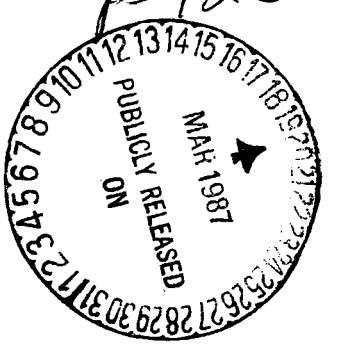
NASA Contractor Report 172492

Trajectory Reconstruction and Aerodynamic Results from the First Discovery Flight, STS-14(41-D)



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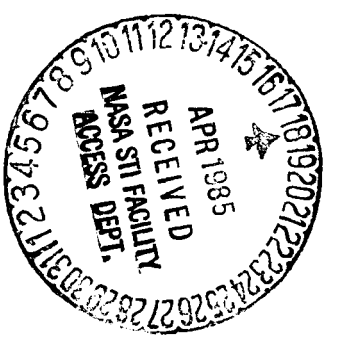

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ABSTRACT

Trajectory reconstruction results for the first Discovery flight are presented. Spacecraft dynamic measurements from IMU2 were utilized in conjunction with the ground based tracking data from two S-band stations, eight C-band, and five cameras at Edwards Air Force Base to determine the spacecraft trajectory from epoch through rollout on Runway 17. Specifics as to the trajectory reconstruction are discussed in Section I herein. The final inertial profile is BT14N02/UN=169750N. Merging of this file with the final LAIRS atmosphere is discussed in Section II. The final Extended BET is ST14BET/UN=274885C. Section III presents plots of relevant parameters from the AEROBET as well as aerodynamic performance comparison results. High frequency files for maneuver extraction were also generated as discussed in Section IV.

The following table is presented as summary information for STS-14 (41-D):

(Epoch: 9/5/84 $12^h59^m0^s$ (46740^s) GMT, h_o = 669 kft)

Event	Time from epoch	Altitude (kft)
Entry interface	480	400
Initial flight extraction	629	320
Maximum Mach (28.0)	718	277
M25	938	241
M20	1242	218
M15	1428	192
M10	1584	169
M5	1798	122
M2	1975	77
M1	2069	50
Main gear deployment	2314	2.3
Weight on wheels	2333	2.1
Weight on nose	2345	2.1
Stop time	2399	2.1

Appendices are attached which contain (A) spacecraft and physical parameters utilized, (B) final residuals obtained from the data fitting process, (C) listing of trajectory parameters, and (D) archival information.

I. Entry Trajectory Reconstruction

I.a. Dynamic data

IMU2 was selected as the dynamic data source for the STS-14 entry reconstruction. Figure I-1 shows the dynamic data time history over five hundred(500) second intervals starting at 0 seconds (~669 kft). Body axes rates and accelerations derived from the IMU2 measured ΔV_{M50} and quaternions are plotted.

In terms of the total sensed ΔV magnitude, the tri-redundant IMUs agreed very well. IMU1 and IMU2 agreed to within 0.44 fps while IMU3 was within 0.32 fps of the other two. Mid-value selection (percentage of occurrences) for the various units are shown in the following two tables:

Accelerometer Comparisons Based on 2415 Points

	Percentage mid-value measurement		
	IMU1	IMU2	IMU3
$\Delta V_{X_{M50}}$	7	29	64
$\Delta V_{Y_{M50}}$	28	7	65
$\Delta V_{Z_{M50}}$	25	49	26

Gyro Comparisons Based on 2420 Points

	Percentage mid-value measurement		
	IMU1	IMU2	IMU3
Euler ψ	15	81	4
Euler θ	29	51	20
Euler ϕ	0	58	42
Total angle, Γ	28	48	24
Total angular rate, $\dot{\Gamma}$	31	32	37

No clear choice is evidenced by these results. Arbitrarily, IMU2 was selected. No data gaps of over 4 seconds were detected in the Operational Instrumentation (OI) recorded data.

I.b. Tracking coverage

Tracking data for STS-14 were obtained from two(2) S-band radars (Guam, Goldstone), eight(8) C-band radars, and five(5) cine-theodolite cameras in the vicinity of Runway 17 at Edwards. Unfortunately, due to a mixup, the GSFC tracking tape contained no high rate (10/sec) data from Guam. Since the recorded high rate data are only kept by the station for approximately one week, a follow-up request for these data could not be satisfied. Therefore, low rate (1/10 sec) range and angle data obtained via the JSC were utilized for trajectory reconstruction. Low rate Guam Doppler data were not processed because of the instantaneous formulation for Doppler observations in ENTREE. Other tracking data excluded from the reconstruction process were: (1) C-band pass from Hawaii (KPTC) because of sparse, low elevation (~4° Max) coverage; (2) Noisy range and azimuth data throughout the first half of the pass from Edwards (EAFC).

