.212	99.417	-79.724	28.302	21020401.5
120.366	30.349	99.431	-79.684	28.298	21026189.2
122.428	29.623	99.441	-79.651	28.294	21030800.7
125.046	28.774	99.471	-79.607	28.289	21036858.2
127.663	27.999	99.508	-79.561	28.284	21043080.5
129.665	27.441	99.537	-79.524	28.280	21047957.7
132.264	26.757	99.590	-79.474	28.274	21054499.7
134.903	26.116	99.636	-79.422	28.266	21061229.2
136.904	25.649	99.666	-79.380	28.263	21066505.5
139.524	25.067	99.703	-79.324	28.256	21073595.0
141.563	24.638	99.734	-79.278	28.251	21079260.5
144.166	24.112	99.777	-79.217	28.243	21086746.5
146.673	23.603	99.822	-79.151	28.235	21094658.2
148.874	23.240	99.855	-79.102	28.229	21100715.2
151.496	22.767	99.902	-79.031	28.220	21108877.2
153.493	22.456	99.937	-78.976	28.213	21115272.7
154.600	22.279	99.957	-78.945	28.209	21118886.2
156.117	22.031	99.985	-78.902	28.203	21123862.5
158.736	21.598	100.050	-78.826	28.193	21132383.7
160.774	21.264	100.102	-78.767	28.185	21138960.7
163.396	20.837	100.170	-78.690	28.175	21147350.2
166.013	20.420	100.238	-78.612	28.164	21155644.5
167.946	20.121	100.289	-78.554	28.156	21161724.0
170.554	19.719	100.353	-78.476	28.145	21169858.0
173.172	19.284	100.382	-78.396	28.134	21177946.0
174.972	18.952	100.387	-78.340	28.127	21183447.5
177.607	18.446	100.390	-78.259	28.115	21191401.5
180.263	17.939	100.393	-78.175	28.104	21199294.7
182.134	17.585	100.393	-78.116	28.095	21204778.5
184.819	17.085	100.393	-78.030	28.083	21212536.2
187.499	16.587	100.393	-77.943	28.071	21220151.7
189.332	16.254	100.394	-77.882	28.063	21225283.7
192.017	15.772	100.393	-77.794	28.050	21232690.2
194.697	15.297	100.393	-77.704	28.037	21239955.0
196.530	14.978	100.392	-77.642	28.029	21244844.7
199.215	14.517	100.392	-77.550	28.016	21251902.5

CONFIDENTIAL

Table A-3b. Reconstructed Ascent Trajectory, Special Parameters (Continued)

201.935	14.057	100.391	-77.456	28.002	21258916.2
203.765	13.755	100.392	-77.392	27.993	21263561.0
206.449	13.316	100.392	-77.297	27.980	21270264.7
209.129	12.866	100.394	-77.201	27.966	21276827.2
210.961	12.596	100.396	-77.135	27.957	21281239.0
213.645	12.179	100.399	-77.037	27.943	21287592.7
216.325	11.770	100.402	-76.938	27.928	21293809.7
218.157	11.495	100.405	-76.879	27.919	21297984.5
220.843	11.097	100.412	-76.769	27.904	21303994.7
223.561	10.704	100.418	-76.665	27.889	21309945.0
225.393	10.443	100.423	-76.594	27.879	21313881.7
228.076	10.068	100.429	-76.489	27.864	21319539.5
230.757	9.702	100.437	-76.383	27.848	21325062.7
232.591	9.455	100.442	-76.310	27.838	21328768.0
235.280	9.102	100.451	-76.201	27.822	21334094.0
237.988	8.752	100.460	-76.091	27.806	21339327.0
239.842	8.518	100.467	-76.014	27.794	21342834.5
242.554	8.176	100.478	-75.899	27.777	21347930.2
245.301	7.845	100.492	-75.784	27.760	21352812.0
247.155	7.624	100.501	-75.704	27.749	21356079.5
249.864	7.304	100.515	-75.587	27.731	21360747.7
251.715	7.089	100.527	-75.506	27.719	21363860.2
254.428	6.780	100.544	-75.385	27.701	21368312.5
257.137	6.477	100.562	-75.264	27.683	21372627.2
258.987	6.273	100.575	-75.179	27.671	21375497.2
261.743	5.976	100.595	-75.053	27.652	21379656.0
264.446	5.691	100.615	-74.926	27.632	21383609.7
266.299	5.499	100.631	-74.839	27.619	21386240.5
269.011	5.223	100.653	-74.709	27.600	21389979.2
270.860	5.039	100.669	-74.619	27.586	21392451.7
273.571	4.775	100.694	-74.486	27.566	21395966.2
275.282	4.516	100.720	-74.352	27.545	21399349.2
278.132	4.341	100.737	-74.258	27.531	21401579.2
280.844	4.092	100.766	-74.120	27.509	21404736.0
283.590	3.844	100.794	-73.978	27.487	21407794.7
285.445	3.679	100.815	-73.880	27.472	21409781.2
288.157	3.442	100.845	-73.736	27.449	21412571.7
290.732	3.222	100.875	-73.597	27.428	21415092.0
292.491	3.074	100.896	-73.501	27.413	21416742.7
295.071	2.861	100.928	-73.358	27.390	21419055.2
297.649	2.653	100.959	-73.213	27.367	21421240.2
300.225	2.449	100.992	-73.066	27.343	21423295.2
302.840	2.249	101.026	-72.914	27.319	21425250.7
304.634	2.116	101.050	-72.811	27.302	21426495.0
307.184	1.925	101.085	-72.657	27.277	21428205.5
309.763	1.738	101.120	-72.500	27.252	21429784.0
312.380	1.552	101.157	-72.338	27.226	21431250.2
314.144	1.428	101.183	-72.228	27.208	21432159.7
316.724	1.252	101.220	-72.064	27.181	21433376.2
319.302	1.080	101.259	-71.897	27.153	21434454.7
321.919	.910	101.299	-71.724	27.124	21435407.5
324.495	.749	101.340	-71.551	27.095	21436206.0
326.261	.642	101.368	-71.430	27.075	21436673.7
328.840	.487	101.411	-71.251	27.045	21437237.5
331.459	.332	101.454	-71.065	27.013	21437661.7
334.033	.178	101.453	-70.878	26.982	21437927.7
336.487	.030	101.533	-70.697	26.950	21438033.5
337.510	-.032	101.549	-70.620	26.937	21438032.7
338.455	-.056	101.577	-70.548	26.925	21438010.5
341.065	-.056	101.669	-70.351	26.891	21437948.7
343.445	-.056	101.754	-70.171	26.859	21437892.0
345.842	-.055	101.839	-69.989	26.827	21437835.7
348.120	-.053	101.926	-69.817	26.797	21437783.5
350.405	-.052	102.003	-69.645	26.766	21437732.5
352.887	-.051	102.093	-69.457	26.732	21437678.0
355.301	-.049	102.180	-69.275	26.699	21437627.2
357.594	-.048	102.262	-69.102	26.667	21437580.2
359.905	-.047	102.345	-68.928	26.635	21437533.5
362.802	-.045	102.449	-68.710	26.595	21437476.7
364.984	-.043	102.527	-68.545	26.564	21437436.0
367.160	-.043	102.604	-68.382	26.533	21437396.2
370.030	-.040	102.707	-68.166	26.492	21437345.5
372.238	-.040	102.786	-68.000	26.461	21437307.7
374.419	-.037	102.863	-67.836	26.429	21437272.2
376.598	-.036	102.941	-67.672	26.397	21437238.2
379.523	-.035	103.044	-67.453	26.355	21437194.2
381.853	-.033	103.126	-67.278	26.320	21437160.5
384.091	-.032	103.205	-67.110	26.287	21437129.2
386.270	-.030	103.282	-66.947	26.254	21437100.7
389.147	-.029	103.383	-66.732	26.211	21437064.2

CONFIDENTIAL

APPENDIX B

REENTRY TRAJECTORY

The reentry trajectory is provided in two sets, the earth-centered inertial coordinates and the special earth-referenced coordinates. The inertial set has the z axis aligned with the earth's rotational axis, positive north, and the x-y plane is in the equatorial plane with the x-z plane containing the Greenwich meridian at the time of retrofire (17 March $2^h45^m49^s$).

CONFIDENTIAL

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
631.5742	11013774.25	17437673.50	6729258.69	-21577.36	9466.91	9223.32
633.9746	10961226.50	17462276.50	6751364.00	-21613.78	9429.17	9197.77
636.3664	10909628.87	17492803.25	6772291.00	-21649.62	9371.41	9175.57
638.7744	10857321.37	17505356.00	6794434.00	-21686.03	9313.15	9152.87
641.1494	10805774.87	17527406.50	6816115.62	-21721.59	9255.89	9132.59
643.5493	10753602.50	17549551.00	6838000.81	-21757.14	9197.75	9107.82
645.9492	10701344.62	17571553.75	6859331.44	-21792.87	9139.43	9085.07
648.3496	10648991.00	17593422.00	6881411.69	-21828.50	9081.10	9062.22
650.7495	10596553.00	17615145.75	6903332.56	-21863.6	9022.77	9039.29
652.4233	10559946.75	17636214.00	6918449.19	-21887.9	8981.93	9023.15
655.5215	10492065.00	17657924.50	6946358.1	-21932.95	8906.47	8993.42
657.9214	10439386.50	17678229.00	6967913.81	-21967.53	8848.00	8970.37
660.3496	10386002.00	17700641.50	6989667.31	-22002.53	8788.44	8946.84
662.7495	10333156.75	17721662.50	7011111.63	-22036.93	8729.71	8923.38
665.1494	10280229.12	17742542.50	7032498.00	-22071.19	8670.97	8900.12
667.5493	10227219.50	17763281.25	7053829.37	-22105.33	8612.03	8876.73
669.9214	10174744.62	17783640.25	7074858.00	-22138.67	8553.61	8853.44
672.3213	10121577.62	17804097.25	7096077.12	-22172.29	8494.59	8829.91
674.7212	10068322.00	17824412.50	7117232.75	-22205.86	8435.54	8806.34
677.1216	10014979.00	17844589.75	7138349.81	-22239.24	8376.01	8782.51
679.5215	9961567.12	17864620.50	7159398.31	-22272.41	8316.97	8758.63
681.9214	9908076.12	17884560.25	7180389.50	-22305.22	8257.59	8734.74
684.3354	9854189.75	17904371.25	7201446.69	-22338.53	8197.70	8710.70
686.7495	9800222.62	17924088.75	7222445.69	-22371.21	8137.83	8686.52
689.1216	9747119.50	17943322.50	7243022.25	-22403.34	8078.94	8662.53
691.5215	9693215.00	17962633.50	7263782.75	-22435.54	8019.23	8638.57
693.9214	9639433.25	17981813.25	7284485.19	-22467.71	7959.51	8614.15
696.3213	9585474.37	18000843.25	7305129.12	-22499.85	7899.55	8589.84
698.7212	9531439.00	18019729.75	7325714.75	-22531.50	7839.83	8565.54
700.3486	9494752.75	18032455.50	7332641.19	-22552.98	7799.18	8548.99
703.5493	9422500.50	18057293.00	7366951.19	-22595.07	7719.12	8516.12
705.9492	9368237.00	18075743.00	387359.56	-22626.32	7658.94	8491.51
708.3496	9313887.75	18094055.00	407712.81	-22657.29	7598.64	8466.77
710.7212	9259117.87	18112005.50	427763.56	-22687.88	7539.21	8442.41
713.1216	9205621.50	18130030.00	447999.81	-22718.43	7478.87	8417.57
715.5215	9151062.50	18147976.00	468171.12	-22749.21	7418.44	8392.51
717.9492	9095796.25	18165842.00	489514.21	-22779.87	7357.33	8367.30
720.3496	9041079.37	18183429.75	509569.00	-22810.07	7296.73	8342.26
722.7495	8986311.25	18200968.50	528559.69	-22840.27	7236.28	8317.29
725.1494	8931451.25	18218162.00	549489.81	-22869.90	7175.54	8291.84
727.5493	8876527.12	18235219.75	568359.19	-22899.62	7114.91	8266.68
729.9214	8822176.00	18252115.50	587936.81	-22928.75	7054.71	8241.74
732.3354	8766789.00	18269072.25	607804.12	-22958.29	6993.59	8216.29
734.7495	8711330.62	18285881.25	627607.81	-22987.73	6932.12	8192.64
737.1494	8655127.87	18302445.00	7647233.94	-23016.49	6871.33	8165.11
739.5493	8600855.87	18318862.25	7666798.69	-23045.38	6810.25	8139.55
741.9492	8545515.00	18335132.50	7686301.94	-23073.91	6748.39	8113.78
744.3496	8490004.50	18351252.00	7705747.06	-23102.35	6687.77	8087.86
746.7495	8434617.37	18367035.75	7725126.12	-23130.47	6626.68	8062.06
748.3486	8397614.00	18377799.75	7738004.44	-23149.16	6585.72	8044.67
751.5493	8323461.06	18398747.75	7763597.75	-23186.53	6523.95	8012.20
753.9492	8267782.50	18414283.00	7782809.25	-23214.15	6442.56	7984.22
756.3495	8212026.50	18429673.75	7802024.19	-23241.66	6380.38	7958.13
758.7495	8156216.00	18444913.50	7821091.56	-23268.98	6319.34	7931.98
761.1494	8100347.12	18460065.25	7840096.19	-23296.11	6257.61	7905.84
763.5493	8044290.31	18474949.00	7859037.75	-23323.16	6196.12	7879.47
765.9492	7988393.69	18489745.00	7877916.06	-23350.07	6134.40	7853.08
768.3496	7932212.87	18504395.75	7896734.69	-23376.36	6072.53	7826.59
770.7495	7876179.74	18519835.00	7915496.12	-23403.12	6010.77	7800.29
773.1494	7819993.75	18533245.75	7934173.62	-23429.73	5948.72	7773.37
775.5493	7763725.06	18547447.75	7952797.19	-23455.12	5886.78	7746.92
777.9492	7707473.69	18561501.25	7971356.94	-23481.26	5824.86	7720.16
780.3354	7651341.75	18575327.00	7989747.25	-23506.60	5763.12	7693.55
782.7495	7594564.44	18589163.75	8008287.50	-23532.22	5700.49	7666.64
785.1494	7538059.25	18602769.75	8026454.44	-23557.34	5638.28	7639.74
787.5493	7481493.50	18616225.50	8044855.50	-23582.49	5575.97	7612.62
789.9492	7424967.62	18629523.50	8063193.94	-23607.46	5512.73	7585.85
792.3496	7368170.50	18642693.75	8081270.12	-23632.46	5451.34	7558.50
794.7495	7311425.50	18655701.25	8099477.44	-23656.99	5388.76	7531.51
796.3896	7272611.06	18664504.75	8111814.75	-23673.72	5346.16	7512.78
799.5493	7197759.91	18681266.75	8135496.12	-23705.45	5263.89	7477.01
801.9492	7140841.25	18692824.50	8152407.19	-23729.49	5201.32	7449.49
804.3496	7083951.56	18706234.50	8171256.00	-23753.32	5138.59	7422.07
806.7495	7026817.62	18718491.25	8189035.31	-23776.93	5075.79	7394.66
809.1494	6969727.12	18730597.25	8206748.56	-23800.41	5012.07	7366.95
811.5493	6912580.44	18742553.00	8224295.50	-23823.73	4950.37	7339.43
813.9492	6855378.12	18754359.00	8241976.06	-23846.82	4887.50	7311.67
816.3496	6798109.19	18766014.25	8259493.69	-23869.52	4824.59	7283.93
818.7495	6740797.25	18777517.25	8276941.30	-23892.41	4761.51	7256.12
821.1494	6683430.69	18788869.00	8294221.36	-23914.98	4698.65	7228.27
823.5493	6626019.50	18800069.50	8311635.19	-23937.11	4635.61	7200.34
825.9492	6569537.19	18811118.75	8328881.75	-23959.25	4572.45	7172.35
828.3354	6511338.81	18821955.00	8345963.44	-23981.12	4509.77	7144.55
830.7495	6453420.62	18832765.25	8363176.69	-24002.89	4446.41	7116.27
833.1494	6395790.00	18843360.00	8380221.12	-24024.58	4382.87	7087.99
835.5493	6338107.62	18853802.75	8397197.62	-24046.04	4319.78	7059.68
837.9492	6280374.25	18864093.75	8414106.25	-24067.02	4256.41	7031.46

CONFIDENTIAL

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
214.0234	18381314.00	11591455.12	2240030.75	-13041.49	17929.64	11839.54
216.4233	18349934.25	11634442.12	2269435.37	-13101.15	17891.81	11831.95
218.7983	18318749.25	11676888.75	2296527.84	-13159.95	17854.47	11824.87
220.4385	18297131.75	11706151.12	2315917.84	-13200.55	17828.47	11819.51
223.5986	18255292.75	11762412.62	2353253.72	-13278.62	17778.49	11809.62
225.9985	18223354.75	11805033.12	2381596.16	-13337.87	17745.09	11801.71
228.3984	18191274.00	11847561.62	2409899.84	-13396.80	17701.84	11796.91
230.7983	18159251.75	11889995.00	2438194.87	-13456.38	17663.17	11786.13
233.1982	18126488.00	11932341.37	2466477.97	-13514.77	17624.45	11778.73
235.5986	18094176.50	11974609.62	2494733.53	-13573.67	17585.83	11771.09
237.9985	18061530.50	12016758.00	2522973.97	-13632.48	17546.81	11762.96
240.3984	18029743.75	12058821.75	2551188.59	-13690.98	17507.69	11753.59
242.7983	17995816.50	12100791.37	2579386.03	-13749.48	17468.47	11745.24
245.1982	17962749.00	12142665.62	2607563.53	-13807.91	17429.18	11736.98
247.5986	17929534.50	12184455.75	2635726.67	-13866.22	17389.50	11729.44
249.9985	17896187.50	12226141.25	2663863.37	-13924.21	17349.85	11719.81
252.3843	17862898.75	12267486.25	2691813.25	-13982.16	17310.21	11711.93
254.7983	17829074.75	12309226.00	2720073.53	-14040.39	17270.37	11702.13
257.1982	17795209.75	12350624.75	2748146.91	-14098.43	17230.26	11693.31
259.5986	17761398.50	12391935.25	2776204.62	-14156.21	17189.78	11684.31
261.9985	17727256.00	12433140.75	2804234.75	-14213.72	17149.54	11675.05
264.3984	17693175.50	12474249.37	2832247.72	-14271.28	17108.99	11665.88
266.7983	17659856.50	12515260.62	2860229.41	-14328.89	17068.45	11656.49
268.4385	17635323.25	12542232.50	2879341.66	-14367.95	17040.77	11650.39
271.5586	17589799.00	12596998.97	2916138.84	-14443.48	16986.95	11637.81
273.9985	17555267.75	12637714.57	2944056.87	-14500.37	16945.76	11628.16
276.3984	17520199.75	12678335.25	2971951.75	-14557.39	16904.54	11618.53
278.7983	17485195.00	12718855.12	2999823.59	-14614.49	16863.29	11608.94
281.1982	17450053.75	12759275.87	3027672.12	-14671.11	16821.96	11599.11
283.5986	17414769.00	12799595.12	3055507.62	-14728.00	16780.25	11589.20
285.9985	17379255.25	12839826.12	3083303.41	-14784.56	16738.69	11579.07
288.3984	17343806.00	12879947.12	3111079.94	-14841.04	16656.79	11568.97
290.7983	17308121.25	12919967.12	3138832.25	-14897.43	16654.55	11558.90
293.1982	17272301.50	12959886.25	3166559.97	-14953.63	16612.79	11548.38
295.5986	17236339.75	12999712.50	3194265.25	-15009.75	16570.79	11538.18
297.9985	17200250.25	13039472.12	3221946.22	-15064.94	16528.19	11527.73
300.3843	17164242.25	13078819.37	3249435.87	-15121.65	16485.77	11517.23
302.7983	17127668.00	13118556.50	3277226.22	-15177.53	16442.05	11506.48
305.1982	17091176.50	13157965.62	3304827.72	-15233.79	16400.60	11495.79
307.5986	17054544.00	13197781.75	3332408.87	-15288.88	16357.12	11484.87
309.9985	17017785.50	13236485.75	3359958.47	-15344.41	16314.19	11474.04
312.3984	16980894.00	13275585.37	3387481.72	-15399.77	16271.00	11462.95
314.7983	16943872.00	13314583.25	3414979.16	-15454.96	16227.79	11451.68
316.4385	16919495.75	13341174.87	3433754.31	-15492.81	16198.73	11444.17
319.5986	16869417.00	13392273.00	3469896.31	-15565.04	16140.78	11429.38
321.9985	16831996.25	13432956.62	3497311.75	-15620.09	16096.88	11417.74
324.3984	16794444.25	13469535.12	3524599.66	-15674.71	16053.19	11406.46
326.7983	16755760.75	13508508.62	3552076.28	-15729.43	16009.34	11395.00
329.1982	16718946.25	13546274.25	3579393.76	-15783.91	15965.13	11383.25
331.5986	16680093.75	13584646.00	3606703.25	-15839.49	15921.16	11371.56
333.9985	16642917.25	13622802.00	3633979.56	-15892.80	15876.99	11359.63
336.3984	16604711.37	13660851.12	3661227.34	-15946.71	15832.08	11347.78
338.7983	16566275.37	13698793.00	3688446.50	-16001.22	15787.51	11335.79
341.1982	16527919.50	13736628.00	3715636.56	-16055.21	15742.87	11323.52
343.5986	16489306.50	13774363.25	3742802.01	-16108.92	15698.11	11311.43
345.9985	16450582.50	13811983.12	3769934.44	-16162.48	15653.01	11299.10
348.3843	16411959.62	13849273.62	3796876.50	-16215.56	15608.18	11286.80
350.7983	16372749.12	13886895.03	3824138.28	-16269.57	15562.75	11274.15
353.1982	16333639.87	13924192.50	3851150.10	-16322.84	15517.33	11261.69
355.5986	16294394.75	13961285.62	3878167.28	-16376.12	15471.93	11249.06
357.9985	16255029.87	13998461.87	3905148.59	-16429.78	15426.14	11236.28
360.3984	16215537.75	14035478.50	3932099.12	-16482.15	15380.66	11223.39
362.7983	16175918.87	14072285.50	3959019.69	-16535.00	15334.73	11210.49
364.4385	16148769.50	14097417.50	3977398.66	-16571.20	15303.09	11201.55
367.5986	16096292.50	14145674.75	4012769.56	-16640.47	15242.37	11184.35
369.9985	16056294.12	14182199.62	4039598.22	-16692.93	15196.24	11171.28
372.3984	16016170.25	14218613.62	4066389.31	-16745.03	15150.00	11158.06
374.7983	15975920.87	14254916.25	4093151.34	-16797.48	15103.47	11144.54
377.1982	15935546.00	14291107.37	4119981.12	-16849.63	15056.96	11131.19
379.5986	15895037.87	14327193.62	4146583.87	-16901.57	15010.13	11117.48
381.9772	15854896.00	14362736.12	4172934.12	-16952.59	14963.65	11104.19
384.3984	15813665.62	14399013.75	4199882.50	-17005.12	14916.35	11090.16
386.7983	15772793.12	14434755.00	4226479.56	-17056.83	14869.19	11076.63
389.1982	15731796.62	14470382.87	4253045.56	-17108.33	14821.99	11062.57
391.5986	15692668.25	14505904.62	4279583.19	-17159.69	14774.62	11048.51
393.9985	15649425.50	14541305.75	4306091.81	-17210.67	14727.07	11034.62
396.3843	15608374.62	14576283.97	4332394.94	-17261.51	14679.87	11020.64
398.7765	15567254.25	14611356.87	4358671.62	-17312.23	14632.45	11006.32
401.1704	15525445.50	14646415.62	4385068.44	-17363.14	14584.34	10991.90
403.5986	15483221.75	14681771.12	4411741.81	-17414.34	14536.12	10977.59
405.9985	15441368.50	14716593.50	4438369.31	-17464.85	14487.87	10962.90
408.3984	15399394.00	14751313.25	4464761.81	-17515.33	14439.78	10948.40
410.7983	15357298.50	14785906.25	4490619.93	-17565.61	14391.34	10933.46
412.3652	15329749.25	14808431.37	4507743.12	-17598.57	14359.97	10924.01
415.5703	15273237.75	14854357.50	4542723.44	-17665.18	14295.30	10904.03
417.9702	15231783.00	14888601.25	4568874.06	-17715.23	14246.43	10889.04
420.3706	15188199.87	14922739.62	4594993.94	-17764.91	14197.61	10874.01

CONFIDENTIAL

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
422.7735	15165506.12	14954754.00	4621072.31	-17814.63	14148.91	10858.82
425.1744	15112693.75	14990650.87	4647114.25	-17863.85	14099.65	10843.68
427.5986	15059255.25	15024827.75	4673426.50	-17914.16	14050.03	10828.36
429.9453	15017160.25	15057742.25	4698819.56	-17962.10	14001.88	10813.32
432.3452	14973993.87	15091286.25	4724757.06	-18011.25	13952.63	10797.95
434.7456	14920711.25	15124718.62	4750652.37	-18060.13	13903.12	10782.18
437.1455	14887300.12	15158025.12	4776509.81	-18109.95	13853.47	10766.54
439.5454	14843781.62	15191212.50	4802329.69	-18157.88	13803.80	10751.91
441.9453	14800146.50	15224293.37	4828111.75	-18206.18	13753.83	10735.09
444.3184	14756835.50	15256860.37	4853567.75	-18254.13	13704.60	10719.29
446.7744	14711991.87	15290455.62	4879874.87	-18303.39	13653.23	10702.97
449.1743	14668007.50	15323162.87	4905541.56	-18351.90	13603.19	10686.82
451.5464	14624419.62	15355371.62	4930872.50	-18399.11	13553.39	10670.80
453.9462	14580236.25	15387833.25	4956461.81	-18446.87	13503.27	10654.48
456.3462	14535878.25	15420184.12	4982011.94	-18494.59	13452.70	10638.16
458.7466	14491426.87	15452415.12	5007528.19	-18542.22	13402.14	10621.92
460.3735	14461233.25	15474191.62	5024800.44	-18574.53	13367.50	10610.76
463.5742	14401491.00	15516868.87	5058726.37	-18637.68	13300.05	10588.42
465.9746	14356996.87	15548733.75	5084127.87	-18684.69	13248.89	10571.87
468.3745	14311989.00	15580467.75	5109474.12	-18731.79	13198.33	10555.03
470.7744	14266979.12	15612083.00	5134784.81	-18778.79	13146.57	10538.09
473.1465	14222278.87	15643254.62	5159762.25	-18824.83	13096.02	10521.54
475.5464	14177145.25	15674572.00	5184992.50	-18871.43	13044.57	10504.52
477.9746	14131763.87	15706194.12	5210478.87	-18918.62	12992.66	10487.28
480.3745	14085915.62	15737363.12	5235626.31	-18964.77	12940.87	10469.78
482.7744	14042036.87	15768298.12	5260732.19	-19010.90	12889.33	10452.60
485.1743	13994557.25	15799169.12	5285796.50	-19057.09	12837.63	10435.18
487.5742	13948767.00	15829915.75	5310819.06	-19102.94	12785.59	10417.82
489.9463	13903400.12	15860183.12	5335510.31	-19147.95	12734.17	10400.49
492.3604	13857120.25	15890863.75	5360596.37	-19193.90	12681.59	10382.78
494.7744	13811729.87	15921411.75	5385639.62	-19239.39	12629.31	10364.99
497.1743	13764502.62	15951657.87	5410493.25	-19284.87	12576.82	10347.22
499.5742	13718167.00	15981778.00	5435304.19	-19329.81	12524.32	10329.43
501.9746	13671713.75	16011778.25	5460077.12	-19374.85	12471.77	10311.31
504.3745	13625161.87	16041646.12	5484801.75	-19419.95	12419.14	10293.38
506.7744	13578502.50	16071387.62	5509482.94	-19464.49	12366.45	10275.10
508.3735	13547352.75	16091134.75	5525904.50	-19494.13	12330.98	10263.09
511.5742	13484963.00	16130489.75	5558714.31	-19553.63	12260.34	10238.70
513.9746	13437973.37	16159855.25	5583269.19	-19597.97	12207.39	10220.34
516.3745	13392787.37	16189087.75	5607774.75	-19642.02	12153.97	10201.80
518.7744	13343595.87	16218192.25	5632235.62	-19685.83	12100.76	10183.10
521.1743	13296299.12	16247169.75	5656652.06	-19729.66	12047.38	10164.75
523.5742	13248837.62	16276017.00	5681023.94	-19773.20	11993.77	10146.00
525.9746	13201382.00	16304742.75	5705355.81	-19816.72	11940.42	10127.27
528.3745	13153771.87	16333323.87	5729637.44	-19860.05	11886.52	10108.23
530.7744	13106057.50	16361795.87	5753873.56	-19903.51	11832.76	10089.38
533.1743	13058239.37	16390129.62	5778044.06	-19946.59	11778.87	10070.18
535.5742	13010319.00	16418332.00	5802208.62	-19989.44	11724.92	10051.12
537.9746	12962294.12	16446411.62	5826312.31	-20032.26	11670.90	10032.02
540.3604	12914441.87	16474197.87	5850222.12	-20074.55	11616.79	10012.76
542.7744	12865929.25	16502168.75	5874370.94	-20117.22	11562.31	9993.17
545.1743	12817599.25	16529851.87	5898330.56	-20159.35	11507.98	9973.99
547.5742	12769168.00	16557464.37	5922242.69	-20201.69	11453.35	9954.47
549.9746	12720625.75	16584831.50	5946114.62	-20243.64	11398.88	9934.74
552.3745	12671092.75	16612122.00	5969933.44	-20285.48	11344.11	9915.05
554.7744	12623259.37	16639281.00	5993704.69	-20327.38	11289.27	9895.12
556.4146	12589926.50	16657766.12	6009923.06	-20355.57	11251.76	9881.77
559.5742	12525492.50	16693203.50	6041104.81	-20410.17	11179.29	9855.56
561.9746	12476451.50	16719572.25	6064727.87	-20451.49	11124.39	9835.48
564.3745	12427320.75	16745603.62	6088218.00	-20492.48	11069.26	9815.43
566.7744	12378091.62	16772102.37	6111849.69	-20532.40	11014.02	9795.10
569.1743	12328764.87	16799468.25	6135332.87	-20573.93	10958.55	9775.01
571.5742	12279347.50	16825701.00	6158767.44	-20614.72	10902.99	9754.59
573.9746	12229333.62	16851826.00	6182157.94	-20655.00	10847.47	9734.31
576.3745	12180192.12	16877771.75	6205494.37	-20695.30	10791.64	9713.55
578.7744	12132475.25	16902624.00	6228781.44	-20735.43	10736.11	9693.12
581.1743	12087664.37	16929077.50	6252019.19	-20775.39	10680.20	9672.47
583.5742	12033757.62	16954865.75	6275237.31	-20815.18	10624.21	9651.73
585.9746	11987745.37	16980302.00	6298350.25	-20854.90	10568.32	9630.93
588.3604	11937044.25	17005443.50	6321302.06	-20894.12	10512.39	9610.89
590.7744	11887456.75	17030757.75	6344475.75	-20933.71	10455.91	9588.98
593.1743	11837170.87	17055783.25	6367463.06	-20972.97	10399.54	9567.93
595.5742	11779791.37	17080673.75	6390399.94	-21011.74	10343.32	9546.89
597.9746	11729318.37	17105434.00	6413290.56	-21050.62	10286.85	9525.51
600.3745	11678742.37	17130053.50	6436175.37	-21089.46	10230.11	9504.31
602.7744	11628183.37	17154536.75	6458839.00	-21128.00	10173.47	9482.77
604.4146	11593410.25	17171190.75	6474451.00	-21154.06	10134.78	9469.16
607.5742	11525489.62	17202903.00	6504031.75	-21204.58	10059.88	9439.99
609.9746	11475544.87	17227174.50	6526955.25	-21242.46	10003.04	9418.21
612.3745	11424519.37	17251117.50	6549532.19	-21280.57	9946.06	9396.63
614.7744	11373403.00	17274913.50	6572056.94	-21318.19	9889.00	9374.78
617.1743	11322196.50	17298577.50	6594529.31	-21355.63	9831.75	9352.95
619.5742	11270900.50	17322104.00	6616940.19	-21392.82	9774.48	9331.03
621.9746	11219544.50	17345497.75	6639321.12	-21430.26	9717.00	9309.22
624.3745	11169029.62	17368748.50	6661635.50	-21467.28	9659.51	9286.88
626.7744	11116466.00	17391861.75	6683805.44	-21504.06	9602.24	9264.66
629.1743	11064814.12	17414836.75	6706104.19	-21540.94	9544.44	9242.53

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
631.5742	11113074.25	17437673.5	6729258.69	-21577.36	9466.91	9221.32
633.9746	11961226.52	17462274.50	6750264.00	-21613.78	9429.13	9197.77
636.3664	10909678.87	17492803.25	6772291.00	-21649.67	9371.41	9175.57
638.7744	10857321.37	17505254.00	6794434.00	-21686.03	9313.15	9152.87
641.1494	10805774.87	17527405.50	6816115.62	-21721.59	9255.82	9130.59
643.5493	10753602.50	17549555.00	6838900.81	-21757.14	9197.75	9107.82
645.9492	10701344.62	17571553.75	6859331.44	-21792.87	9139.41	9085.07
648.3456	10549591.00	17593422.00	6881611.69	-21828.37	9081.13	9062.22
650.7495	10596563.00	17615145.75	6903332.56	-21863.63	9022.77	9039.22
652.4233	10559946.75	17637214.00	6918449.19	-21887.97	8981.08	9023.15
655.5215	10492065.00	17657924.52	6946358.12	-21932.95	8906.43	8999.42
657.9214	10439286.52	17572022.00	6967913.81	-21967.53	8848.00	8977.37
660.3495	10386012.00	17700641.52	6989667.31	-22002.53	8788.44	9946.84
662.7495	10333156.75	17721662.50	7011110.69	-22036.93	8729.71	8923.38
665.1494	10280229.12	17742547.50	7032498.00	-22071.19	8670.97	8900.12
667.5493	10227219.50	17763281.25	7053829.37	-22105.33	8612.03	8875.73
669.9214	10174744.62	17783642.25	7074858.00	-22138.67	8552.61	8853.44
672.3213	10121572.62	17804607.25	7096077.12	-22172.29	8494.59	8829.91
674.7212	10068327.00	17824412.50	7117232.75	-22205.86	8435.54	8806.34
677.1216	10014979.00	17844589.75	7138340.81	-22239.34	8376.01	8782.51
679.5215	9961567.12	17864623.52	7159398.31	-22272.41	8316.97	8758.63
681.9214	9908076.12	17884509.25	7180399.50	-22305.22	8257.59	8734.74
684.3354	9854189.75	17904371.25	7201445.69	-22338.55	8197.70	8710.70
686.7495	9800222.62	17924188.75	7222445.69	-22371.23	8137.83	8686.52
689.1216	9747119.50	17943322.50	7243032.25	-22403.34	8078.94	8662.53
691.5215	9693215.00	17962633.52	7263782.75	-22435.54	8019.23	8638.57
693.9214	9639433.25	17981813.25	7284485.19	-22467.71	7959.51	8614.15
696.3213	9585474.37	18000843.25	7305129.12	-22499.85	7899.55	8589.94
698.7212	9531439.00	18019729.75	7325714.75	-22531.57	7839.83	8565.54
700.3486	9494752.75	18032455.50	7339641.19	-22552.98	7799.19	8548.95
703.5493	9422520.50	18057293.00	7366951.19	-22595.07	7719.12	8516.12
705.9492	9368237.00	18075743.00	7387359.56	-22626.32	7658.94	8491.51
708.3496	9313887.75	18094055.00	7407712.81	-22657.29	7598.64	8466.77
710.7212	9260117.87	18112005.52	7427763.56	-22687.89	7539.71	8442.41
713.1216	9205621.50	18130020.00	7447999.81	-22718.43	7478.87	8417.57
715.5215	9151062.50	18147906.50	7468173.12	-22749.21	7418.44	8392.51
717.9492	9095796.25	18165842.00	7488514.31	-22779.87	7357.32	8367.37
720.3496	9041079.37	18183429.75	7508559.00	-22810.07	7296.73	8342.26
722.7495	8986321.25	18200868.52	7528559.69	-22840.27	7236.28	8317.29
725.1494	8931451.25	18218162.00	7549489.81	-22869.90	7175.54	8291.84
727.5493	8876530.12	18235219.75	7568359.19	-22899.62	7114.01	8266.68
729.9214	8822176.00	18252115.52	7587936.81	-22928.75	7054.71	8241.74
732.3354	8765789.00	18269272.25	7607804.12	-22958.29	6993.59	8214.29
734.7495	8711339.62	18285881.25	7627607.81	-22987.73	6932.32	8190.64
737.1494	8656127.87	18302445.00	7647233.94	-23016.49	6871.33	8165.11
739.5493	8600855.87	18318862.25	7666798.69	-23045.38	6810.25	8139.55
741.9492	8545515.00	18335132.50	7686301.94	-23073.91	6749.09	8113.78
744.3496	8490094.50	18351252.00	7705747.06	-23102.35	6687.72	8087.86
746.7495	8434617.37	18367235.75	7725125.12	-23132.47	6626.68	8062.06
748.3486	8397614.00	18377799.75	7738004.44	-23149.16	6585.72	8044.67
751.5493	8323461.06	18398747.75	7763697.75	-23186.53	6503.95	8010.70
753.9492	8267782.50	18414283.00	7782893.25	-23214.15	6442.56	7984.22
756.3496	8212026.50	18429673.75	7802024.19	-23241.44	6380.98	7958.13
758.7495	8156216.00	18444913.50	7821091.56	-23268.98	6319.34	7931.98
761.1494	8100347.12	18460065.25	7840096.19	-23296.11	6257.61	7905.84
763.5493	8044399.31	18474949.00	7859037.75	-23323.16	6196.12	7879.47
765.9492	7988393.69	18489745.00	7877914.06	-23350.07	6134.40	7853.08
768.3496	7932317.87	18504395.75	7896734.69	-23376.36	6072.53	7826.59
770.7495	7876179.94	18518893.00	7915495.12	-23403.02	6010.77	7800.29
773.1494	7819993.75	18533245.75	7934172.62	-23429.03	5949.73	7773.37
775.5493	7763725.06	18547447.75	7952797.19	-23455.12	5886.78	7746.92
777.9492	7707403.69	18561501.25	7971356.94	-23481.76	5824.86	7720.16
780.3354	7651341.75	18575327.00	7989747.25	-23506.60	5763.12	7693.55
782.7495	7594564.44	18589163.75	8008287.50	-23532.22	5700.49	7566.64
785.1494	7538059.25	18602769.75	8026654.44	-23557.34	5638.28	7639.74
787.5493	7481492.52	18616225.52	8044955.50	-23582.69	5575.97	7612.62
789.9492	7424867.62	18629533.50	8063193.94	-23607.46	5513.73	7585.85
792.3496	7368179.50	18642693.75	8081370.12	-23632.46	5451.34	7558.50
794.7495	7311425.50	18655701.25	8099477.44	-23656.99	5388.76	7531.51
796.3896	7272611.06	18664504.75	8111814.75	-23672.72	5346.16	7512.78
799.5493	7197759.91	18681265.75	8135496.12	-23705.45	5263.89	7477.01
801.9492	7143842.25	18693824.50	8153407.19	-23729.49	5201.32	7449.49
804.3496	7083951.56	18706234.52	8171256.00	-23753.32	5138.59	7422.07
806.7495	7026817.62	18718491.25	8189035.31	-23776.97	5075.79	7394.66
809.1494	6969727.12	18730597.25	8206748.56	-23800.41	5013.07	7366.95
811.5493	6912580.44	18742553.00	8224295.50	-23823.77	4950.37	7339.43
813.9492	6955378.12	18754359.00	8241976.06	-23846.92	4887.50	7311.67
816.3496	6793119.19	18766014.25	8259493.69	-23869.52	4824.59	7280.93
818.7495	6740797.25	18777517.25	8276941.00	-23892.41	4761.51	7256.12
821.1494	6683430.69	18788869.00	8294321.56	-23914.98	4698.65	7228.27
823.5493	6626010.50	18800069.50	8311635.19	-23937.11	4635.61	7200.34
825.9492	6568527.19	18811118.75	8328881.75	-23959.25	4572.45	7172.35
828.3354	6511338.91	18821955.00	8345962.44	-23981.12	4509.77	7144.55
830.7495	6453470.62	18832765.25	8363175.69	-24002.89	4446.41	7116.27
833.1494	6395790.00	18843363.00	8380221.12	-24024.58	4382.97	7087.99
835.5493	6338157.62	18853802.75	8397197.62	-24046.94	4319.78	7059.68
837.9492	6280374.25	18864003.75	8414126.25	-24067.02	4256.41	7031.46