Figures I-2 and I-3 illustrate the tracking coverages for STS-14. Figure I-2 shows the entire entry ground track with stations (complexes) as noted. Times and corresponding altitudes at 500^{s} increments along the track are given. Figures I-3a, I-3b, and I-3c show the detailed tracking coverage from entry to California C-band acquisition, California C-band acquisition to final approach, and final approach to landing, respectively. Times, altitudes and station coverages with respect to the ground track are as shown. Acronyms and locations for the STS-14 trackers are given in Table I.

I.c. Reconstruction results

The final BET solution for STS-14, BT14N02, is presented in Table II. For comparison, the initial estimate from the onboard navigation system, the JSC/TRW estimate and a state-only ENTREE estimate are also given. Comparison of the two ENTREE estimates shows that a significant improvement in the fit to the tracking data is achieved by extending the solution set to include accelerometer scale factors. The estimates for scale factor corrections (+5, +107, +18 ppm in X, Y, Z, respectively) are consistent with the 1σ performance specification levels of 100 ppm in each channel. There is very good agreement between

the JSC/TRW and BT14N02 solutions both at epoch and throughout the entry trajectory. The weighted fit statistics for BT14N02, based on 5783 observations, are μ_w = -0.118 and σ_w = 1.344. A summary of the residuals, by station and data type, is given in Table III. Plots of the final residuals are given as Appendix B. Composite residuals are included in this section. The symbol key for the stations appearing on the composite plots is given as Figure I-4. Composite range, azimuth and elevation residuals are shown as Figures I-5, I-6, and I-7, respectively.

Comparisons of the final BET position and velocity after rollout on Runway 17 versus post-landed survey values are given below:

END CONDITIONS AT VEHICLE STOP (Runway #17 Coordinates)

	Survey	BT14N02
X, ft	+12793	+12848
Y, ft	+66	+61
$h-h_{RW}$, ft	+16	+7
$\dot{X}$, fps	0	+0.05
$\dot{Y}$, fps	0	-0.05
$\dot{h}$, fps	0	-0.13

Figure I-8 presents plots of the BET during rollout on Runway 17. Surveyed values are depicted thereon. Vehicle stop occurs 2399^s after epoch.

TYPE	STATION NO.	STATION NAME	LATITUDE (GEOD.) (DEG)	LONGITUDE (DEG)	ALT (ABOVE REF.) (FT)	MODULUS OF REFRACTION	SCALE HEIGHT (M)
S-BAND, N-S	1	GWMS	13.31063	144.73681	380.4100	380.	5795.
C-BAND, FPQ-6	2	PTPC	37.49784	237.50039	-27.0300	334.	6821.
C-BAND, TPQ-18	3	VDBC	34.66587	239.41865	203.5433	338.	6507.
C-BAND, FPS-16	5	VDSC	34.58276	239.43853	1972.1457	319.	6049.
THEODOLITE	6	THEO1	34.91673	242.29058	2742.4000	N/A	N/A
THEODOLITE	7	THEO5	34.83905	242.29574	2701.7400	N/A	N/A
THEODOLITE	8	THEO9	34.94739	242.08924	2370.2200	N/A	N/A
C-BAND, FPS-16	9	FRCC	34.96083	242.08856	2480.3478	299.	7387.
C-BAND, FPS-16	10	EAFC	34.96962	242.06974	2521.7192	299.	7366.
THEODOLITE	11	THEO7	34.92839	242.23770	2378.5000	N/A	N/A
S-BAND, N-S	12	GDSS	35.34221	243.12654	2994.4600	289.	7556.
C-BAND, FPQ-14	14	KPTC	21.57210	201.73343	931.4000	N/A	N/A
C-BAND, FPS-16	15	SNFC	33.24771	240.47935	732.1500	335.	6263.
THEODOLITE	16	THE15	34.89239	241.99087	2696.6400	N/A	N/A
C-BAND, ALCOR	20	KMRC	9.39870	167.48199	86.0200	N/A	N/A

Table I. STS-14 station locations and refraction data.

EPOCH: 9/15/84 $12^h59^m0^s$ (46740^s) GMT

DATA TYPES: S-band, 2 radars (GWMS, GDSS)
C-band, 8 radars (KMRC, PTPC, VDBC, VDSC, SNFC, FRCC, EAFC)
Cine-theodolite, 5 cameras (THEO1, THEO5, THEO7, THEO9, THE15)

COMMENTS: 5° Elevation constraint on C, S-band; No constraint on theodolite
Excluded C-band Hawaii pass (KPTC) because of sparse, low elevation coverage
Excluded noisy Range, Azimuth data during first half of Edwards pass (EAFC)
Processed low rate (1/10s) S-band Range, X, Y-angle data from Guam (GWMS) received via JSC

PARAMETER	Initial Estimate, Nav	JSC/TRW	BT14N01[1]	Final Solution, BT14N02[2]
V_R, fps	24079.0	24078.9	24081.1	24077.667
γ_R, deg	-1.283	-1.287	-1.279	-1.2893269
Ψ_R, deg	59.771	59.770	59.769	59.768329
h_D, ft	668949.	668511.	664647.	668971.83
Φ_D, deg	1.690	1.684	1.679	1.6843213
λ , deg	139.823	139.812	139.809	139.81285
ψ , deg	57.354 see	57.338	57.379	57.381717
θ , deg	29.971 Appendix	30.001	30.018	30.025645
ϕ , deg	-2.259 A	-2.270	-2.274	-2.2729920
μ_w	---	---	-0.943	-0.118
σ_w	---	---	5.044	1.344

[1] state only

[2] state and accelerometer scale factors {ΔSF_X, ΔSF_Y, ΔSF_Z (ppm) = +5, +107, +18}

Table II. STS-14 solution and comparisons.