CONFIDENTIAL

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
840.3496	6222578.56	18874234.50	8432057.50	-24098.2	4197.89	7003.08
842.7495	5164744.44	18884221.00	8447722.87	-24108.6	4129.56	6974.49
844.3896	6125191.36	18890859.75	8459146.12	-24123.0	4086.36	6955.16
847.5493	6048927.44	18903737.75	8481062.87	-24150.1	4002.50	6917.63
849.9492	5990945.25	18913267.00	8497630.12	-24170.3	3938.83	6889.02
852.3242	5933517.31	18922547.50	8513957.87	-24190.00	3876.17	6860.65
854.7246	5875427.69	18931775.00	8530391.25	-24210.00	3812.30	6831.65
857.1245	5817322.55	18940947.75	8546752.25	-24229.51	3749.54	6803.02
859.5244	5759130.62	18949767.50	8563044.12	-24249.06	3685.91	6774.10
861.9243	5700912.12	18958534.50	8579265.62	-24268.32	3621.14	6745.27
864.3242	5642647.56	18967148.50	8595427.00	-24287.45	3557.44	6716.39
866.7246	5584325.67	18975611.25	8611506.87	-24306.19	3493.67	6687.18
869.1245	5525977.56	18983919.00	8627521.50	-24325.09	3429.70	6658.01
871.5244	5467571.44	18992073.25	8643464.12	24343.64	3365.87	6628.95
873.9243	5409126.44	19000074.25	8659337.87	24361.70	3301.75	6599.64
876.3105	5351972.06	19007877.25	8675051.50	24379.90	3238.21	6570.68
878.6963	5292786.69	19015527.00	8690692.62	24397.68	3174.75	6541.40
881.0962	5234213.37	19023069.75	8706255.87	24415.41	3110.32	6511.88
883.5244	5174906.06	19030543.00	8722132.25	24432.94	3045.71	6482.31
885.9243	5116249.25	19037775.25	8737653.50	24450.52	2981.56	6452.56
888.3242	5057549.75	19044854.00	8753103.62	24467.71	2917.47	6423.10
890.7246	4998796.69	19051779.50	8768486.12	-24484.39	2852.99	6393.54
892.3984	4957806.06	19056517.50	8779171.37	-24496.37	2808.21	6372.71
895.4965	4881877.75	19065180.00	8799854.37	-24517.71	2725.09	6334.31
897.8965	4823017.87	19071552.00	8814120.50	-24534.11	2660.87	6304.62
900.2964	4764119.37	19077860.50	8829115.25	-24550.34	2596.54	6274.83
902.6963	4705181.37	19084014.75	8844139.50	-24566.2	2532.29	6245.02
905.0962	4646235.75	19090014.75	8859099.87	-24582.0	2467.80	6215.06
907.4966	4587180.50	19095861.00	8873972.25	24597.6	2403.36	6184.87
909.9243	4527445.12	19101616.50	8888950.50	24613.1	2338.02	6154.40
912.2964	4469043.25	19107287.00	8903513.75	24628.2	2274.45	6124.56
914.6963	4409920.00	19112467.75	8918176.12	24643.1	2209.75	6094.55
917.0962	4350761.37	19117693.25	8932766.00	24657.7	2145.02	6064.21
919.4966	4291555.50	19122764.75	8947286.25	24672.4	2080.55	6034.06
921.8975	4232332.56	19127682.50	8961736.75	24686.9	2015.92	6003.53
924.2974	4173039.28	19132442.75	8976107.87	24701.1	1951.29	5972.96
926.7256	4113042.29	19137121.50	8990574.37	24715.2	1885.84	5942.29
929.1255	4053711.47	19141551.00	9004798.62	24729.12	1821.27	5911.79
931.5254	3994347.44	19145843.00	9018949.62	24742.91	1756.40	5881.23
933.8975	3935640.06	19149933.25	9032864.50	-24755.96	1692.39	5850.97
936.2974	3876212.37	19153917.25	9046869.50	-24769.12	1627.65	5820.35
938.6973	3816753.19	19157745.50	9060930.87	-24782.31	1562.71	5789.62
940.3242	3776426.53	19160252.25	9072273.25	-24790.78	1518.95	5768.63
943.5254	3697249.30	19164976.00	9088604.00	-24807.65	1432.32	5727.62
945.9253	3637488.94	19168235.50	9102312.62	-24820.26	1367.35	5696.66
948.3252	3577928.00	19171539.25	9115947.00	-24832.53	1302.54	5665.83
950.7256	3519285.81	19174589.00	9129511.00	-24844.54	1237.53	5634.83
953.1255	3459647.19	19177480.00	9142935.62	-24856.32	1172.71	5603.68
955.4976	3399672.66	19180185.50	9156251.75	-24867.77	1108.33	5573.13
957.9253	3339286.37	19182796.50	9169743.50	-24879.27	1042.67	5541.58
960.3252	3279565.16	19185221.50	9183075.12	-24890.44	977.46	5510.21
962.7256	3219805.09	19187489.75	9196194.37	-24901.51	912.52	5479.07
965.1255	3160130.91	19189601.00	9209376.00	-24912.41	847.64	5447.70
967.5254	3100232.78	19191557.00	9222342.62	-24922.99	782.41	5416.53
969.9253	3040405.59	19193355.75	9235213.87	-24933.37	717.65	5385.02
972.3115	2980896.50	19194991.25	9248116.50	-24943.70	652.57	5353.76
974.7256	2920669.76	19196487.50	9261002.37	-24953.47	587.06	5321.95
977.1255	2860771.09	19197813.25	9272736.87	-24963.51	521.89	5290.59
979.5254	2800849.81	19198992.50	9286395.87	-24972.93	456.72	5259.00
981.9253	2740955.72	19200013.25	9298979.00	24982.52	391.41	5227.36
984.3252	2680939.34	19200871.50	9311486.00	24991.50	326.42	5195.54
986.7256	2620939.06	19201576.50	9323919.12	25000.62	260.89	5163.71
988.3652	2579942.00	19201967.75	9332368.00	25006.48	216.41	5142.03
991.5254	2500800.44	19202516.25	9343551.50	25017.85	130.69	5100.16
993.9253	2441849.66	19202751.50	9361752.12	25026.69	65.44	5068.29
996.3252	2382777.00	19202823.00	9372878.12	25034.62	[illegible]	5036.27
998.7256	2322675.00	19202752.00	9384078.87	25042.67	-65.18	5004.39
1001.1255	2260565.75	19202517.25	9396000.50	25050.39	-130.42	4972.41
1003.5254	2200438.44	19202125.75	9408795.37	25057.78	-195.72	4940.34
1005.9253	2140293.12	19201577.75	9420613.12	25065.30	-261.01	4908.19
1008.3252	2080137.00	19200871.00	9432252.62	25072.40	-326.36	4875.94
1010.7255	2019937.00	19200011.00	9444019.12	25079.65	-391.83	4843.73
1013.1255	1959741.00	19198992.25	9455434.62	25086.26	-457.06	4811.31
1015.5254	1899528.64	19197817.00	9467112.00	25092.97	-522.38	4779.33
1017.9253	1839300.55	19196485.00	9478544.12	-25099.14	-587.73	4746.98
1020.3115	1779400.84	19195005.00	9489832.87	-25105.30	-652.71	4714.61
1022.7256	1718787.78	19193249.75	9501174.75	-25111.36	-718.65	4681.94
1025.1255	1658516.02	19191546.75	9512372.12	-25117.16	-783.92	4649.56
1027.5254	1598230.80	19189587.00	9523491.75	-25122.57	-849.15	4617.12
1029.9253	1537932.70	19187471.50	9534532.00	-25127.89	-914.69	4584.29
1032.3252	1477622.14	19185197.00	9545495.75	-25132.96	-980.03	4551.73
1034.7256	1417267.09	19182765.75	9556382.50	-25138.07	-1045.57	4519.07
1036.3652	1376066.94	19181015.00	9563772.75	-25141.18	-1090.79	4496.60
1039.5254	1296607.19	19177474.00	9577916.00	-25147.31	-1176.24	4453.79
1041.9253	1236250.91	19174532.50	9583565.37	-25151.63	-1241.72	4421.00
1044.3252	1175884.50	19171474.00	9599135.75	-25155.77	-1307.11	4388.00
1046.7256	1115496.36	19163258.00	9609629.12	-25159.49	-1372.54	4355.13

CONFIDENTIAL

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
1049.1255	1055111.30	19164885.25	9620041.50	-25163.44	-1438.21	4322.17
1051.5254	994717.47	19161355.52	9630374.87	-25166.93	-1503.45	4289.31
1053.9253	934315.71	19157668.75	9640629.12	-25170.05	-1568.78	4256.28
1056.3252	873996.04	19153825.50	9650804.25	-25173.40	-1634.12	4223.26
1058.7256	813476.62	19149824.50	9660902.00	-25176.26	-1699.62	4190.18
1061.1255	753053.06	19143667.50	9670918.25	-25178.75	-1765.04	4157.06
1063.5254	692623.56	19141352.50	9680855.00	-25181.22	-1830.51	4123.90
1065.9024	632815.34	19136928.25	9690619.12	-25183.60	-1895.17	4090.93
1068.2866	572719.51	19132328.25	9700332.75	-25185.24	-1960.23	4058.04
1070.7002	511939.46	19127517.50	9710086.50	-25187.39	-2026.17	4024.37
1073.1006	451469.12	19122575.50	9719796.87	-25188.97	-2091.50	3991.30
1075.5005	391016.49	19117477.75	9729245.12	-25190.38	-2156.79	3957.60
1077.9004	330560.35	19112223.50	9738733.00	-25191.79	-2222.32	3924.22
1080.3003	270131.37	19106811.25	9748190.62	-25192.75	-2287.65	3890.83
1082.7002	209640.19	19101243.00	9757378.25	-25193.62	-2352.93	3857.46
1084.3403	168318.83	19097347.25	9763686.25	-25194.08	-2397.60	3834.59
1087.5005	88700.79	19089634.50	9775724.12	-25194.60	-2483.67	3790.27
1089.9004	28236.12	19083595.25	9784790.25	-25194.76	-2549.13	3756.85
1092.3003	-32228.94	19077393.25	9793746.00	-25194.75	-2614.54	3722.22
1094.7002	-92693.65	19071046.25	9802660.75	-25194.57	-2679.86	3689.38
1097.1006	-153170.76	19064535.00	9811476.00	-25194.24	-2745.30	3655.47
1099.5005	-213632.92	19057868.50	9820208.50	-25193.53	-2810.29	3621.93
1101.8726	-273392.71	19051125.50	9828762.62	-25192.66	-2875.00	3588.71
1104.2725	-333851.21	19044147.50	9837332.37	-25191.47	-2940.21	3554.73
1106.7002	-395078.25	19036929.25	9845923.75	-25190.51	-3006.35	3520.55
1109.1006	-455473.25	19029634.25	9854330.75	-25188.80	-3071.87	3485.55
1111.5005	-515922.02	19022184.25	9862657.37	-25187.22	-3136.87	3452.57
1113.9004	-576366.78	19014577.75	9870992.50	-25185.47	-3202.14	3418.68
1116.2066	-635452.62	19006859.25	9879019.87	-25183.39	-3267.08	3384.88
1118.6724	-696540.75	18998987.50	9887055.00	-25180.97	-3331.91	3351.06
1121.0723	-756969.61	18990913.25	9895156.25	-25178.52	-3396.93	3316.94
1123.4722	-817392.30	18982682.50	9902975.87	-25175.77	-3462.28	3283.02
1125.8726	-877820.45	18974293.50	9910915.37	-25172.83	-3527.33	3248.77
1128.3003	-939929.76	18965650.00	9918660.62	-25169.84	-3593.43	3214.30
1130.7002	-999330.95	18956949.00	9926333.62	-25166.57	-3658.43	3180.12
1132.2993	-1039573.34	18951063.00	9931400.75	-25164.02	-3701.87	3157.17
1135.5025	-1120119.66	18939073.75	9941434.62	-25159.01	-3788.67	3111.77
1137.9004	-1180494.08	18929903.00	9948861.00	-25155.76	-3853.82	3077.95
1140.3003	-1240858.97	18920576.25	9956204.62	-25151.98	-3918.99	3042.95
1142.7002	-1301213.55	18911093.00	9963466.00	-25146.63	-3984.02	3008.43
1145.1006	-1361569.52	18901451.50	9970646.37	-25141.92	-4049.15	2974.21
1147.5005	-1421901.72	18891655.00	9977742.75	-25137.05	-4114.19	2939.70
1149.9004	-1482222.36	18881724.25	9984756.37	-25132.21	-4179.15	2905.23
1152.3003	-1542531.22	18871596.75	9991687.37	-25127.23	-4244.09	2870.85
1154.7002	-1602827.50	18861333.50	9998535.50	-25121.72	-4309.06	2836.12
1157.1006	-1663122.73	18850912.25	10005331.87	-25116.14	-4373.89	2801.68
1159.5005	-1723391.80	18840337.50	10011984.12	-25110.12	-4438.79	2767.11
1161.9004	-1783646.45	18829607.50	10018583.62	-25104.14	-4503.57	2732.61
1164.2865	-1843543.31	18818783.50	10025063.00	-25097.94	-4568.08	2698.09
1166.7002	-1904111.30	18807679.25	10031532.87	-25091.52	-4633.41	2663.11
1169.1006	-1964332.50	18796479.50	10037884.00	-25084.65	-4698.22	2628.63
1171.5005	-2024525.11	18785126.50	10044153.62	-25077.90	-4763.01	2593.75
1173.9004	-2084700.87	18773619.00	10050337.62	-25070.62	-4827.75	2559.01
1176.3003	-2144859.22	18761954.25	10056433.37	-25063.38	-4892.37	2524.34
1178.7002	-2204999.69	18750135.50	10062449.75	-25055.71	-4957.02	2489.46
1180.3403	-2246090.37	18741969.25	10066513.37	-25050.71	-5001.16	2465.88
1183.5005	-2325238.19	18726529.75	10074233.25	-25040.36	-5086.54	2419.90
1185.9004	-2385222.87	18713745.25	10079998.75	-25032.26	-5151.12	2384.95
1188.3003	-2445287.81	18701305.75	10085680.50	-25023.90	-5215.48	2350.19
1190.7002	-2505432.28	18688711.75	10091278.50	-25015.17	-5280.02	2315.16
1193.1006	-2565468.19	18675960.00	10096793.62	-25006.63	-5344.60	2280.93
1195.5005	-2625470.66	18663056.00	10102223.62	-24997.45	-5409.13	2245.12
1197.9004	-2685451.19	18649997.25	10107569.50	-24988.36	-5473.71	2209.98
1200.3003	-2745439.66	18636783.75	10112831.50	-24979.39	-5537.86	2175.14
1202.7002	-2805345.59	18623416.00	10118000.50	-24969.55	-5602.44	2140.03
1205.1006	-2865270.21	18609892.75	10123104.12	-24959.59	-5666.71	2104.77
1207.5005	-2925158.91	18596214.25	10128113.50	-24949.60	-5731.01	2069.93
1209.9004	-2985023.03	18582383.25	10133038.75	-24939.22	-5795.21	2034.62
1212.2866	-3044521.53	18568478.00	10137852.12	-24928.97	-5859.43	1999.66
1214.7002	-3104676.75	18554258.00	10142635.87	-24918.46	-5923.81	1964.33
1217.1006	-3164477.72	18539961.75	10147308.62	-24907.57	-5987.86	1929.00
1219.5005	-3224239.97	18525516.50	10151995.75	-24896.32	-6052.00	1893.77
1221.9004	-3283975.19	18510913.25	10156398.25	-24885.05	-6116.17	1858.53
1224.3003	-3343683.06	18496159.00	10160816.50	-24873.54	-6180.37	1823.42
1226.7002	-3403363.03	18481249.25	10165150.00	-24861.78	-6244.10	1787.97
1228.3403	-3444133.25	18470977.25	10168062.75	-24853.87	-6287.94	1763.95
1231.5005	-3522650.16	18450968.25	10173563.37	-24837.92	-6372.09	1717.26
1233.9004	-3582244.09	18435599.00	10177642.12	-24825.73	-6436.29	1681.81
1236.3003	-3641808.09	18420076.00	10181635.87	-24812.95	-6500.02	1646.47
1238.7002	-3701341.59	18404400.25	10185544.62	-24800.31	-6563.66	1611.01
1241.1006	-3760856.44	18388569.00	10189369.37	-24787.34	-6627.61	1575.74
1243.5005	-3820328.16	18372586.00	10193108.12	-24774.43	-6691.34	1540.05
1245.9004	-3879768.00	18356451.00	10196761.75	-24760.79	-6754.96	1504.72
1248.3003	-3939175.28	18340163.50	10200330.50	-24747.29	-6818.51	1469.33
1250.7002	-3998549.91	18323723.25	10203814.12	-24733.58	-6882.30	1433.78
1253.1006	-4057903.41	18307126.75	10207212.87	-24719.63	-6945.85	1398.09
1255.5005	-4117211.12	18290381.25	10210525.62	-24705.49	-7009.26	1362.65

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
1257.9004	-4175494.62	18273483.50	10212753.12	-24691.09	-7072.80	1327.09
1260.2866	-4235235.87	18256520.75	10214977.87	-24676.54	-7135.97	1291.80
1262.7002	-4294926.44	18239231.75	10219052.37	-24661.53	-7199.78	1255.87
1265.1006	-4354105.75	18221872.5	10222924.25	-24646.56	-7263.02	1220.35
1267.5005	-4413236.69	18204366.00	10225910.12	-24631.20	-7326.41	1184.67
1269.9004	-4472330.75	18186707.5	10228610.37	-24615.85	-7389.45	1148.96
1272.3003	-4531387.37	18168897.75	10231305.00	-24600.91	-7452.63	1113.30
1274.7002	-4590416.06	18151936.50	10233954.00	-24584.22	-7515.63	1077.64
1276.3154	-4630106.75	18138762.75	10235675.37	-24573.63	-7558.20	1053.73
1279.4756	-4707729.00	18114746.5	10238931.00	-24551.96	-7641.16	1006.72
1281.8755	-4766631.56	18096322.75	10241274.25	-24535.48	-7704.21	970.99
1284.2754	-4825404.37	18077768.00	10243591.37	-24518.89	-7767.23	935.04
1286.6753	-4884217.12	18059052.00	10245792.62	-24502.04	-7830.00	899.38
1289.0752	-4943099.12	18041185.0	10247907.87	-24484.97	-7892.81	863.44
1291.4756	-5001951.81	18021164.0	10249937.75	-24467.61	-7955.74	827.82
1293.8472	-5059958.00	18002223.0	10251858.87	-24450.14	-8017.62	792.27
1296.2754	-5119226.56	17982677.5	10253738.75	-24432.14	-8080.97	756.09
1298.6753	-5177827.12	17963219.0	10255510.12	-24414.48	-8143.46	720.20
1301.0752	-5236397.31	17943500.0	10257195.75	-24395.99	-8206.14	684.48
1303.4756	-5294928.50	17923817.5	10258795.62	-24377.91	-8268.53	648.55
1305.8755	-5353410.62	17903898.75	10260309.00	-24359.16	-8330.97	612.68
1308.2612	-5411533.25	17883949.25	10261729.12	-24340.70	-8393.11	577.02
1310.6475	-5469563.31	17863847.50	10263062.62	-24321.88	-8454.97	541.43
1313.0474	-5527910.25	17842481.75	10264318.75	-24302.54	-8517.15	505.36
1315.4756	-5586808.31	17822723.75	10265501.87	-24282.86	-8580.04	469.08
1317.8755	-5645151.31	17802057.75	10266584.52	-24263.29	-8642.46	433.28
1320.2754	-5703357.12	17781242.00	10267581.37	-24243.49	-8704.60	397.34
1322.6753	-5761515.19	17760277.75	10268491.75	-24223.56	-8766.44	361.33
1324.3496	-5819261.12	17745563.50	10269075.62	-24209.24	-8809.77	336.18
1327.2504	-5874996.87	17718931.5	10270019.75	-24183.73	8887.37	291.16
1329.2905	-5921573.44	17701720.5	10270554.12	-24167.27	8937.15	262.37
1332.1592	-5990845.12	17675977.00	10271245.00	-24142.33	9010.95	219.30
1334.[illegible]	-6037471.31	17658527.75	10271640.50	-24125.38	-9060.48	190.32
1336.9555	-6105653.81	17632426.00	10272124.62	-24099.89	-9134.30	147.13
1338.8904	-6153177.69	17614733.75	10272380.75	-24082.61	-9192.72	118.14
1341.7593	-6222225.19	17588289.25	10272657.87	-24056.70	-9257.22	75.04
1343.6014	-6268465.50	17571263.50	10272774.87	-24039.26	-9326.65	46.13
1346.5596	-6337590.50	17543556.00	10272845.75	-24012.78	-9380.14	3.24
1348.4902	-6383962.69	17525393.25	10272823.75	-23994.73	-9429.67	-25.97
1351.3594	-6452748.75	17498233.5	10272637.25	-23968.10	-9502.66	-69.17
1353.2005	-6499017.12	17479840.0	10272525.75	-23949.92	-9551.76	-98.19
1356.1592	-6567681.44	17452334.75	10272182.62	-23927.36	-9624.96	-141.02
1358.0503	-6613361.37	17433609.50	10271832.00	-23903.92	-9674.09	-171.32
1360.9956	-6683267.75	17405484.5	10271322.87	-23875.64	-9747.96	-213.86
1362.8906	-6729494.94	17386068.5	10270891.62	-23857.06	-9795.92	-242.36
1365.7954	-6797752.87	17358406.25	10270124.00	-23828.38	-9869.64	-286.13
1367.6906	-6842807.19	17339657.75	10269555.00	-23809.44	-9917.57	-314.47
1370.5552	-6912019.06	17311742.75	10268578.00	-23786.21	-9990.99	-358.21
1372.4902	-6957754.91	17291764.25	10267877.12	-23761.98	-10038.73	-395.72
1375.3555	-7025743.59	17262492.5	10266694.87	-23731.19	-10112.17	-430.58
1377.2254	-7070261.50	17242827.75	10265921.25	-23711.30	-10161.15	-459.86
1380.1953	-7139929.94	17213665.25	10264444.87	-23681.49	-10233.21	-502.69
1382.1353	-7185750.94	17193764.50	10263441.12	-23661.18	-10281.76	-532.06
1384.9955	-7253386.94	17164254.25	10261958.00	-23630.89	-10353.62	-574.96
1386.9355	-7299209.37	17144121.50	10260714.37	-23610.17	-10402.27	-604.01
1389.7954	-7366694.94	17114270.25	10258925.25	-23579.21	-10473.90	-647.19
1391.7354	-7412409.12	17093904.50	10257641.50	-23558.45	-10522.19	-676.30
1394.6272	-7480776.12	17063265.50	10255615.75	-23526.61	-10594.78	-719.91
1396.5256	-7525370.12	17043107.00	10254221.87	-23505.73	-10642.00	-749.49
1399.4375	-7593533.69	17012120.75	10251986.37	-23473.57	-10714.27	-792.22
1401.3726	-7639899.75	16991362.25	10250426.87	-23452.37	-10762.56	-821.25
1404.2383	-7706596.12	16960396.50	10248009.87	-23419.60	-10833.79	-864.47
1406.1724	-7751324.62	16939418.25	10246311.50	-23397.71	-10881.51	-893.56
1409.0396	-7818336.06	16908106.50	10243536.75	-23364.90	-10952.59	-936.69
1410.9722	-7863437.19	16886974.00	10241949.37	-23342.61	-11000.26	-965.77
1413.8394	-7932299.94	16855251.75	10238717.37	-23309.24	-11071.04	-1009.80
1415.7705	-7975414.56	16833815.25	10237039.50	-23286.66	-11118.67	-1038.35
1418.6392	-8042144.69	16801820.00	10234000.37	-23252.86	-11189.48	-1081.20
1420.5703	-8087040.94	16781163.75	10231833.25	-23229.79	-11236.82	-1110.30
1423.4775	-8154533.94	16747291.87	10228501.37	-23195.21	-11308.27	-1154.30
1425.3706	-8198422.25	16725940.75	10226373.37	-23172.24	-11354.60	-1182.62
1428.2773	-8265726.62	16692833.75	10222879.37	-23136.95	-11425.57	-1226.31
1430.2114	-8310452.37	16670689.00	10220478.37	-23113.14	-11472.86	-1255.52
1433.0776	-8376648.81	16637705.12	10216817.87	-23077.79	-11542.77	-1298.67
1435.0112	-8421248.50	16615340.87	10214278.87	-23053.59	-11589.55	-1327.58
1437.8774	-8487273.75	16582023.25	10210411.75	-23017.95	-11659.02	-1370.81
1439.8115	-8531768.37	16559428.50	10207732.37	-22993.27	-11705.80	-1399.90
1442.6772	-8597618.50	16525783.62	10203658.62	-22956.82	-11775.14	-1443.19
1444.6113	-8641994.75	16502964.50	10200839.50	-22931.94	-11821.70	-1472.01
1447.4775	-8707659.62	16468982.25	10196558.75	-22894.97	-11890.65	-1515.01
1449.4453	-8752696.62	16445527.37	10193548.25	-22869.48	-11938.11	-1544.86
1452.2773	-8817401.12	16411632.12	10189113.50	-22832.33	-12006.06	-1587.34
1454.2456	-8862315.56	16387954.50	10185950.75	-22806.31	-12053.31	-1616.76
1457.0776	-8926850.25	16353723.75	10181320.75	-22768.62	-12120.72	-1659.32
1459.0454	-8971627.62	16329826.75	10178026.50	-22742.10	-12167.67	-1688.88
1461.8774	-9035980.12	16295271.87	10173193.37	-22704.05	-12235.14	-1731.42
1463.8452	-9080630.12	16271150.00	10169747.50	-22677.25	-12281.85	-1760.71

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
1465.7896	-9124696.75	16247225.25	10166295.62	-22650.89	-12327.83	-1789.98
1468.6455	-9188232.37	16211921.00	10161122.12	-22611.48	-12395.39	-1832.95
1470.5894	-9232257.37	16187781.87	10157530.75	-22584.42	-12441.06	-1862.20
1473.4795	-9298471.12	16151727.25	10152085.75	-22544.06	-12509.01	-1905.77
1475.3896	-9341508.25	16127790.37	10149419.25	-22517.24	-12553.77	-1934.27
1478.2793	-9406516.12	16091416.62	10142755.87	-22476.39	-12621.48	-1977.83
1483.0796	-9514242.50	16031561.87	10133099.25	-22406.89	-12733.52	-2049.70
1487.8545	-9621567.62	15969495.37	10123141.00	-22337.53	-12844.16	-2121.37
1492.6543	-9728112.50	15907587.87	10112786.62	-22266.31	-12954.64	-2193.11
1497.4995	-9835821.50	15844544.00	10101995.00	-22193.62	-13065.59	-2265.58
1499.4326	-9878695.62	15819244.37	10097577.75	-22164.14	-13109.55	-2294.20
1502.2993	-9942170.50	15781569.87	10090932.50	-22120.21	-13174.67	-2337.05
1504.2274	-9984902.37	15756059.50	10086393.87	-22090.39	-13218.55	-2365.91
1507.1996	-10049175.12	15718065.62	10079548.62	-22046.03	-13283.30	-2408.97
1512.2524	-10161566.12	15649327.75	10066937.75	-21964.74	-13398.68	-2485.77
1514.4165	-10209061.87	15620274.62	10061523.50	-21930.15	-13447.23	-2517.99
1516.5454	-10255712.50	15591596.37	10056129.25	-21895.79	-13494.45	-2549.69
1518.7124	-10303122.62	15562701.87	10050569.25	-21860.85	-13542.63	-2581.78
1520.9706	-10352255.50	15532022.87	10044962.50	-21825.82	-13590.69	-2613.98
1524.2605	-10419804.12	15489560.00	10036549.50	-21773.17	-13659.88	-2661.37
1526.2202	-10466788.12	15459008.75	10030766.37	-21737.22	-13706.53	-2693.30
1528.3472	-10512984.12	15430805.75	10025004.50	-21701.46	-13752.48	-2724.62
1530.5222	-10560383.87	15400692.12	10019013.12	-21664.53	-13799.37	-2756.88
1533.7354	-10570668.25	15356295.12	10010139.37	-21609.15	-13867.67	-2804.25
1535.8545	-10675421.37	15326960.50	10004133.75	-21571.62	-13912.16	-2835.38
1538.0293	-10722297.27	15296654.87	9997932.50	-21532.98	-13957.50	-2867.40
1540.1606	-10768146.75	15266860.25	9991787.87	-21494.69	-14001.01	-2898.63
1543.3716	-10837270.12	15221799.00	9982405.37	-21435.81	-14066.37	-2945.47
1545.5405	-10883519.62	15191242.75	9975982.50	-21395.54	-14109.76	-2977.10
.547.6665	-10929963.25	15161721.75	9969067.62	-21355.35	-14151.67	-3007.81
1553.0522	-11043637.00	15084700.62	9953211.25	-21251.11	-14256.92	-3085.83
1555.2163	-11089639.50	15053800.00	9946499.75	-21208.45	-14298.27	-3116.77
1557.3452	-11134745.12	15023320.75	9939832.00	-21165.98	-14338.32	-3147.32
1559.5122	-11180564.87	14992265.75	9932978.37	-21122.80	-14378.86	-3178.12
1561.6714	-11226104.62	14961133.00	9926096.62	-21078.78	-14419.00	-3208.44
1564.8604	-11293230.37	14915041.50	9915781.75	-21012.71	-14477.97	-3252.43
1567.0235	-11338581.12	14883726.75	9908724.62	-20967.40	-14515.99	-3281.46
1569.1475	-11383130.00	14852811.62	9901715.25	-20922.36	-14553.86	-3309.47
1571.3335	-11428815.75	14820954.37	9894449.25	-20875.51	-14592.33	-3338.17
1574.5356	-11495549.25	14774139.12	9883692.62	-20804.96	-14647.54	-3380.21
1576.6543	-11539577.37	14743067.87	9876532.50	-20757.45	-14683.62	-3407.30
1578.7905	-11583858.12	14711661.62	9869195.37	-20708.79	-14719.85	-3433.82
1580.9326	-11623195.62	14680077.75	9861808.12	-20659.55	-14755.53	-3460.22
1584.1353	-11694220.75	14632753.62	9850666.00	-20584.72	-14806.72	-3500.02
1586.2544	-11737788.00	14601341.00	9843227.00	-20533.16	-14839.89	-3525.50
1588.3906	-11781595.37	14569604.25	9835664.00	-20480.59	-14872.95	-3550.47
1590.5352	-11825420.12	14537773.25	9828037.37	-20427.75	-14905.14	-3575.17
1593.6973	-11889927.97	14490470.37	9816660.62	-20347.52	-14950.74	-3611.68
1595.8545	-11933751.62	14458185.00	9808842.75	-20291.50	-14981.57	-3636.39
1597.9902	-11977039.75	14426157.50	9801050.87	-20235.93	-15010.38	-3660.22
1600.1733	-12020346.25	14393959.37	9793181.00	-20179.57	-15038.28	-3684.34
1603.3254	-12084924.75	14345734.25	9781327.25	-20092.46	-15079.67	-3719.25
1605.4546	-12127341.37	14313754.75	9773422.12	-20033.85	-15105.65	-3741.39
1607.5903	-12170165.50	14281466.12	9765407.75	-19974.82	-15130.96	-3763.72
1609.7334	-12212806.75	14249012.75	9757318.87	-19913.08	-15155.99	-3785.10
1612.8975	-12275657.37	14201003.87	9745292.25	-19821.07	-15190.35	-3816.94
1615.0205	-12317682.37	14169731.37	9737156.87	-19758.75	-15211.74	-3837.47
1617.1475	-12359639.00	14136353.75	9728983.25	-19693.63	-15233.35	-3857.69
1619.2983	-12401927.50	14103565.75	9722664.12	-19628.49	-15253.69	-3877.81
1622.4976	-12464566.87	14054723.12	9718211.87	-19530.63	-15282.85	-3906.76
1624.5864	-12505293.50	14022779.50	9700932.12	-19463.42	-15299.99	-3924.99
1626.7476	-12547283.00	13990694.87	9691578.50	-19395.29	-15316.90	-3944.62
1628.8766	-12588387.00	13957159.37	9683136.37	-19326.49	-15332.90	-3961.12
1632.0675	-12649865.50	13908214.87	9671459.12	-19218.71	-15353.83	-3987.16
1634.1865	-12690665.87	13875560.25	9661967.00	-19145.17	-15365.85	-4001.75
1636.3125	-12721265.12	13842882.25	9653444.00	-19069.97	-15375.77	-4016.17
1639.4526	-12791970.62	13794582.37	9640800.62	-18955.45	-15387.14	-4035.62
1641.6167	-12831895.25	13761284.37	9632053.62	-18875.13	-15393.42	-4049.03
1643.7456	-12872020.50	13728503.00	9623418.12	-18793.09	-15396.05	-4061.79
1645.8735	-12911912.62	13695733.00	9614756.25	-18711.25	-15398.15	-4071.92
1649.0572	-12971177.37	13646795.62	9601790.75	-18584.67	-15397.57	-4088.96
1651.2163	-13011311.87	13613473.87	9592935.12	-18497.06	-15396.20	-4098.04
1653.3115	-13049965.75	13581220.50	9584339.75	-18410.48	-15391.47	-4106.75
1655.4736	-13089673.75	13547946.37	9575457.87	-18320.14	-15387.78	-4115.73
1658.6523	-13147695.37	13499047.87	9562351.25	-18186.24	-15378.51	-4126.32
1660.7744	-13186188.25	13466471.50	9553588.62	-18092.25	-15370.96	-4132.29
1662.9116	-13224756.77	13433579.87	9544751.62	-17999.72	-15362.32	-4137.33
1668.2134	-13319550.37	13352192.62	9522792.00	-17759.92	-15337.90	-4146.59
1670.3493	-13357217.50	13319587.50	9513970.62	-17658.55	-15325.91	-4148.29
1672.4663	-13394651.37	13287019.25	9505151.50	-17557.13	-15312.38	-4148.19
1677.8135	-13487878.12	13205257.37	9482972.50	-17297.50	-15269.02	-4147.44
1679.9414	-13524516.87	13172864.75	9474152.00	-17191.90	-15246.56	-4145.47
1682.0654	-13561952.12	13140413.00	9465343.75	-17084.37	-15225.80	-4142.75
1684.2036	-13597249.12	13107898.37	9456438.87	-16975.92	-15201.38	-4140.82
1687.4136	-13651578.87	13059159.50	9443206.25	-16812.50	-15165.90	-4135.08
1689.5455	-13687217.37	13026928.75	9434417.50	-16698.86	-15141.14	-4129.00
1691.6665	-13722592.75	12994762.75	9425646.37	-16580.37	-15118.80	-4122.37

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
1693.7334	-13756736.12	12963535.25	9417137.62	-16457.89	-15598.03	-4115.87
1696.6543	-13804550.00	12919475.75	9405118.77	-16281.27	-15573.47	-4113.53
1701.6724	-13885454.25	12843965.12	9384475.00	-15963.92	-15025.12	-4117.09
1703.5654	-13915550.25	12815544.62	9376679.05	-15832.07	-15000.76	-4119.04
1706.6274	-13963710.25	12769672.00	9364043.27	-15624.47	-14961.68	-4134.92
1708.7915	-13997357.75	12737336.25	9355077.50	-15472.16	-14922.58	-4150.38
1710.9204	-14030134.00	12705614.87	9346221.00	-15319.53	-14877.99	-4169.79
1713.0874	-14063166.37	12673436.50	9337161.75	-15167.25	-14820.75	-4191.42
1715.2456	-14095738.25	12641526.75	9328094.00	-15017.05	-14749.92	-4211.58
1718.4355	-14143291.75	12594605.50	9314632.25	-14797.59	-14623.79	-4228.58
1720.5952	-14175089.62	12563195.87	9305533.62	14649.35	-14529.47	-4225.04
1722.7222	-14206090.25	12532397.00	9296535.00	-14510.94	-14430.09	-4218.27
1724.8735	-14237119.87	12501454.75	9287512.62	-14345.49	-14334.27	-4179.33
1728.0723	-14282622.75	12455838.50	9274226.75	14155.06	-14187.16	-4127.69
1730.1953	-14312393.12	12425833.37	9265501.62	13939.90	-14079.03	-4091.73
1732.3223	-14341864.87	12396008.25	9256838.00	13772.71	-13965.81	-4054.78
1734.4736	-14371311.50	12366091.87	9248152.75	-13602.12	-13845.74	-4019.41
1737.6724	-14414410.50	12322101.37	9235382.25	-13345.13	-13659.20	-3965.26
1739.7954	-14442554.50	12293243.75	9227005.37	-13168.29	-13528.72	-3926.20
1741.9224	-14470370.75	12264609.37	9218697.12	-12987.67	-13392.79	-3886.10
1744.0732	-14498108.12	12235952.00	9210384.75	-12804.04	-13253.30	-3843.19
1747.2354	-14538154.62	12194278.87	9198349.25	-12524.95	-13041.23	-3774.77
1749.2866	-14563652.50	12167782.12	9190648.37	-12335.69	-12892.69	-3724.93
1751.2734	-14587982.50	12142262.00	9183294.37	-12155.73	-12754.52	-3677.86
1754.2295	-14623515.62	12104902.00	9172528.87	-11885.18	-12549.54	-3605.80
1759.2725	-14682276.37	12042492.50	9154659.62	-11419.83	-12205.52	-3477.05
1761.1655	-14703714.37	12019511.50	9148140.87	-11230.24	-12063.04	-3420.56
1764.1885	-14737209.12	11983343.37	9137930.37	-10930.07	-11865.96	-3334.75
1766.0864	-14757752.37	11960943.87	9131656.75	-10717.70	-11737.94	-3276.19
1768.0732	-14778824.25	11937744.37	9125197.00	-10494.05	-11615.54	-3226.41
1771.0293	-14809335.37	11903681.12	9115733.37	-10149.05	-11430.99	-3176.51
1776.0723	-14859033.87	11846942.37	9099787.25	-9560.98	-11071.24	-3147.59
1777.9653	-14876920.37	11826149.12	9093834.50	-9335.91	-10896.56	-3141.35
1780.9883	-14904657.00	11792637.37	9084364.62	-9014.81	-10613.38	-3124.02
1782.9956	-14922542.50	11772542.37	9078123.50	-8805.40	-10404.58	-3094.23
1785.1226	-14941036.87	11750657.12	9071598.50	-8585.04	-10174.29	-3041.33
1787.3086	-14959557.12	11728664.12	9065032.62	-8359.14	-9947.03	-2965.85
1790.4722	-14985438.00	11697725.12	9055873.62	-8002.62	-9612.44	-2824.44
1792.5952	-15002169.12	11677562.75	9049983.37	-7757.85	-9381.46	-2724.41
1794.7222	-15018407.75	11657861.00	9044293.12	-7512.54	-9144.36	-2626.12
1796.9082	-15034568.37	11638139.12	9038655.75	-7272.76	-8899.09	-2535.09
1800.0723	-15057027.50	11610564.00	9030835.37	-6919.21	-8531.14	-2424.75
1802.1953	-15071459.25	11592722.12	9025823.62	-6682.74	-8278.51	-2320.41
1804.3223	-15085421.50	11575382.50	9020973.50	-6446.03	-8024.33	-2237.85
1806.4736	-15099034.75	11558385.25	9016247.75	-6209.46	-7776.06	-2155.36
1809.5156	-15117413.62	11535265.75	9009859.00	-5873.96	-7424.19	-2038.44
1811.4873	-15128784.87	11520846.12	9005921.12	-5660.62	-7203.55	-1966.18
1814.5103	-15145404.62	11499525.87	9000145.87	-5335.11	-6902.79	-1854.78
1816.4414	-15155486.50	11486386.12	8996633.87	-5126.19	-6726.12	-1776.18
1819.4272	-15170207.62	11466771.75	8991482.62	-4754.45	-6437.09	-1679.24
1821.3613	-15179173.12	11454511.25	8988286.12	-4516.65	-6246.27	-1627.31
1823.3354	-15187861.62	11442364.87	8985139.87	-4285.73	-6059.44	-1590.54
1826.3154	-15200146.12	11424745.62	8980432.50	-3959.36	-5765.57	-1548.64
1828.2876	-15207752.50	11413562.25	8977404.75	-3755.44	-5555.38	-1521.82
1831.3105	-15219694.75	11397261.62	8972885.62	-3482.19	-5242.45	-1468.05
1833.3203	-15225521.62	11386923.12	8969985.75	-3310.50	-5035.87	-1417.83
1835.4482	-15232376.37	11376440.62	8967037.75	-3132.20	-4825.80	-1352.87
1838.6274	-15241920.75	11361552.25	8962908.00	-2872.30	-4540.35	-1245.12
1840.7915	-15247939.75	11351924.12	8961293.75	2690.77	4357.87	-1170.97
1842.9862	-15253287.87	11342978.62	8957911.12	2510.91	4183.04	-1103.88
1845.0483	-15258628.75	11334113.62	8955598.87	2337.01	4017.22	-1044.31
1848.2275	-15265680.37	11321713.37	8952402.25	2099.13	3783.66	-962.30
1850.3154	-15269914.62	11313975.75	8950458.87	1956.87	3628.24	-901.38
1852.4414	-15273931.50	11306427.62	8948599.87	1821.06	3479.23	-847.78
1854.5786	-15277687.62	11299135.62	8946842.37	1693.07	3338.13	-797.34
1857.7466	-15282779.37	11288866.12	8944426.75	1521.41	3145.30	-727.63
1859.8745	-15285903.37	11282302.12	8942927.25	1414.87	3024.11	-681.83
1862.0044	-15288810.87	11275983.25	8941521.62	1315.27	2909.36	-638.01
1864.1353	-15291516.62	11269893.50	8940207.00	1224.28	2801.81	-595.92
1867.2725	-15295166.37	11261341.25	8938426.25	1102.48	2653.53	-539.33
1869.3203	-15297349.75	11255999.75	8937356.87	1029.04	2563.19	-505.02
1874.5103	-15302279.87	11243207.37	8934933.00	-869.92	-2366.62	-429.04
1876.5615	-15304007.87	11238426.50	8934083.00	-814.89	-2294.54	-399.69
1878.6484	-15305655.37	11233704.87	8933278.00	-764.06	-2230.40	-371.81
1881.7476	-15307917.12	11226932.50	8932186.12	-695.48	-2140.09	-332.81
1883.7964	-15309300.62	11222609.00	8931527.00	-655.12	-2087.40	-317.63
1885.8882	-15310635.25	11218312.62	8930899.37	-620.87	2027.43	-289.53
1888.0893	-15312511.62	11213133.12	8930147.00	-589.34	1957.97	-267.19
1891.0303	-15313701.50	11208174.62	8929530.62	-576.55	1921.02	-245.71
1893.1665	-15314925.62	11204103.12	8929006.50	-569.51	1890.84	-245.05
1895.3364	-15316159.87	11200031.62	8928478.87	-568.16	1861.76	-241.26
1898.4736	-15317939.50	11194247.00	8927716.25	-566.36	1826.02	-244.90
1900.5215	-15319103.87	11193526.87	8927216.12	-568.85	1807.18	-243.57
1905.7476	-15322082.62	11181218.37	8925924.87	-571.88	1755.14	-253.58
1933.8633	-15338775.75	11135568.50	8919986.00	-615.54	1492.25	-171.88
1939.0054	-15341947.87	11127952.12	8919152.25	-618.20	1470.22	-152.40
1941.0635	-15343223.00	11124932.75	8918849.12	-620.91	1463.91	-143.17