OBSERVATION STATISTICS BASED ON FINAL STATE

STATION NO.	NAME	OBSERVATION TYPE	OBSERVATIONS ACCEPTED	AVERAGE WEIGHT. RES.	AVERAGE RESIDUAL	STANDARD STAND. DEV.	WEIGHTED STAND. DEV.
1	GWMS	RANGE	13 OF 13	.11544246E-01	.55575846E+00	.71552286E+01	.88834569E+00
1	GWMS	X-ANGLE	14 OF 14	-.14001501E+01	-.48143908E-01	.28947674E-01	.64368572E+00
1	GWMS	Y-ANGLE	14 OF 14	-.11561571E+01	-.13743056E-01	.87875840E-02	.74234760E+00
2	PTPC	RANGE	82 OF 82	-.72710932E+00	-.22328357E+02	.17672696E+02	.57632076E+00
2	PTPC	AZIMUTH	85 OF 85	-.52429369E-01	-.60079631E-03	.23998108E-02	.20942300E+00
2	PTPC	ELEVATION	85 OF 85	.88921055E+00	.15986639E-01	.60931560E-02	.35267177E+00
3	VDBC	RANGE	169 OF 169	-.22750629E+01	-.68985499E+02	.29739719E+02	.96949672E+00
3	VDBC	AZIMUTH	200 OF 200	.40786452E+00	.46737831E-02	.66322335E-02	.57877155E+00
3	VDBC	ELEVATION	200 OF 200	-.18287478E+00	-.29725274E-02	.57156369E-02	.37395697E+00
5	VDSC	RANGE	170 OF 170	-.54852812E+00	-.16600146E+02	.24362090E+02	.80538643E+00
5	VDSC	AZIMUTH	196 OF 196	.80451133E+00	.92190207E-02	.98989856E-02	.86384945E+00
5	VDSC	ELEVATION	196 OF 196	-.17280795E+01	-.25180268E-01	.14806272E-01	.84308983E+00
6	THEO1	AZIMUTH	209 OF 209	.23330304E+00	.13367280E-02	.42603031E-02	.74356317E+00
6	THEO1	ELEVATION	209 OF 209	.55290306E+00	.31679012E-02	.54316755E-02	.94800621E+00
7	THEO5	AZIMUTH	124 OF 124	.17458636E+00	.10003062E-02	.16693075E-02	.29134911E+00
7	THEO5	ELEVATION	124 OF 124	.54290557E+00	.31106198E-02	.30601311E-02	.53409364E+00
8	THEO9	AZIMUTH	182 OF 182	-.19513352E+00	-.11180327E-02	.45986526E-02	.80261629E+00
8	THEO9	ELEVATION	182 OF 182	.26312331E-01	.15075855E-03	.38553735E-02	.67288962E+00
9	FRCC	RANGE	256 OF 256	-.33043327E+00	-.99149357E+01	.32401791E+02	.10738101E+01
9	FRCC	AZIMUTH	271 OF 271	.77731990E+00	.89074299E-02	.22418304E-01	.19563661E+01
9	FRCC	ELEVATION	274 OF 274	.34639332E+00	.38411985E-02	.17948311E-01	.15286748E+01
10	EAFC	RANGE	124 OF 124	-.36318939E+01	-.10903079E+03	.19520079E+02	.64996641E+00
10	EAFC	AZIMUTH	107 OF 107	-.42921588E+00	-.49184517E-02	.23594846E-01	.20590388E+01
10	EAFC	ELEVATION	289 OF 289	.45320724E+00	.56309025E-02	.14752013E-01	.11877501E+01
11	THEO7	AZIMUTH	192 OF 192	.33573083E+00	.19235959E-02	.43681820E-02	.76239158E+00
11	THEO7	ELEVATION	192 OF 192	.35913579E+00	.20576965E-02	.50779784E-02	.88627442E+00
12	GDSS	RANGE	169 OF 169	.11962287E+01	.13625854E+02	.71210941E+01	.60084375E+00
12	GDSS	DOPPLER	168 OF 168	-.28277894E+00	-.28335513E+00	.88238771E+00	.88154187E+00
12	GDSS	X-ANGLE	168 OF 168	.10686660E+00	.14723550E-02	.83422168E-02	.59974461E+00
12	GDSS	Y-ANGLE	169 OF 169	.95099794E+00	.10902421E-01	.18198546E-01	.15875010E+01
15	SNFC	RANGE	142 OF 142	-.87128334E+00	-.26440375E+02	.28928417E+02	.95112567E+00
15	SNFC	AZIMUTH	169 OF 169	.13703546E+00	.15703107E-02	.51032859E-02	.44534571E+00
15	SNFC	ELEVATION	170 OF 170	-.15372253E+01	-.24213195E-01	.10425651E-01	.57586062E+00
16	THE15	AZIMUTH	208 OF 208	-.27714296E+00	-.15879122E-02	.24765991E-02	.43224809E+00
16	THE15	ELEVATION	208 OF 208	-.84760559E+00	-.48564223E-02	.49740032E-02	.86812733E+00
20	KMRC	RANGE	17 OF 17	-.38850612E+00	-.11655184E+02	.26460629E+02	.88202097E+00
20	KMRC	AZIMUTH	18 OF 18	-.28593788E+00	-.32766068E-02	.50282897E-02	.43880105E+00
20	KMRC	ELEVATION	18 OF 18	.88582814E+00	.10150843E-01	.11072252E-01	.96623623E+00