[redacted]

Table B-1. Reconstructed Reentry Trajectory, ECI Coordinates (Continued)

TIME (SEC)	X (FT)	Y (FT)	Z (FT)	XDOT (FT/SEC)	YDOT (FT/SEC)	ZDOT (FT/SEC)
1944.1646	-15345147.37	11120417.62	8918477.25	-622.24	-1452.60	-141.13
1946.2056	-15346417.62	11117449.75	8918128.00	-624.50	-1448.76	-132.54
1948.2983	-15347726.37	11114422.37	8917856.50	-626.17	-1444.40	-126.85
1951.3643	-15349649.50	11110004.75	8917476.75	-628.39	-1437.37	-120.88
1953.4502	-15350960.25	11107013.12	8917224.12	-628.28	-1431.05	-121.43
1955.4985	-15352245.50	11104089.37	8916971.87	-626.63	-1423.68	-124.91
1958.6035	-15354199.87	11099682.12	8916582.12	-632.25	-1415.22	-126.21
1960.6504	-15355495.37	11096795.75	8916316.87	-633.55	-1405.02	-132.98
1962.6982	-15356800.37	11093922.37	8916043.50	-640.99	-1401.20	-134.08
1965.8032	-15358787.75	11089588.12	8915614.62	-639.14	-1390.65	-142.14
1967.8506	-15360100.75	11086743.75	8915329.25	-643.47	-1387.89	-136.60
1969.9414	-15361450.37	11083844.75	8915048.37	-647.52	-1385.22	-132.14
1973.0034	-15363430.00	11079615.50	8914645.62	-645.53	-1377.11	-137.92
1975.0913	-15364779.25	11076748.62	8914375.00	-646.95	-1369.17	-128.29
1977.1416	-15366097.75	11073947.37	8914111.00	-639.10	-1363.26	-129.27
1980.2036	-15368063.37	11069788.37	8913717.37	-644.83	-1353.32	-127.79
1982.3252	-15369420.00	11066921.12	8913449.25	-634.05	-1349.59	-125.91
1984.3804	-15370726.00	11064154.75	8913194.37	-636.91	-1342.48	-123.91
1989.5674	-15374034.25	11057232.25	8912546.00	-638.68	-1326.70	-126.97
1993.7114	-15375680.62	11051759.00	8912025.00	-638.50	-1314.77	-124.49
1998.8965	-15379981.00	11044973.25	8911384.37	-634.52	-1302.66	-122.62
2000.9546	-15381284.00	11042293.87	8911138.25	-631.69	-1301.12	-116.47
2004.0864	-15383266.50	11038230.62	8910780.25	-634.40	-1292.66	-112.71
2006.1372	-15384559.00	11035587.50	8910547.75	-676.73	-1284.74	-114.49
2008.2246	-15385935.37	11032952.50	8910348.12	-692.70	-1240.66	-76.80
2011.2866	-15388124.62	11029216.75	8910159.00	-737.29	-1199.39	-45.69
2013.3716	-15389675.87	11026725.50	8910066.87	-753.74	-1190.38	-41.73
2015.4243	-15391272.25	11024286.00	8909982.87	-755.87	-1186.38	-40.11
2018.5225	-15393612.50	11020647.62	8909891.12	-787.17	-1162.38	-19.09
2020.5713	-15395236.37	11018279.12	8909868.62	-797.95	-1149.65	-2.88
2022.6245	-15396869.25	11015920.12	8909874.12	-792.62	-1148.07	-8.21
2025.7222	-15399234.37	11012365.62	8909893.87	-798.98	-1146.96	2.58
2027.7715	-15400975.62	11010011.25	8909880.50	-802.84	-1150.65	-12.70
2029.8633	-15402659.00	11007602.62	8909842.62	-806.62	-1152.29	-23.44
2032.9224	-15405124.25	11004679.62	8909778.75	-805.19	-1151.01	-18.32
2035.0054	-15406796.62	11001679.00	8909747.87	-806.54	-1154.02	-11.37
2037.0635	-15408444.25	10999293.75	8909727.87	-800.57	-1158.00	-8.03
2040.1646	-15410927.37	10995703.87	8909718.50	-800.87	-1161.17	-3.19
2047.4033	-15416714.37	10987235.00	8909627.87	-798.04	-1151.04	-19.64
2049.4532	-15418351.12	10984979.87	8909591.25	-801.13	-1151.19	-16.13
2051.4985	-15419984.87	10982621.62	8909561.50	-794.04	-1150.46	-12.93
2054.6035	-15422445.25	10979151.50	8909523.25	-790.81	-1149.80	-11.72
2056.6504	-15424067.25	10976703.12	8909495.62	-794.05	-1143.74	-15.33
2058.7412	-15425724.87	10974306.00	8909466.87	-791.54	-1149.28	-12.12
2061.8032	-15428147.75	10970777.62	8909442.12	-790.98	-1155.32	-4.08
2063.8506	-15429771.37	10968414.00	8909431.25	-795.11	-1153.62	-6.51
2065.9414	-15431425.75	10966001.12	8909420.50	-797.02	-1154.57	-14.28
2069.0034	-15433879.75	10962452.50	8909372.62	-799.31	-1163.33	-9.83
2071.0913	-15435551.25	10960022.50	8909354.37	-801.86	-1164.34	-7.68
2073.1416	-15437192.87	10957645.62	8909331.62	-799.45	-1154.16	-14.45
2076.2036	-15439625.37	10954135.75	8909283.12	-789.37	-1138.41	-17.29
2078.2915	-15441277.12	10951747.87	8909255.87	-792.86	-1148.95	-8.73
2080.3804	-15442938.12	10949329.00	8909247.75	-797.45	-1167.02	-3.87
2082.4214	-15444570.87	10946949.00	8909237.12	-802.56	-1165.16	-1.68
2085.5674	-15447075.37	10942265.25	8909221.62	-789.38	-1151.26	-8.17
2087.6172	-15448695.50	10940944.75	8909205.25	-791.71	-1151.84	-7.79
2089.7114	-15450358.37	10938525.62	8909185.00	-796.35	-1158.44	-11.53
2092.8115	-15452819.62	10934951.12	8909136.37	-791.59	-1147.60	-19.82
2094.8623	-15454439.87	10932606.75	8909094.50	-788.66	-1138.80	-21.04
2096.9546	-15456096.62	10930211.75	8909055.25	-794.95	-1150.53	-16.51
2100.0112	-15458538.87	10926670.00	8909013.50	-803.10	-1166.92	-10.83
2102.0962	-15460203.50	10924253.00	8908987.00	-793.64	-1151.52	-14.56
2104.1543	-15461924.12	10921898.25	8908950.37	-781.25	-1136.74	-21.00
2107.2485	-15464253.50	10918368.62	8908891.62	-788.99	-1144.73	-15.95
2109.2964	-15465874.75	10916015.37	8908850.00	-794.35	-1153.55	-13.98
2111.3545	-15467524.87	10913652.12	8908827.87	-789.76	-1142.96	-17.27
2114.4482	-15469943.37	10910133.50	8908765.87	-786.63	-1133.59	-22.79
2116.4966	-15471560.75	10907791.50	8908721.00	-792.65	-1150.29	-21.07
2121.6484	-15475611.62	10901914.00	8908596.62	-779.95	-1131.41	-27.21
2123.6714	-15477191.62	10899634.00	8908547.25	-782.04	-1127.68	-21.56
2128.8732	-15481244.62	10893780.87	8908463.62	-791.38	-1149.56	-11.17
2130.9126	-15482984.25	10891393.50	8908431.62	-778.71	-1135.70	-18.80
2136.0615	-15486918.25	10885510.37	8908324.00	-788.68	-1149.49	-23.00
2138.1123	-15488538.25	10883158.37	8908276.87	-791.28	-1144.30	-27.94
2140.1992	-15490178.37	10880783.12	8908221.75	-780.56	-1132.00	-33.00
2143.2574	-15492608.62	10877274.00	8908131.25	-788.29	-1133.33	-28.37
2145.3804	-15494255.87	10874893.37	8908078.25	-793.27	-1152.37	-22.55
2147.4385	-15495893.00	10872519.62	8908040.00	-797.63	-1154.36	-14.61
2150.5396	-15498355.37	10868960.25	8907987.12	-790.40	-1141.22	-19.50
2152.5806	-15499971.50	10866631.87	8907942.25	-793.25	-1140.41	-24.49
2154.6733	-15501631.87	10864242.62	8907898.25	-793.56	-1142.91	-25.18

[redacted]

[redacted]

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters

GEMINI 8 REENTRY(ESPOD)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
2.325	25362.5	23975.9	-.036	61.108	957112.0	-.817	19.987
4.867	25330.7	23946.3	-.089	61.099	957039.2	-.735	20.124
7.355	25298.3	23912.9	-.114	61.099	956926.[illegible]	-.655	20.258
9.906	25261.3	23876.7	-.126	61.104	956788.2	-.573	20.396
12.422	25223.4	23838.8	-.152	61.117	956632.7	-.492	20.531
14.326	25199.0	23814.1	-.180	61.132	956493.0	-.431	20.633
16.876	25170.2	23785.0	-.216	61.152	956269.5	-.349	20.769
19.396	25137.5	23752.7	-.242	61.136	956015.2	-.268	20.904
21.906	25102.1	23717.5	-.270	61.117	955732.6	-.188	21.038
24.422	25093.7	23709.2	-.280	61.112	955429.0	-.108	21.173
26.370	25093.9	23709.4	-.283	61.111	955198.5	-.045	21.277
28.876	25094.3	23709.8	-.287	61.111	954875.5	.035	21.410
31.396	25094.5	23710.1	-.291	61.112	954556.7	.115	21.545
33.942	25095.0	23710.6	-.295	61.112	954230.5	.197	21.681
36.422	25095.4	23711.0	-.298	61.113	953938.7	.276	21.813
38.372	25095.7	23711.4	-.302	61.113	953652.7	.339	21.917
40.876	25096.1	23711.7	-.306	61.114	953321.5	.418	22.051
43.396	25096.3	23711.9	-.309	61.116	952984.0	.499	22.185
45.942	25096.8	23712.5	-.313	61.117	952639.0	.580	22.321
50.377	25097.6	23713.3	-.320	61.120	952029.2	.722	22.557
52.911	25097.9	23713.7	-.324	61.122	951674.2	.803	22.693
55.432	25098.0	23713.7	-.327	61.124	951317.5	.883	22.828
57.942	25098.6	23714.3	-.332	61.126	950958.2	.964	22.962
60.422	25099.0	23714.8	-.335	61.128	950599.7	1.043	23.094
62.795	25099.4	23715.2	-.339	61.131	950253.0	1.119	23.221
65.195	25099.9	23715.8	-.342	61.134	949899.0	1.195	23.349
67.624	25100.2	23716.1	-.346	61.137	949537.2	1.273	23.479
70.023	25100.7	23716.6	-.349	61.140	949176.0	1.350	23.607
72.423	25100.9	23716.8	-.353	61.143	948811.5	1.426	23.735
74.813	25101.5	23717.4	-.357	61.147	948443.2	1.503	23.863
76.412	25101.9	23717.8	-.359	61.149	948195.5	1.554	23.949
79.595	25102.3	23718.2	-.364	61.154	947699.7	1.655	24.118
81.996	25102.8	23718.8	-.367	61.158	947320.5	1.732	24.246
84.423	25103.2	23719.2	-.371	61.162	946933.5	1.809	24.376
86.795	25103.7	23719.8	-.374	61.167	946551.7	1.885	24.503
89.224	25104.3	23720.3	-.378	61.172	946157.5	1.963	24.633
91.624	25104.6	23720.7	-.381	61.176	945764.2	2.039	24.761
94.023	25105.1	23721.2	-.385	61.181	945367.5	2.116	24.889
96.396	25105.6	23721.7	-.389	61.187	944971.7	2.192	25.016
98.795	25106.2	23722.4	-.393	61.193	944567.7	2.268	25.145
101.195	25106.5	23722.6	-.397	61.198	944160.5	2.345	25.273
103.595	25106.9	23723.1	-.400	61.203	943749.2	2.421	25.402
105.996	25107.6	23723.7	-.403	61.209	943335.0	2.498	25.530
108.367	25108.0	23724.2	-.407	61.216	942922.0	2.574	25.657
110.823	25108.4	23724.7	-.410	61.222	942491.0	2.652	25.788
113.195	25108.9	23725.1	-.414	61.229	942071.2	2.727	25.915
115.595	25109.6	23725.8	-.417	61.235	941643.0	2.804	26.044
117.996	25110.0	23726.3	-.421	61.242	941211.2	2.880	26.173
120.396	25110.5	23726.8	-.425	61.249	940775.5	2.957	26.301
122.795	25111.2	23727.6	-.429	61.256	940336.5	3.033	26.430
124.422	25111.5	23727.9	-.430	61.261	940037.0	3.085	26.517
127.624	25112.1	23728.5	-.435	61.271	939443.2	3.187	26.689
130.023	25112.6	23729.0	-.439	61.279	938993.7	3.264	26.817
132.423	25113.2	23729.7	-.443	61.287	938540.5	3.340	26.946
134.795	25113.8	23730.2	-.446	61.295	938039.5	3.415	27.073
137.195	25114.2	23730.6	-.449	61.303	937630.0	3.492	27.202
139.595	25114.9	23731.3	-.453	61.312	937167.2	3.568	27.331
142.023	25115.5	23732.0	-.456	61.321	936694.7	3.645	27.461
144.423	25116.0	23732.5	-.460	61.330	936225.0	3.722	27.590
146.822	25116.5	23733.2	-.463	61.338	935751.7	3.798	27.719
149.224	25117.1	23733.7	-.467	61.347	935274.5	3.874	27.848
151.624	25117.7	23734.2	-.471	61.357	934793.7	3.950	27.977
153.996	25118.3	23734.9	-.474	61.367	934315.5	4.026	28.104
156.409	25118.7	23735.3	-.477	61.377	933825.7	4.102	28.234
158.823	25119.2	23736.0	-.481	61.386	933331.7	4.179	28.364
161.224	25120.0	23736.6	-.485	61.397	932837.5	4.255	28.493
163.624	25120.5	23737.2	-.488	61.407	932339.5	4.331	28.622
166.023	25121.1	23737.8	-.491	61.418	931838.2	4.408	28.751
168.423	25121.8	23738.5	-.495	61.429	931333.5	4.484	28.880
170.795	25122.3	23739.1	-.498	61.439	930831.7	4.559	29.008
172.422	25122.8	23739.6	-.501	61.447	930485.5	4.610	29.095
175.624	25123.5	23740.3	-.505	61.462	929799.0	4.712	29.268
178.023	25124.3	23741.1	-.509	61.473	929285.5	4.788	29.397
180.423	25124.9	23741.7	-.512	61.485	928758.7	4.864	29.527
182.823	25125.4	23742.3	-.515	61.496	928233.5	4.940	29.656
185.224	25126.2	23743.1	-.519	61.509	927705.[illegible]	5.016	29.785
187.624	25126.8	23743.7	-.522	61.521	927173.0	5.092	29.915
190.023	25127.6	23744.5	-.526	61.534	926637.5	5.167	30.044
192.423	25128.1	23745.1	-.529	61.546	926099.0	5.243	30.174
194.823	25128.8	23745.7	-.533	61.559	925557.0	5.319	30.304
197.224	25129.4	23746.4	-.537	61.572	925011.0	5.395	30.433
199.624	25130.0	23747.0	-.540	61.585	924461.7	5.471	30.563
202.023	25130.5	23747.5	-.544	61.599	923909.2	5.546	30.693
204.409	25131.3	23748.4	-.547	61.612	923356.5	5.622	30.822

CONFIDENTIAL

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
206.823	25132.0	23749.1	-.550	61.626	922794.0	5.698	30.952
209.224	25132.8	23749.9	-.553	61.640	922231.0	5.773	31.082
211.624	25133.2	23750.4	-.557	61.654	921665.2	5.849	31.212
214.023	25134.2	23751.3	-.560	61.669	921096.0	5.925	31.342
216.423	25134.6	23751.8	-.564	61.683	920523.2	6.000	31.472
218.798	25135.5	23752.7	-.567	61.697	919953.2	6.075	31.600
220.433	25135.8	23753.0	-.569	61.707	919557.7	6.127	31.689
223.599	25136.8	23754.1	-.574	61.727	918791.0	6.226	31.861
225.999	25137.4	23754.7	-.577	61.743	918205.2	6.301	31.991
228.398	25138.2	23755.5	-.580	61.758	917616.0	6.377	32.121
230.798	25138.9	23756.3	-.584	61.774	917023.5	6.452	32.251
233.198	25139.6	23756.9	-.587	61.789	916427.5	6.527	32.382
235.599	25140.4	23757.8	-.590	61.805	915828.0	6.603	32.512
237.999	25141.2	23758.6	-.594	61.821	915225.2	6.678	32.642
240.398	25141.8	23759.3	-.597	61.838	914619.5	6.753	32.773
242.798	25142.5	23759.9	-.601	61.854	914010.0	6.828	32.903
245.198	25143.3	23760.8	-.604	61.871	913397.5	6.903	33.034
247.599	25144.0	23761.5	-.607	61.888	912781.2	6.979	33.165
249.999	25144.7	23762.3	-.610	61.905	912162.2	7.054	33.295
252.384	25145.3	23762.8	-.614	61.922	911543.7	7.128	33.425
254.798	25146.3	23763.8	-.617	61.940	910913.7	7.204	33.557
257.198	25147.1	23764.6	-.621	61.957	910285.0	7.279	33.688
259.599	25147.8	23765.4	-.624	61.975	909652.0	7.354	33.818
261.999	25148.4	23766.0	-.627	61.994	909016.2	7.428	33.949
264.398	25149.2	23766.8	-.630	62.012	908377.5	7.503	34.080
266.798	25150.0	23767.7	-.634	62.031	907735.0	7.578	34.211
268.438	2515[illegible].7	23768.4	-.636	62.043	907294.5	7.629	34.301
271.599	25151.7	23769.4	-.640	62.068	906441.0	7.728	34.474
273.999	25152.2	23769.9	-.643	62.087	905789.5	7.802	34.605
276.398	25153.0	23770.7	-.647	62.104	905134.0	7.877	34.736
278.798	25154.0	23771.9	-.650	62.125	904475.5	7.951	34.868
281.198	25154.7	23772.5	-.653	62.145	903814.2	8.026	34.999
283.599	25155.5	23773.4	-.657	62.165	903149.2	8.100	35.130
285.999	25156.3	23774.2	-.660	62.185	902481.0	8.175	35.262
288.398	25157.1	23775.0	-.663	62.205	901809.7	8.249	35.394
290.798	25157.8	23775.7	-.667	62.225	901134.7	8.324	35.525
293.198	25158.7	23776.6	-.669	62.246	900456.7	8.398	35.657
295.599	25159.5	23777.4	-.673	62.266	899775.7	8.472	35.789
297.999	25160.5	23778.5	-.676	62.287	899091.2	8.546	35.921
300.384	25161.3	23779.3	-.680	62.308	898407.5	8.620	36.052
302.798	25162.1	23780.1	-.682	62.330	897712.5	8.695	36.184
305.198	25162.8	23780.9	-.686	62.351	897018.5	8.769	36.316
307.599	25163.6	23781.7	-.690	62.373	896321.2	8.843	36.449
309.999	25164.6	23782.7	-.692	62.395	895620.7	8.917	36.581
312.398	25165.4	23783.5	-.695	62.417	894917.0	8.991	36.713
314.798	25166.1	23784.3	-.698	62.439	894210.2	9.065	36.845
316.438	25167.0	23785.2	-.701	62.455	893725.5	9.115	36.936
319.599	25168.0	23786.2	-.705	62.484	892787.2	9.212	37.110
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
324.398	25169.6	23787.8	-.711	62.5[illegible]	891251.2	9.360	37.375
326.798	25170.6	23788.9	-.714	62.553	890628.7	9.433	37.508
329.198	25171.3	23789.6	-.718	62.576	889[illegible]2.7	9.507	37.640
331.599	25172.5	23790.8	-.720	62.600	889174.0	9.580	37.773
333.999	25173.3	23791.6	-.724	62.624	888441.7	9.654	37.906
336.398	25173.9	23792.3	-.727	62.648	887706.7	9.727	38.039
338.798	25175.1	23793.5	-.731	62.672	886968.2	9.801	38.172
341.198	25175.8	23794.3	-.733	62.697	886226.5	9.874	38.305
343.599	25176.0	23795.2	-.736	62.721	885481.5	9.947	38.438
345.999	25177.6	23796.1	-.739	62.746	884733.7	10.020	38.571
348.384	25178.4	23796.9	-.742	62.771	883987.5	10.093	38.704
350.798	25179.4	23797.9	-.746	62.796	883229.2	10.166	38.838
353.198	25180.2	23798.8	-.749	62.821	882472.2	10.239	38.971
355.599	25181.2	23799.0	-.752	62.847	881711.7	10.312	39.105
357.999	25182.2	23800.0	-.755	62.872	880948.2	10.385	39.239
360.398	25183.1	23801.8	-.758	62.899	880182.2	10.458	39.372
362.798	25184.0	23802.7	-.761	62.925	879413.0	10.531	39.506
364.438	25184.6	23803.3	-.764	62.943	878885.0	10.581	39.597
367.599	25185.8	23804.5	-.767	62.977	877863.5	10.676	39.774
369.999	25186.8	23805.6	-.770	63.004	877084.5	10.749	39.908
372.398	25187.7	23806.5	-.773	63.031	876303.2	10.821	40.042
374.798	25188.7	23807.5	-.776	63.058	875518.5	10.894	40.176
377.198	25189.8	23808.6	-.779	63.085	874730.5	10.966	40.310
379.599	25190.5	23809.4	-.783	63.113	873939.2	11.039	40.444
381.97[illegible]	25191.3	23810.2	-.785	63.140	873154.5	11.110	40.577
384.398	25192.5	23811.3	-.788	63.168	872348.2	11.183	40.713
386.798	25193.7	23812.6	-.792	63.196	871548.2	11.255	40.848
389.198	25194.6	23813.5	-.795	63.224	870745.0	11.327	40.982
391.599	25195.5	23814.5	-.798	63.253	869938.2	11.399	41.117
393.999	25196.4	23815.4	-.800	63.281	869129.0	11.471	41.252
396.384	25197.5	23816.5	-.803	63.310	868322.0	11.543	41.386
398.771	25198.4	23817.5	-.806	63.339	867511.2	11.614	41.520
401.17[illegible]	25199.3	23818.4	-.810	63.369	866692.7	11.686	41.655
403.599	25200.5	23819.6	-.812	63.397	865861.7	11.758	41.792
405.999	25201.3	23820.4	-.816	63.427	865037.5	11.830	41.927

CONFIDENTIAL

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
408.398	25202.4	23821.6	-.818	63.457	864210.2	11.902	42.062
410.798	25203.2	23822.4	-.822	63.487	863379.7	11.973	42.198
412.[illegible]65	25204.2	23823.4	-.825	63.517	862835.7	12.020	42.286
415.572	25205.4	23824.6	-.827	63.548	861770.5	12.115	42.467
417.973	25206.4	23825.6	-.830	63.578	860880.7	12.186	42.603
420.371	25207.2	23826.6	-.833	63.609	860038.2	12.257	42.739
422.771	25208.5	23827.8	-.836	63.640	859193.0	12.329	42.874
425.170	25209.2	23828.5	-.839	63.671	858345.2	12.400	43.010
427.599	25210.6	23830.0	-.842	63.702	857494.0	12.471	43.148
429.945	25211.5	23830.9	-.845	63.733	856649.0	12.541	43.281
432.345	25212.6	23832.1	-.847	63.765	855792.2	12.612	43.417
434.746	25213.5	23833.0	-.850	63.797	854932.5	12.682	43.553
437.146	25214.5	23834.0	-.853	63.829	854070.0	12.753	43.690
439.545	25215.8	23835.2	-.856	63.861	853204.2	12.824	43.826
441.945	25216.5	23836.1	-.859	63.894	852335.7	12.894	43.963
444.318	25217.7	23837.3	-.862	63.926	851473.7	12.964	44.098
446.774	25218.6	23838.2	-.865	63.959	850579.2	13.036	44.238
449.174	25219.9	23839.5	-.868	63.993	849701.7	13.106	44.375
451.545	25220.8	23840.5	-.871	64.026	848831.7	13.176	44.510
453.946	25221.9	23841.6	-.873	64.060	847948.7	13.246	44.647
456.345	25222.9	23842.6	-.876	64.093	847062.2	13.316	44.784
458.747	25224.1	23843.9	-.878	64.127	846174.7	13.386	44.921
460.374	25224.8	23844.6	-.881	64.159	845570.2	13.433	45.015
463.574	25226.4	23846.2	-.884	64.196	844378.0	13.526	45.198
465.975	25227.3	23847.1	-.887	64.230	843480.5	13.596	45.335
468.375	25228.5	23848.4	-.890	64.265	842581.2	13.656	45.473
470.774	25229.5	23849.4	-.893	64.300	841677.2	13.735	45.611
473.146	25230.6	23850.5	-.896	64.334	840781.5	13.804	45.747
475.546	25231.7	23851.6	-.898	64.369	839872.7	13.873	45.885
477.975	25232.6	23853.0	-.901	64.405	838951.5	13.944	46.024
480.375	25233.8	23853.9	-.904	64.441	838024.0	14.013	46.163
482.774	25234.9	23855.0	-.906	64.477	837119.0	14.082	46.301
485.174	25236.3	23856.4	-.909	64.514	836199.0	14.151	46.439
487.574	25237.4	23857.5	-.912	64.550	835276.2	14.220	46.578
489.946	25238.3	23858.5	-.914	64.585	834361.5	14.288	46.714
492.360	25239.5	23859.7	-.918	64.622	833427.7	14.357	46.854
494.774	25240.6	23860.8	-.920	64.658	832491.5	14.426	46.993
497.174	25241.8	23862.0	-.923	64.696	831558.0	14.495	47.132
499.574	25242.8	23863.0	-.925	64.733	830621.7	14.564	47.271
501.975	25243.9	23864.2	-.928	64.771	829682.5	14.632	47.410
504.375	25245.3	23865.6	-.931	64.809	828740.5	14.700	47.549
506.774	25246.2	23865.6	-.933	64.847	827795.7	14.769	47.689
508.374	25246.9	23867.3	-.935	64.872	827165.0	14.814	47.781
511.574	25248.6	23869.2	-.939	64.923	825908.2	14.905	47.967
513.975	25249.9	23870.3	-.942	64.961	824944.5	14.973	48.107
516.375	25250.8	23871.3	-.945	65.000	823988.5	15.041	48.247
518.774	25251.8	23872.4	-.947	65.039	823030.0	15.109	48.387
521.174	25253.1	23873.7	-.949	65.078	822068.5	15.176	48.526
523.574	25254.1	23874.7	-.952	65.117	821104.5	15.244	48.666
525.975	25255.5	23876.1	-.954	65.156	[illegible]	15.312	48.807
528.375	25256.4	23877.1	-.957	65.196	819169.2	15.379	48.947
530.774	25257.9	23878.5	-.960	65.236	818197.0	15.446	49.087
533.174	25259.0	23879.7	-.963	65.276	817222.2	15.514	49.228
535.574	25260.2	23880.9	-.965	65.316	816244.5	15.581	49.368
537.975	25261.5	23882.3	-.967	65.357	815264.7	15.648	49.509
540.361	25262.5	23883.7	-.970	65.397	814287.7	15.714	49.649
542.774	25263.7	23884.5	-.973	65.438	813296.7	15.782	49.790
545.174	25264.9	23885.7	-.975	65.479	812308.7	15.848	49.931
547.574	25266.2	23887.1	-.978	65.520	811318.7	15.915	50.073
549.975	25267.2	23888.2	-.980	65.562	810325.2	15.982	50.214
552.375	25268.5	23889.5	-.983	65.603	809328.7	16.048	50.355
554.774	25269.8	23890.8	-.984	65.646	808331.2	16.115	50.497
556.415	25270.5	23891.6	-.987	65.674	807647.2	16.160	50.593
559.574	25272.0	23893.7	-.990	65.729	806326.5	16.247	50.780
561.975	25273.5	23894.6	-.993	65.772	805319.5	16.313	50.922
564.375	25274.7	23895.9	-.995	65.814	804311.0	16.379	51.064
566.774	25275.9	23897.1	-.998	65.858	803299.7	16.445	51.206
569.174	25277.0	23898.2	-1.000	65.900	802286.0	16.511	51.348
571.574	25278.3	23899.6	-1.003	65.943	801269.5	16.576	51.490
573.975	25279.6	23900.8	-1.005	65.987	800250.0	16.642	51.632
576.375	25280.6	23901.9	-1.008	66.031	799229.2	16.707	51.775
578.774	25282.0	23903.3	-1.010	66.074	798203.7	16.773	51.918
581.174	25283.2	23904.6	-1.012	66.118	797177.2	16.838	52.060
583.574	25284.4	23905.8	-1.015	66.162	796148.0	16.903	52.203
585.975	25285.8	23907.2	-1.017	66.207	795116.0	16.968	52.346
588.360	25286.8	23908.2	-1.020	66.252	794087.7	17.032	52.488
590.774	25288.2	23909.7	-1.022	66.296	793044.5	17.098	52.633
593.174	25289.5	23911.0	-1.024	66.341	792005.0	17.162	52.776
595.574	25290.7	23912.3	-1.026	66.387	790962.7	17.227	52.919
597.975	25292.0	23913.6	-1.029	66.432	789919.0	17.291	53.063
600.375	25293.3	23915.0	-1.032	66.478	788872.5	17.356	53.207
602.774	25294.6	23916.2	-1.034	66.524	787822.7	17.420	53.350
604.415	25295.2	23917.0	-1.035	66.555	787103.7	17.464	53.449
607.574	25297.2	23919.0	-1.032	66.616	785716.2	17.548	53.638

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
609.975	25298.3	23920.1	-1.041	66.662	784659.2	17.612	53.783
612.375	25299.9	23921.7	-1.043	66.709	783600.2	17.676	53.927
614.774	25301.0	23922.8	-1.045	66.754	782538.2	17.739	54.071
617.174	25302.3	23924.1	-1.048	66.803	781474.5	17.803	54.216
619.574	25303.4	23925.3	-1.050	66.850	780408.2	17.866	54.361
621.975	25304.9	23926.9	-1.052	66.897	779339.0	17.930	54.506
624.375	25306.1	23928.1	-1.055	66.945	778267.5	17.993	54.650
626.774	25307.3	23929.4	-1.057	66.993	777193.7	18.056	54.796
629.174	25308.8	23930.8	-1.059	67.041	776117.5	18.119	54.941
631.574	25310.0	23932.2	-1.061	67.089	775039.0	18.192	55.086
633.975	25311.3	23933.5	-1.063	67.138	773958.0	18.244	55.232
636.360	25312.5	23934.6	-1.066	67.186	772881.5	18.307	55.376
638.774	25313.9	23936.1	-1.068	67.235	771789.5	18.369	55.523
641.149	25315.3	23937.6	-1.070	67.284	770712.5	18.431	55.667
643.549	25316.5	23938.8	-1.072	67.333	769622.5	18.493	55.813
645.949	25317.9	23940.2	-1.075	67.382	768530.0	18.556	55.959
648.350	25319.1	23941.4	-1.077	67.432	767434.7	18.618	56.105
650.750	25320.7	23943.1	-1.079	67.482	766337.2	18.679	56.252
652.423	25321.5	23943.9	-1.081	67.517	765570.2	18.722	56.354
655.521	25323.1	23945.6	-1.083	67.582	764147.7	18.8[illegible]	56.543
657.921	25324.4	23947.0	-1.085	67.632	763043.5	18.864	56.690
660.350	25325.8	23948.3	-1.088	67.683	761924.2	18.926	56.838
662.750	25327.1	23949.7	-1.090	67.734	760815.0	18.987	56.985
665.149	25328.5	23951.2	-1.092	67.785	759703.7	19.048	57.132
667.549	25330.0	23952.7	-1.094	67.836	758590.2	19.109	57.280
669.921	25331.2	23953.9	-1.096	67.887	757487.0	19.169	57.425
672.321	25332.5	23955.3	-1.098	67.939	756369.0	19.230	57.573
674.721	25334.0	23956.8	-1.10[illegible]	67.990	755248.5	19.290	57.721
677.122	25335.3	23958.1	-1.103	68.042	754125.7	19.351	57.868
679.521	25336.6	23959.5	-1.104	68.095	753000.7	19.411	58.016
681.921	25337.9	23960.8	-1.106	68.147	751872.7	19.472	58.164
684.335	25339.5	23962.4	-1.109	68.200	750737.7	19.532	58.313
686.750	25340.7	23963.7	-1.111	68.253	749599.5	19.592	58.463
689.122	25342.0	23965.1	-1.113	68.306	748479.0	19.651	58.609
691.521	25343.4	23966.4	-1.114	68.359	747343.0	19.711	58.758
693.921	25344.7	23967.8	-1.117	68.413	746204.7	19.771	58.907
696.321	25346.2	23969.4	-1.119	68.466	745064.2	19.830	59.055
698.721	25347.6	23970.8	-1.121	68.520	743921.5	19.889	59.204
700.349	25348.6	23971.8	-1.122	68.556	743145.5	19.929	59.305
703.549	25350.5	23973.7	-1.125	68.629	741616.5	20.008	59.504
705.949	25351.8	23975.1	-1.127	68.683	740467.0	20.067	59.654
708.350	25353.1	23976.4	-1.129	68.738	739315.5	20.126	59.803
710.721	25354.6	23978.0	-1.131	68.792	738175.5	20.184	59.951
713.122	25355.8	23979.2	-1.132	68.847	737019.7	20.242	60.101
715.521	25357.3	23980.8	-1.135	68.903	735861.7	20.301	60.251
717.949	25358.7	23982.2	-1.136	68.959	734688.7	20.359	60.403
720.350	25360.1	23983.7	-1.139	69.014	733526.2	20.417	60.553
722.750	25361.8	23985.4	-1.141	69.070	732362.0	20.475	60.703
725.149	25362.9	23986.5	-1.142	69.126	731195.7	20.533	60.854
727.549	25364.4	23988.1	-1.144	69.183	730027.2	20.591	61.004
729.921	25365.8	23989.5	-1.146	69.239	728871.0	20.647	61.153
732.335	25367.3	23991.1	-1.149	69.295	727691.7	20.705	61.305
734.750	25368.9	23992.7	-1.150	69.352	726510.5	20.763	61.457
737.149	25370.1	23994.0	-1.151	69.409	725334.5	20.820	61.608
739.549	25371.7	23995.6	-1.153	69.466	724156.2	20.877	61.760
741.949	25372.9	23996.9	-1.155	69.524	722975.5	20.933	61.911
744.350	25374.4	23998.3	-1.157	69.582	721792.5	20.990	62.063
746.750	25375.7	23999.8	-1.159	69.640	720617.7	21.046	62.214
748.349	25376.6	24000.7	-1.161	69.678	719817.2	21.084	62.316
751.549	25378.7	24002.8	-1.162	69.756	718232.5	21.159	62.518
753.949	25380.1	24004.3	-1.164	69.814	717041.7	21.215	62.670
756.350	25381.6	24005.8	-1.166	69.873	715849.0	21.271	62.823
758.750	25383.0	24007.2	-1.168	69.932	714654.2	21.326	62.975
761.149	25384.4	24008.7	-1.170	69.991	713457.5	21.382	63.128
763.549	25386.0	24010.2	-1.171	70.050	712259.0	21.437	63.280
765.949	25387.5	24011.9	-1.173	70.109	711058.5	21.493	63.433
768.350	25388.7	24013.1	-1.175	70.169	709855.7	21.548	63.586
770.750	25390.4	24014.9	-1.176	70.229	708651.5	21.603	63.739
773.149	25391.6	24016.1	-1.178	70.289	707445.2	21.657	63.893
775.549	25393.1	24017.7	-1.180	70.349	706237.0	21.712	64.046
777.949	25394.9	24019.5	-1.181	70.410	705027.0	21.767	64.200
780.335	25396.1	24020.8	-1.183	70.470	703822.2	21.821	64.353
782.750	25397.6	24022.3	-1.185	70.531	702601.2	21.875	64.507
785.149	25398.9	24023.6	-1.186	70.592	701385.5	21.929	64.661
787.549	25400.5	24025.3	-1.188	70.653	700168.0	21.983	64.815
789.949	25401.9	24026.8	-1.189	70.714	698948.0	22.037	64.970
792.350	25403.6	24028.4	-1.192	70.776	697727.0	22.090	65.124
794.750	25405.0	24030.0	-1.193	70.837	696503.5	22.144	65.279
796.390	25406.1	24031.0	-1.194	70.880	695666.5	22.180	65.384
799.549	25407.9	24032.9	-1.196	70.962	694051.2	22.250	65.588
801.949	25409.4	24034.5	-1.198	71.024	692822.5	22.303	65.743
804.350	25410.9	24036.0	-1.199	71.087	691592.0	22.356	65.898
806.750	25412.3	24037.5	-1.201	71.149	690359.5	22.408	66.053
809.149	25413.8	24039.0	-1.203	71.212	689125.0	22.461	66.209

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
811.549	25415.4	24040.7	-1.204	71.276	687899.5	22.513	66.364
813.949	25416.5	24042.2	-1.206	71.339	686651.2	22.565	66.520
816.350	25418.2	24043.6	-1.207	71.402	685411.2	22.617	66.676
818.751	25419.9	24045.3	-1.209	71.466	684170.0	22.669	66.832
821.143	25421.5	24046.9	-1.210	71.530	682926.5	22.720	66.988
823.549	25422.8	24048.3	-1.212	71.594	681681.5	22.772	67.144
825.949	25424.3	24049.8	-1.213	71.658	680435.0	22.823	67.301
828.325	25425.9	24051.5	-1.215	71.722	679194.0	22.874	67.456
830.750	25427.4	24053.0	-1.216	71.788	677937.0	22.925	67.614
833.149	25428.9	24054.6	-1.218	71.852	676685.5	22.976	67.771
835.549	25430.5	24056.3	-1.219	71.918	675432.0	23.026	67.928
837.949	25431.9	24057.6	-1.220	71.983	674177.2	23.077	68.085
840.351	25433.5	24059.4	-1.222	72.048	672920.2	23.127	68.242
842.750	25434.9	24060.8	-1.223	72.114	671661.5	23.177	68.400
844.[illegible]	25436.1	24062.0	-1.224	72.159	670[illegible].7	23.211	68.537
847.549	25438.2	24064.2	-1.226	72.245	669140.0	23.276	68.715
849.949	25439.7	24065.7	-1.228	72.312	667876.2	23.326	68.873
852.324	25441.2	24067.0	-1.229	72.377	666624.5	23.375	69.029
854.725	25442.7	24068.9	-1.231	72.444	665357.2	23.424	69.187
857.125	25444.1	24070.2	-1.232	72.511	664089.0	23.473	69.346
859.524	25445.7	24072.[illegible]	-1.233	72.578	662818.5	23.522	69.504
861.924	25447.2	24073.5	-1.235	72.645	661546.7	23.571	69.663
864.324	25448.9	24075.2	-1.236	72.712	660273.7	23.619	69.821
866.725	25450.2	24076.6	-1.237	72.780	658998.7	23.667	69.980
869.125	25452.0	24078.4	-1.239	72.848	657722.5	23.716	70.139
871.524	25453.6	24080.1	-1.240	72.916	656444.5	23.764	70.298
873.924	25454.9	24081.4	-1.241	72.984	655165.2	23.811	70.458
876.311	25456.6	24083.2	-1.242	73.051	653891.2	23.859	70.616
878.696	25458.1	24084.8	-1.243	73.120	652616.5	23.906	70.775
881.105	25459.6	24086.2	-1.245	73.188	651330.5	23.953	70.934
883.524	25461.2	24087.8	-1.246	73.258	650031.7	24.001	71.096
885.924	25462.5	24089.6	-1.247	73.327	648744.7	24.048	71.256
888.324	25464.4	24091.3	-1.248	73.396	647456.2	24.094	71.416
890.725	25465.7	24092.6	-1.250	73.465	646165.7	24.141	71.577
892.298	25467.0	24093.9	-1.251	73.514	645265.0	24.173	71.689
895.497	25469.0	24096.0	-1.252	73.604	643595.5	24.233	71.896
897.896	25470.6	24097.7	-1.254	73.674	642300.7	24.279	72.057
900.296	25472.2	24099.4	-1.255	73.744	641004.5	24.324	72.217
902.696	25473.8	24101.0	-1.256	73.814	639706.7	24.370	72.378
905.096	25475.4	24102.6	-1.257	73.884	638408.5	24.415	72.540
907.497	25476.9	24104.2	-1.258	73.956	637107.7	24.461	72.701
909.924	25478.4	24105.7	-1.259	74.027	635795.7	24.506	72.864
912.296	25480.0	24107.4	-1.261	74.098	634502.5	24.551	73.024
914.696	25481.6	24109.0	-1.262	74.169	633198.2	24.595	73.186
917.096	25483.0	24110.4	-1.263	74.240	631891.7	24.640	73.347
919.497	25484.7	24112.3	-1.264	74.311	630584.0	24.684	73.509
921.897	25486.2	24113.9	-1.265	74.383	629274.7	24.728	73.672
924.297	25487.8	24115.5	-1.266	74.454	627964.5	24.772	73.834
926.726	25489.4	24117.1	-1.267	74.528	626637.2	24.816	73.998
929.125	25491.1	24119.[illegible]	-1.268	74.601	625324.5	24.860	74.161
931.525	25492.8	24120.7	-1.269	74.673	624010.2	24.903	74.324
933.897	25494.2	24122.1	-1.270	74.745	622730.7	24.945	74.485
936.297	25495.9	24123.7	-1.271	74.817	621393.2	24.988	74.648
938.697	25497.5	24125.5	-1.272	74.890	620075.2	25.031	74.811
94[illegible].324	25499.4	24126.4	-1.273	74.940	619018.7	25.063	74.921
943.525	25501.5	24128.6	-1.274	75.038	617419.5	25.116	75.139
945.925	25502.3	24130.5	-1.275	75.111	616097.5	25.159	75.303
948.325	25504.0	24132.2	-1.276	75.185	614774.0	25.201	75.467
950.725	25505.6	24133.9	-1.277	75.259	613449.5	25.242	75.630
953.125	25507.1	24135.5	-1.278	75.333	612123.5	25.284	75.794
955.498	25509.7	24137.1	-1.279	75.406	610811.7	25.325	75.957
957.925	25510.3	24138.7	-1.280	75.481	609468.5	25.366	76.123
960.325	25511.8	24140.3	-1.281	75.556	608138.7	25.407	76.287
962.726	25513.5	24142.1	-1.282	75.631	606807.5	25.448	76.452
965.125	25515.2	24143.8	-1.283	75.706	605475.7	25.488	76.616
967.525	25516.8	24145.5	-1.284	75.781	604143.0	25.529	76.781
969.925	25518.3	24147.1	-1.284	75.856	602808.7	25.569	76.946
972.317	25520.1	24148.9	-1.285	75.931	601480.7	25.608	77.110
974.726	25521.4	24150.3	-1.286	76.007	600136.2	25.648	77.277
977.125	25523.3	24152.2	-1.287	76.083	598798.5	25.688	77.442
979.525	25524.7	24153.7	-1.288	76.159	597459.5	25.727	77.607
981.925	25526.5	24155.6	-1.289	76.235	596119.5	25.766	77.773
984.325	25527.9	24157.0	-1.289	76.311	594778.2	25.805	77.939
986.726	25529.7	24158.9	-1.291	76.387	593435.2	25.844	78.105
988.365	25530.6	24159.8	-1.291	76.440	592517.5	25.870	78.218
991.525	25532.8	24162.0	-1.292	76.541	590747.0	25.920	78.437
993.925	25534.8	24164.2	-1.293	76.618	589401.5	25.959	78.603
996.325	25536.2	24165.6	-1.294	76.695	588054.5	25.996	78.770
998.726	25537.9	24167.4	-1.294	76.772	586706.2	26.034	78.936
1001.125	25539.5	24169.0	-1.295	76.849	585357.5	26.071	79.103
1003.525	25540.9	24170.5	-1.296	76.927	584007.5	26.109	79.270
1005.925	25542.7	24172.3	-1.296	77.005	582657.0	26.146	79.437
1008.325	25544.3	24174.0	-1.297	77.083	581305.0	26.182	79.604
1010.726	25546.1	24175.9	-1.298	77.161	579952.0	26.219	79.771

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
1013.125	25547.6	24177.4	-1.299	77.239	578597.5	26.255	79.939
1015.525	25549.4	24179.3	-1.299	77.317	577242.7	26.291	80.106
1017.925	25550.9	24180.8	-1.300	77.396	575887.2	26.327	80.274
1020.312	25552.5	24182.5	-1.300	77.474	574538.2	26.363	80.441
1022.726	25554.2	24184.3	-1.301	77.553	573172.2	26.399	80.610
1025.125	25555.9	24186.1	-1.302	77.632	571813.2	26.434	80.778
1027.525	25557.4	24187.7	-1.302	77.711	570453.7	26.469	80.946
1029.925	25559.0	24189.3	-1.303	77.791	569093.5	26.504	81.114
1032.325	25560.6	24190.9	-1.304	77.870	567731.5	26.539	81.283
1034.726	25562.4	24192.8	-1.304	77.952	566369.0	26.573	81.451
1036.365	25563.4	24193.8	-1.305	78.005	565437.5	26.596	81.567
1039.525	25565.7	24196.3	-1.305	78.109	563641.2	26.641	81.789
1041.925	25567.4	24198.0	-1.306	78.189	562276.2	26.675	81.958
1044.325	25569.0	24199.7	-1.307	78.270	560910.5	26.708	82.127
1046.726	25570.5	24201.2	-1.307	78.350	559543.2	26.742	82.296
1049.125	25572.4	24203.2	-1.308	78.431	558175.5	26.775	82.465
1051.525	25573.9	24204.8	-1.308	78.511	556806.7	26.807	82.635
1053.925	25575.5	24206.5	-1.309	78.592	555437.0	26.840	82.805
1056.325	25577.5	24208.4	-1.309	78.672	554067.0	26.873	82.974
1058.724	25579.1	24210.2	-1.309	78.754	552696.[illegible]	26.905	83.144
1061.125	25580.6	24211.7	-1.310	78.836	551324.2	26.937	83.314
1063.525	25582.2	24213.4	-1.311	78.917	549951.7	26.968	83.484
1065.900	25584.0	24215.3	-1.311	78.998	548592.7	27.000	83.653
1068.287	25585.3	24216.6	-1.311	79.079	547226.2	27.031	83.822
1070.700	25587.2	24218.6	-1.312	79.161	545843.2	27.062	83.993
1073.101	25588.7	24220.2	-1.312	79.243	544467.2	27.093	84.164
1075.500	25590.4	24221.9	-1.313	79.326	543090.7	27.123	84.335
1077.900	25592.3	24223.9	-1.313	79.408	541713.5	27.154	84.506
1080.300	25593.9	24225.5	-1.314	79.490	540335.5	27.184	84.677
1082.700	25595.6	24227.3	-1.314	79.573	538957.2	27.214	84.848
1084.340	25596.8	24228.5	-1.314	79.629	538014.7	27.234	84.965
1087.500	25598.9	24230.7	-1.314	79.738	536198.0	27.273	85.190
1089.900	25600.5	24232.5	-1.315	79.821	534817.5	27.302	85.362
1092.300	25602.2	24234.2	-1.315	79.904	533436.2	27.331	85.533
1094.700	25603.9	24235.[illegible]	-1.316	79.987	532054.5	27.360	85.705
1097.101	25605.6	24237.9	-1.316	80.071	530671.0	27.389	85.877
1099.500	25607.2	24239.4	-1.316	80.155	529287.7	27.417	86.048
1101.873	25608.9	24241.2	-1.316	80.237	527920.2	27.445	86.218
1104.272	25610.4	24242.7	-1.317	80.321	526535.7	27.472	86.391
1106.700	25612.4	24244.8	-1.317	80.406	525134.7	27.500	86.565
1109.101	25613.8	24246.3	-1.318	80.490	523748.7	27.528	86.737
1111.500	25615.6	24248.1	-1.318	80.574	522362.5	27.555	86.910
1113.900	25617.4	24250.[illegible]	-1.318	80.658	520975.5	27.582	87.082
1116.287	25619.0	24251.7	-1.318	80.742	519596.2	27.608	87.254
1118.673	25620.5	24253.3	-1.318	80.826	518216.5	27.634	87.426
1121.072	25622.2	24255.1	-1.318	80.911	516828.2	27.661	87.599
1123.472	25623.9	24256.8	-1.319	80.995	515439.2	27.687	87.772
1125.873	25625.5	24258.5	-1.319	81.081	514049.7	27.712	87.945
1128.300	25627.4	24260.5	-1.319	81.166	512643.7	27.738	88.120
1130.700	25629.2	24262.3	-1.319	81.252	511253.2	27.763	88.293
1132.293	25630.0	24263.0	-1.319	81.308	510326.5	27.780	88.409
1135.500	25632.2	24265.5	-1.319	81.422	508471.0	27.813	88.641
1137.900	25633.9	24267.2	-1.320	81.508	507079.2	27.838	88.814
1140.300	25635.7	24269.1	-1.320	81.593	505687.2	27.862	88.988
1142.700	25637.4	24270.[illegible]	-1.320	81.679	504294.[illegible]	27.886	89.162
1145.101	25638.9	24272.4	-1.321	81.765	502900.5	27.910	89.336
1147.500	25640.6	24274.2	-1.321	81.851	501576.5	27.933	89.510
1149.900	25642.4	24276.1	-1.321	81.937	500112.2	27.957	89.684
1152.300	25644.3	24278.1	-1.321	82.023	498717.5	27.980	89.858
1154.700	25645.9	24279.7	-1.321	82.110	497322.5	28.003	90.033
1157.101	25647.6	24281.5	-1.320	82.196	495926.7	28.025	90.207
1159.500	25649.1	24283.1	-1.321	82.283	494531.0	28.047	90.382
1161.900	25650.9	24284.9	-1.320	82.369	493135.2	28.069	90.557
1164.337	25652.6	24286.7	-1.320	82.456	491747.[illegible]	28.091	90.731
1166.700	25654.3	24288.5	-1.320	82.543	490342.5	28.113	90.906
1169.101	25655.9	24290.1	-1.320	82.630	488945.0	28.134	91.081
1171.500	25657.6	24292.[illegible]	-1.320	82.717	487547.7	28.155	91.257
1173.900	25659.1	24293.6	-1.320	82.804	486150.0	28.176	91.432
1176.300	25660.9	24295.4	-1.320	82.891	484751.7	28.197	91.607
1178.700	25662.4	24297.0	-1.320	82.979	483354.2	28.217	91.782
1180.240	25663.8	24298.4	-1.320	83.038	482398.5	28.231	91.902
1183.500	25666.1	243[illegible]	-1.320	83.154	480557.0	28.257	92.134
1185.900	25667.8	24302.6	-1.320	83.242	479158.0	28.277	92.309
1188.300	25669.4	24304.3	-1.319	83.329	477759.0	28.296	92.485
1190.700	25670.9	24305.9	-1.319	83.417	476360.0	28.315	92.661
1193.101	25672.8	24307.9	-1.319	83.505	474960.5	28.334	92.837
1195.500	25674.3	24309.5	-1.319	83.593	473561.0	28.353	93.013
1197.900	25676.1	24311.3	-1.319	83.682	472160.7	28.371	93.189
1200.300	25677.9	24313.2	-1.319	83.770	470760.5	28.389	93.365
1202.700	25679.7	24315.0	-1.319	83.858	469360.5	28.407	93.541
1205.101	25681.2	24316.6	-1.319	83.947	467960.0	28.425	93.718
1207.500	25682.9	24318.4	-1.318	84.035	466559.7	28.442	93.894
1209.900	25684.4	24320.0	-1.318	84.124	465159.2	28.459	94.071
1212.287	25686.3	24321.9	-1.318	84.212	463766.5	28.476	94.246

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
1214.720	25688.1	24323.9	-1.318	84.301	462357.5	28.492	94.424
1217.1[illegible]	25689.7	24325.5	-1.317	84.390	460956.5	28.509	94.601
1219.5[illegible]	25691.2	24327.1	-1.317	84.479	459555.5	28.525	94.778
1221.[illegible]	25692.9	24328.9	-1.317	84.568	458154.7	28.541	94.955
1224.390	25694.6	24330.7	-1.317	84.657	456753.2	28.556	95.132
1226.730	25696.2	24332.3	-1.316	84.747	455352.2	28.572	95.309
1228.240	25697.6	24333.7	-1.316	84.808	454395.3	28.582	95.430
1231.530	25699.7	24336.0	-1.316	84.926	452550.0	28.601	95.664
1233.900	25701.6	24337.9	-1.316	85.015	451149.7	28.616	95.841
1236.300	25703.0	24339.4	-1.315	85.104	449747.0	28.630	96.018
1238.700	25704.7	24341.2	-1.315	85.194	448345.5	28.644	96.196
1241.101	25706.4	24342.9	-1.315	85.284	446944.0	28.659	96.373
1243.500	25708.3	24345.0	-1.314	85.374	445543.0	28.672	96.551
1245.9[illegible]	25709.7	24346.5	-1.314	85.463	444141.2	28.685	96.729
1248.30[illegible]	25711.5	24348.3	-1.313	85.553	442743.2	28.699	96.907
1250.7[illegible]	25713.2	24350.2	-1.313	85.643	441339.5	28.711	97.084
1253.1[illegible]	25715.0	24352.0	-1.313	85.734	439937.7	28.723	97.262
1255.5[illegible]	25716.7	24353.8	-1.312	85.824	438537.0	28.735	97.440
1257.930	25718.4	24355.6	-1.312	85.914	437136.0	28.747	97.618
1260.287	25720.1	24357.3	-1.311	86.003	435743.2	28.759	97.796
1262.700	25721.7	24359.0	-1.311	86.094	434334.5	28.771	97.975
1265.101	25723.4	24360.8	-1.311	86.185	432933.2	28.782	98.153
1267.500	25725.0	24362.5	-1.310	86.275	431532.7	28.793	98.331
1269.900	25726.7	24364.3	-1.310	86.366	430132.2	28.803	98.510
1272.30[illegible]	25728.2	24365.9	-1.309	86.456	428732.0	28.814	98.688
1274.7[illegible]	25730.0	24367.7	-1.308	86.547	427331.7	28.824	98.867
1276.315	25731.3	24369.1	-1.308	86.608	426390.[illegible]	28.831	98.987
1279.476	25733.2	24371.1	-1.307	86.727	424547.0	28.843	99.222
1281.875	25734.9	24372.9	-1.307	86.818	423148.0	28.853	99.401
1284.275	25736.7	24374.8	-1.307	86.909	421748.7	28.862	99.580
1286.675	25738.5	24376.6	-1.306	87.000	420350.0	28.871	99.759
1289.075	25740.2	24378.4	-1.305	87.091	418951.2	28.879	99.937
1291.476	25741.9	24380.2	-1.305	87.182	417552.2	28.888	100.116
1293.847	25743.3	24381.7	-1.305	87.272	416170.2	28.896	100.293
1296.275	25745.0	24383.4	-1.304	87.364	414755.7	28.903	100.474
1298.675	25746.9	24385.4	-1.303	87.456	413358.0	28.911	100.653
1301.075	25748.3	24386.9	-1.303	87.547	411960.7	28.918	100.833
1303.476	25750.2	24388.9	-1.302	87.638	410563.5	28.925	101.012
1305.875	25751.7	24390.5	-1.301	87.729	409166.7	28.932	101.191
1308.261	25753.6	24392.5	-1.301	87.820	407778.7	28.939	101.369
1310.647	25755.3	24394.2	-1.300	87.911	406390.5	28.945	101.548
1313.047	25756.8	24395.8	-1.299	88.003	404995.2	28.951	101.727
1315.476	25758.4	24397.5	-1.298	88.095	403583.5	28.956	101.909
1317.875	25760.2	24399.4	-1.298	88.186	402188.7	28.962	102.088
1320.275	25761.9	24401.2	-1.297	88.278	400794.0	28.967	102.268
1322.675	25763.6	24403.0	-1.296	88.369	399399.7	28.972	102.447
1324.350	25764.6	24404.0	-1.296	88.433	398427.0	28.975	102.572
1327.359	25766.7	24406.3	-1.295	88.548	396679.5	28.980	102.798
1329.291	25768.2	24407.8	-1.294	88.622	395558.2	28.984	102.942
1332.159	25770.1	24409.9	-1.293	88.731	393893.2	28.988	103.157
1334.092	25771.3	24411.2	-1.293	88.805	392774.0	28.991	103.302
1336.959	25773.3	24413.2	-1.292	88.915	391110.5	28.995	103.517
1338.891	25774.5	24414.5	-1.291	88.989	389991.2	28.998	103.661
1341.759	25776.5	24416.6	-1.290	89.099	388329.[illegible]	29.001	103.876
1343.692	25777.9	24418.1	-1.289	89.173	387210.5	29.003	104.021
1346.560	25779.8	24420.1	-1.288	89.282	385549.5	29.006	104.236
1348.493	25781.1	24421.5	-1.288	89.356	384432.0	29.007	104.381
1351.359	25783.2	24423.7	-1.287	89.467	382771.7	29.009	104.596
1353.291	25784.5	24425.	-1.286	89.541	381655.0	29.011	104.741
1356.159	25786.4	24427.2	-1.285	89.651	379996.7	29.012	104.956
1358.092	25787.9	24428.6	-1.285	89.724	378880.7	29.013	105.101
1360.996	25789.8	24430.6	-1.284	89.835	377202.7	29.013	105.319
1362.891	25791.0	24431.[illegible]	-1.283	89.908	376108.5	29.014	105.461
1365.795	25793.1	24434.1	-1.282	90.020	374432.2	29.014	105.679
1367.690	25794.3	24435.3	-1.281	90.092	373330.[illegible]	29.014	105.822
1370.595	25796.3	24437.4	-1.280	90.203	371664.5	29.013	106.040
1372.490	25797.5	24438.7	-1.279	90.276	370572.2	29.013	106.182
1375.396	25799.4	24440.8	[illegible]	90.388	368898.7	29.012	106.400
1377.335	25800.9	24442.3	[illegible]	90.462	367781.5	29.011	106.546
1380.195	25802.8	24444.3	-1.276	90.571	366135.2	29.009	106.761
1382.135	25804.0	24445.6	-1.275	90.646	365019.2	29.007	106.907
1384.996	25806.0	24447.6	-1.274	90.756	363374.5	29.005	107.122
1386.936	25807.2	24448.9	-1.273	90.830	362259.2	29.003	107.267
1389.795	25808.9	24450.8	-1.273	90.940	360616.5	29.000	107.482
1391.735	25810.4	24452.3	-1.271	91.014	359503.0	28.998	107.628
1394.637	25812.2	24454.2	-1.270	91.125	357838.0	28.994	107.846
1396.536	25813.4	24455.5	-1.269	91.198	356749.2	28.991	107.989
1399.437	25815.3	24457.5	-1.268	91.310	355086.5	28.987	108.207
1401.371	25816.8	24459.1	-1.267	91.384	353979.0	28.984	108.352
1404.238	25818.5	24460.9	-1.266	91.494	352337.2	28.978	108.568
1406.170	25819.7	24462.2	-1.265	91.568	351231.7	28.975	108.713
1409.039	25821.6	24464.2	-1.264	91.678	349591.7	28.969	108.929
1410.970	25822.8	24465.5	-1.263	91.752	348487.7	28.965	109.074
1413.838	25824.5	24467.3	-1.261	91.862	346850.2	28.959	109.290

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
1415.771	25825.8	24468.6	-1.261	91.937	345747.2	28.954	109.435
1418.638	25827.7	24470.5	-1.260	92.046	344111.2	28.947	109.651
1420.572	25828.7	24471.7	-1.259	92.123	343030.7	28.943	109.796
1423.478	2583[illegible].7	24473.0	-1.257	92.232	341353.2	28.935	110.015
1425.371	25831.7	24474.9	-1.256	92.304	340275.5	28.930	110.157
1428.277	25833.4	24476.7	-1.255	92.415	338621.7	28.921	110.376
1430.211	25834.5	24477.9	-1.254	92.490	337522.0	28.915	110.521
1433.078	25835.2	24479.6	-1.253	92.599	335893.2	28.907	110.737
1435.011	25837.0	24480.5	-1.251	92.673	334795.5	28.902	110.882
1437.877	25838.6	24482.3	-1.249	92.783	333170.0	28.891	111.097
1439.812	25839.4	24483.2	-1.248	92.857	332073.5	28.884	111.243
1442.677	25840.9	24484.8	-1.247	92.967	330450.7	28.874	111.458
1444.611	25841.7	24485.6	-1.246	93.041	329356.2	28.867	111.604
1447.478	25842.[illegible]	24487.1	-1.244	93.151	327736.0	28.856	111.819
1449.445	25844.1	24488.2	-1.243	93.226	326624.5	28.848	111.967
1452.227	25845.3	24489.5	-1.241	93.335	325026.2	28.837	112.180
1454.246	25846.2	24490.5	-1.240	93.409	323915.7	28.829	112.328
1457.078	25847.1	24491.5	-1.238	93.518	322325.2	28.817	112.541
1459.045	25847.8	24492.3	-1.238	93.593	321212.5	28.808	112.688
1461.877	25849.0	24493.6	-1.236	93.701	319619.7	28.796	112.901
1463.845	25849.6	24494.2	-1.234	93.776	318514.0	28.787	113.049
1465.792	25850.4	24495.1	-1.233	93.851	317422.5	28.778	113.195
1468.646	25851.2	24496.0	-1.232	93.960	315820.5	28.764	113.410
1470.589	25851.6	24496.5	-1.230	94.034	314731.2	28.755	113.556
1473.479	25852.3	24497.4	-1.229	94.145	313113.2	28.740	113.773
1475.390	25852.7	24497.9	-1.227	94.218	312045.2	28.730	113.916
1478.279	25853.5	24498.7	-1.226	94.329	310430.7	28.715	114.133
1483.081	25853.7	24499.1	-1.223	94.511	307752.5	28.689	114.493
1487.854	25854.2	24499.8	-1.220	94.693	305092.5	28.663	114.851
1492.654	25853.8	24499.6	-1.217	94.876	302425.2	28.635	115.211
1497.5[illegible]	25853.4	24499.6	-1.213	95.061	299738.5	28.605	115.574
1499.433	25852.9	24499.0	-1.212	95.134	298668.5	28.593	115.719
1502.299	25852.2	24498.4	-1.210	95.243	297083.7	28.575	115.934
1504.232	25851.7	24498.0	-1.209	95.316	296016.2	28.562	116.078
1507.100	25851.0	24497.4	-1.207	95.426	294434.2	28.544	116.293
1512.252	25849.7	24495.2	-1.203	95.622	291597.5	28.509	116.679
1514.417	25847.6	24494.2	-1.202	95.704	290408.0	28.494	116.840
1516.545	25846.2	24493.[illegible]	-1.201	95.785	289239.0	28.479	117.000
1518.712	25845.0	24491.9	-1.199	95.866	288050.0	28.464	117.162
1520.871	25843.6	24490.5	-1.198	95.949	286867.5	28.448	117.323
1524.061	25840.8	24487.9	-1.195	96.070	285122.2	28.425	117.561
1526.222	25838.5	24485.7	-1.193	96.152	283943.0	28.408	117.722
1528.347	25836.2	24483.4	-1.191	96.232	282783.5	28.392	117.881
1530.533	25833.6	24480.9	-1.189	96.315	281594.0	28.376	118.044
1533.735	25828.9	24476.3	-1.186	96.437	279854.5	28.351	118.283
1535.854	25824.8	24472.4	-1.184	96.517	278705.2	28.334	118.441
1538.029	25820.6	24468.2	-1.182	96.600	277527.7	28.317	118.603
1540.[illegible]	25815.7	24463.4	-1.179	96.681	276376.2	28.299	118.761
1543.372	258[illegible]7.6	24455.[illegible]	-1.174	[illegible]	2746[illegible]	28.272	119.000
1545.541	25801.5	24449.5	-1.173	96.886	273481.2	28.255	119.162
1547.667	25794.7	24442.7	-1.169	96.967	272342.0	28.237	119.320
1553.052	25775.8	24424.1	-1.163	97.172	269468.0	28.190	119.720
1555.216	25767.2	24415.7	-1.160	97.254	268318.0	28.171	119.880
1557.345	25759.2	244[illegible]5.8	-1.157	97.335	26719[illegible]	28.152	120.038
1559.512	25749.2	24397.8	-1.153	97.417	266[illegible]45.0	28.13[illegible]	120.198
1561.67[illegible]	25739.4	24388.0	-1.150	97.498	2649[illegible]8.7	28.11[illegible]	120.358
1564.862	25723.5	24372.3	-1.144	97.617	263235.7	28.08[illegible]	120.594
1567.021	25712.1	24361.0	-1.140	97.696	262126.2	28.06	120.753
1569.147	257[illegible].4	24349.4	-1.135	97.772	261[illegible].0	28.[illegible]4	120.910
1571.332	25687.9	24336.0	-1.129	97.851	259872.5	28.023	121.072
1574.536	25667.5	24316.7	-1.123	97.967	258225.7	27.993	121.307
1576.654	25653.3	243[illegible]2.5	-1.119	98.042	257141.2	27.972	121.463
1578.791	25639.2	24287.5	-1.114	98.116	256052.7	27.951	121.620
1580.934	25622.6	24271.0	-1.110	98.190	254965.0	27.930	121.778
1584.135	25597.3	24246.7	-1.102	98.303	253355.7	27.898	122.013
1586.254	25579.5	24228.1	-1.098	98.375	252298.2	27.877	122.168
1588.391	25559.0	24208.6	-1.093	98.447	251222.2	27.855	122.324
1590.533	25539.0	24188.6	-1.087	98.519	250158.5	27.833	122.481
1593.697	25506.7	24156.4	-1.079	98.627	248598.5	27.800	122.711
1595.854	25483.6	24133.4	-1.075	98.700	247541.7	27.778	122.869
1597.992	25459.8	24109.7	-1.069	98.772	246501.0	27.755	123.024
1600.133	25435.0	24084.9	-1.062	98.845	245464.2	27.733	123.180
1603.335	25395.0	24045.6	-1.055	98.951	243926.0	27.69[illegible]	123.412
1605.455	25369.0	24018.1	-1.049	99.020	242915.2	27.6[illegible]	123.565
1607.590	25339.0	23989.9	-1.042	99.091	241903.7	27.6[illegible]	123.720
1609.733	2531[illegible]	23959.5	-1.038	99.159	240895.5	27.6[illegible]	123.874
1612.897	25267.[illegible]	23912.7	-1.[illegible]29	99.261	239417.5	27.[illegible]	124.102
1615.021	25229.[illegible]	23879.9	-1.022	99.33[illegible]	238436.7	27.[illegible]	124.255
1617.147	25194.6	23845.1	-1.018	99.396	237456.2	27.5[illegible]	124.407
1619.298	25159.3	23809.7	-1.012	99.465	236473.0	27.5[illegible]	124.561
1622.498	25105.3	23755.7	-1.002	99.564	235024.2	27.48	124.790
1624.586	25065.3	23716.8	-.997	99.629	234086.5	27.463	124.938
1626.749	25026.9	23677.5	-.991	99.698	233122.7	27.438	125.092
1628.871	24986.0	23636.6	-.984	99.769	232193.7	27.414	125.243

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
1632.061	24919.8	23570.5	-.977	99.856	230785.0	27.377	125.468
1634.187	24872.9	23523.6	-.971	99.916	229860.2	27.352	125.618
1636.312	24823.5	23474.2	-.964	99.977	228942.7	27.327	125.768
1639.452	24745.1	23396.8	-.955	100.066	227604.5	27.291	125.988
1641.616	24690.5	23341.3	-.947	100.125	226691.5	27.265	126.140
1643.746	24631.6	23282.4	-.941	100.185	225801.0	27.240	126.288
1645.874	24571.4	23222.2	-.933	100.241	224920.5	27.215	126.436
1649.052	24478.4	23129.2	-.922	100.331	223621.0	27.177	126.656
1651.216	24412.7	23063.5	-.915	100.386	222748.0	27.151	126.805
1653.312	24345.8	22996.6	-.906	100.442	221911.2	27.126	126.950
1655.474	24276.5	22927.4	-.902	100.498	221056.2	27.100	127.098
1658.652	24171.6	22822.4	-.891	100.577	219812.5	27.061	127.315
1660.774	24097.2	22748.0	-.889	100.627	218992.5	27.036	127.459
1662.912	24022.1	22673.8	-.883	100.677	218172.2	27.010	127.603
1668.213	23829.8	22483.4	-.879	100.796	216160.2	26.946	127.960
1670.343	23746.9	22397.5	-.892	100.833	215356.7	26.922	128.102
1672.466	23662.8	22313.4	-.884	100.868	214554.0	26.894	128.243
1677.813	23442.4	22092.8	-.886	100.967	212547.0	26.829	128.596
1679.943	23349.8	22000.1	-.884	101.009	211753.2	26.803	128.736
1682.066	23256.5	21906.7	-.897	101.042	210962.0	26.777	128.875
1684.204	23160.5	21810.9	-.889	101.081	210168.2	26.751	129.013
1687.414	23016.6	21666.7	-.894	101.132	208977.7	26.712	129.220
1689.541	22916.2	21566.2	-.904	101.159	208186.0	26.687	129.357
1691.667	22814.0	21463.9	-.927	101.179	207384.2	26.661	129.493
1693.722	22710.2	21359.0	-.965	101.193	206583.5	26.636	129.624
1696.654	22563.1	21212.6	-1.035	101.217	205396.0	26.601	129.808
1701.672	22305.9	20955.3	-1.211	101.280	203174.2	26.541	130.122
1703.565	22195.6	20845.0	-1.290	101.304	202193.0	26.519	130.239
1706.627	22024.4	20673.9	-1.430	101.373	200551.7	26.483	130.427
1708.792	21892.8	20542.6	-1.579	101.441	199300.5	26.457	130.559
1710.920	21759.4	20408.4	-1.631	101.523	197995.2	26.432	130.688
1713.087	21616.4	20266.3	-1.716	101.625	196598.2	26.406	130.818
1715.246	21466.5	20117.3	-1.782	101.742	195155.5	26.381	130.947
1718.436	21229.8	19881.3	-1.827	101.911	192976.5	26.343	131.135
1720.595	21062.9	19712.7	-1.830	102.021	191404.5	26.317	131.261
1722.722	20886.4	19538.2	-1.817	102.063	190015.5	26.291	131.384
1724.874	20715.8	19357.7	-1.807	102.089	188611.2	26.266	131.507
1728.072	20427.1	19079.8	-1.800	102.105	186525.5	26.229	131.688
1730.195	20230.7	18892.3	-1.791	102.119	185129.5	26.204	131.807
1732.322	20029.2	18690.8	-1.780	102.135	183771.5	26.179	131.925
1734.474	19821.1	18472.6	-1.769	102.161	182420.2	26.155	132.042
1737.672	19503.6	18155.0	-1.751	102.202	180454.5	26.119	132.215
1739.795	19293.3	17934.7	-1.741	102.224	179177.5	26.095	132.327
1741.922	19057.1	17718.5	-1.734	102.247	177910.0	26.071	132.439
1744.073	18824.5	17475.8	-1.722	102.266	176669.2	26.049	132.550
1747.235	18471.5	17122.7	-1.716	102.280	174867.2	26.013	132.711
1749.287	18229.2	16879.2	-1.708	102.281	173722.0	25.991	132.813
1751.273	17999.1	16640.9	-1.709	102.279	172620.2	25.971	132.911
1754.229	17656.4	16307.0	-1.721	102.263	171022.5	25.942	133.054
1759.272	17072.0	15722.0	-1.777	102.196	168315.7	25.889	133.291
1761.166	16832.6	15492.2	-1.802	102.153	167286.0	25.871	133.378
1764.188	16473.9	15122.9	-1.912	102.046	165628.2	25.842	133.513
1766.086	16229.0	14877.5	-2.035	101.949	164542.2	25.825	133.597
1768.073	15983.0	14621.1	-2.214	101.861	163340.2	25.807	133.693
1771.029	15612.8	14251.9	-2.565	101.794	161370.2	25.781	133.838
1776.072	14963.0	13612.5	-3.223	101.924	157448.0	25.737	134.014
1777.965	14689.8	13329.4	-3.435	102.051	155803.0	25.721	134.089
1780.089	14371.3	12923.4	-3.652	102.272	153073.0	25.696	134.205
1782.996	13977.2	12630.3	-3.735	102.396	151229.5	25.680	134.280
1785.123	13655.4	12318.9	-3.763	102.470	149291.7	25.663	134.358
1787.309	13327.2	11980.6	-3.780	102.450	147335.7	25.645	134.435
1790.472	12822.6	11475.2	-3.843	102.271	144564.5	25.621	134.543
1792.595	12474.7	11126.6	-3.891	102.126	142739.2	25.606	134.614
1794.722	12122.5	10773.8	-3.938	101.988	140939.5	25.591	134.682
1796.903	11759.4	10420.2	-3.969	101.899	139125.5	25.576	134.749
1800.072	11244.3	9994.8	-4.017	101.766	136572.0	25.556	134.843
1802.195	10889.2	9530.5	-4.051	101.701	134907.2	25.543	134.903
1804.322	10533.2	9183.4	-4.095	101.642	133277.5	25.530	134.962
1806.474	10181.8	8831.0	-4.163	101.559	131661.7	25.518	135.018
1809.516	9683.9	8333.6	-4.280	101.427	129423.2	25.501	135.094
1811.487	9371.1	8010.8	-4.381	101.327	127996.0	25.491	135.142
1814.510	8918.6	7567.8	-4.665	101.183	125804.2	25.477	135.210
1816.441	8613.9	7262.7	-4.945	100.838	124378.5	25.468	135.252
1819.427	8172.7	6821.6	-5.581	100.488	122071.7	25.455	135.314
1821.361	7878.1	6527.9	-6.103	100.326	120486.2	25.448	135.351
1823.335	7590.4	6242.0	-6.667	100.259	118782.7	25.440	135.388
1826.315	7163.4	5818.8	-7.476	100.321	116071.0	25.429	135.440
1828.289	6876.3	5534.7	-7.932	100.447	114209.7	25.423	135.473
1831.311	6463.1	5125.2	-8.427	100.603	111334.7	25.413	135.519
1833.320	6191.1	4855.1	-8.687	100.607	109437.7	25.406	135.548
1835.448	5910.1	4575.4	-8.947	100.484	107458.7	25.400	135.577
1838.627	5514.8	4181.3	-9.420	100.067	104555.0	25.391	135.617
1840.792	5253.8	3921.5	-9.974	99.675	102598.5	25.386	135.642
1842.886	5002.1	3671.9	-10.434	99.281	100701.7	25.391	135.664

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGL (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
1845.048	4763.4	3436.4	-11.274	98.901	98729.0	25.377	135.686
1848.228	4432.2	3116.5	-12.019	98.313	95832.2	25.371	135.716
1850.315	4219.7	2931.3	-12.533	97.885	93870.5	25.367	135.733
1852.441	4017.8	2703.4	-13.075	97.467	91937.0	25.364	135.750
1854.579	3826.8	2517.4	-13.662	97.039	89997.2	25.361	135.765
1857.747	3569.9	2267.5	-14.499	96.374	87147.0	25.358	135.786
1859.875	3407.6	2112.2	-15.058	95.876	85252.5	25.356	135.799
1862.004	3256.0	1967.3	-15.615	95.355	83374.5	25.354	135.810
1864.135	3115.1	1833.6	-16.142	94.812	81516.7	25.352	135.821
1867.272	2923.6	1654.1	-16.899	94.020	78823.2	25.350	135.835
1869.320	2808.1	1547.4	-17.382	93.495	77093.0	25.349	135.844
1874.513	2557.7	1323.2	-18.611	92.130	72796.5	25.347	135.862
1876.562	2457.6	1244.6	-19.035	91.549	71132.5	25.347	135.868
1878.648	2335.8	[illegible]	-19.458	90.937	69463.7	25.347	135.874
1881.748	2274.7	1083.6	-20.039	90.028	67076.0	25.347	135.881
1883.796	2203.1	1025.9	-20.376	89.511	65439.7	25.347	135.886
1885.888	2140.0	[illegible]	-20.642	89.000	63848.7	25.347	135.890
1888.989	2061.2	909.8	-20.658	88.377	61551.5	25.347	135.895
1891.030	2020.7	874.8	-20.579	88.102	60085.0	25.347	135.899
1893.167	1939.9	848.9	-20.554	88.219	58580.7	25.349	135.902
1895.336	1961.4	821.5	-20.351	88.307	57082.7	25.348	135.905
1898.474	1927.5	790.7	-20.195	88.655	54959.5	25.349	135.909
1900.521	1910.2	772.4	-19.978	88.790	53670.0	25.349	135.912
1905.748	1862.9	727.3	-19.598	89.442	50282.2	25.349	135.918
1933.863	1623.3	455.8	-14.830	89.794	35659.5	25.350	135.941
1939.005	1612.2	429.1	-14.205	89.388	33590.4	25.350	135.944
1941.063	1596.6	419.3	-13.904	89.175	32780.7	25.350	135.945
1944.165	1585.8	409.4	-13.750	89.204	31601.5	25.351	135.947
1946.226	1583.2	401.2	-13.436	89.009	30841.5	25.351	135.948
1948.258	1579.4	394.8	-13.230	88.881	30078.2	25.351	135.949
1951.364	1573.4	385.8	-12.981	88.776	28982.5	25.351	135.950
1953.452	1567.6	380.6	-12.917	88.852	28248.7	25.351	135.951
1955.499	1560.5	376.3	-12.911	89.015	27533.0	25.351	135.952
1958.604	1555.1	367.0	-12.640	89.219	26463.7	25.352	135.953
1960.650	1547.0	360.4	-12.568	89.566	25771.0	25.352	135.954
1962.698	1546.7	354.1	-12.206	89.741	25089.0	25.352	135.955
1965.803	1537.1	349.6	-12.731	90.100	24058.2	25.352	135.956
1967.851	1535.9	342.9	-12.065	89.995	23403.5	25.352	135.957
1969.941	1534.8	337.0	-11.825	89.925	22739.0	25.352	135.958
1973.003	1526.5	330.8	-11.742	89.939	21791.7	25.352	135.959
1975.091	1519.7	322.8	-11.549	89.946	21139.2	25.352	135.959
1977.142	1511.2	322.5	-11.725	89.936	20512.7	25.352	135.960
1980.204	1504.5	311.2	-11.373	90.062	19588.5	25.352	135.961
1982.225	1496.3	312.2	-11.613	89.859	18954.0	25.352	135.962
1984.280	1491.0	305.2	-11.384	89.900	18347.0	25.352	135.962
1989.567	1477.9	294.1	-11.151	90.232	16837.5	25.352	135.963
1993.711	1466.0	284.5	-10.932	90.265	15669.0	25.352	135.964
1998.896	1454.2	277.6	[illegible]	[illegible]	[illegible]	25.352	135.965
2000.955	1451.0	275.5	-10.722	90.031	13677.7	25.352	135.965
2004.285	1445.2	266.0	-10.512	89.994	12839.0	25.352	135.966
2006.137	1433.1	267.1	-10.483	90.061	12296.0	25.352	135.966
2008.225	1423.0	190.3	-7.165	90.054	11833.5	25.352	135.966
2011.287	1418.7	112.4	-4.473	89.996	11393.5	25.352	135.966
2013.272	1408.0	94.1	-3.794	90.107	11192.2	25.352	135.966
2015.424	1407.3	89.5	-2.512	90.154	11008.5	25.352	135.966
2019.522	1404.0	47.2	-1.683	90.069	10861.0	25.352	135.967