TOTAL WEIGHTED FIT STATISTICS--- NOBS = 5783 WGT. MEAN = -.11837522E+00 WGT. STD. DEV. = .13436151E+01

Table III. STS-14 residual summary.

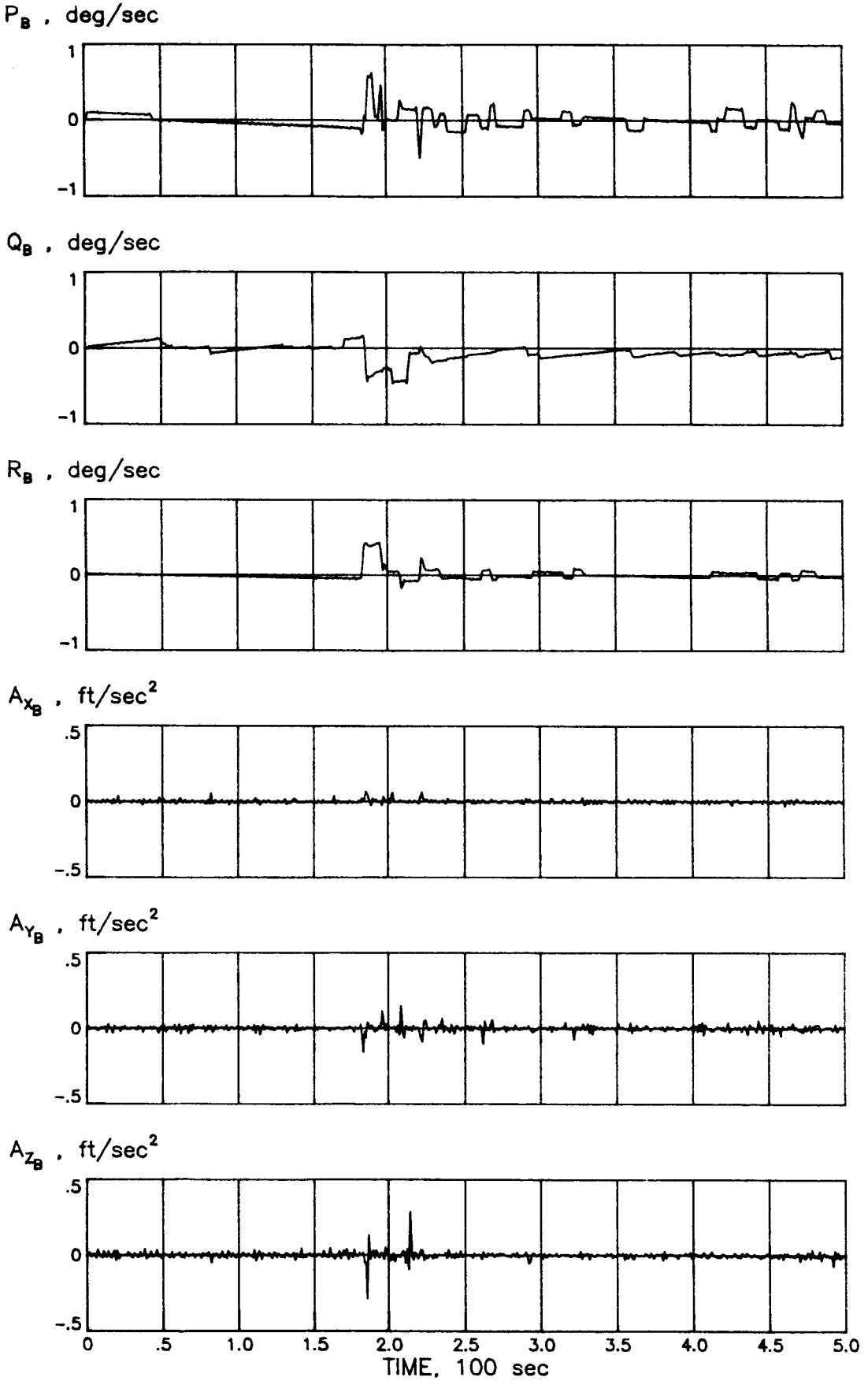


Figure I-1. STS-14 Dynamic data , IMU 2

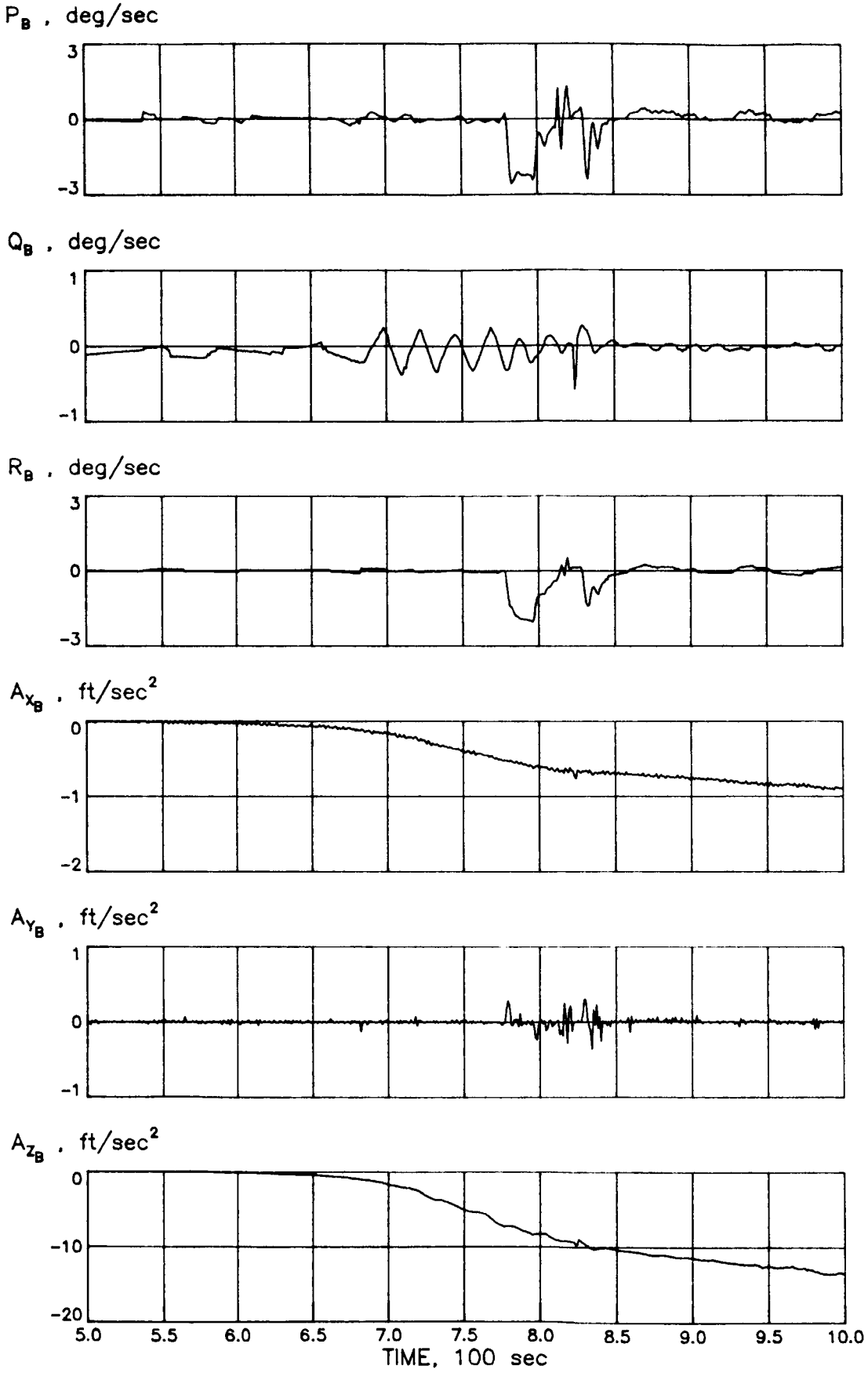


Figure I-1. (continued)

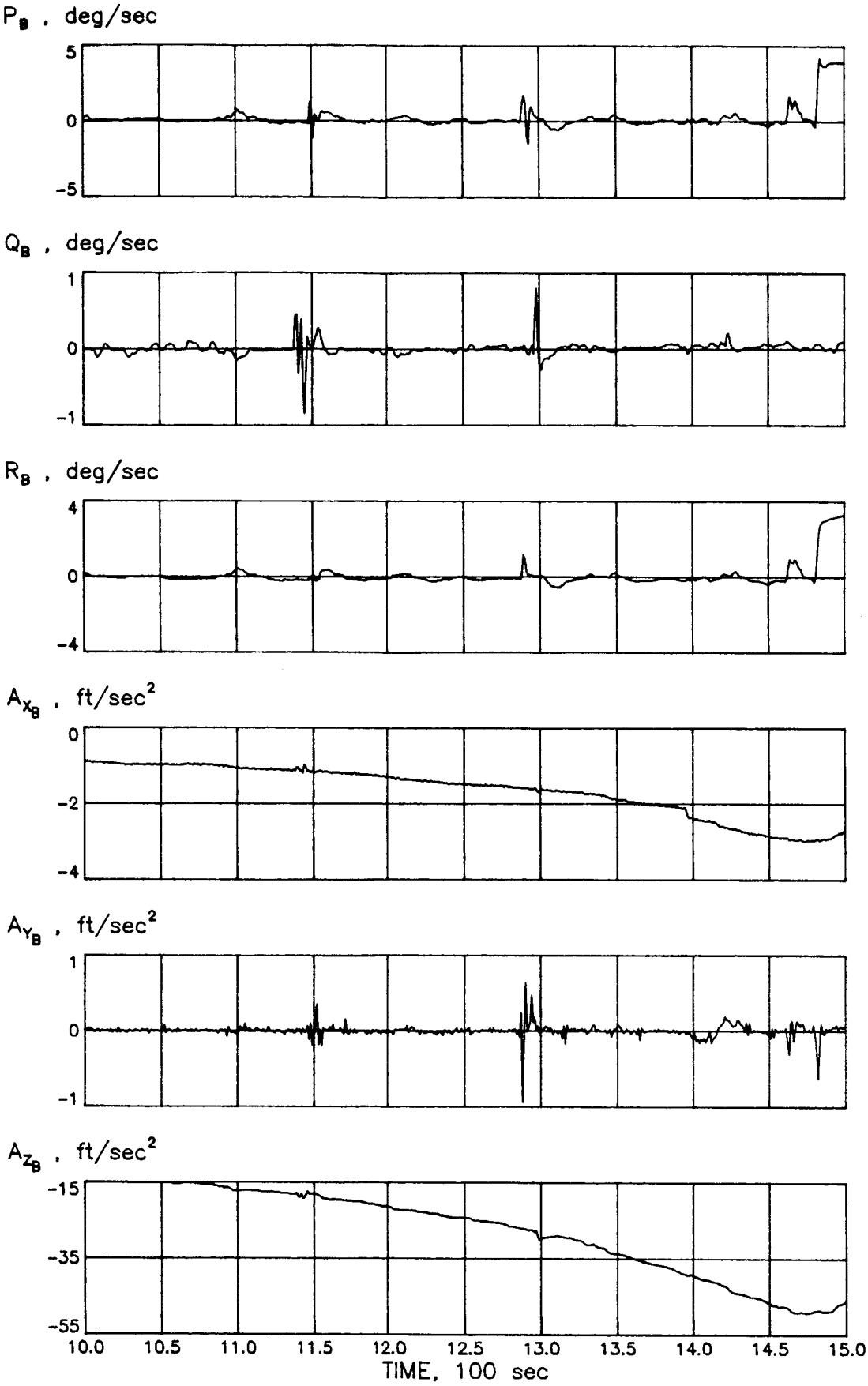


Figure I-1. (continued)