CONFIDENTIAL

Table B-2a. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	INERTIAL VEL. MAGNITUDE (FT/SEC)	RELATIVE VEL. MAGNITUDE (FT/SEC)	INERTIAL FLT. PATH ANGLE (DEGREES)	INERTIAL HEADING ANGLE (DEGREES)	ALTITUDE (FEET)	GEODETIC LAT. (DEGREES)	GEODETIC LONG. (DEGREES)
2020.571	1399.5	27.8	-.8[illegible]	89.754	10728.7	25.352	135.967
2022.625	1395.1	28.7	-.776	89.285	107[illegible].5	25.352	135.967
2025.722	1397.8	24.5	-.596	89.6[illegible]	1[illegible]65[illegible].7	25.352	135.967
2027.771	1403.1	30.4	-.814	90.100	10615.2	25.352	135.967
2029.863	1406.7	37.5	-.913	90.626	10571.0	25.352	135.967
2032.922	1404.8	33.3	-.828	90.436	10515.7	25.352	135.968
2035.005	1404.5	32.6	-.974	90.087	10461.5	25.352	135.968
2037.063	1407.8	35.4	-.922	89.929	10415.2	25.352	135.968
2040.165	1410.6	37.5	-.892	89.728	10346.7	25.352	135.968
2047.413	1410.8	32.4	-1.014	90.411	10178.2	25.352	135.969
2049.450	1402.6	31.3	-.854	90.327	10131.5	25.352	135.969
2051.499	1397.9	29.3	-.992	90.119	10085.2	25.351	135.969
2054.604	1395.5	29.5	-1.044	90.047	10008.2	25.351	135.969
2056.652	1392.4	25.2	-.972	90.287	9961.5	25.351	135.969
2058.741	1395.5	28.6	-1.012	90.079	9913.0	25.351	135.969
2061.833	1400.2	31.2	-.993	89.717	9838.2	25.351	135.969
2063.851	1401.1	29.6	-.866	89.887	9791.7	25.351	135.970
2065.941	1402.0	32.0	-.954	90.196	9745.2	25.351	135.970
2069.003	1411.5	39.1	-.979	89.981	9672.7	25.351	135.970
2071.091	1413.8	39.4	-.877	89.932	9624.7	25.351	135.970
2073.142	1404.1	31.9	-.847	90.253	9581.2	25.351	135.970
2076.204	1385.4	22.2	-.862	90.384	9517.7	25.351	135.970
2078.292	1396.0	25.2	-.820	90.010	9475.2	25.351	135.971
2080.389	1413.5	41.1	-.954	89.720	9429.2	25.351	135.971
2082.421	1414.8	39.2	-.725	89.734	9386.7	25.351	135.971
2085.567	1395.9	27.5	-.937	89.929	9322.7	25.351	135.971
2087.617	1397.7	27.2	-.863	89.947	9277.7	25.351	135.971
2089.711	1405.8	33.8	-.915	90.088	9232.0	25.351	135.971
2092.812	1394.2	29.3	-.972	90.443	9160.5	25.351	135.972
2094.362	1385.4	25.6	-.889	90.544	9114.2	25.351	135.972
2096.955	1399.5	28.9	-.853	90.246	9069.7	25.351	135.972
2100.011	1415.6	41.6	-.836	90.091	9016.2	25.351	135.972
2102.096	1398.6	28.3	-.860	90.254	8963.0	25.351	135.972
2104.154	1379.5	27.5	-1.038	90.476	8915.5	25.351	135.972
2107.249	1390.4	25.1	-.883	90.357	8842.7	25.351	135.972
2109.296	1400.7	29.4	-.943	90.235	[illegible]	25.351	135.972
2111.354	1389.4	23.7	-.812	90.405	8750.2	25.351	135.972
2114.449	138[illegible]	25.1	-.797	90.671	8699.0	25.351	135.972
2116.497	1397.1	30.7	-.924	90.520	8655.7	25.351	135.972
2121.648	1374.5	31.2	-1.010	90.779	8535.5	25.351	135.973
2123.671	1368.4	25.8	-.651	90.691	8495.0	25.350	135.972
2128.823	1395.7	23.7	-.728	90.164	8400.2	25.350	135.972
2130.913	1376.9	25.6	-.970	90.408	8366.2	25.350	135.973
2136.062	1394.2	31.0	-.939	92.579	8244.2	25.350	135.973
2138.112	1391.4	27.4	-.792	90.672	8199.7	25.350	135.973
2140.199	1375.4	32.7	-.982	90.919	8154.7	25.350	135.973
2143.297	1390.8	29.0	-.729	90.955	8090.7	25.350	135.973
2145.380	1399.2	21.9	-.864	90.614	8050.5	25.350	135.973
2147.438	1403.2	28.8	-.626	90.365	8013.0	25.350	135.973
2150.542	1388.3	22.5	-.646	90.585	7955.0	25.349	135.973
2152.591	1389.4	26.5	-.621	90.824	7932.5	25.349	135.973
2154.673	1391.6	28.2	-.669	90.821	7900.7	25.349	135.973

CONFIDENTIAL

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
2.325	-.038	59.266	19.997	-.812	21882839.2
4.967	-.094	59.254	20.145	-.730	21882769.2
7.355	-.121	59.251	20.280	-.655	21882658.2
9.926	-.134	59.254	20.437	-.569	21882522.7
12.422	-.160	59.265	20.583	-.489	21882369.0
14.326	-.199	59.279	20.693	-.428	21882230.2
16.876	-.228	59.297	20.842	-.347	21882008.2
19.396	-.257	59.277	20.985	-.267	21881755.0
21.926	-.266	59.254	21.130	-.187	21881473.5
24.422	-.297	59.248	21.275	-.107	21881179.0
26.376	-.300	59.249	21.387	-.045	21880929.7
28.976	-.304	59.248	21.531	.034	21880614.7
31.396	-.308	59.249	21.676	.114	21880297.7
33.942	-.312	59.249	21.822	.195	21879971.0
36.422	-.316	59.250	21.965	.274	21879648.5
38.372	-.319	59.250	22.077	.336	21879392.7
40.876	-.323	59.252	22.221	.415	21879059.2
43.396	-.327	59.252	22.366	.495	21878720.0
45.942	-.331	59.255	22.513	.576	21878373.2
50.372	-.338	59.258	22.768	.717	21877759.5
52.911	-.342	59.260	22.914	.797	21877401.7
55.432	-.346	59.262	23.059	.877	21877042.2
57.942	-.351	59.265	23.204	.957	21876680.0
60.422	-.355	59.267	23.346	1.036	21876318.0
62.795	-.358	59.270	23.483	1.111	21875968.0
65.195	-.362	59.272	23.621	1.187	21875610.0
67.624	-.366	59.274	23.761	1.264	21875244.7
70.023	-.370	59.281	23.899	1.341	21874878.7
72.423	-.374	59.284	24.038	1.417	21874509.7
74.823	-.378	59.289	24.176	1.493	21874136.7
76.422	-.381	59.290	24.269	1.544	21873885.7
79.595	-.386	59.296	24.451	1.644	21873383.0
81.996	-.389	59.300	24.589	1.720	21872998.2
84.423	-.392	59.305	24.729	1.797	21872605.5
86.795	-.396	59.310	24.866	1.873	21872217.7
89.224	-.400	59.315	25.006	1.950	21871817.2
91.624	-.405	59.320	25.144	2.026	21871417.5
94.223	-.408	59.325	25.282	2.102	21871014.0
96.396	-.412	59.331	25.419	2.177	21870611.2
98.795	-.415	59.338	25.557	2.252	21870200.2
101.195	-.420	59.343	25.696	2.329	21869785.5
103.595	-.423	59.349	25.834	2.405	21869366.5
105.996	-.427	59.356	25.973	2.481	21868944.2
108.357	-.431	59.362	26.111	2.556	21868523.0
110.823	-.434	59.369	26.251	2.634	21868083.5
113.195	-.438	59.376	26.388	2.709	21867655.0
115.595	-.442	59.384	26.527	2.785	21867218.0
117.996	-.446	59.391	26.666	2.861	21866777.0
120.396	-.450	59.398	26.804	2.937	21866331.7
122.795	-.453	59.406	26.943	3.013	21865883.0
124.422	-.456	59.411	27.037	3.065	21865576.7
127.624	-.461	59.423	27.222	3.166	21864969.5
130.023	-.464	59.431	27.360	3.242	21864509.7
132.423	-.469	59.440	27.499	3.318	21864045.7
134.795	-.471	59.449	27.636	3.392	21863584.0
137.195	-.476	59.458	27.775	3.468	21863113.2
139.595	-.479	59.467	27.914	3.544	21862639.0
142.023	-.483	59.477	28.054	3.621	21862155.0
144.423	-.487	59.486	28.193	3.697	21861673.2
146.823	-.490	59.496	28.332	3.772	21861187.7
149.224	-.494	59.506	28.471	3.848	21860698.2
151.624	-.498	59.516	28.610	3.924	21860205.0
153.996	-.501	59.527	28.748	3.999	21859714.0
156.419	-.505	59.537	28.887	4.075	21859211.0
158.822	-.509	59.548	29.027	4.151	21858707.7
161.224	-.512	59.559	29.166	4.227	21858195.7
163.624	-.516	59.571	29.305	4.303	21857686.0
166.023	-.520	59.582	29.445	4.378	21857168.7
168.423	-.524	59.593	29.584	4.454	21856649.7
170.795	-.527	59.605	29.721	4.529	21856133.5
172.422	-.53	59.614	29.816	4.580	21855777.2
175.624	-.535	59.630	30.002	4.680	21855071.0
178.023	-.539	59.642	30.141	4.756	21854537.2
180.423	-.542	59.655	30.281	4.831	21854000.0
182.923	-.546	59.667	30.420	4.907	21853459.0
185.224	-.550	59.681	30.559	4.982	21852914.5
187.624	-.553	59.694	30.639	5.058	21852366.2
190.023	-.556	59.708	30.839	5.133	21851814.5
192.423	-.560	59.721	30.979	5.208	21851259.5
194.823	-.564	59.735	31.117	5.284	21850703.5
197.224	-.568	59.749	31.257	5.359	21850137.5
199.624	-.571	59.763	31.397	5.434	[illegible]
202.023	-.575	59.778	31.537	5.510	21849000.7
204.419	-.579	59.793	31.676	5.534	[illegible]

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
206.822	-.592	59.919	31.816	5.660	21847849.5
209.224	-.595	59.823	31.956	5.735	21847268.5
211.624	-.598	59.838	32.096	5.810	21846694.2
214.023	-.593	59.852	32.236	5.885	21846096.2
216.423	-.597	59.869	32.376	5.960	21845504.5
218.798	-.600	59.884	32.515	6.035	21844915.5
220.438	-.603	59.896	32.657	6.086	21844506.7
223.599	-.607	59.917	32.795	6.185	21843714.2
225.999	-.61	59.934	32.935	6.259	21843108.5
228.398	-.612	59.951	33.075	6.334	21842499.2
230.798	-.618	59.967	33.216	6.409	21841886.2
233.198	-.621	59.984	33.356	6.484	21841269.7
235.599	-.625	60.002	33.496	6.559	21840649.5
237.999	-.629	60.019	33.637	6.634	21840025.7
240.398	-.632	60.037	33.777	6.708	21839398.7
242.798	-.636	60.055	33.919	6.783	21838768.0
245.198	-.639	60.073	34.058	6.858	21838133.7
247.599	-.643	60.091	34.199	6.932	21837495.5
249.999	-.646	60.110	34.340	7.007	21836854.5
252.384	-.650	60.128	34.480	7.081	21836213.5
254.798	-.653	60.147	34.621	7.156	21835561.2
257.198	-.657	60.166	34.762	7.230	21834909.7
259.599	-.660	60.185	34.903	7.305	21834253.7
261.999	-.664	60.205	35.044	7.379	21833594.7
264.398	-.667	60.225	35.185	7.454	21832932.5
266.798	-.671	60.245	35.326	7.529	21832266.5
268.439	-.672	60.259	35.423	7.579	21831809.5
271.599	-.678	60.286	35.608	7.674	21830924.5
273.999	-.681	60.306	35.750	7.751	21830248.5
276.398	-.684	60.327	35.891	7.825	21829569.7
278.798	-.688	60.349	36.032	7.899	21828885.5
281.198	-.691	60.369	36.174	7.973	21828199.2
283.599	-.695	60.391	36.315	8.047	21827509.0
285.999	-.698	60.412	36.457	8.121	21826815.5
288.398	-.702	60.434	36.599	8.195	21826118.7
290.738	-.705	60.455	36.74	8.269	21825418.0
293.138	-.708	60.479	36.882	8.343	21824714.0
295.599	-.712	60.501	37.024	8.416	21824006.7
297.999	-.716	60.523	37.166	8.490	21823296.0
300.384	-.719	60.545	37.307	8.563	21822585.7
302.798	-.722	60.569	37.450	8.637	21821863.7
305.198	-.726	60.592	37.592	8.711	21821142.7
307.599	-.729	60.615	37.734	8.785	21820418.2
309.999	-.732	60.639	37.876	8.859	21819690.5
312.398	-.736	60.662	38.018	8.932	21818959.0
314.798	-.739	60.687	38.161	9.005	21818224.5
316.438	-.741	60.703	38.258	9.055	21817720.7
319.599	-.746	60.725	38.445	9.152	21816745.2
321.999	-.750	60.747	38.589	9.225	21816009.5
324.399	-.752	60.785	38.731	9.298	21815252.2
326.799	-.756	60.810	38.873	9.371	21814501.0
329.198	-.759	60.835	39.016	9.444	21813746.0
331.599	-.762	60.861	39.159	9.517	21812988.0
333.999	-.766	60.886	39.302	9.590	21812226.5
336.398	-.769	60.912	39.444	9.663	21811461.7
338.798	-.773	60.938	39.587	9.736	21810693.5
341.198	-.774	60.965	39.731	9.809	21809921.7
343.599	-.779	60.991	39.874	9.882	21809146.5
345.999	-.782	61.019	40.017	9.955	21808368.5
348.394	-.785	61.044	40.159	10.027	21807591.7
350.798	-.789	61.072	40.304	10.100	21806802.7
353.199	-.792	61.099	40.447	10.172	21806014.7
355.599	-.795	61.127	40.591	10.245	21805223.2
357.999	-.799	61.154	40.734	10.317	21804428.5
360.399	-.802	61.182	40.878	10.390	21803633.7
362.799	-.805	61.211	41.022	10.462	21802830.5
364.438	-.808	61.230	41.120	10.511	21802280.2
367.599	-.812	61.267	41.310	10.606	21801216.7
369.999	-.815	61.296	41.454	10.679	21800405.5
372.398	-.818	61.325	41.598	10.751	21799591.7
374.798	-.821	61.354	41.742	10.823	21798774.5
377.198	-.825	61.384	41.886	10.895	21797953.7
379.599	-.828	61.413	42.030	10.967	21797129.5
381.970	-.831	61.442	42.173	11.037	21796312.0
384.398	-.834	61.472	42.319	11.110	21795472.2
386.798	-.837	61.503	42.464	11.182	21794638.7
389.198	-.841	61.534	42.608	11.253	21793801.7
391.599	-.844	61.564	42.753	11.325	21792961.2
393.999	-.847	61.595	42.899	11.397	21792118.0
396.384	-.850	61.626	43.042	11.468	21791277.0
398.771	-.853	61.657	43.186	11.539	21790432.2
401.170	-.857	61.689	43.331	11.610	21789579.2
403.599	-.859	61.720	43.478	11.682	21788713.2
405.999	-.863	61.752	43.623	11.753	21787854.0

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
408.398	-.866	61.784	43.759	11.824	21786991.7
410.738	-.869	61.817	43.914	11.895	21786126.2
412.365	-.871	61.849	44.068	11.942	21785559.2
415.571	-.875	61.882	44.203	12.036	21784396.0
417.970	-.878	61.915	44.349	12.107	21783521.2
420.371	-.881	61.948	44.495	12.178	21782643.0
422.771	-.884	61.981	44.641	12.249	21781761.7
425.170	-.887	62.014	44.787	12.319	21780877.7
427.569	-.891	62.049	44.934	12.391	21779980.0
429.945	-.893	62.081	45.077	12.459	21779109.2
432.345	-.896	62.116	45.224	12.530	21778216.0
434.746	-.899	62.150	45.370	12.600	21777319.5
437.146	-.903	62.185	45.516	12.670	21776420.0
439.545	-.906	62.219	45.663	12.741	21775517.2
441.945	-.909	62.254	45.809	12.811	21774611.5
444.318	-.912	62.289	45.954	12.885	21773712.7
446.774	-.915	62.325	46.105	12.952	21772779.7
449.174	-.918	62.361	46.251	13.021	21771864.7
451.546	-.921	62.397	46.397	13.090	21770957.2
453.946	-.923	62.433	46.544	13.160	21770036.5
456.346	-.926	62.469	46.691	13.230	21769117.7
458.747	-.929	62.505	46.838	13.299	21768156.0
461.374	-.932	62.540	46.939	13.346	21767555.7
463.574	-.936	62.580	47.135	13.439	21766312.9
465.975	-.939	62.616	47.282	13.508	21765376.0
468.375	-.941	62.654	47.433	13.578	21764437.0
470.774	-.945	62.691	47.578	13.647	21763495.0
473.146	-.947	62.728	47.724	13.715	21762560.7
475.546	-.952	62.765	47.872	13.784	21761612.7
477.975	-.953	62.805	48.021	13.854	21760651.7
480.375	-.956	62.844	48.170	13.923	21759696.7
482.774	-.959	62.882	48.318	13.991	21758740.2
485.174	-.962	62.921	48.466	14.060	21757780.5
487.574	-.965	62.960	48.615	14.129	21756818.0
489.946	-.967	62.999	48.761	14.196	21755863.7
492.365	-.971	63.038	48.911	14.265	21754899.5
494.774	-.973	63.078	49.061	14.334	21753912.7
497.174	-.976	63.118	49.209	14.402	21752939.0
499.574	-.979	63.158	49.358	14.470	21751962.2
501.975	-.982	63.198	49.508	14.538	21750982.5
504.375	-.985	63.239	49.657	14.606	21749999.7
506.774	-.987	63.280	49.806	14.674	21749014.2
508.374	-.990	63.316	49.956	14.719	21748356.2
511.574	-.993	63.361	50.105	14.810	21747034.5
513.975	-.996	63.403	50.254	14.877	21746039.7
516.375	-.999	63.444	50.404	14.945	21745042.5
518.774	-1.002	63.486	50.554	15.012	21744042.5
521.174	-1.004	63.527	50.704	15.080	21743039.5
523.574	-1.007	63.569	50.854	15.147	21742034.0
525.975	-1.009	63.612	51.004	15.214	21741025.7
528.375	-1.012	63.655	51.154	15.281	21740015.0
530.774	-1.015	63.697	51.305	15.348	21739001.0
533.174	-1.018	63.741	51.455	15.415	21737984.0
535.574	-1.021	63.784	51.606	15.482	21736964.2
537.975	-1.022	63.827	51.756	15.548	21735942.0
540.365	-1.026	63.870	51.906	15.614	21734923.0
542.774	-1.029	63.915	52.058	15.681	21733889.2
545.174	-1.031	63.959	52.209	15.748	21732858.7
547.574	-1.034	64.003	52.360	15.814	21731826.0
549.975	-1.036	64.047	52.512	15.880	21730789.7
552.375	-1.039	64.092	52.663	15.946	21729751.5
554.774	-1.042	64.137	52.815	16.012	21728712.0
556.415	-1.044	64.167	52.918	16.057	21727996.5
559.574	-1.048	64.227	53.119	16.144	21726619.0
561.975	-1.050	64.273	53.270	16.211	21725569.0
564.375	-1.052	64.319	53.422	16.275	21724517.0
566.774	-1.055	64.365	53.574	16.341	21723462.2
569.174	-1.057	64.410	53.726	16.406	21722405.0
571.574	-1.061	64.457	53.878	16.471	21721345.0
573.975	-1.063	64.503	54.031	16.536	21720282.0
576.375	-1.066	64.550	54.182	16.602	21719216.5
578.774	-1.068	64.597	54.336	16.667	21718148.2
581.174	-1.071	64.644	54.489	16.731	21717077.7
583.574	-1.073	64.692	54.641	16.796	21716004.5
585.975	-1.076	64.740	54.794	16.861	21714929.5
588.360	-1.079	64.787	54.947	16.925	21713856.5
590.774	-1.081	64.836	55.101	16.990	21712768.7
593.174	-1.083	64.884	55.254	17.054	21711685.0
595.574	-1.085	64.932	55.408	17.118	21710598.7
597.975	-1.088	64.981	55.561	17.182	21709510.2
600.375	-1.091	65.030	55.715	17.246	21708419.0
602.774	-1.094	65.079	55.869	17.310	21707324.7
604.415	-1.095	65.113	55.974	17.354	21706575.5
607.574	-1.058	65.178	56.177	17.438	21705129.0

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
609.975	-1.101	65.228	56.331	17.501	21724027.5
612.375	-1.103	65.273	56.486	17.565	217[illegible]2923.5
614.774	-1.105	65.328	56.641	17.629	21721816.7
617.174	-1.108	65.379	56.795	17.691	21720708.9
619.574	-1.110	65.429	56.949	17.754	21699596.7
621.975	-1.112	65.479	57.104	17.817	21698482.5
624.375	-1.116	65.531	57.259	17.880	21697366.0
626.774	-1.117	65.582	57.414	17.943	21696247.[illegible]
629.174	-1.120	65.634	57.569	18.005	21695125.5
631.574	-1.122	65.685	57.725	18.068	21694002.0
633.975	-1.125	65.737	57.880	18.131	21692875.7
636.362	-1.127	65.789	58.035	18.192	21691754.0
638.774	-1.129	65.841	58.192	18.255	21690616.2
641.149	-1.132	65.893	58.346	18.316	21689494.5
643.549	-1.134	65.946	58.502	18.378	21688359.[illegible]
645.949	-1.136	65.999	58.658	18.440	21687221.0
648.350	-1.139	66.052	58.814	18.501	21686[illegible]9[illegible].2
650.750	-1.141	66.106	58.971	18.563	21694937.0
652.423	-1.143	66.143	59.080	18.606	21684138.2
655.521	-1.146	66.212	59.282	18.685	21682656.7
657.921	-1.147	66.266	59.439	18.746	21681506.7
660.350	-1.150	66.321	59.597	18.808	21680341.2
662.750	-1.153	66.376	59.754	18.869	21679186.2
665.149	-1.155	66.430	59.912	18.930	21678029.0
667.549	-1.157	66.495	60.069	18.990	21676869.7
669.921	-1.159	66.539	60.224	19.051	21675721.2
672.321	-1.161	66.594	60.382	19.111	21674557.2
674.721	-1.163	66.650	60.540	19.171	21673391.0
677.122	-1.166	66.705	60.697	19.231	21672222.2
679.521	-1.168	66.762	60.855	19.291	21671[illegible]51.2
681.921	-1.170	66.818	61.012	19.351	21669878.2
684.335	-1.172	66.874	61.173	19.411	21668696.0
686.750	-1.174	66.931	61.332	19.471	21667511.5
689.122	-1.177	66.987	61.483	19.530	21666345.5
691.521	-1.179	67.044	61.647	19.589	21665163.5
693.921	-1.181	67.101	61.806	19.648	21663979.2
696.321	-1.183	67.159	61.965	19.708	21662792.5
698.721	-1.185	67.216	62.124	19.767	21661603.7
700.349	-1.186	67.255	62.232	19.806	21660796.5
702.549	-1.189	67.333	62.444	19.885	21659206.0
705.949	-1.192	67.391	62.603	19.943	21658010.5
708.35	-1.194	67.449	62.762	20.002	21656812.7
710.721	-1.196	67.507	62.921	20.059	21655627.2
713.122	-1.197	67.566	63.081	20.118	21654425.2
715.521	-1.200	67.625	63.241	20.176	21653221.2
717.949	-1.202	67.685	63.402	20.234	21652001.5
720.350	-1.204	67.745	63.563	20.292	21650793.0
722.750	-1.206	67.804	63.723	20.350	21649587.5
725.149	-1.208	67.864	63.884	20.407	21648370.2
727.549	-1.210	67.924	64.044	20.464	21647155.7
729.921	-1.217	67.984	64.202	20.521	21645953.7
732.335	-1.213	68.044	64.365	20.578	21644728.2
734.750	-1.215	68.106	64.527	20.635	21643500.7
737.149	-1.217	68.166	64.689	20.692	21642278.5
739.549	-1.219	68.228	64.851	20.749	21641054.2
741.949	-1.222	68.290	65.011	20.805	21639827.5
744.350	-1.224	68.351	65.173	20.862	21638598.5
746.75	-1.225	68.413	65.334	20.918	21637367.7
748.349	-1.227	68.454	65.442	20.955	21636546.7
751.549	-1.229	68.537	65.659	21.031	216349[illegible].5
753.949	-1.231	68.599	65.821	21.085	21633664.0
756.350	-1.233	68.662	65.983	21.141	21632425.2
758.750	-1.235	68.724	66.145	21.196	21631184.7
761.149	-1.237	68.787	66.308	21.252	21629942.2
763.549	-1.238	68.851	66.471	21.307	21628697.7
765.949	-1.240	68.914	66.634	21.362	21627451.5
768.350	-1.242	68.979	66.797	21.417	21626203.0
770.750	-1.244	69.041	66.960	21.471	21624953.[illegible]
773.149	-1.246	69.106	67.123	21.526	21623701.0
775.549	-1.247	69.171	67.286	21.580	21622447.2
777.949	-1.249	69.235	67.450	21.634	21621191.5
780.335	-1.251	69.299	67.613	21.688	21619941.2
782.750	-1.253	69.364	67.778	21.742	21618674.5
785.149	-1.254	69.429	67.942	21.796	21617413.2
787.549	-1.256	69.494	68.106	21.850	21616150.2
789.949	-1.258	69.559	68.270	21.903	21614885.2
792.350	-1.260	69.625	68.435	21.956	21613618.5
794.750	-1.262	69.691	68.599	22.[illegible]1	21612349.7
796.390	-1.263	69.736	68.712	22.046	21611481.7
799.549	-1.264	69.823	68.929	22.115	21609807.0
801.949	-1.266	69.890	69.094	22.168	21608533.2
804.350	-1.268	69.957	69.259	22.220	21607257.5
806.750	-1.270	70.023	69.424	22.273	21605980.0
809.149	-1.272	70.091	69.590	22.325	21604[illegible].5

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
811.549	-1.273	70.159	69.755	22.277	21603419.5
813.949	-1.275	70.226	69.921	22.429	21602136.7
816.350	-1.276	70.293	70.087	22.480	21600852.9
818.750	-1.278	70.361	70.253	22.532	21599566.0
821.149	-1.280	70.429	70.419	22.583	21598277.7
823.549	-1.281	70.497	70.585	22.635	21596988.2
825.949	-1.283	70.566	70.752	22.686	21595697.0
828.335	-1.284	70.634	70.917	22.736	21594411.7
830.750	-1.285	70.704	71.085	22.787	21593112.0
833.149	-1.287	70.773	71.252	22.838	21591814.2
835.549	-1.289	70.842	71.419	22.888	21590516.5
837.949	-1.290	70.911	71.586	22.938	21589217.5
840.350	-1.292	70.981	71.753	22.988	21587916.5
842.750	-1.293	71.051	71.921	23.038	21586613.7
844.390	-1.294	71.120	72.035	23.072	21585722.7
847.549	-1.296	71.191	72.256	23.137	21584294.2
849.949	-1.298	71.262	72.424	23.186	21582696.7
852.324	-1.299	71.332	72.590	23.235	21581401.7
854.725	-1.301	71.403	72.758	23.284	21580090.7
857.125	-1.302	71.474	72.927	23.333	21578778.7
859.524	-1.304	71.545	73.095	23.381	21577464.7
861.924	-1.305	71.617	73.264	23.430	21576149.7
864.324	-1.306	71.688	73.432	23.478	21574833.2
866.725	-1.308	71.760	73.601	23.526	21573515.2
869.125	-1.309	71.833	73.770	23.574	21572195.7
871.524	-1.310	71.905	73.940	23.622	21570874.7
873.924	-1.312	71.977	74.110	23.670	21569552.5
876.311	-1.313	72.049	74.277	23.717	21568236.0
878.696	-1.314	72.122	74.446	23.764	21566918.7
881.096	-1.316	72.195	74.616	23.811	21565592.0
883.524	-1.317	72.269	74.788	23.858	21564248.2
885.924	-1.319	72.343	74.958	23.905	21562918.7
888.324	-1.320	72.416	75.128	23.951	21561588.0
890.725	-1.321	72.490	75.298	23.997	21560255.2
892.398	-1.322	72.542	75.417	24.030	21559325.2
895.497	-1.324	72.637	75.637	24.089	21557601.5
897.926	-1.325	72.712	75.808	24.135	21556264.7
900.296	-1.326	72.786	75.979	24.180	21554926.5
902.696	-1.327	72.861	76.150	24.226	21553587.2
905.096	-1.328	72.936	76.321	24.271	21552247.2
907.497	-1.330	73.011	76.492	24.316	21550905.0
909.924	-1.331	73.087	76.664	24.361	21549546.2
912.296	-1.332	73.162	76.835	24.405	21548217.2
914.696	-1.333	73.238	77.007	24.450	21546871.7
917.096	-1.335	73.313	77.179	24.494	21545524.2
919.497	-1.336	73.389	77.351	24.538	21544175.7
921.897	-1.337	73.466	77.523	24.582	21542825.7
924.297	-1.338	73.543	77.696	24.626	21541474.7
926.726	-1.339	73.620	77.870	24.670	21540106.5
929.125	-1.340	73.697	78.043	24.713	21538753.5
931.525	-1.341	73.774	78.215	24.756	21537399.0
933.897	-1.342	73.850	78.386	24.799	21536059.0
936.297	-1.343	73.927	78.559	24.841	21534702.2
938.697	-1.345	74.005	78.723	24.884	21533344.5
941.324	-1.345	74.059	78.850	24.912	21532423.0
943.525	-1.347	74.142	79.081	24.959	21530609.0
945.925	-1.348	74.243	79.255	25.011	21529247.5
948.325	-1.349	74.318	79.429	25.052	21527884.7
950.726	-1.350	74.396	79.603	25.094	21526521.0
953.125	-1.351	74.475	79.777	25.135	21525156.0
955.498	-1.352	74.553	79.949	25.176	21523806.0
957.925	-1.353	74.633	80.125	25.217	21522423.2
960.325	-1.354	74.712	80.299	25.258	21521055.0
962.726	-1.355	74.792	80.474	25.299	21519685.2
965.125	-1.355	74.871	80.649	25.339	21518315.2
967.525	-1.356	74.951	80.824	25.379	21516944.2
969.925	-1.357	75.031	81.000	25.419	21515572.0
972.312	-1.358	75.111	81.173	25.459	21514206.5
974.726	-1.359	75.191	81.349	25.499	21512824.0
977.125	-1.360	75.271	81.524	25.538	21511448.7
979.525	-1.361	75.352	81.701	25.577	21510072.2
981.925	-1.362	75.433	81.976	25.616	21508695.0
984.325	-1.363	75.514	82.151	25.655	21507316.7
986.726	-1.364	75.595	82.227	25.693	21505936.7
988.365	-1.365	75.652	82.348	25.719	21504993.7
991.525	-1.365	75.759	82.581	25.770	21503175.0
993.925	-1.366	75.840	82.756	25.807	21501793.0
996.325	-1.367	75.921	82.933	25.845	21500409.7
998.726	-1.368	76.003	83.109	25.883	21499025.5
1001.125	-1.368	76.085	83.286	25.920	21497640.7
1003.525	-1.369	76.167	83.463	25.957	21496255.0
1005.925	-1.370	76.250	83.640	25.994	21494868.7
1008.325	-1.371	76.323	83.817	26.030	21493481.5
1010.726	-1.372	76.416	83.994	26.067	21492093.0

CONFIDENTIAL

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
1013.125	-1.372	76.499	84.172	26.103	21490703.5
1015.525	-1.373	76.582	84.349	26.139	21489313.7
1017.925	-1.373	76.665	84.527	26.175	21487923.5
1020.312	-1.374	76.748	84.704	26.210	21486542.0
1022.726	-1.375	76.832	84.883	26.246	21485139.5
1025.125	-1.376	76.914	85.061	26.281	21483746.2
1027.525	-1.376	77.[illegible]	85.239	26.316	21482352.7
1029.925	-1.377	77.084	85.417	26.350	21480958.5
1032.325	-1.377	77.168	85.596	26.385	21479563.0
1034.726	-1.378	77.252	85.774	26.419	21478166.7
1036.365	-1.379	77.311	85.897	26.442	21477212.5
1039.525	-1.379	77.422	86.132	26.487	21475372.5
1041.925	-1.380	77.507	86.311	26.521	21473974.7
1044.325	-1.380	77.592	86.490	26.554	21472576.0
1046.726	-1.381	77.677	86.669	26.587	21471176.2
1049.125	-1.382	77.762	86.849	26.620	21469776.0
1051.525	-1.382	77.848	87.028	26.653	21468375.0
1053.925	-1.383	77.934	87.208	26.685	21466973.2
1056.325	-1.383	78.020	87.388	26.718	21465571.5
1058.726	-1.384	78.106	87.568	26.750	21464168.7
1061.125	-1.384	78.192	87.749	26.782	21462765.5
1063.525	-1.385	78.279	87.929	26.813	21461361.7
1065.926	-1.385	78.366	88.106	26.844	21459972.0
1068.297	-1.385	78.449	88.285	26.875	21458575.0
1070.7[illegible]	-1.386	78.537	88.467	26.906	21457161.2
1073.101	-1.386	78.623	88.648	26.937	21455754.7
1075.5[illegible]	-1.387	78.711	88.829	26.968	21454348.0
1077.9[illegible]	-1.388	78.798	89.010	26.998	21452940.7
1080.3[illegible]	-1.388	78.885	89.191	27.028	21451532.7
1082.7[illegible]	-1.388	78.972	89.371	27.058	21450124.7
1084.34[illegible]	-1.389	79.032	89.495	27.078	21449162.2
1087.50[illegible]	-1.389	79.148	89.734	27.117	21447337.[illegible]
1089.90[illegible]	-1.389	79.236	89.915	27.146	21445897.5
1092.30[illegible]	-1.390	79.323	90.097	27.175	21444487.5
1094.70[illegible]	-1.390	79.412	90.278	27.203	21443077.0
1097.1[illegible]	-1.391	79.501	90.460	27.232	21441665.2
1099.5[illegible]	-1.391	79.589	90.642	27.260	21440253.7
1101.873	-1.391	79.676	90.822	27.287	21438858.5
1104.272	-1.391	79.765	91.004	27.315	21437446.5
1106.70[illegible]	-1.391	79.855	91.189	27.343	21436017.5
1109.101	-1.392	79.944	91.371	27.370	21434604.2
1111.5[illegible]	-1.392	80.033	91.554	27.397	21433190.7
1113.9[illegible]	-1.392	80.122	91.736	27.424	21431777.0
1116.297	-1.392	80.211	91.918	27.451	21430371.0
1118.672	-1.393	80.300	92.100	27.477	21428965.0
1121.072	-1.393	80.390	92.283	27.503	21427550.5
1123.472	-1.393	80.479	92.466	27.529	21426135.5
1125.873	-1.393	80.569	92.649	27.554	21424720.2
1128.2[illegible]	-1.393	80.660	92.834	27.580	21423288.5
1130.7[illegible]	-1.393	80.751	93.019	27.605	21421872.7
1132.299	-1.393	80.811	93.14[illegible]	27.622	21420929.2
1135.5[illegible]	-1.393	80.931	93.385	27.655	21419[illegible]4[illegible].5
1137.9[illegible]	-1.394	81.022	93.568	27.679	21417624.0
1140.3[illegible]	-1.394	81.112	93.752	27.703	214162[illegible]7.5
1142.7[illegible]	-1.394	81.203	93.936	27.727	21414790.2
1145.1[illegible]	-1.394	81.292	94.12[illegible]	27.751	21413372.5
1147.5[illegible]	-1.395	81.385	94.304	27.774	21411954.7
1149.9[illegible]	-1.395	81.474	94.490	27.797	21410537.0
1152.3[illegible]	-1.394	81.567	94.673	27.820	21409119.[illegible]
1154.7[illegible]	-1.395	81.659	94.857	27.843	21407701.0
1157.1[illegible]	-1.394	81.751	95.042	27.866	21406282.5
1159.5[illegible]	-1.395	81.842	95.227	27.888	21404864.2
1161.9[illegible]	-1.394	81.933	95.411	27.910	21403446.0
1164.287	-1.394	82.025	95.595	27.932	21402036.[illegible]
1166.7[illegible]	-1.395	82.117	95.781	27.953	21400609.5
1169.1[illegible]1	-1.394	82.209	95.966	27.974	21399190.2
1171.5[illegible]	-1.395	82.301	96.151	27.995	21397771.7
1173.9[illegible]	-1.395	82.393	96.336	28.016	21396352.7
1176.3[illegible]	-1.394	82.485	96.522	28.037	21394933.7
1178.7[illegible]	-1.394	82.578	96.707	28.057	21393515.2
1180.24[illegible]	-1.394	82.641	96.834	28.071	21392545.7
1182.5[illegible]	-1.394	82.763	97.078	28.097	21390677.5
1185.9[illegible]	-1.394	82.856	97.264	28.116	21389258.7
1188.3[illegible]	-1.393	82.949	97.450	28.136	21387840.0
1190.7[illegible]	-1.393	83.042	97.635	28.155	21386421.5
1193.1[illegible]	-1.393	83.135	97.822	28.174	21385002.7
1195.5[illegible]	-1.393	83.228	98.[illegible]	28.192	21383584.2
1197.9[illegible]	-1.394	83.321	98.104	28.210	21382165.2
1200.3[illegible]	-1.393	83.414	98.380	28.228	21380746.7
1202.7[illegible]	-1.393	83.508	98.565	28.246	21379328.5
1205.1[illegible]1	-1.393	83.602	98.753	28.264	21377910.0
1207.5[illegible]	-1.392	83.695	98.939	28.281	21376492.0
1209.9[illegible]	-1.392	83.789	99.126	28.298	21375074.0
1212.297	-1.392	83.882	99.311	28.315	21373664.2