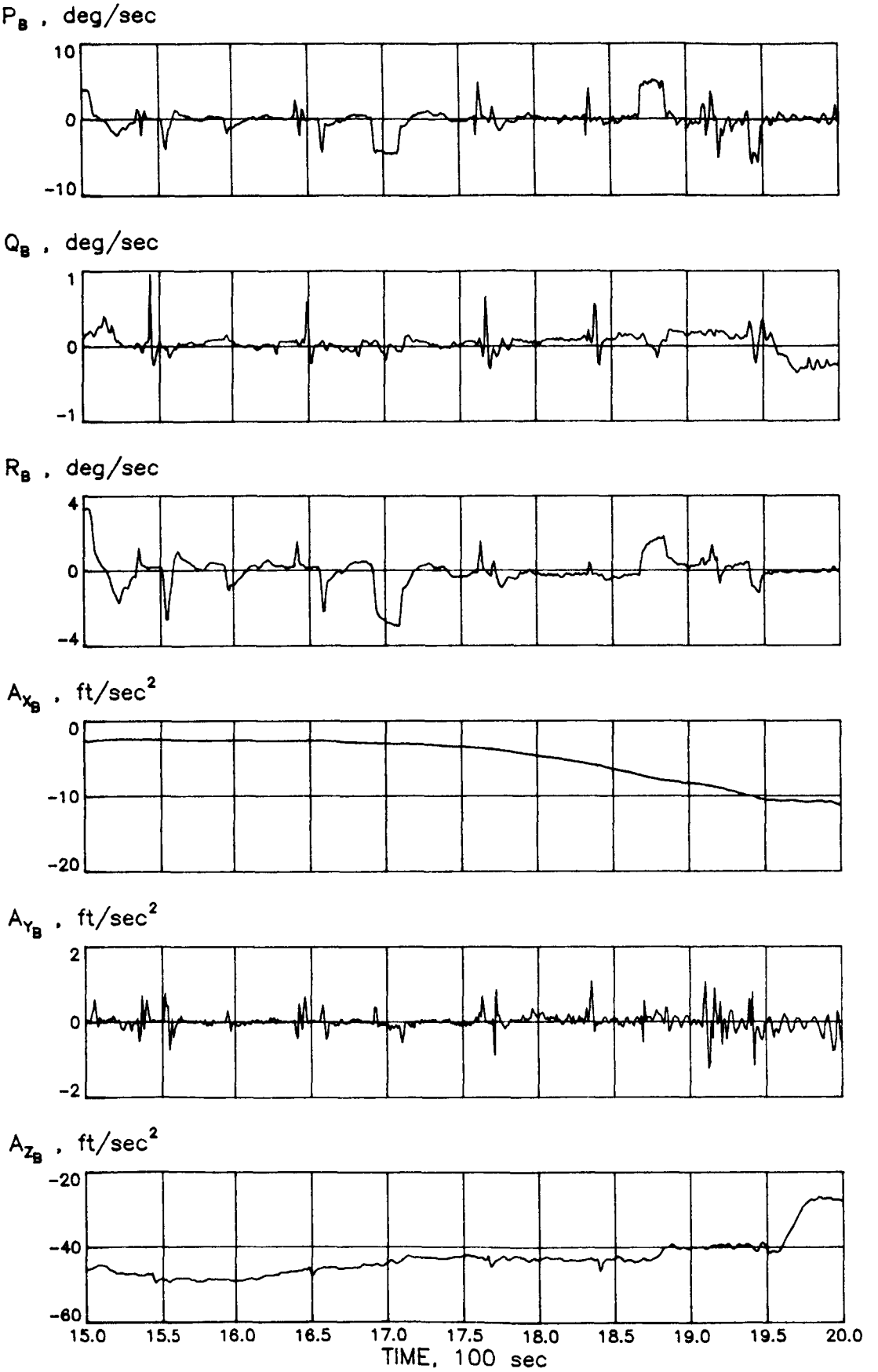


Figure I-1. (continued)