CONFIDENTIAL

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
1214.700	-1.392	83.976	99.499	28.331	21372238.0
1217.100	-1.391	84.071	99.686	28.349	21370822.5
1219.500	-1.391	84.165	99.872	28.364	21369403.0
1221.900	-1.391	84.259	100.060	28.379	21367986.0
1224.300	-1.391	84.352	100.247	28.395	21366569.7
1226.700	-1.390	84.447	100.434	28.410	21365152.0
1228.340	-1.390	84.512	100.562	28.421	21364194.0
1231.570	-1.389	84.636	100.820	28.44	21362319.0
1233.970	-1.390	84.731	101.006	28.455	21360903.0
1236.300	-1.389	84.825	101.194	28.469	21359486.5
1238.700	-1.388	84.920	101.371	28.483	21358070.7
1241.101	-1.388	85.015	101.559	28.497	21356655.0
1243.500	-1.388	85.110	101.746	28.510	21355240.0
1245.900	-1.387	85.205	101.934	28.523	21353824.7
1248.300	-1.387	85.300	102.122	28.536	21352410.5
1250.700	-1.387	85.395	102.310	28.549	21350996.5
1253.101	-1.386	85.490	102.498	28.561	21349582.0
1255.500	-1.386	85.586	102.686	28.574	21348168.5
1257.900	-1.385	85.681	102.874	28.585	21346755.5
1260.237	-1.385	85.775	103.061	28.597	21345350.5
1262.730	-1.385	85.871	103.250	28.609	21343938.0
1265.101	-1.384	85.967	103.439	28.620	21342517.2
1267.500	-1.384	86.062	103.627	28.631	21341105.5
1269.900	-1.383	86.158	103.816	28.641	21339694.0
1272.300	-1.382	86.254	104.004	28.652	21338283.0
1274.700	-1.382	86.350	104.193	28.662	21336872.5
1276.315	-1.381	86.414	104.320	28.668	21335923.7
1279.476	-1.380	86.542	104.568	28.681	21334067.7
1281.875	-1.380	86.636	104.757	28.690	21332659.0
1284.275	-1.380	86.732	104.945	28.699	21331250.5
1286.675	-1.379	86.829	105.134	28.708	21329842.2
1289.075	-1.378	86.925	105.323	28.717	21328434.7
1291.476	-1.378	87.020	105.512	28.725	21327027.2
1293.847	-1.377	87.116	105.690	28.733	21325637.0
1296.275	-1.377	87.212	105.890	28.741	21324214.2
1298.675	-1.376	87.310	106.079	28.748	21322808.7
1301.075	-1.375	87.405	106.269	28.756	21321404.0
1303.476	-1.374	87.502	106.458	28.763	21319990.5
1305.875	-1.374	87.599	106.647	28.769	21318595.7
1308.261	-1.373	87.694	106.835	28.776	21317201.7
1310.647	-1.372	87.790	107.024	28.782	21315806.7
1313.047	-1.372	87.887	107.213	28.788	21314405.2
1315.476	-1.371	87.985	107.405	28.794	21312987.5
1317.875	-1.370	88.081	107.594	28.799	21311587.2
1320.275	-1.370	88.179	107.784	28.804	21310187.0
1322.675	-1.369	88.275	107.973	28.809	21308787.7
1324.350	-1.368	88.342	108.106	28.812	21307811.7
1327.250	-1.367	88.463	108.342	28.818	21306158.5
[illegible]	[illegible]	88.541	108.494	28.821	[illegible]
1332.150	-1.365	88.657	108.773	28.826	21303264.7
1334.090	-1.365	88.735	108.876	28.828	21302142.0
1336.950	-1.364	88.851	109.103	28.832	21300474.2
1338.891	-1.363	88.929	109.255	28.835	21299352.5
1341.750	-1.362	89.045	109.487	28.838	21297686.7
1343.690	-1.361	89.122	109.635	28.840	21296566.2
1346.550	-1.360	89.238	109.867	28.843	21294902.5
1348.490	-1.360	89.316	110.015	28.844	21293783.2
1351.350	-1.359	89.432	110.242	28.846	21292121.0
1353.291	-1.358	89.511	110.395	28.848	21291003.0
1356.150	-1.357	89.626	110.622	28.849	21289343.2
1358.090	-1.356	89.705	110.775	28.850	21288226.5
1360.936	-1.355	89.822	111.006	28.851	21286547.7
1362.891	-1.354	89.900	111.156	28.851	21285453.2
1365.795	-1.353	90.017	111.386	28.851	21283775.7
1367.630	-1.352	90.093	111.536	28.851	21282683.7
1370.595	-1.351	90.211	111.766	28.850	21281009.7
1372.495	-1.350	90.282	111.917	28.850	21279918.0
1375.396	-1.349	90.404	112.147	28.849	21278245.7
1377.335	-1.348	90.455	112.301	28.848	21277129.5
1380.195	-1.347	90.530	112.529	28.846	21275485.0
1382.135	-1.346	90.670	112.681	28.844	21274370.5
1384.996	-1.345	90.704	112.910	28.842	21272728.2
1386.936	-1.344	90.872	113.062	28.840	21271615.0
1389.795	-1.343	90.988	113.290	28.837	21269975.5
1391.735	-1.342	91.047	113.441	28.835	21268864.2
1394.637	-1.341	91.104	113.673	28.831	21267203.2
1396.576	-1.340	91.261	113.824	28.828	21266117.2
1399.437	-1.338	91.370	114.054	28.824	21264459.0
1401.371	-1.338	91.457	114.207	28.821	21263355.0
1404.238	-1.336	91.573	114.435	28.816	21261719.2
1406.170	-1.335	91.651	114.588	28.812	21260616.5
1409.030	-1.334	91.767	114.816	28.806	21258982.5
1410.970	-1.333	91.845	114.969	28.802	21257882.7
1413.838	-1.331	91.962	115.197	28.796	21256251.5

CONFIDENTIAL

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
1415.771	-1.331	92.041	115.350	28.792	21255153.2
1418.639	-1.329	92.155	115.578	28.785	21253524.5
1420.571	-1.328	92.234	115.731	28.780	21252428.0
1423.479	-1.327	92.352	115.962	28.772	21250779.5
1425.371	-1.326	92.428	116.112	28.767	21249707.0
1428.277	-1.324	92.546	116.343	28.759	21249062.0
1430.211	-1.323	92.624	116.497	28.753	21246968.2
1433.178	-1.322	92.74	116.724	28.744	21245348.5
1435.[illegible]	-1.320	92.819	116.878	28.738	21244257.2
1437.977	-1.319	92.934	117.135	28.728	21242641.5
1439.912	-1.318	93.012	117.258	28.722	21241552.0
1442.677	-1.316	93.128	117.436	28.712	21239939.7
1444.611	-1.315	93.205	117.630	28.704	21238852.5
1447.478	-1.313	93.322	117.967	28.694	21237243.5
1449.445	-1.312	93.402	118.123	28.686	21236140.0
1452.277	-1.310	93.516	118.248	28.675	21234553.2
1454.244	-1.309	93.595	118.404	28.667	21233451.2
1457.179	-1.307	93.719	118.639	28.655	21231868.0
1459.145	-1.306	93.789	118.784	28.646	21230769.2
1461.977	-1.304	93.903	119.[illegible]	28.634	21229189.2
1463.945	-1.303	93.980	119.165	28.625	21228092.7
1465.791	-1.301	94.061	119.310	28.616	21227010.5
1468.646	-1.300	94.176	119.546	28.602	21225422.7
1470.595	-1.298	94.254	119.730	28.592	21224343.2
1473.479	-1.297	94.371	119.929	28.578	21222740.0
1475.391	-1.295	94.448	12[illegible]	28.569	21221682.0
1478.279	-1.293	94.562	12[illegible]	28.554	2122[illegible]83.0
1482.[illegible]9	-1.291	94.757	12[illegible].589	28.528	21217431.2
1487.854	-1.289	94.951	121.069	28.501	21214799.0
1490.654	-1.284	95.143	121.447	28.473	21212160.5
1497.5[illegible]	-1.281	95.308	121.331	28.444	21209503.7
1499.432	-1.279	95.415	121.994	28.432	21208446.2
1502.299	-1.277	95.530	122.210	28.414	21206880.0
1504.232	-1.276	95.608	122.362	28.401	21205825.2
1507.1[illegible]	-1.274	95.722	122.59	28.382	21204262.5
1512.252	-1.27	95.97	12[illegible].[illegible]07	28.348	21201461.2
1514.417	-1.269	96.[illegible]16	123.149	28.333	21200287.0
1516.545	-1.267	96.112	123.336	28.318	21199133.2
1518.712	-1.266	96.188	123.517	28.303	21197960.0
1520.871	-1.264	96.275	123.677	28.287	21196793.5
1524.761	-1.261	96.403	123.920	28.264	21195072.2
1526.22[illegible]	-1.259	96.450	124.[illegible]	28.248	21193909.2
1528.347	-1.257	96.575	124.267	28.232	21192766.2
1531.533	-1.254	96.662	124.430	28.215	21191593.7
1533.735	-1.252	96.791	124.691	28.190	21189879.7
1535.854	-1.250	96.876	124.858	28.174	21188747.5
1538.020	-1.248	96.943	125.020	28.156	21187587.7
1540.141	-1.245	97.049	125.196	28.130	21186453.7
1542.377	-1.241	97.179	125.440	28.113	21184750.7
1545.541	-1.237	97.264	125.610	28.095	21183604.0
1547.667	-1.234	97.351	125.786	28.077	21182483.0
155[illegible].[illegible]52	-1.228	97.563	126.213	28.031	21179656.2
1555.914	-1.225	97.654	126.378	28.012	21178525.5
1557.345	-1.221	97.747	126.545	27.993	21177416.5
1559.512	-1.217	97.827	126.714	27.973	21176291.2
1561.67[illegible]	-1.214	97.912	126.892	27.954	21175174.7
1564.850	-1.208	98.039	127.122	27.925	21173531.5
1567.021	-1.202	98.122	127.3[illegible]	27.905	21172424.5
1569.147	-1.197	98.212	127.464	27.895	21171339.5
1571.333	-1.192	98.387	127.637	27.864	21170230.0
1574.576	-1.185	98.470	127.886	27.833	21168614.0
1576.654	-1.181	98.489	128.051	27.813	21167550.5
1578.791	-1.176	98.567	128.217	27.792	21166483.0
1580.924	-1.171	98.646	128.333	27.771	21165416.7
1584.135	-1.163	98.766	128.631	27.739	21163834.5
1586.254	-1.159	98.842	128.795	27.718	21162793.7
1598.391	-1.154	98.919	128.96	27.696	21161749.5
1590.533	-1.148	98.996	129.126	27.674	21160707.7
1593.627	-1.140	99.113	129.371	27.642	21159180.7
1595.854	-1.136	99.187	129.526	27.619	21158146.7
1597.990	-1.129	99.264	129.710	27.597	21157128.5
1600.133	-1.122	99.342	129.865	27.574	21156114.5
1603.335	-1.115	99.455	130.111	27.540	21154610.5
1605.455	-1.108	99.529	130.272	27.518	21153622.7
1607.590	-1.101	99.604	130.434	27.495	21152634.5
1609.732	-1.096	99.677	13[illegible].6[illegible]	27.471	21151649.5
1612.897	-1.087	99.785	130.841	27.437	21150206.5
1615.021	-1.080	99.860	131.002	27.413	21149247.2
1617.147	-1.076	99.931	131.164	27.389	21148292.5
1619.298	-1.069	100.004	131.327	27.365	21147333.2
1622.498	-1.059	100.111	131.569	27.329	21145920.5
1624.596	-1.054	100.179	131.726	27.306	21145006.5
1626.748	-1.047	100.253	131.889	27.281	21144067.5
1628.871	-1.042	100.320	132.048	27.257	21143152.7

CONFIDENTIAL

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
1632.061	-1.023	100.424	132.287	27.220	21141790.7
1634.187	-1.027	100.488	132.446	27.195	21140895.7
1636.312	-1.020	100.554	132.635	27.171	21139998.7
1639.452	-1.010	100.65	132.838	27.134	21138696.0
1641.616	-1.002	100.714	132.998	27.109	21137808.2
1643.746	-.995	100.791	133.156	27.084	21136943.0
1645.874	-.987	100.841	133.312	27.058	21136087.2
1649.052	-.976	100.938	133.544	27.021	21134825.5
1651.216	-.968	100.999	133.704	26.995	21133978.0
1653.312	-.959	101.06	133.857	26.970	21133166.2
1655.474	-.955	101.121	134.014	26.944	21132336.7
1658.652	-.944	101.208	134.245	26.906	21131132.0
1660.774	-.942	101.267	134.398	26.880	21130336.2
1662.912	-.935	101.319	134.551	26.854	21129541.5
1668.213	-.932	101.444	134.93	26.790	21127592.7
1670.342	-.936	101.490	135.081	26.765	21126814.7
1672.466	-.938	101.531	135.231	26.739	21126037.5
1677.813	-.940	101.644	135.607	26.674	21124094.2
1679.940	-.939	101.691	135.755	26.649	21123325.7
1682.066	-.942	101.729	135.902	26.623	21122560.0
1684.204	-.946	101.774	136.05	26.597	21121791.5
1687.414	-.950	101.833	136.271	26.558	21120639.0
1689.541	-.961	101.865	136.416	26.533	21119872.5
1691.667	-.985	101.890	136.560	26.507	21119096.0
1693.733	-1.026	101.908	136.703	26.482	21118319.5
1696.654	-1.111	101.939	136.897	26.446	21117166.0
1701.672	-1.289	102.014	137.231	26.388	21114962.5
1703.565	-1.374	102.044	137.356	26.366	21114143.2
1706.627	-1.523	102.123	137.557	26.329	21112437.2
1708.792	-1.629	102.2	137.698	26.304	21111211.0
1710.920	-1.729	102.293	137.836	26.279	21109930.0
1713.097	-1.831	102.408	137.975	26.253	21108558.0
1715.246	-1.899	102.538	138.113	26.228	21107140.2
1718.436	-1.951	102.728	138.315	26.190	21104998.0
1720.595	-1.956	102.831	138.450	26.164	21103541.0
1722.722	-1.943	102.908	138.582	26.139	21102121.5
1724.874	-1.933	102.941	138.714	26.114	21100767.0
1728.072	-1.927	102.971	138.908	26.076	21098637.5
1730.195	-1.919	102.995	139.036	26.052	21097285.2
1732.322	-1.909	103.022	139.162	26.027	21095951.0
1734.474	-1.899	103.067	139.289	26.003	21094623.5
1737.672	-1.881	103.120	139.475	25.967	21092697.5
1739.795	-1.872	103.156	139.596	25.942	21091438.2
1741.922	-1.866	103.192	139.716	25.920	21090202.5
1744.073	-1.855	103.226	139.837	25.896	21088974.5
1747.235	-1.851	103.260	140.011	25.862	21087256.2
1749.287	-1.848	103.274	140.122	25.840	21086082.0
1751.273	-1.847	103.287	140.228	25.812	21085009.2
1754.229	-1.864	103.291	140.382	25.790	21083432.7
1759.272	-1.930	103.257	140.641	25.730	21080743.5
1761.166	-1.959	103.227	140.736	25.720	21079761.5
1764.188	-2.083	103.136	140.884	25.692	21078131.2
1766.086	-2.220	103.049	140.976	25.674	21077063.0
1768.073	-2.419	102.971	141.07	25.656	21075877.2
1771.029	-2.808	102.926	141.208	25.620	21073932.2
1776.072	-3.545	103.123	141.435	25.587	21072351.0
1777.965	-3.783	103.287	141.518	25.571	21068421.2
1780.098	-4.042	103.571	141.646	25.546	21065715.2
1782.096	-4.134	103.770	141.73	25.530	21063897.2
1785.123	-4.175	103.956	141.816	25.512	21061965.0
1787.309	-4.205	103.872	141.903	25.495	21059026.5
1790.472	-4.296	103.735	142.024	25.471	21057278.2
1792.595	-4.363	103.619	142.102	25.456	21055467.5
1794.722	-4.432	103.512	142.18	25.441	21053692.0
1796.908	-4.484	103.464	142.257	25.426	21051882.0
1800.072	-4.566	103.397	142.364	25.406	21049347.7
1802.195	-4.625	103.384	142.433	25.393	21047695.2
1804.322	-4.698	103.381	142.50	25.381	21046077.5
1806.474	-4.801	103.356	142.566	25.368	21044473.2
1809.516	-4.975	103.311	142.655	25.352	21042250.5
1811.487	-5.120	103.270	142.71	25.342	21040832.7
1814.510	-5.520	103.096	142.792	25.327	21038654.7
1816.441	-5.869	102.891	142.841	25.319	21037237.5
1819.427	-6.691	102.676	142.915	25.306	21034047.5
1821.361	-7.371	102.507	142.961	25.299	21033364.2
1823.335	-8.114	102.529	143.006	25.291	21031667.7
1826.315	-9.217	102.776	143.071	25.281	21028964.0
1828.288	-9.873	103.064	143.111	25.274	21027111.7
1831.311	-10.649	103.479	143.171	25.264	21024245.7
1833.320	-11.104	103.649	143.208	25.258	21022354.5
1835.448	-11.585	103.680	143.245	25.251	21020381.7
1838.627	-12.466	103.438	143.290	25.242	21017486.2
1840.792	-13.282	103.140	143.323	25.237	21015534.7
1842.886	-14.283	102.846	143.364	25.232	21013642.5

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
1845.148	-15.441	102.574	143.395	25.228	21011674.0
1848.228	-17.260	102.136	143.428	25.222	21008752.7
1850.315	-18.900	101.796	143.464	25.219	21006833.2
1852.441	-19.647	101.472	143.490	25.216	21004893.7
1854.579	-21.042	101.128	143.514	25.213	21002956.7
1857.747	-23.207	100.544	143.548	25.209	21000109.7
1859.875	-24.779	100.051	143.570	25.207	20998217.2
1862.004	-26.455	99.401	143.590	25.205	20996341.0
1864.135	-28.135	98.856	143.610	25.204	20994484.7
1867.272	-30.917	97.856	143.637	25.202	20991793.0
1869.320	-32.830	97.124	143.654	25.201	20990063.7
1874.510	-38.088	94.946	143.694	25.199	20985769.0
1876.552	-40.289	93.691	143.708	25.198	20984106.5
1878.648	-42.530	92.299	143.723	25.198	20982437.0
1881.748	-46.000	90.026	143.743	25.198	20979997.2
1883.736	-48.393	88.249	143.756	25.198	20978413.0
1885.888	-50.617	86.582	143.769	25.198	20976821.7
1888.939	-53.063	84.071	143.788	25.199	20974524.2
1891.030	-54.281	82.743	143.799	25.199	20973057.5
1893.167	-55.392	82.936	143.812	25.199	20971552.7
1895.336	-56.137	83.564	143.824	25.200	20970054.5
1898.474	-57.315	84.066	143.841	25.200	20967941.0
1900.521	-57.661	84.602	143.852	25.200	20966591.2
1905.749	-59.226	87.117	143.880	25.201	20963253.2
1932.863	-65.773	87.944	144.021	25.201	20948629.2
1939.005	-66.392	84.121	144.046	25.202	20946549.7
1941.063	-66.213	82.692	144.055	25.202	20945750.5
1944.165	-67.029	81.051	144.071	25.202	20944571.0
1946.206	-66.496	81.027	144.079	25.202	20943811.0
1948.299	-66.378	79.729	144.090	25.202	20943047.5
1951.364	-66.276	77.442	144.103	25.203	20941951.5
1953.451	-66.925	77.826	144.113	25.203	20941217.7
1955.499	-67.898	78.998	144.122	25.203	20940501.7
1958.614	-68.028	80.976	144.137	25.203	20939432.2
1960.655	-69.053	84.517	144.146	25.203	20938739.5
1962.598	-68.490	86.607	144.155	25.203	20938057.5
1965.892	-69.882	90.840	144.169	25.203	20937036.7
1967.851	-69.412	92.548	144.179	25.203	20936372.0
1969.941	-68.972	88.675	144.188	25.203	20935707.5
1973.033	-69.974	88.783	144.202	25.203	20934758.2
1975.091	-70.496	88.825	144.211	25.203	20934107.7
1977.142	-72.201	88.572	144.221	25.203	20933481.2
1980.204	-72.440	90.511	144.234	25.203	20932557.0
1982.325	-74.293	87.036	144.244	25.203	20931922.5
1984.386	-74.673	87.646	144.253	25.203	20931310.5
1989.567	-76.373	94.198	144.276	25.203	20929806.0
1993.711	-77.871	95.715	144.294	25.203	20928637.5
1998.896	-80.056	97.378	144.316	25.203	20927207.5
2000.955	-80.679	97.100	144.325	25.203	20926646.2
2004.086	-81.306	88.827	144.339	25.203	20925807.5
2006.137	-84.045	91.690	144.348	25.203	20925264.5
2008.225	-79.092	91.600	144.356	25.203	20924802.0
2011.287	-77.707	89.067	144.369	25.203	20924362.0
2013.372	-75.241	95.046	144.378	25.203	20924150.7
2015.424	-74.132	98.404	144.387	25.203	20923967.0
2018.522	-67.052	93.053	144.400	25.203	20923769.5

Table B-2b. Reconstructed Reentry Trajectory, Special Parameters (Continued)

TIME FROM RETROFIRE (SEC)	RELATIVE FLT. PATH ANGLE (DEGREES)	RELATIVE HEADING ANGLE (DEGREES)	INERTIAL LONG. (DEGREES)	GEOCENTRIC LAT. (DEGREES)	RADIUS TO EARTH CENTER (FEET)
2020.571	-44.718	72.122	144.429	25.203	20923707.2
2022.625	-38.478	30.5[illegible]	144.418	25.203	20923669.0
2025.722	-36.381	60.496	144.431	25.203	20923619.2
2027.771	-41.025	101.581	144.439	25.203	20923583.7
2029.863	-36.613	121.517	144.448	25.203	20923539.5
2032.922	-37.617	113.918	144.461	25.203	20923474.2
2035.[illegible]	-42.785	94.573	144.477	25.203	20923430.0
2037.063	-39.768	86.141	144.479	25.203	20923383.7
2040.165	-35.226	77.767	144.492	25.203	20923315.2
2047.403	-47.9[illegible]	116.494	144.523	25.203	20923146.7
2049.450	-41.840	109.9[illegible]	144.532	25.203	20923130.2
2051.499	-54.159	99.377	144.540	25.203	20923054.0
2054.604	-59.701	93.523	144.553	25.203	20922977.0
2056.65[illegible]	-57.165	120.4[illegible]8	144.562	25.203	20922929.2
2058.741	-58.475	97.113	144.571	25.203	20922881.7
2061.873	-49.6[illegible]8	[illegible].277	144.584	25.203	20922857.0
2063.951	-45.716	82.149	144.592	25.203	20922760.5
2065.941	-45.662	101.967	144.601	25.203	20922714.0
2069.003	-28.063	88.092	144.614	25.203	20922641.5
2071.091	-33.103	86.983	144.623	25.203	20922593.5
2073.142	-40.572	104.676	144.633	25.203	20922550.0
2076.204	-63.440	152.676	144.645	25.203	20922486.5
2078.292	-52.277	90.730	144.654	25.203	20922443.7
2080.380	-35.352	77.990	144.663	25.203	20922398.0
2082.471	-27.193	79.060	144.671	25.203	20922355.5
2085.567	-56.122	83.259	144.685	25.203	20922291.5
2087.617	-5[illegible].817	85.466	144.693	25.203	20922246.5
2089.711	-41.646	94.766	144.702	25.203	20922200.7
2092.812	-53.792	128.354	144.715	25.203	20922129.2
2094.862	-56.039	160.145	144.724	25.203	20922083.0
2096.955	-46.418	115.065	144.733	25.203	20922038.7
2100.011	-29.779	33.484	144.746	25.203	20921975.2
2102.096	-47.803	108.876	144.755	25.203	20921932.0
2104.154	-65.273	-173.939	144.763	25.203	20921884.5
2107.249	-58.637	131.285	144.776	25.202	20921812.7
2109.296	-44.619	105.818	144.785	25.202	20921769.7
2111.354	-56.208	137.991	144.794	25.202	20921728.2
2114.448	-49.888	-177.645	144.807	25.202	20921668.2
2116.497	-47.206	127.487	144.815	25.202	20921625.2
2121.648	-50.879	-161.276	144.837	25.202	20921505.0
2123.671	-27.109	-143.450	144.845	25.202	20921464.7
2128.823	-48.532	104.606	144.867	25.202	20921379.0
2130.[illegible]	[illegible]	[illegible]	144.876	25.202	20921336.0
2136.[illegible]62	-5[illegible].890	135.965	144.897	25.202	20921214.2
2138.112	-44.493	146.261	144.906	25.201	20921169.7
2140.109	-46.078	-166.186	144.915	25.201	20921125.0
2143.297	-27.268	179.680	144.928	25.201	20921061.2
2145.331	-41.494	129.787	144.936	25.201	20921021.0
2147.438	-32.152	111.386	144.945	25.201	20920983.5
2150.540	-44.044	151.088	144.958	25.201	20920935.5
2152.581	-34.617	156.219	144.967	25.201	20920904.2
2154.673	-35.237	151.344	144.975	25.201	20920871.5

(Reverse of this page is blank)

APPENDIX C
IMU CALIBRATION HISTORY

The following plots contain the history of the preflight calibration values for the accelerometer bias and scale factors and the gyro drift rate. The bias and scale factors are shown as the differences from the flight value, and the gyro drift rate is shown as the actual calibrated value (there is no in-flight adjustment for the gyro drift rate). This information was provided by NASA/Honeywell.

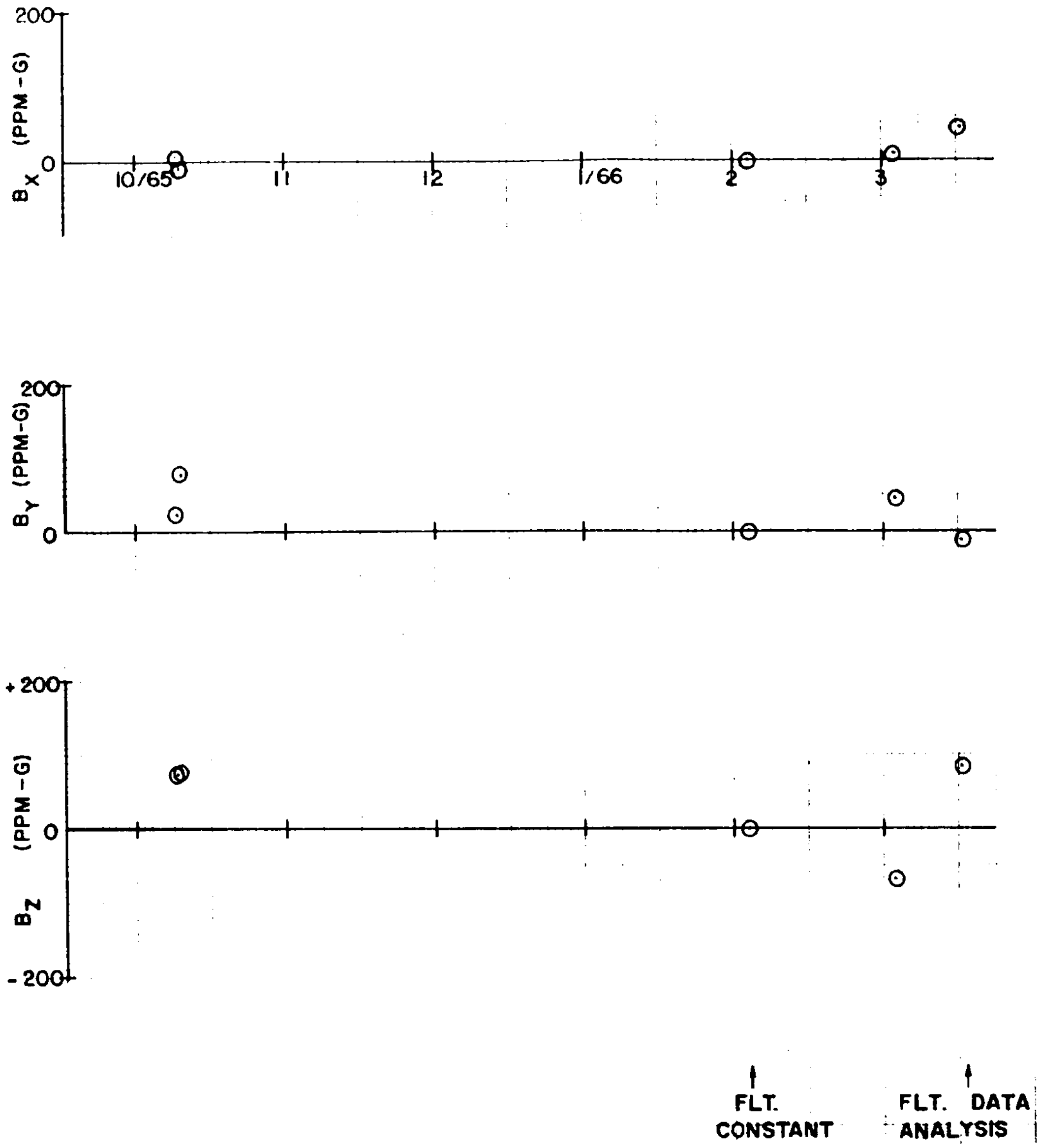


Figure C-1. Accelerometer Bias History (Deviation from Flight Constant)

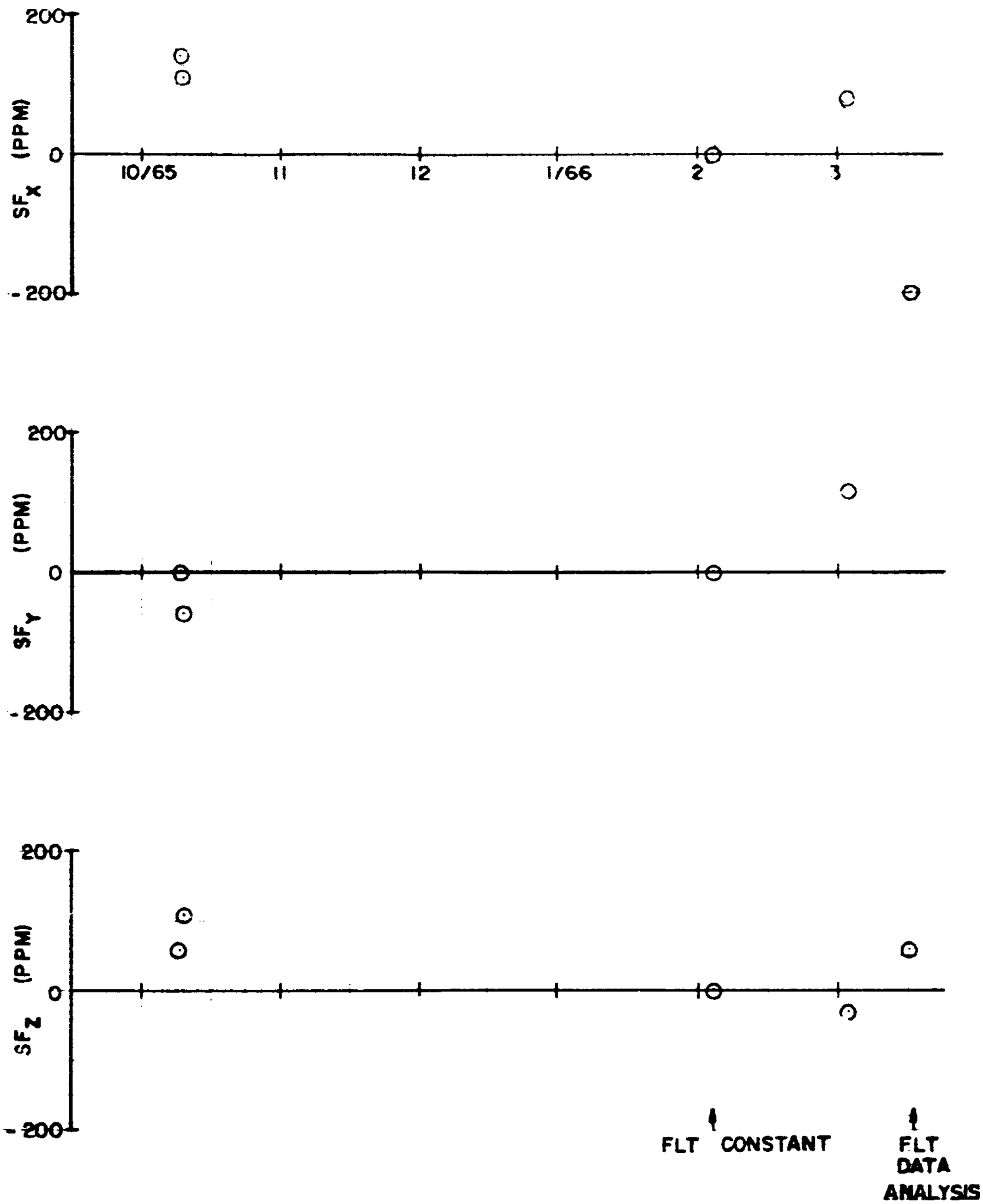


Figure C-2. Accelerometer Scale Factor History (Deviation from Flight Constant)

CONFIDENTIAL

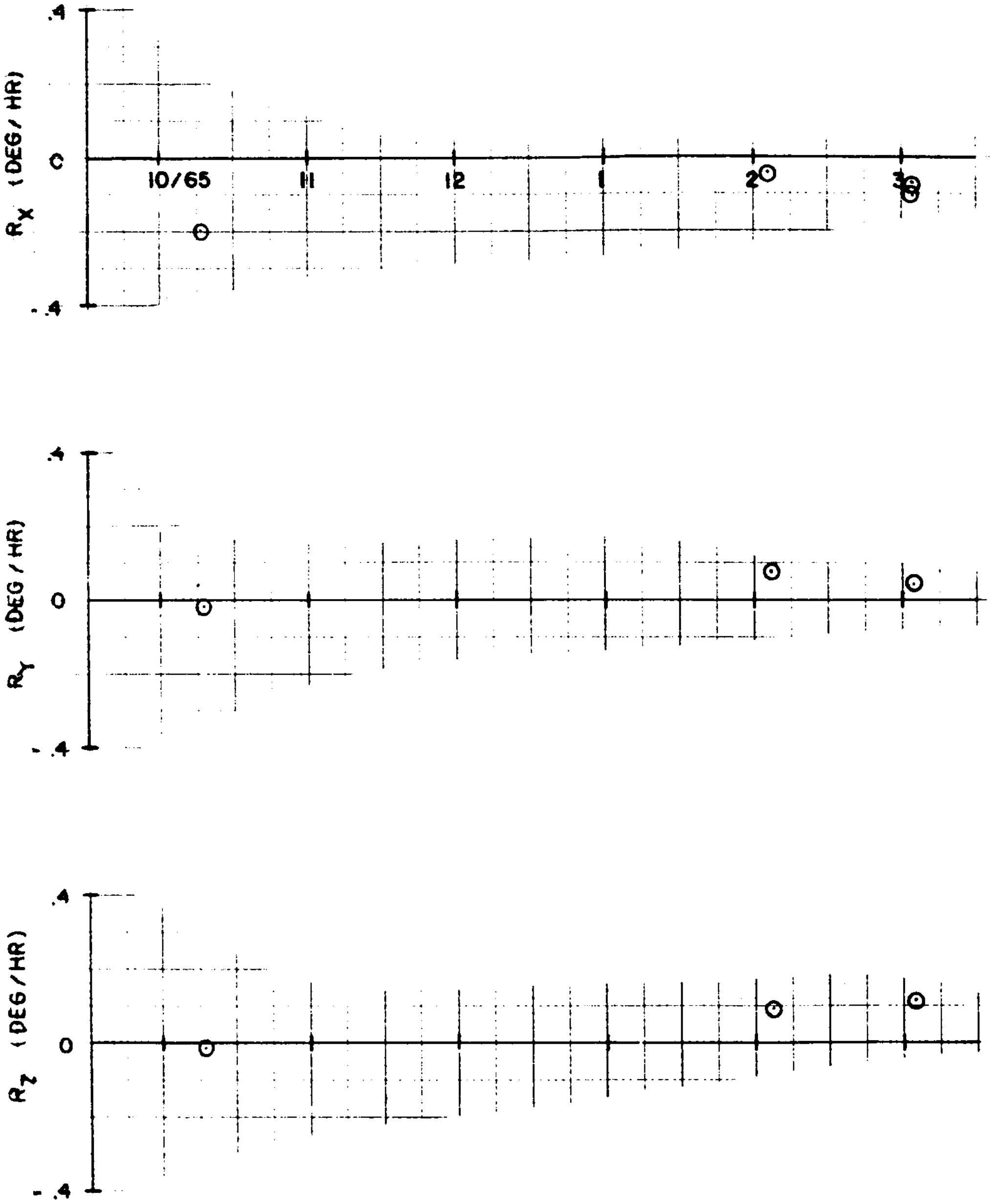


Figure C-3. Gyro Constant Drift Rate History

CONFIDENTIAL

[redacted]

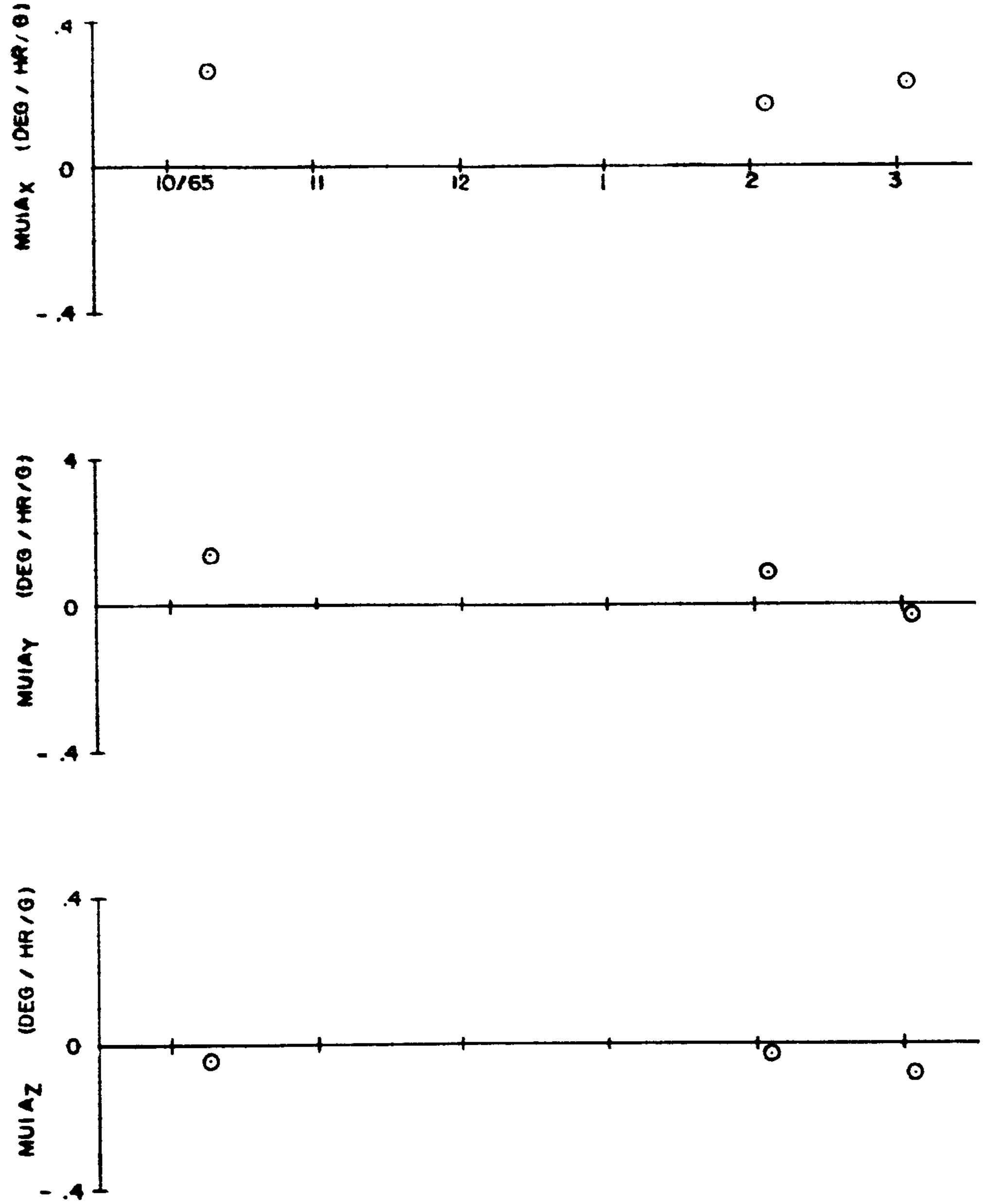


Figure C-4. Gyro Input Axis Unbalance Drift History

[redacted]

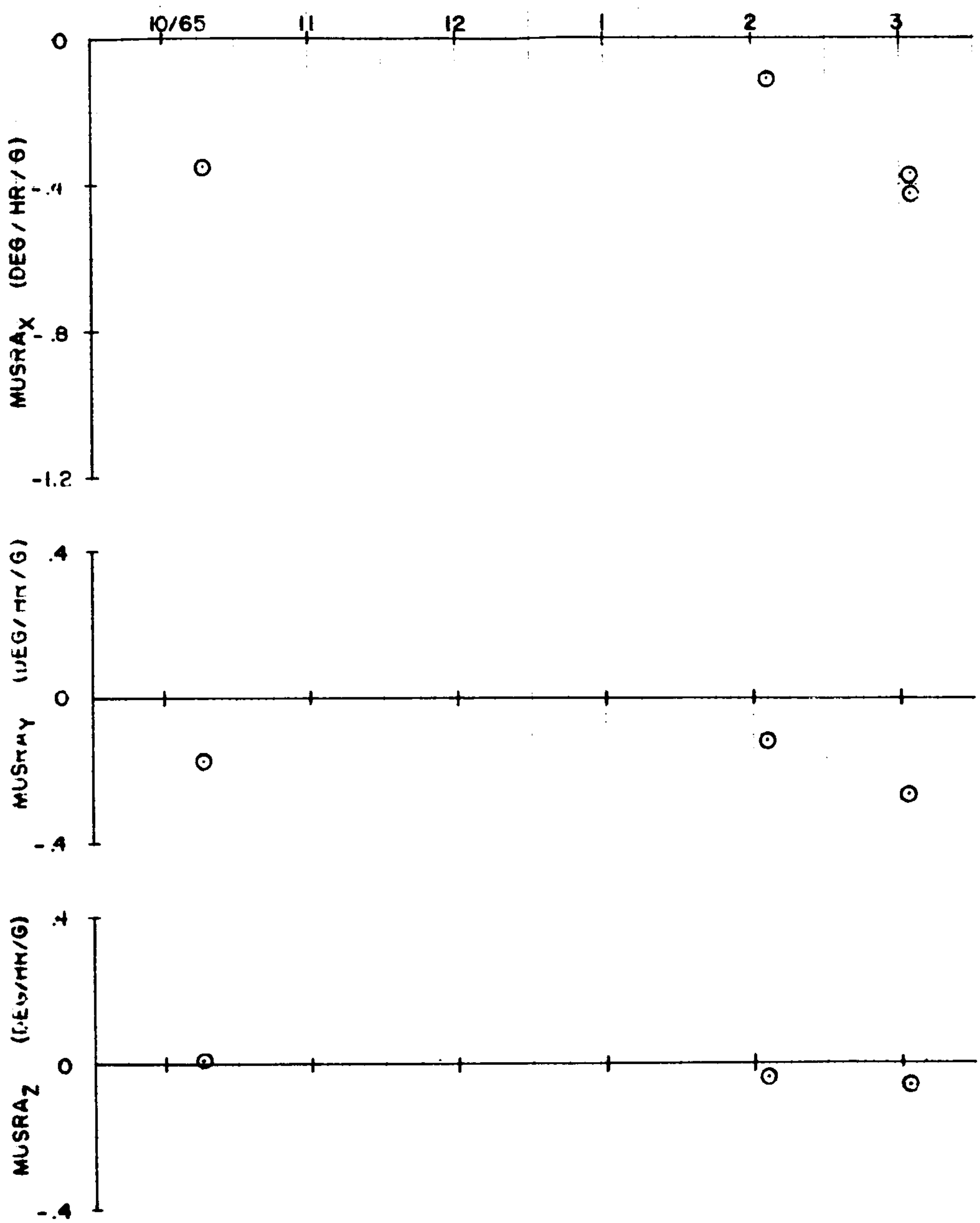


Figure C-5. Gyro Spin Axis Unbalance Drift History

[redacted]

APPENDIX D

ERROR SOURCE REGRESSION ANALYSIS

Tables — **Page**

Figures — **Page**

CONFIDENTIAL

Figures		Page

APPENDIX D

ERROR SOURCE REGRESSION ANALYSIS

The regression analysis was performed using the IMU telemetered data together with tracking data from the GE Mod III, MISTRAM I 10K and 100K system, and data from the MISTRAM II (Eleuthera) system. The fit domain was that of the following tracking systems:

MISTRAM I 10K $\dot{R}_{SUM}$, $\dot{P}$, $\dot{Q}$

MISTRAM I 100K $\dot{P}$, $\dot{Q}$

GE Mod III R, A, E, $\dot{R}$, $\dot{P}$, $\dot{Q}$

MISTRAM II $\dot{R}_{SUM}$, $\dot{P}$, $\dot{Q}$

This domain was selected since MISTRAM position bias errors have no effect. Weighting of the data was accomplished by visually examining the residuals prior to the fit to determine white noise 1-sigma estimates. Table D-1 indicates the various 1-sigma noise estimates which were used in the regression program.

Table D-1. Tracker Noise Estimates

Tracker		From (sec)	To	1σ	From	To	1σ
GE Mod III	R	120	160	10 ft	160	330	20
	A			0.00005 rad			0.00005
	E			0.00005 rad			0.00005
	$\dot{R}$			0.25 ft/sec			0.5
	$\dot{P}$			0.01			0.02
	Q			0.01			0.02
MISTRAM I	R_{SUM}			0.25			0.25
	P_{10K}			0.01			0.005
	Q_{10K}			0.01			0.005
	P_{100K}			0.03			0.01
	Q_{100K}			0.03			0.01
MISTRAM II	R_{SUM}	140	360	0.15			
	P			0.02	-	-	-
	Q			0.02			

Table D-2 lists the total postulated models together with the a priori 1-sigma uncertainties. This model was input into the Recursive Error Modeling Program (REMP) with about half of the terms excluded from the fit. However, the statistical effect of this exclusion is accounted for (Reference 5).

Table D-3 lists the final model selected by REMP along with the error coefficients recovered in the fit. Also in the table are the a priori uncertainties and the a posteriori uncertainties (i.e., the uncertainty associated with the recovered error term). The REMP does a preliminary ordering of the total error model based on the effect of the error function due to the associated 1-sigma a priori uncertainty. The weighted least-square curve-fit then proceeds a term at a time using the established sequence. In this manner, the more prominent error sources are used first in the regression solution. The program rejects error functions as the solution proceeds if they are "excessively" correlated with one or a combination of the previously selected functions. The correlation limit (the definition of "excessively") is an input item and has been empirically determined. In this analysis, the following error sources were purposely omitted from the fit, but left in as far as the a posteriori uncertainties are concerned:

BX	PHIX
BY	PHIY
BZ	VOX
YSF	VOY
A9(4)	VOZ
A10(4)	YGSAU
A11(4)	ZGSAU

In addition, the following terms were automatically omitted by the program due to correlation:

YGCDR
XGIAU
ZGCDR
XGCDR

Table D-2. Error Model and A Priori Uncertainties

Error	Description	1σ a priori uncertainty
BX	X accelerometer bias	5.0 ppm
BY	Y accelerometer bias	5.0 ppm
BZ	Z accelerometer bias	5.0 ppm
*XSF	X accelerometer scale factor	160 ppm
YSF	Y accelerometer scale factor	160 ppm
*ZSF	Z accelerometer scale factor	160 ppm
*POX	X initial position bias	50 ft
*POY	Y initial position bias	50 ft
*POZ	Z initial position bias	50 ft
XGCDR	X gyro constant drift rate	0.1 deg/hr
YGCDR	Y gyro constant drift rate	0.1 deg/hr
ZGCDR	Z gyro constant drift rate	0.1 deg/hr
VOX	X initial velocity bias	0.5 ft/sec
VOY	Y initial velocity bias	0.5 ft/sec
VOZ	Z initial velocity bias	0.5 ft/sec
*XGSAU	X gyro spin axis unbalance	0.2 deg/hr/g
YGSAU	Y gyro spin axis unbalance	0.2 deg/hr/g
ZGSAU	Z gyro spin axis unbalance	0.2 deg/hr/g
XGIAU	X gyro input axis unbalance	0.2 deg/hr/g
*YGIAU	Y gyro input axis unbalance	0.2 deg/hr/g
*ZGIAU	Z gyro input axis unbalance	0.2 deg/hr/g
ZXMSL	Z accelerometer misaligned toward X	35 $\widehat{\text{sec}}$
PHIX	Platform misalignment about X	45 $\widehat{\text{sec}}$
PHIY	Platform misalignment about Y	45 $\widehat{\text{sec}}$
*PHIZ	Platform misalignment about Z (IGS azimuth)	100 $\widehat{\text{sec}}$
TSF	Timing scale factor	100 ppm
DT	Timing bias	0.01 sec
*A4(1)	MISTRAM I refraction error (central site)	5 n units
C2(3)	Time bias in Mod III	0.01 sec
*C3(3)	GE Mod III range bias	100 ft
*C4(3)	GE Mod III refraction error	5 n units
*DO(3)	GE Mod III azimuth bias	0.0002 rad
*FO(3)	GE Mod III elevation bias	0.0002 rad
A2(4)	Time bias in passive MISTRAM	0.01 sec
A9(4)	MISTRAM II X survey	50 ft
A10(4)	MISTRAM II Y survey	50 ft
A11(4)	MISTRAM II Z survey	10 ft
*G3(4)	MISTRAM II rate bias	0.5 ft/sec
*A4(4)	MISTRAM II refraction error	5 n units

*The asterisks indicate those error coefficients solved for in the regression.

Table D-3. Recovered Errors and Uncertainties

Name	Coefficient value	A posteriori uncertainty	A priori uncertainty	Number of sigmas*	Units
TSF	-89.9	19.7	100.	0.9	ppm
DT	+0.025	0.0055	0.01	2.5	sec
A2(4)	+0.00088	0.0019	0.01	0.08	sec
C2(3)	-0.00013	0.00036	0.01	0.001	sec
C4(3)	+15.29	3.3	5.0	3.0	n units
A4(4)	+3.15	5.1	5.0	0.6	n units
A4(1)	+1.71	5.2	5.0	0.3	n units
PHIZ	+56.9	1.8	100.	0.57	$\widehat{sec}$
XSF	+198.	29.8	160.	1.2	ppm
YGIAU	+0.0019	0.29	0.2	0.01	deg/hr/g
ZGIAU	-0.18	0.30	0.2	1.	deg/hr/g
ZXMSL	-37.9	37.4	35.	1.	$\widehat{sec}$
ZSF	-57.8	157.	160.	0.35	ppm
CO(3)	+74.3	11.6	100.	0.74	ft
POX	+18.6	55.	50.	0.35	ft
POZ	-30.	58.7	50.	0.6	ft
POY	+31.1	39.6	50.	0.6	ft
XGSAU	-1.1	0.44	0.2	5.5	deg/hr/g
DO(3)	+0.000015	0.00001	0.0002	0.07	rad
FO(3)	+0.00005	0.00002	0.0002	0.25	rad
G3(4)	-0.22	0.088	0.5	0.45	ft/sec

*This column indicates the magnitude of the recovered coefficients in terms of the a priori 1-sigma.

Table D-3 indicates that only one recovered error coefficient (XGSAU) is very large in terms of its a priori uncertainty. It is felt that this error possibly represents a combination of gyro errors that were excluded. The uncertainty of 0.4°/hr/g is twice the size of the a priori value (0.2), which testifies to the high correlation of this term with omitted terms.* Some compensating effect does occur between XGSAU and ZGIAU.

Figures D-1 through D-10 are plots of the error coefficients as the regression solution proceeds. These plots represent the value of the error coefficients which would be produced by the program if the solution were stopped at the addition of each new error source. These figures also indicate that the solution for ZGIAU shifts abruptly at the inclusion of XGSAU, indicating correlation between these error functions. Figure D-11 is a history of the RMS (root mean square) of the residuals as new error terms are added. Note that the RMS does decrease as XGSAU is added, although the reduction is not impressive. Correlation between PHIZ and XGSAU is evidenced by the level change in PHIZ when XGSAU is included in the fit (see Figure D-4).

Several REMP runs were made using error functions other than XGSAU; however, the resulting fit to the data was decidedly poorer than when XGSAU was used. Because of this, more credibility is given to the final recovered coefficient. To see if a tracker refraction error might be altering the solution somewhat, a regression run was made that used no data beyond 300 seconds, which insured against small elevation angles; the recovered coefficients remained approximately the same (XGSAU became $-1.35\ ^{\circ}$/hr/g). The final solution included tracker refraction errors, and the data were used over the interval 120 to 360 seconds. Data prior to 120 seconds were not used in order that low altitude refraction effects could be avoided. The actual results of the regression may be seen in Figures D-12 through D-16, which are plots of the residuals input to the program with the curve-fit superimposed. The fit to the MISTRAM 10K and 100K data was extremely good, resulting in near zero remaining mean.

The MISTRAM II data were also fit quite well and appears to be reasonably free of systematic trends.

---

*For an explanation of this, see the Appendix of Reference 5.

[redacted]

The GE Mod III curves indicate that although small, systematic trends still remain in all six parameters (Figures D-12 and D-13). Possibly the most dramatic of these is the $\dot{R}$ residuals that indicate a ramp-type error remaining in the data. There is no explanation for the remaining bias at this time.

Some remarks are in order concerning the validity of the recovered error coefficients from the final regression run. First, it is seen from Table D-3 that the terms

A4(4)	ZXMSL
A4(1)	POX
YGIAU	POZ
ZGIAU	XGSAU

have a posteriori uncertainties larger than the a priori uncertainties, because so many error sources are carried as "nuisance" parameters without being solved for. In particular, this implies that although XGSAU was continually recovered to a level of $\approx -1.2^{\circ}/hr/g$, it could be a combination of some unsolved errors. It can be said regarding XGSAU that it is the one term that does the best job of fitting the data. Second, the RMS remaining after the fit is the smallest yet observed for a Gemini analysis (see Figure D-11), a plot of the RMS history). This remaining level of 1.0 denotes a near perfect fit in terms of the assumed noise on the data versus the final observed RMS. Third, the histories of the coefficients as the solution progresses (Figures D-1 through D-10) indicates that serious compensational effects are not present to any alarming degree in the final reduced model.

[redacted]

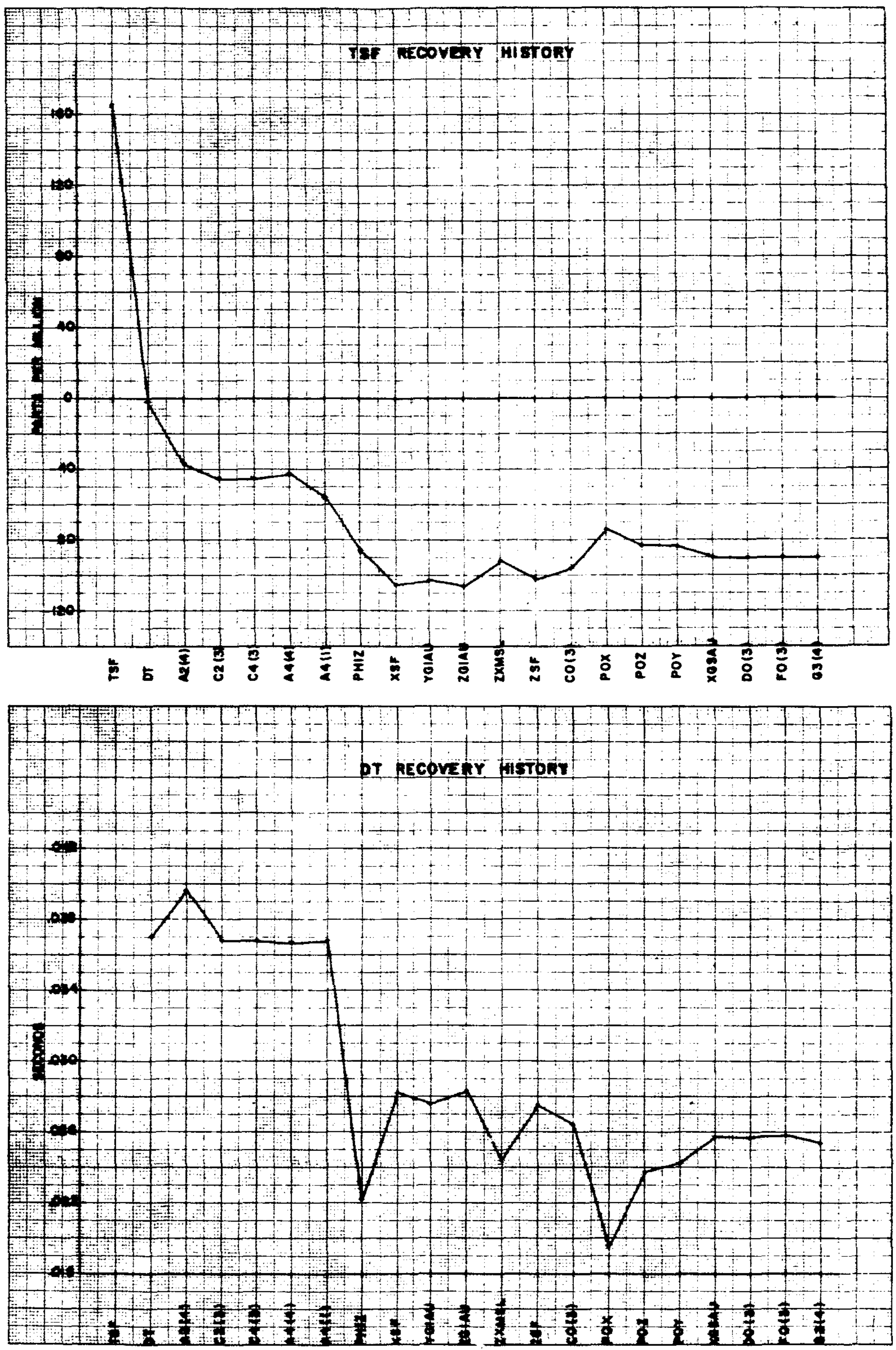
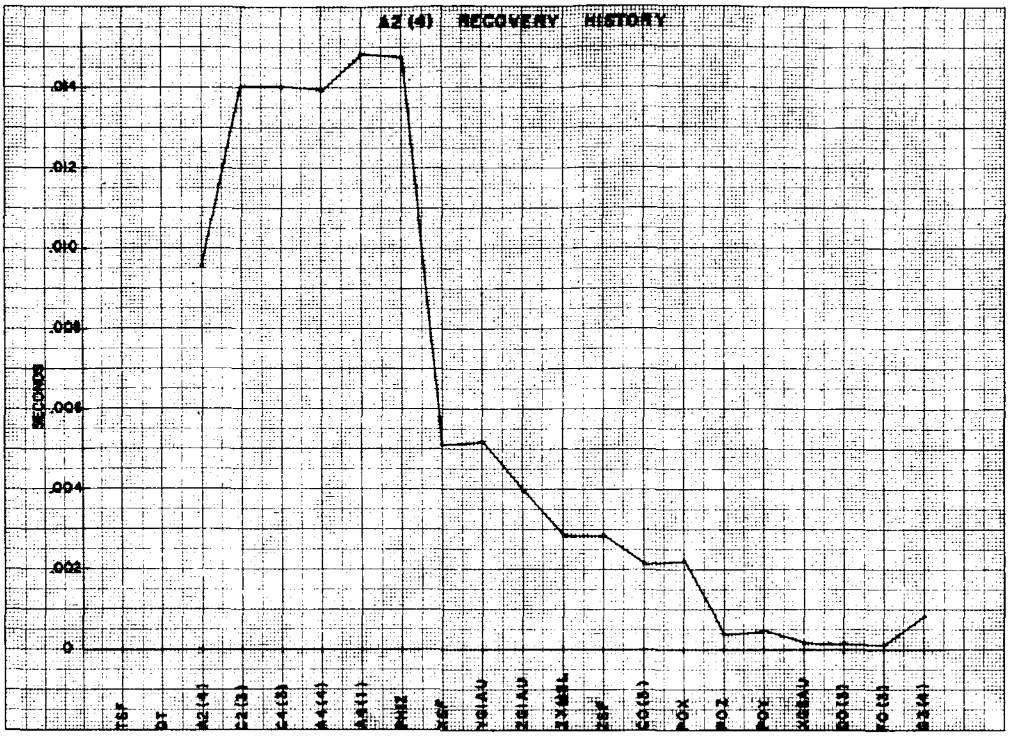


Figure D-1. Error Source Recovery History — TSF, DT

CONFIDENTIAL



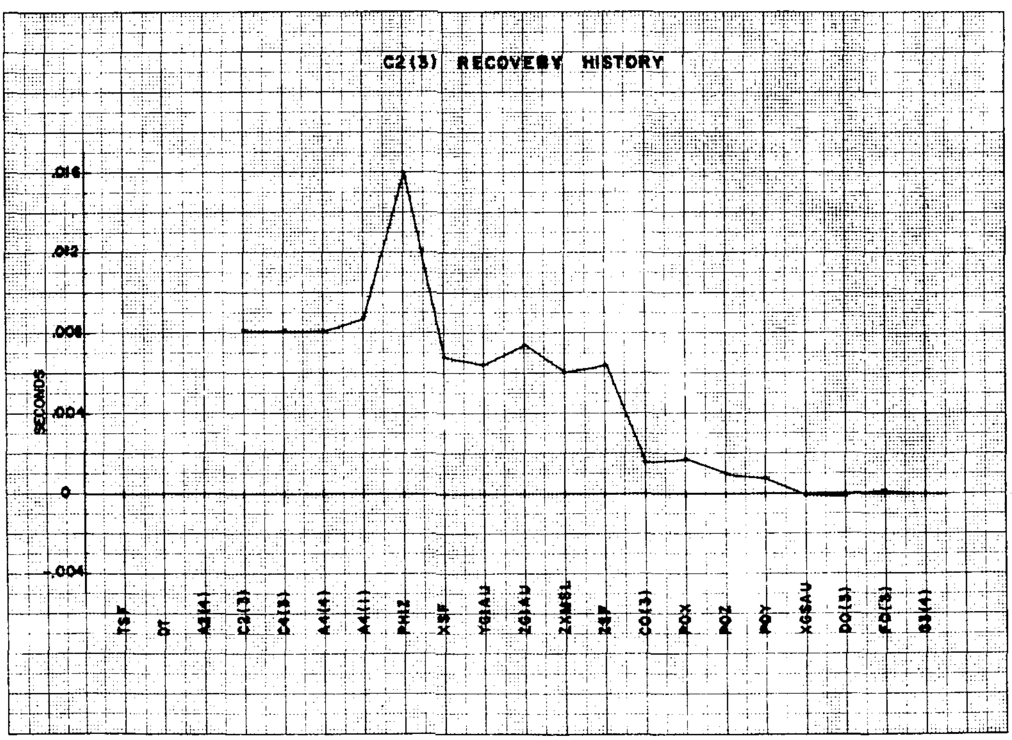
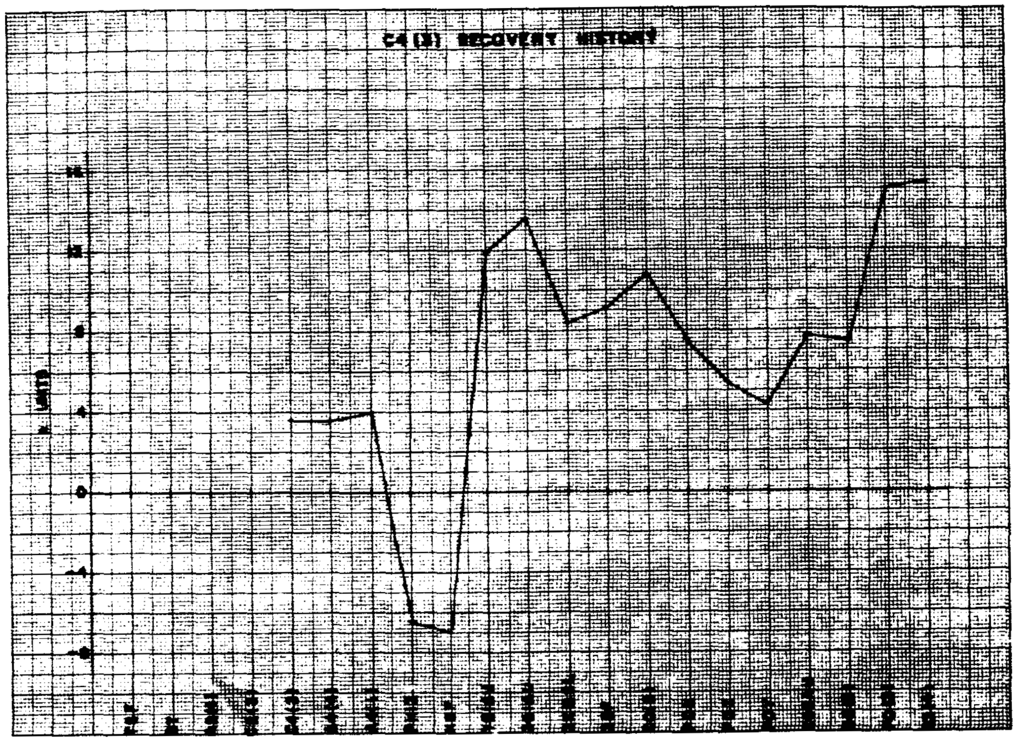


Figure D-2. Error Source Recovery History — A2(4), C2(3)

CONFIDENTIAL



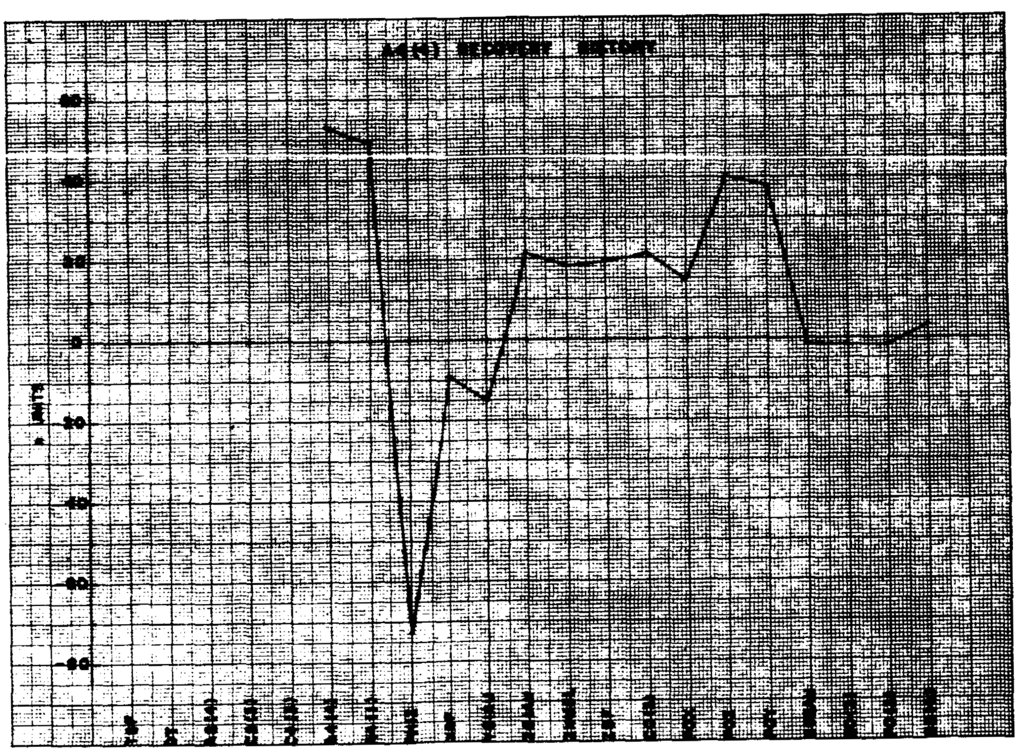
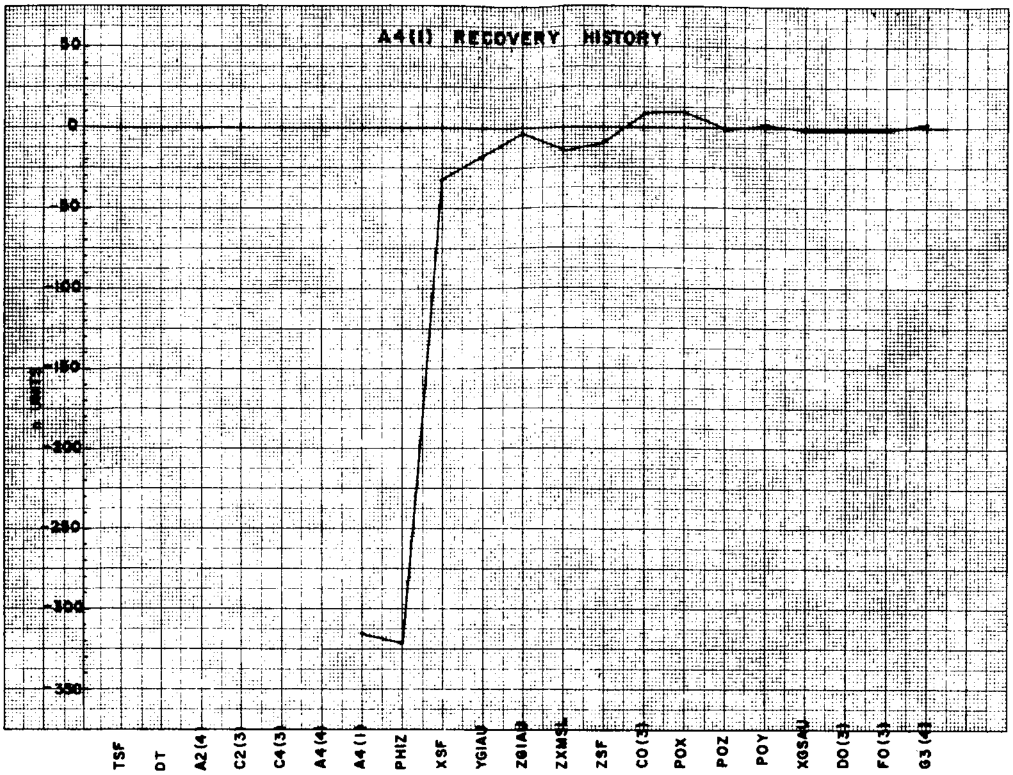


Figure D-3. Error Source Recovery History — C4(3), A4(4)



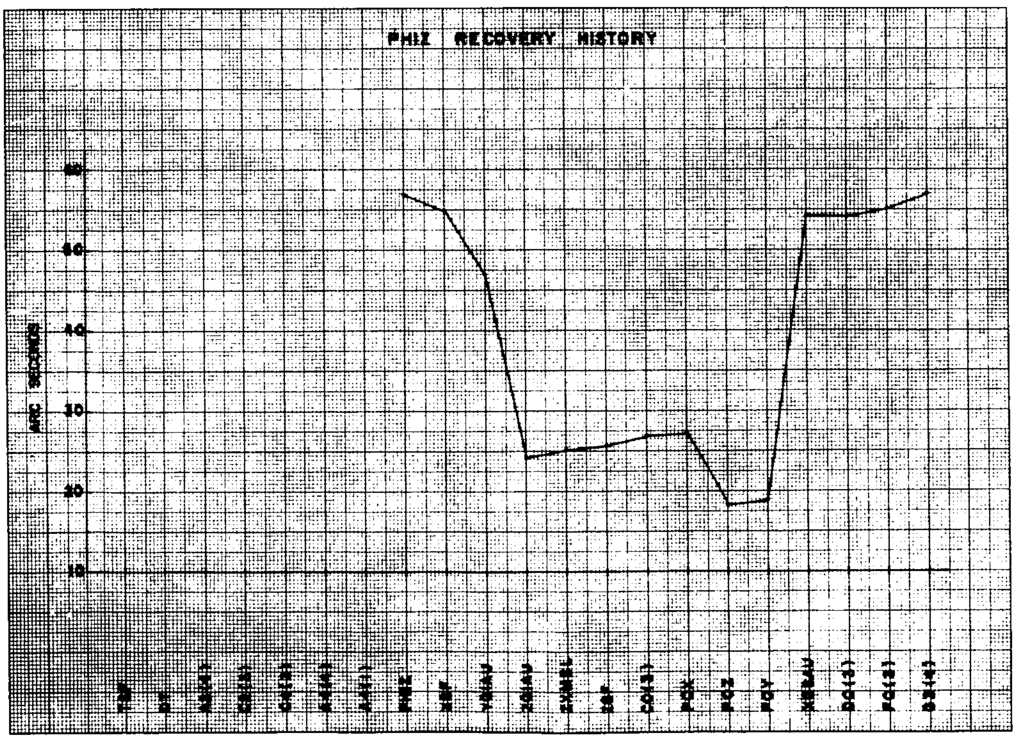
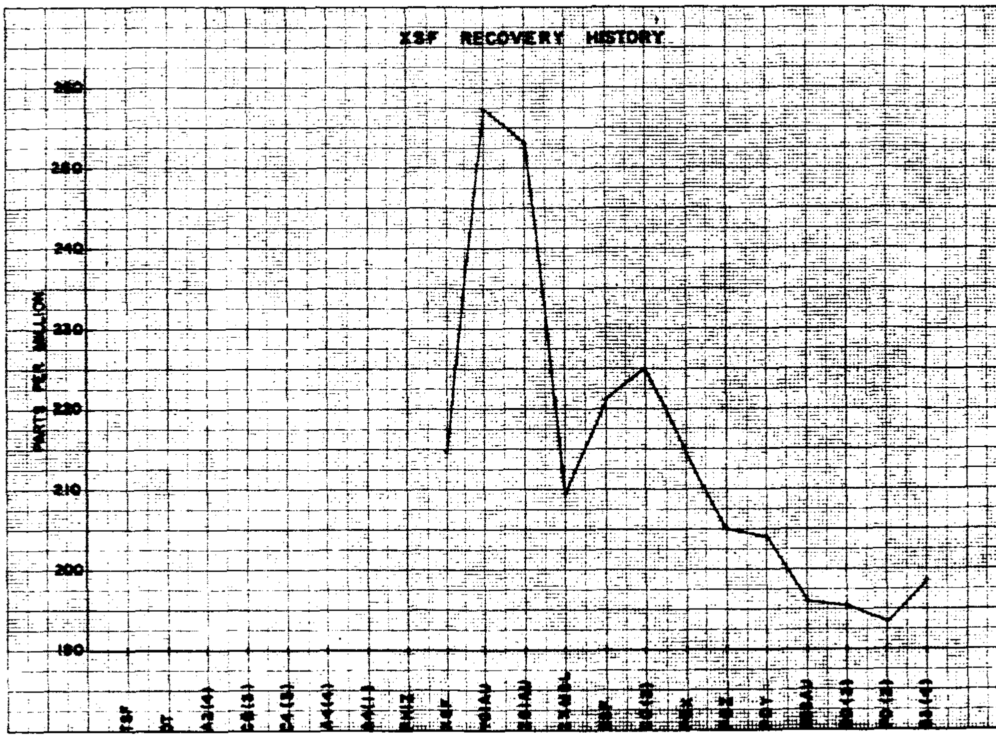


Figure D-4. Error Source Recovery History — A4(1), PHIZ

[redacted]



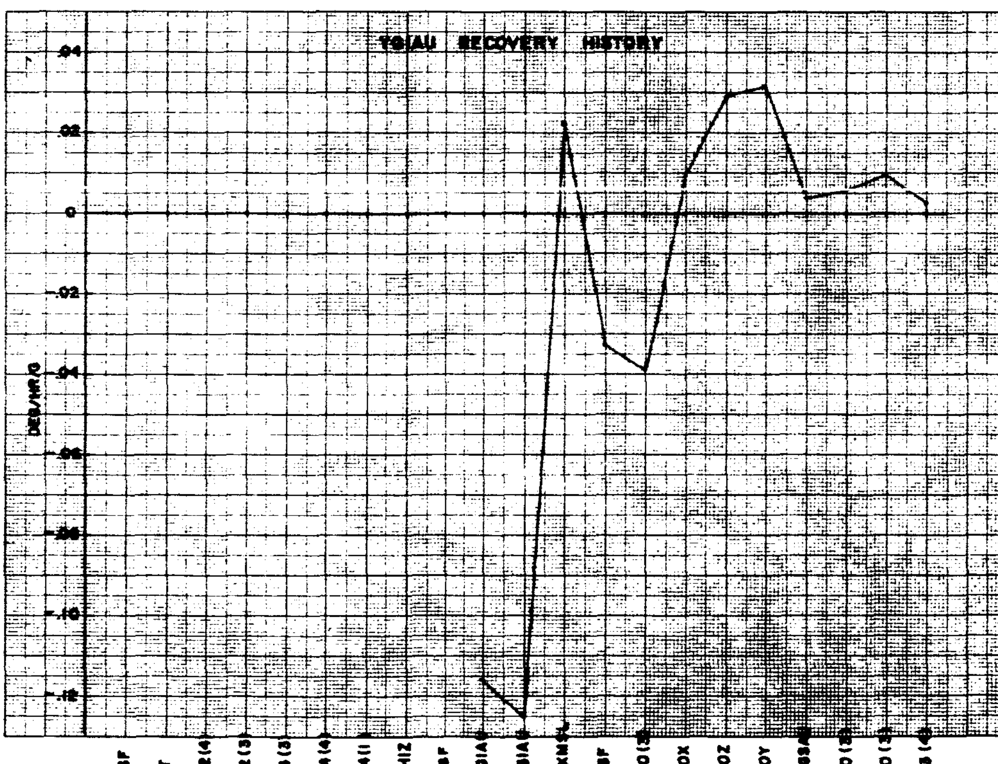
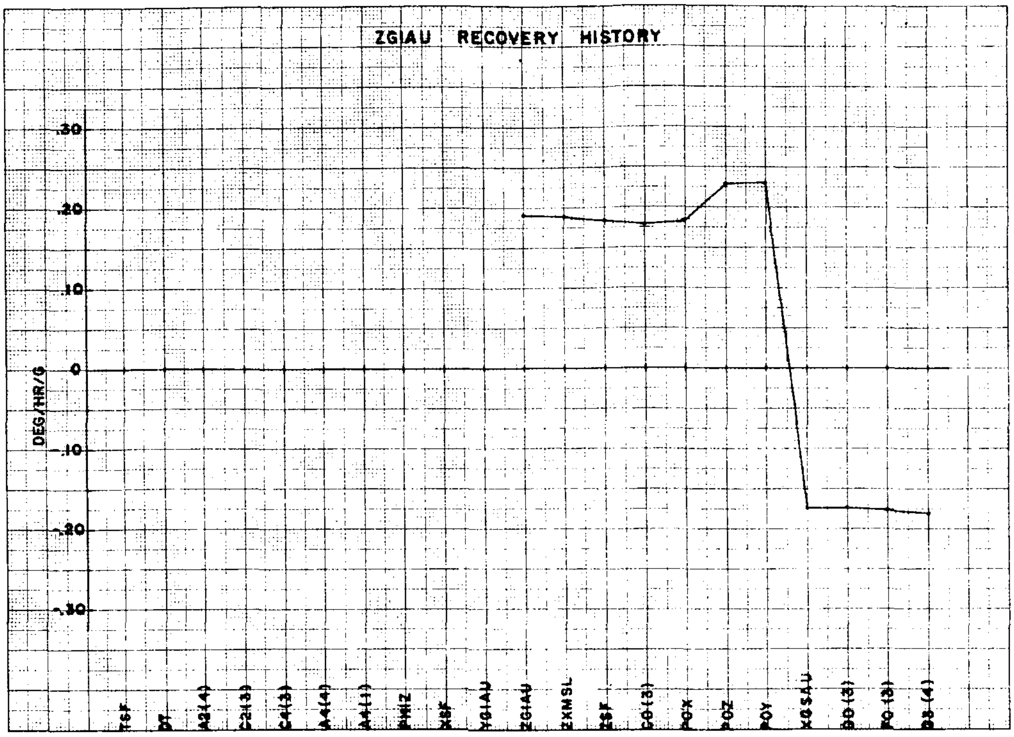


Figure D-5. Error Source Recovery History — XSF, YGIAG

[redacted]

CONFIDENTIAL



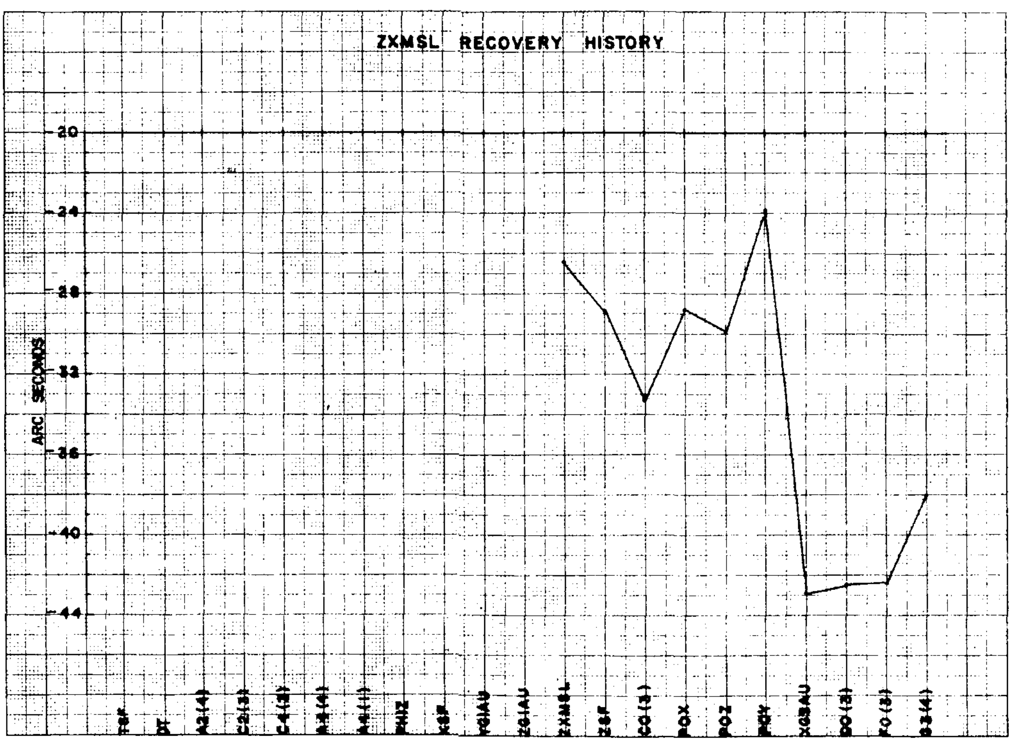


Figure D-6. Error Source Recovery History — ZGIAU, ZXMSL

CONFIDENTIAL

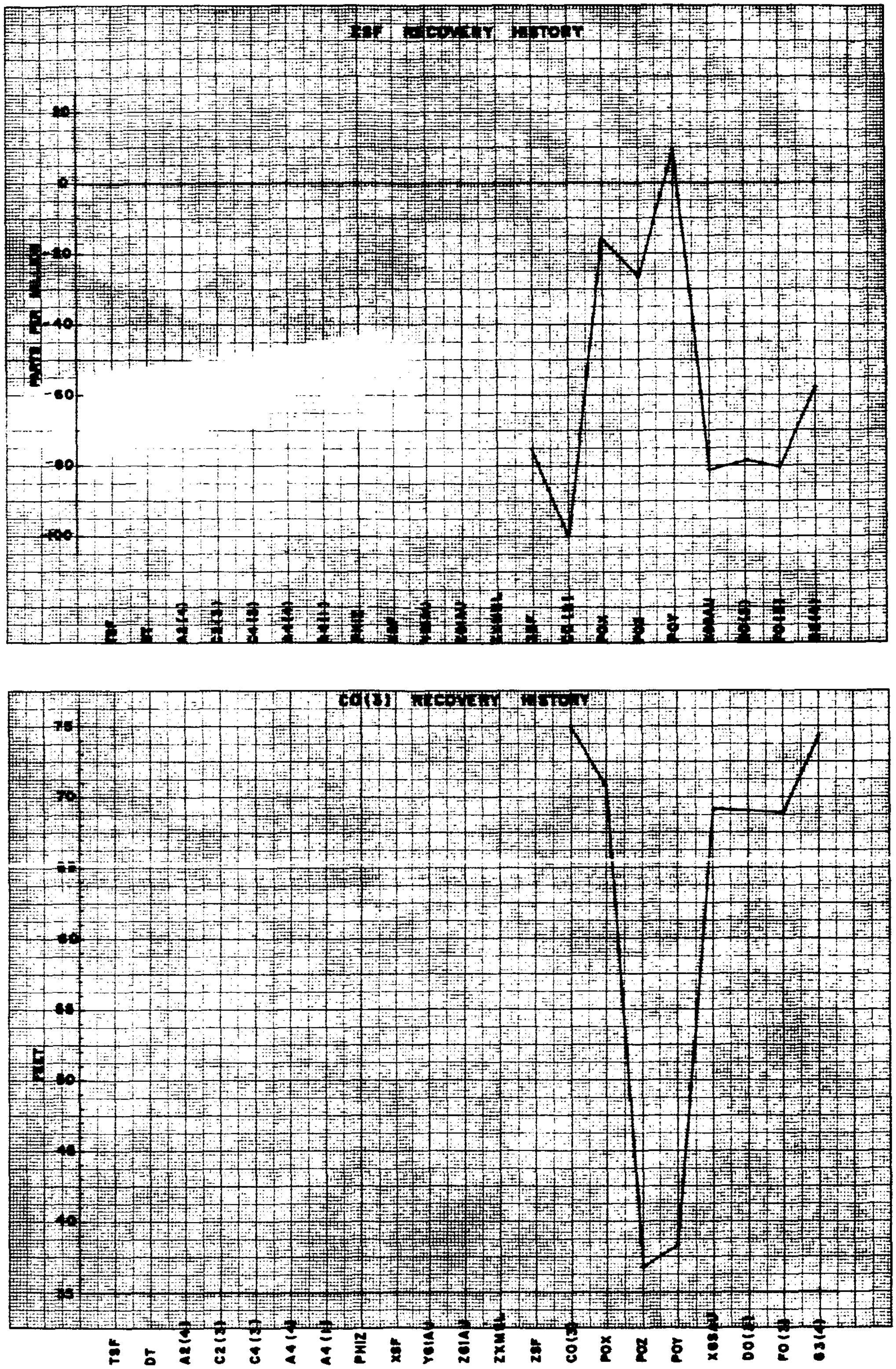
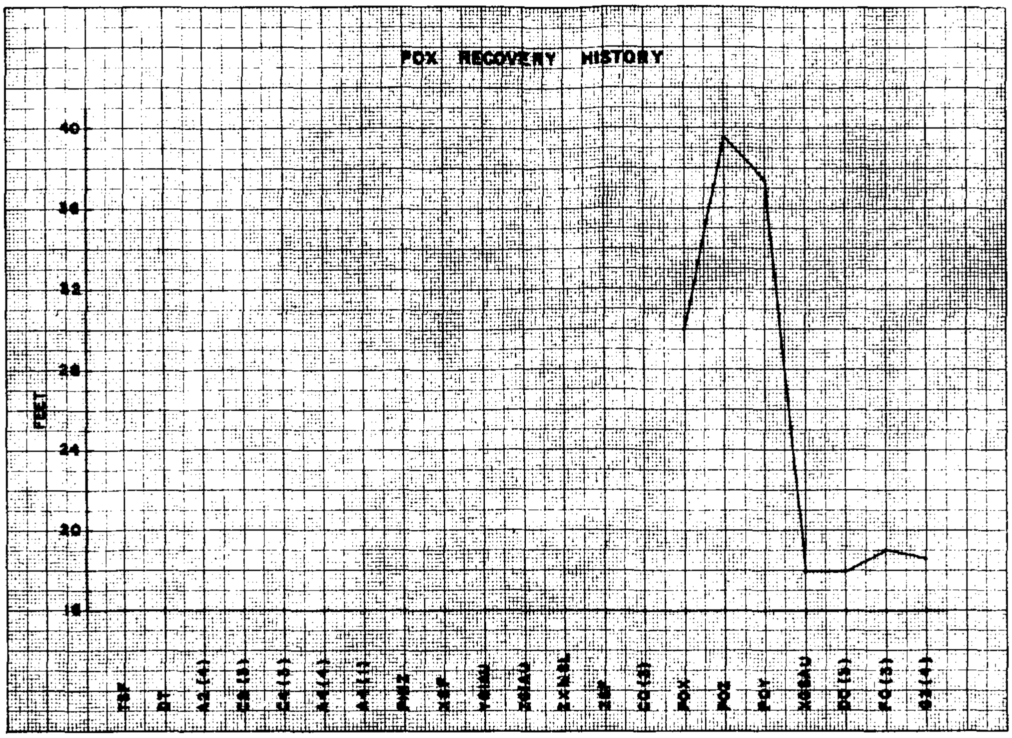


Figure D-7. Error Source Recovery History — ZSF, CO(3)



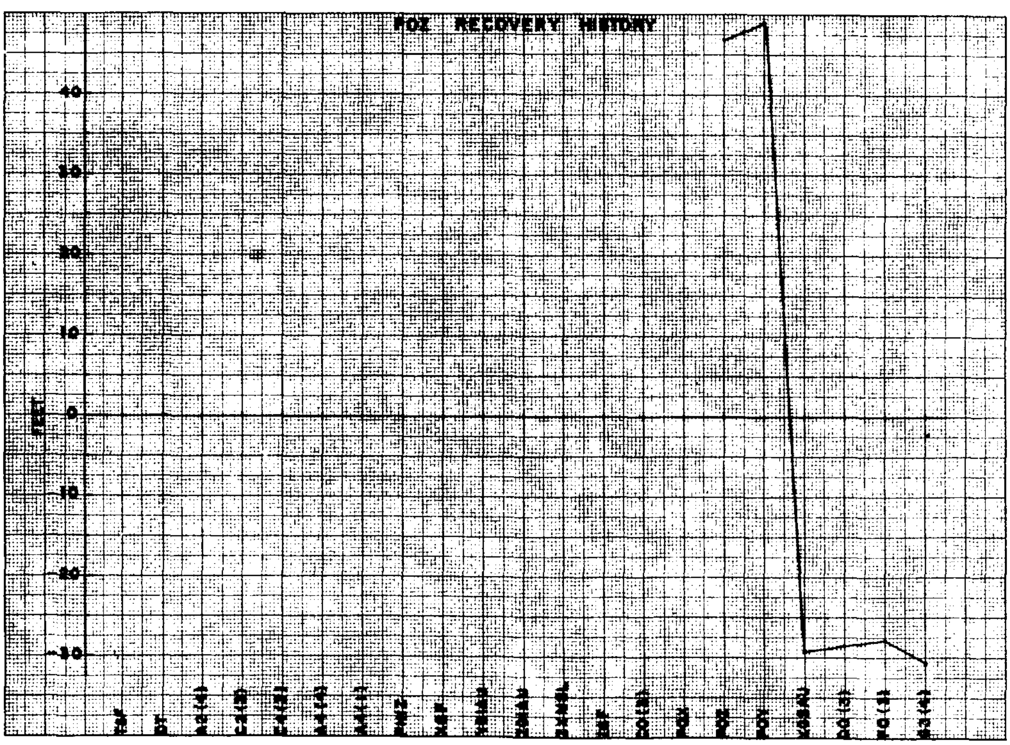
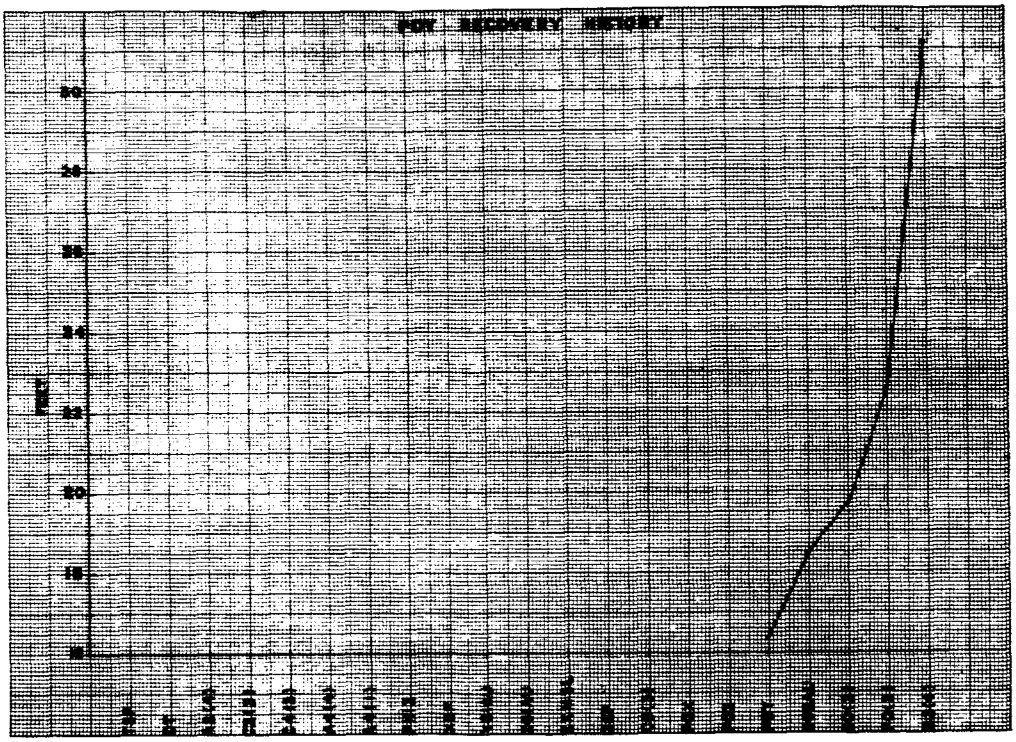


Figure D-8. Error Source Recovery History — POX, POZ



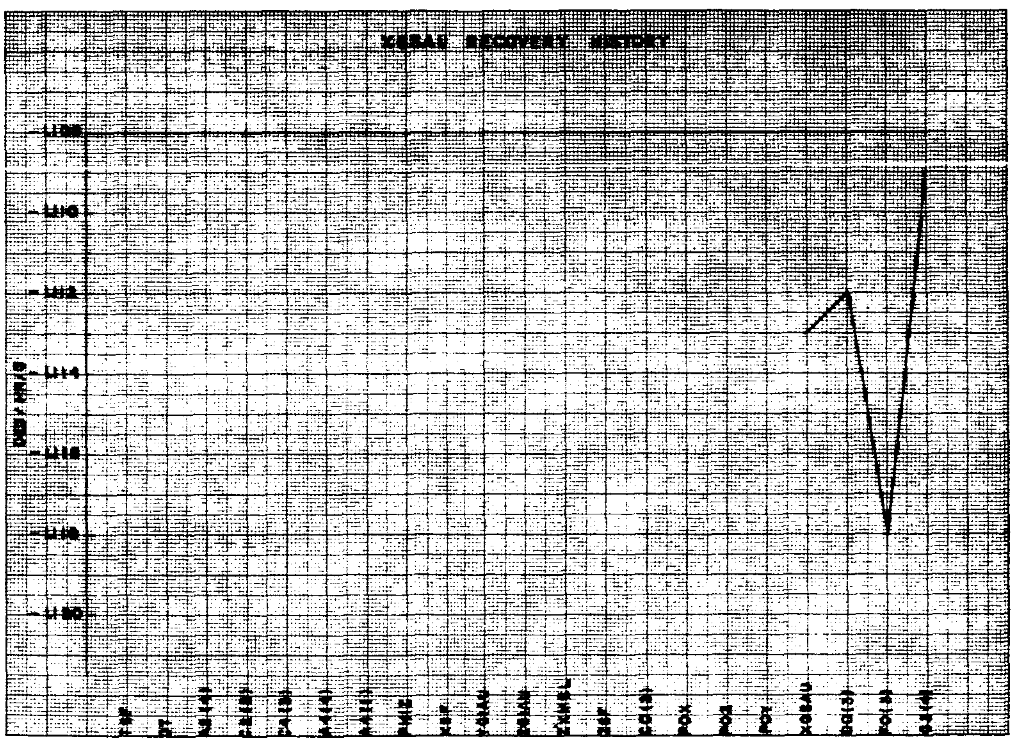
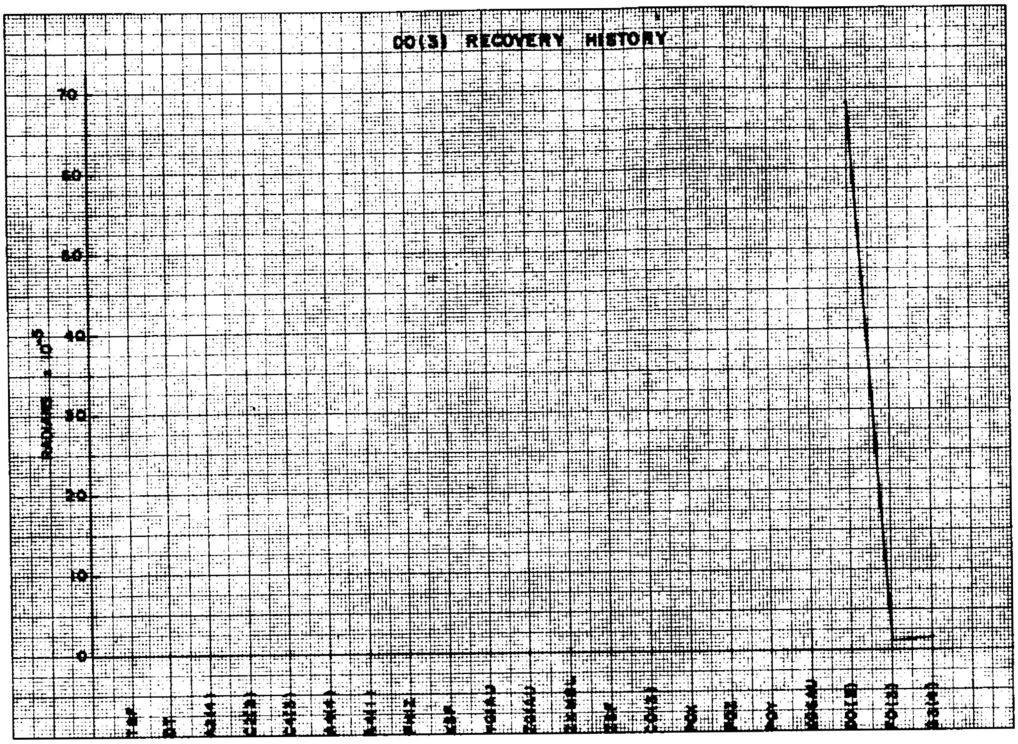


Figure D-9. Error Source Recovery History — POY, XGSAU

CONFIDENTIAL



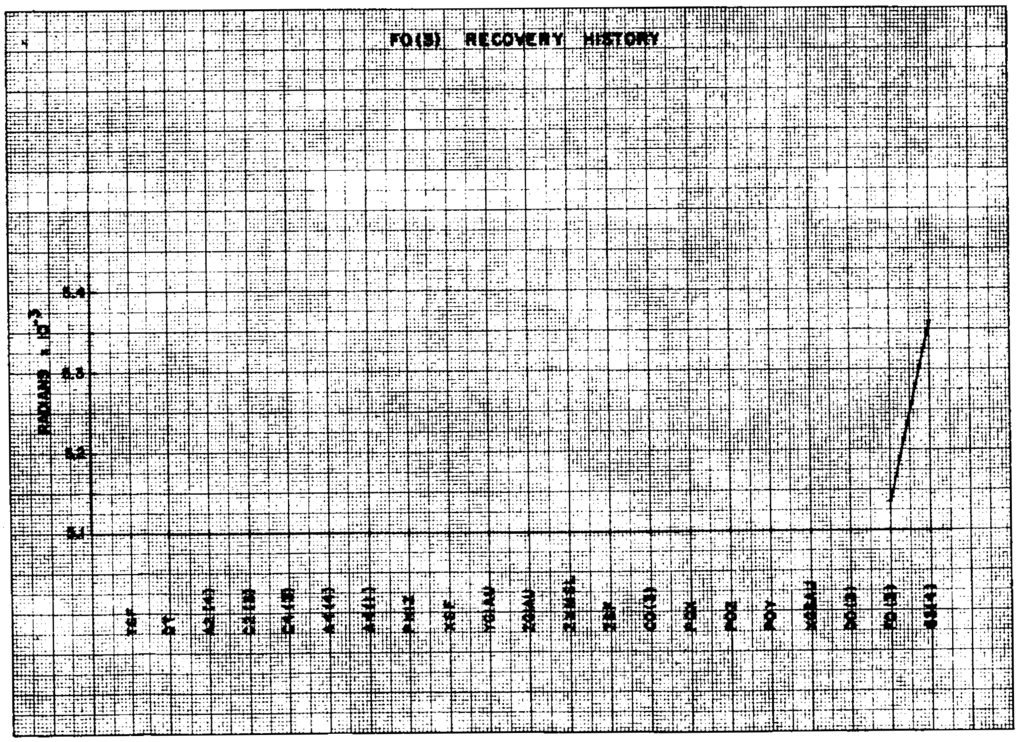


Figure D-10. Error Source Recovery History — DO(3), FO(3)

CONFIDENTIAL

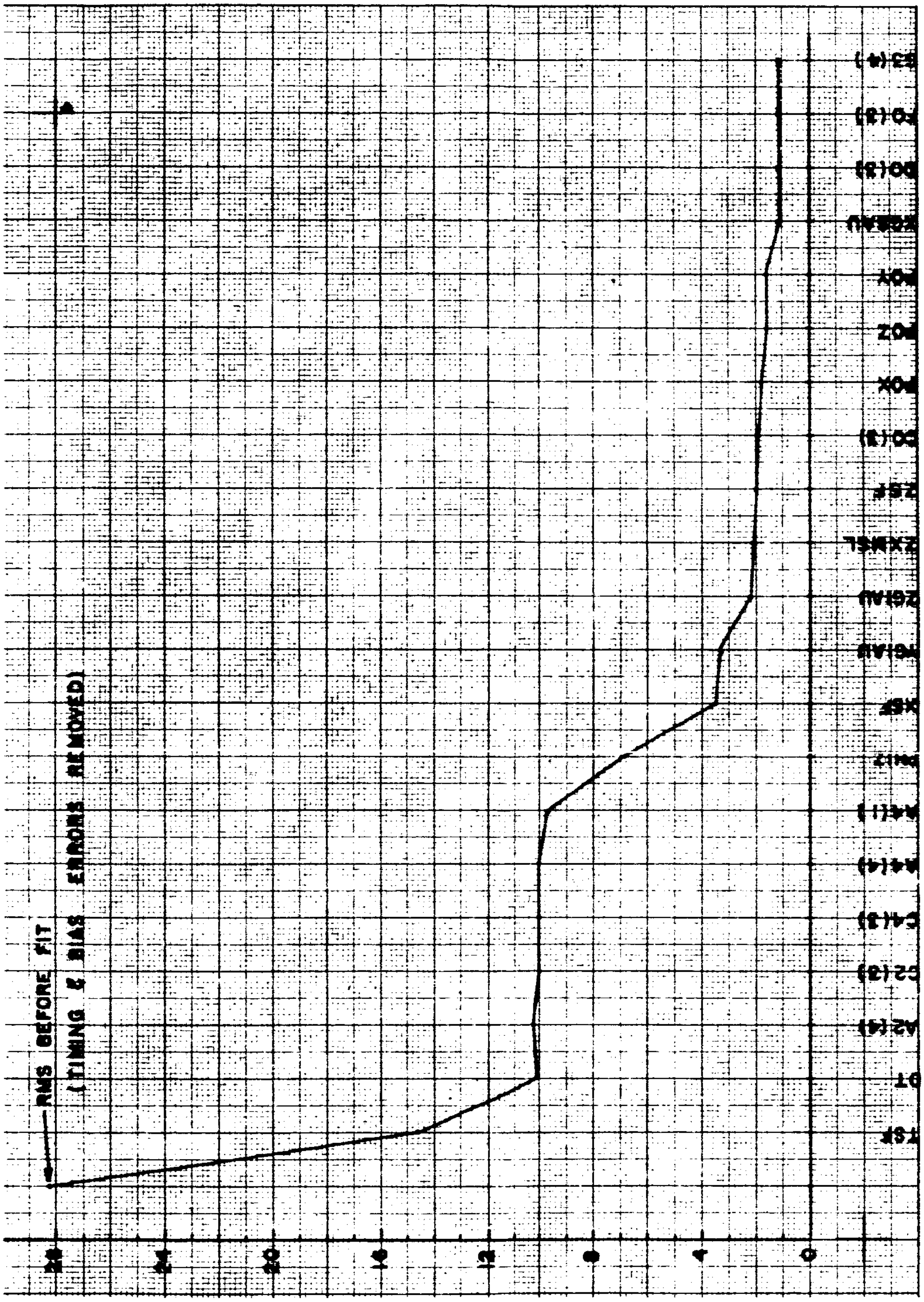


Figure D-11. Regression Residual RMS History

CONFIDENTIAL

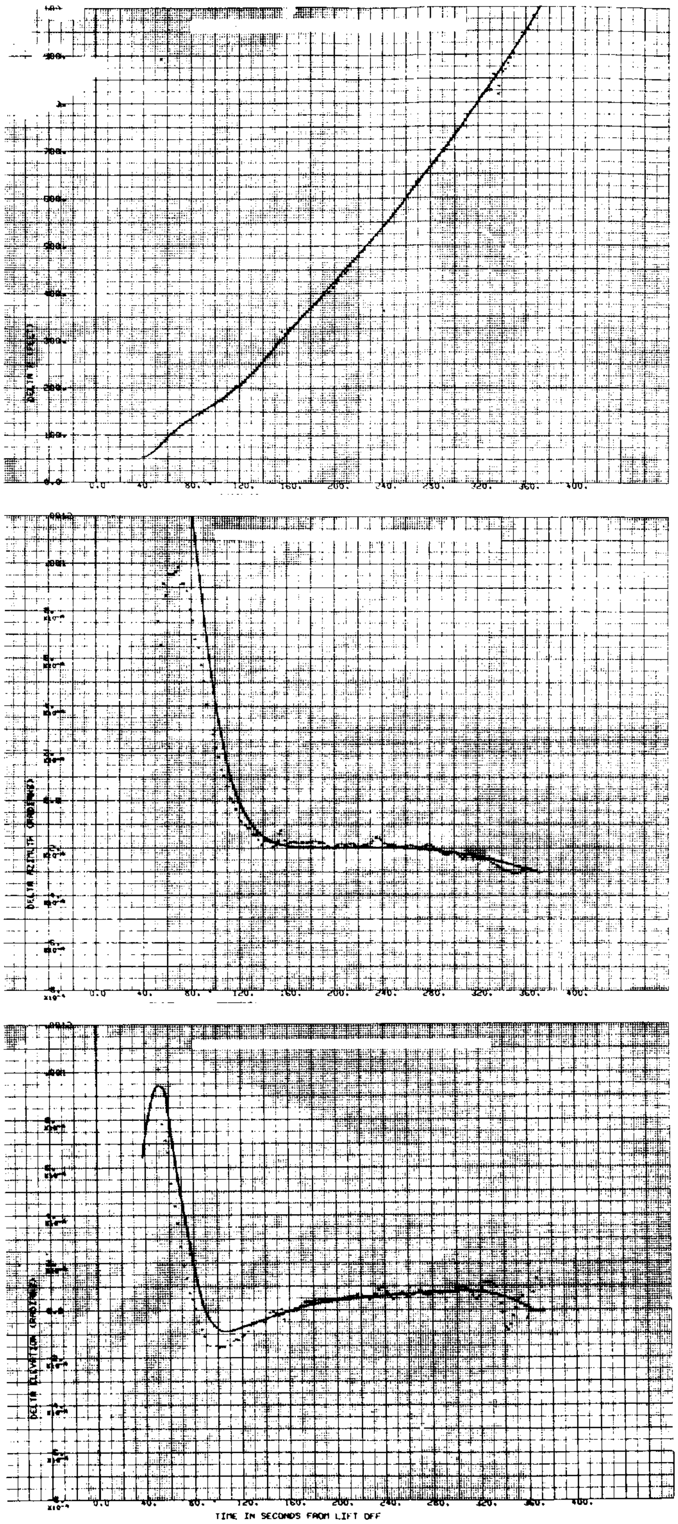


Figure D-12. GE Mod III ΔP and Regression Fit in Tracker Coordinates

CONFIDENTIAL

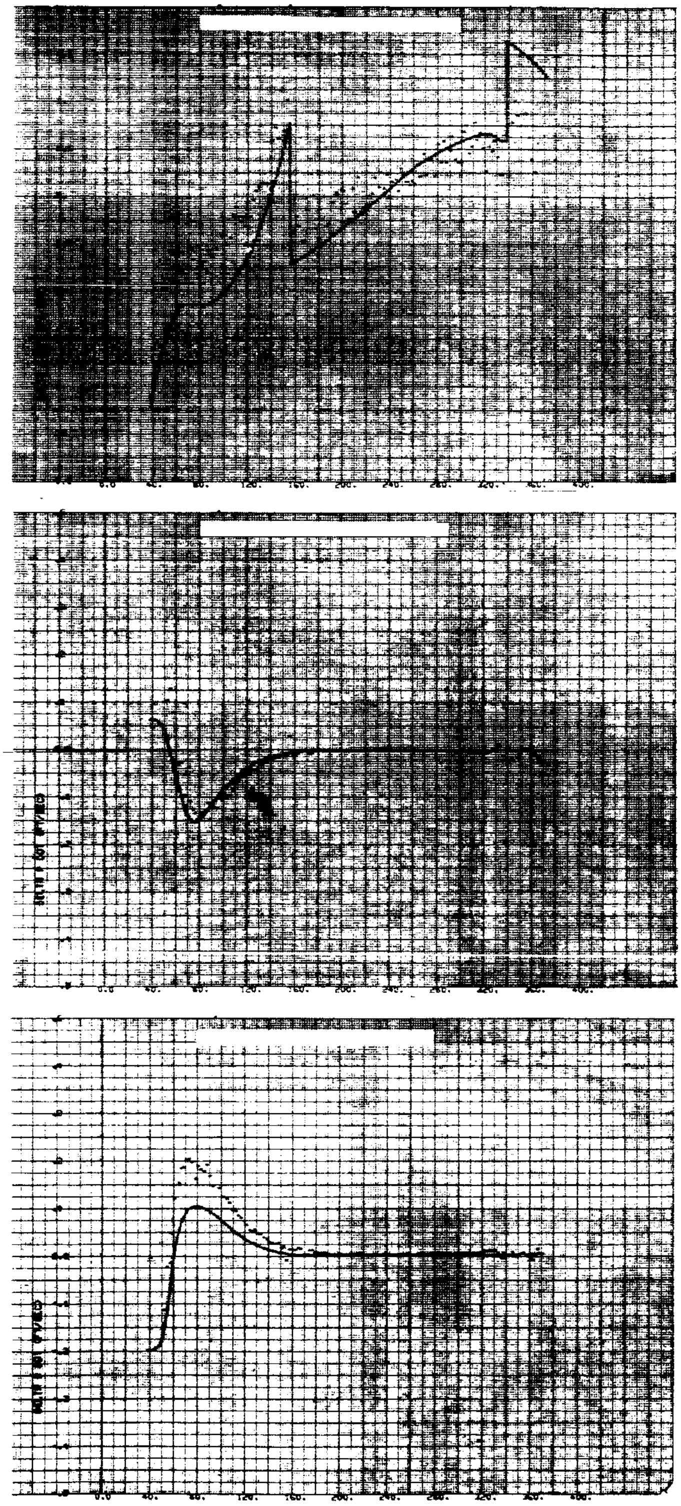


Figure D-13. GE Mod III ΔV and Regression Fit in Tracker Coordinates

CONFIDENTIAL

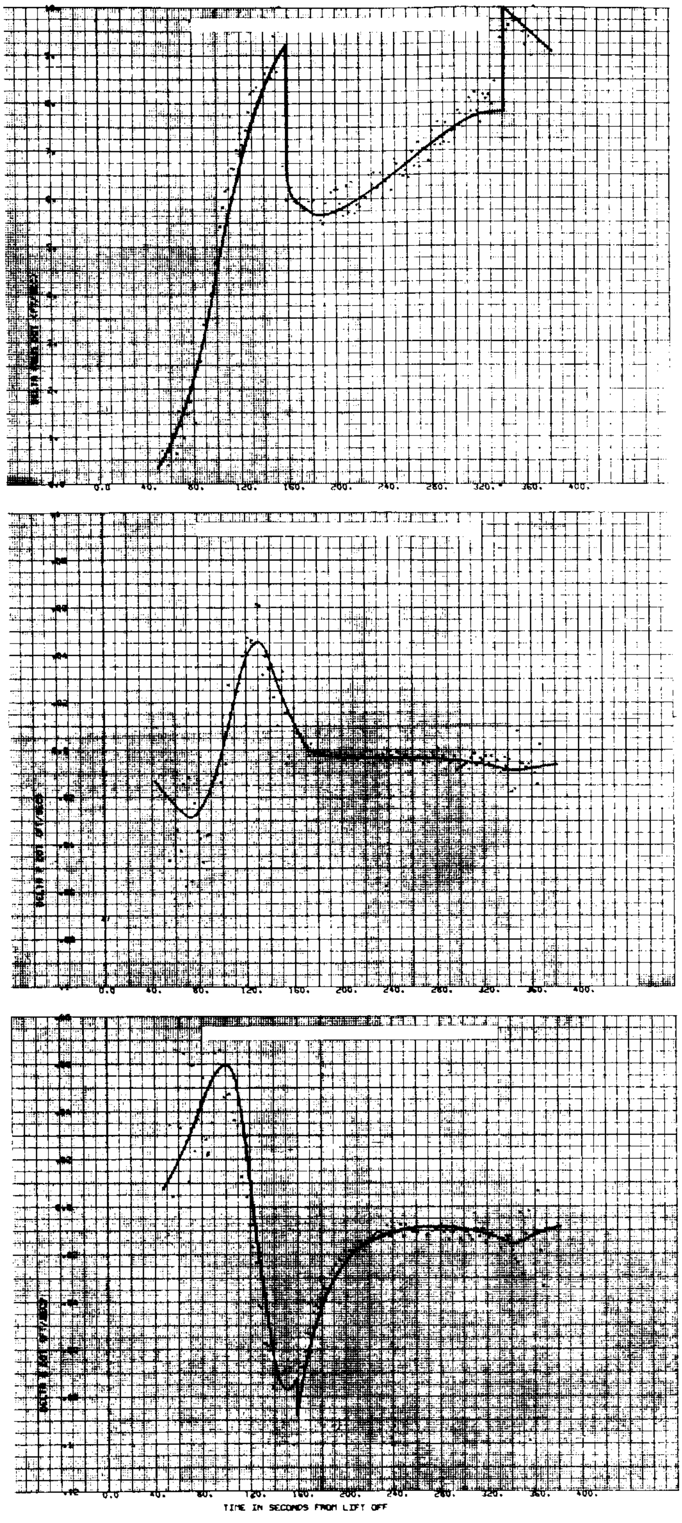


Figure D-14. MISTRAM I 10K and Regression Fit ΔV in Tracker Coordinates

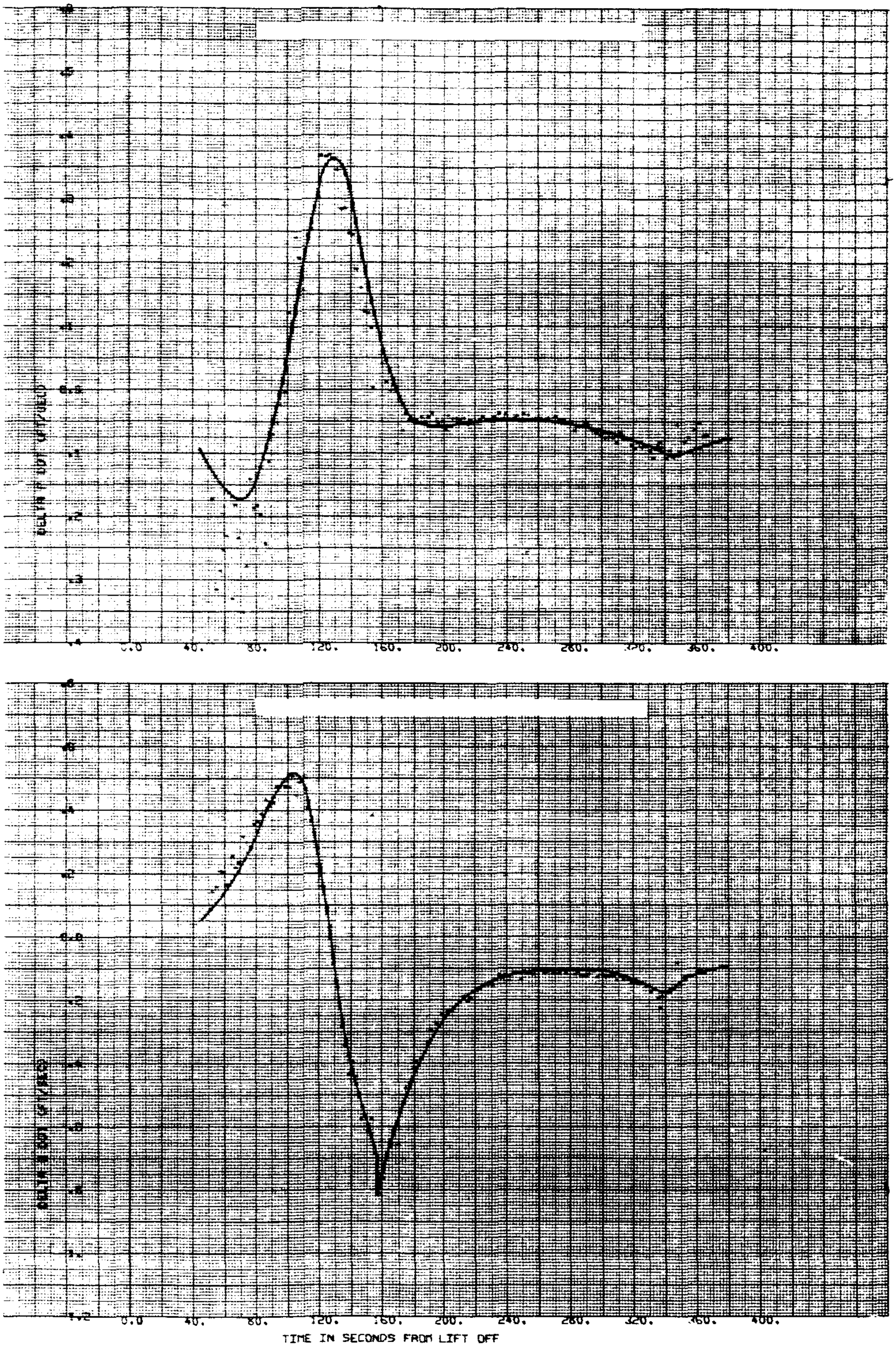


Figure D-15. MISTRAM I 100K and Regression Fit ΔV in Tracker Coordinates

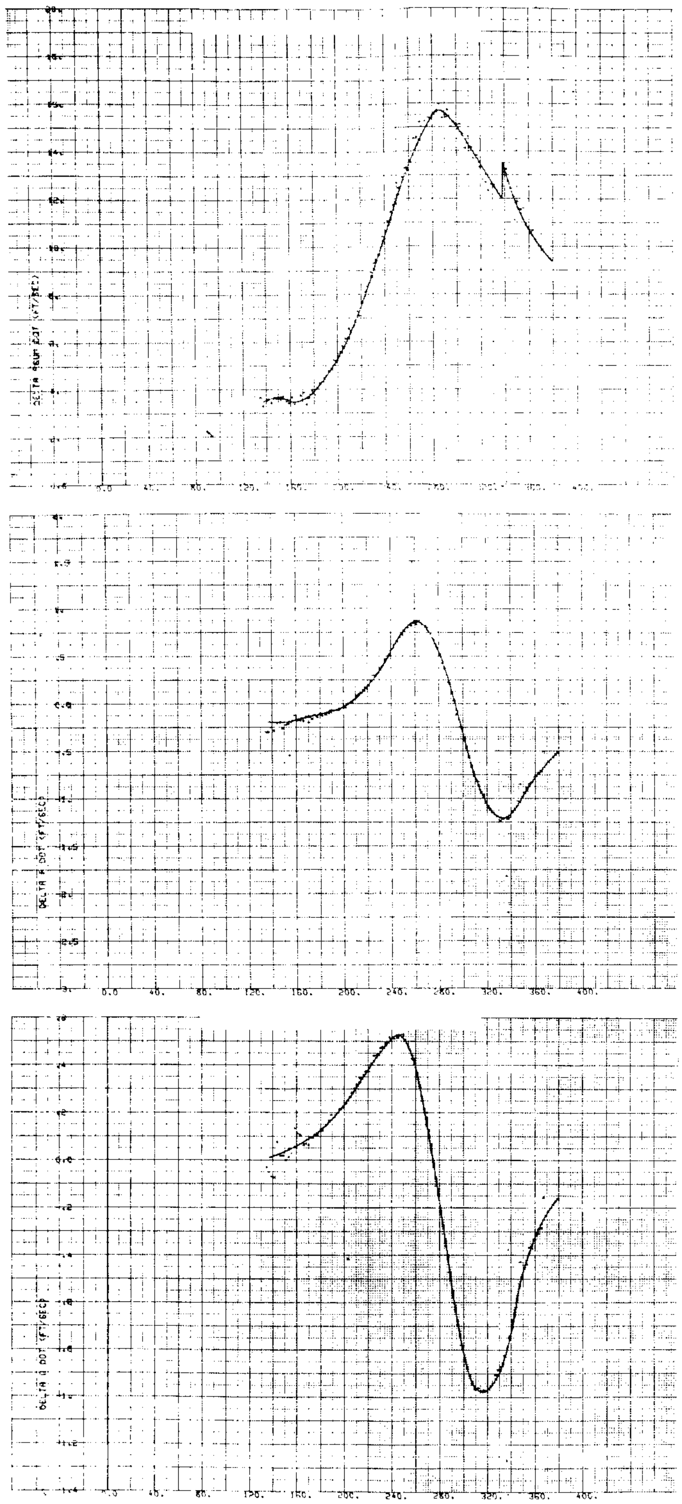


Figure D-16. MISTRAM II Passive ΔV and Regression Fit in Tracker Coordinates

REFERENCES

1. "Gemini 8 Orbit and Reentry Trajectory Reconstruction," TRW Systems, 3150-6034-R0-000.

2. F.B. Lavenhar, "Preliminary Gemini G and C Data Reduction and Analysis Plan," TRW Systems 4160-6009-TU000, 30 October 1964.

3. "Final Flight Test Data , Gemini 8 (MINSTRAM-Only BET)," OD Item 9.2.1.3 No. 20, RCA/AFETR Data Processing Section.

4. "Final Flight Test Data, Gemini 8 (Best Estimate Trajectory)," OD Item 9.2.1.3-26, RCA/AFETR Data Processing Section.

5. "Gemini 7 Inertial Guidance System Evaluation and Trajectory Reconstruction (U)," TRW Systems, 3150-6024-R8-000, 15 February 1966.(C)

(Reverse of this page is blank)