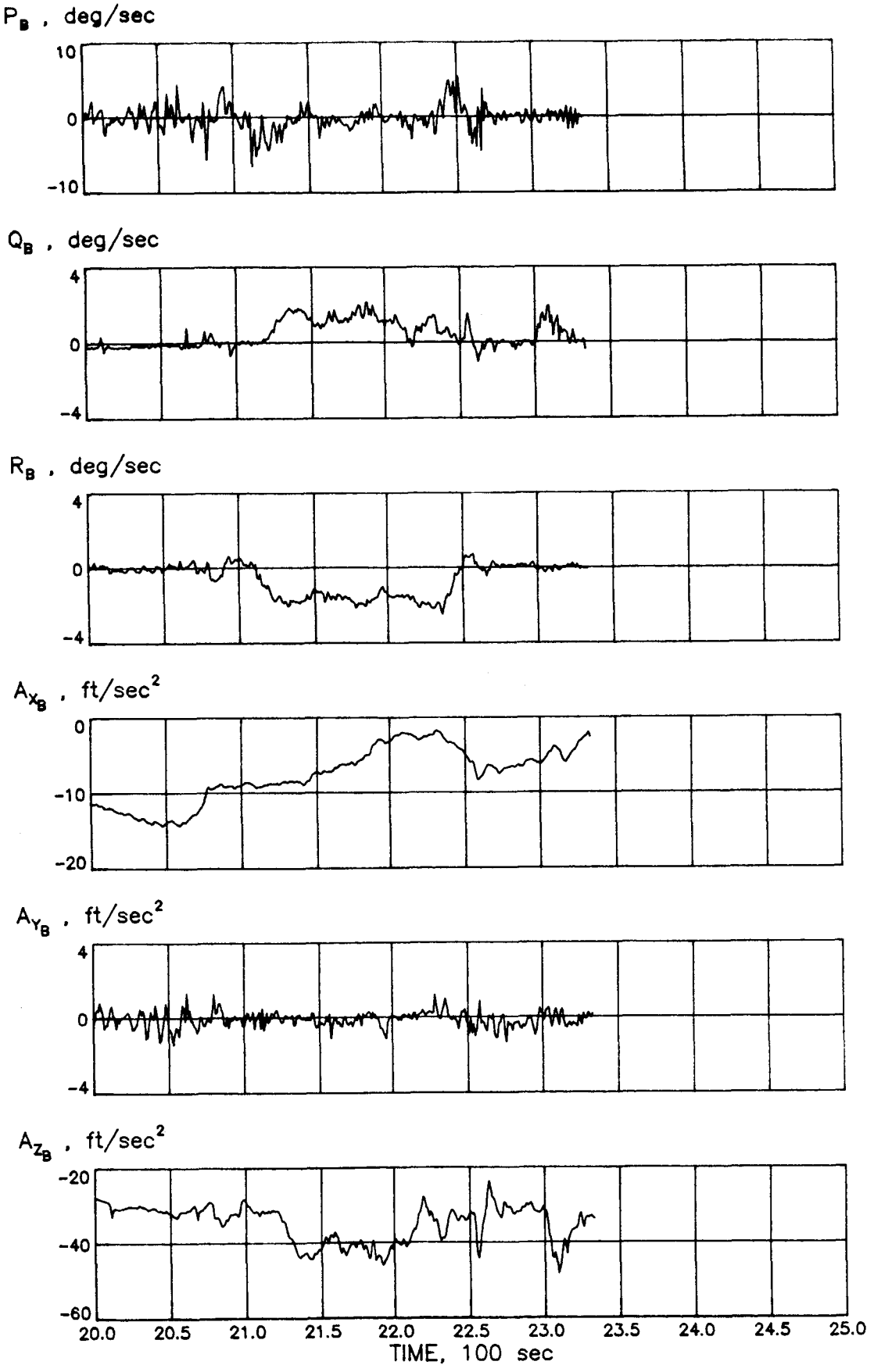


Figure I-1. (concluded)

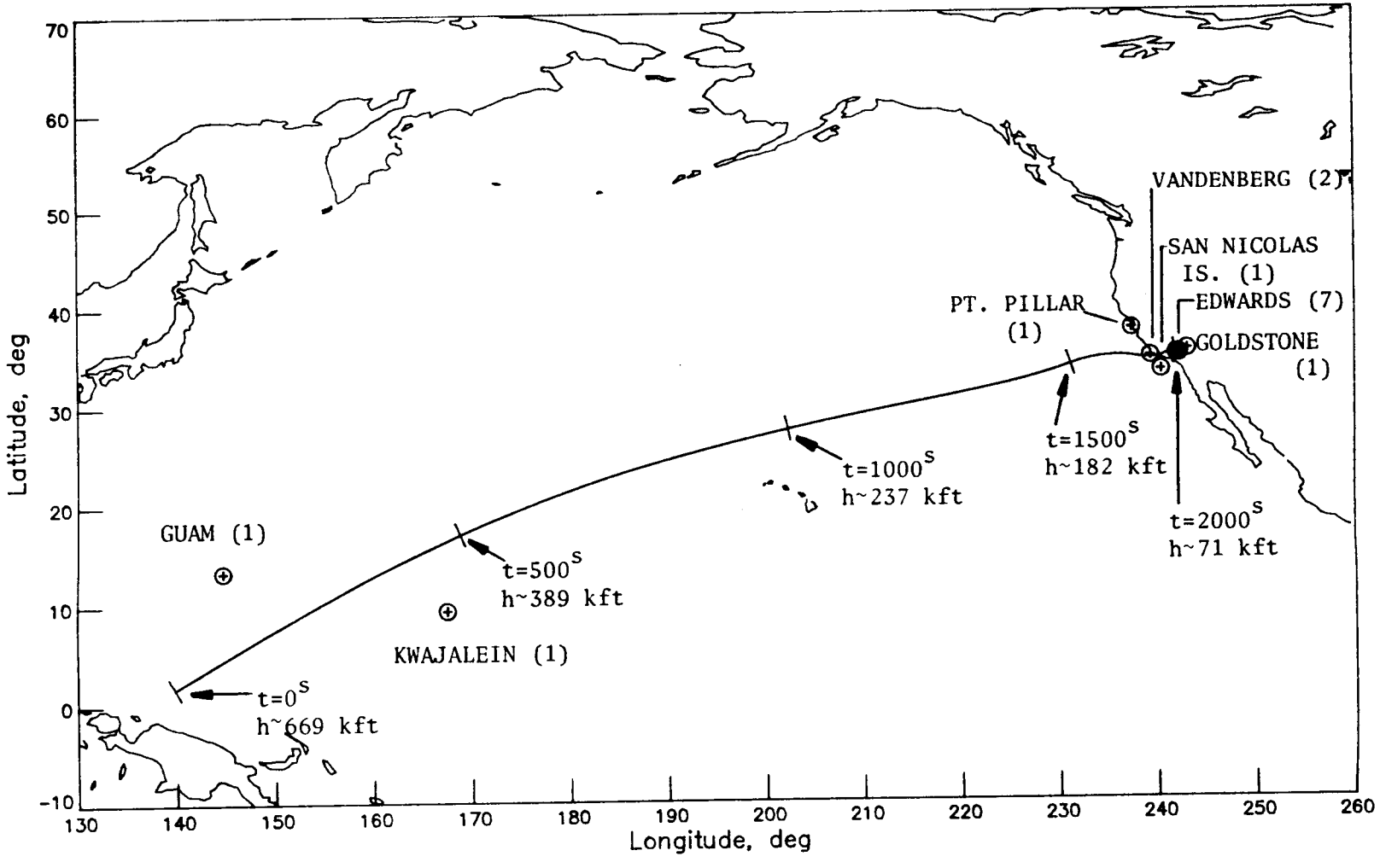
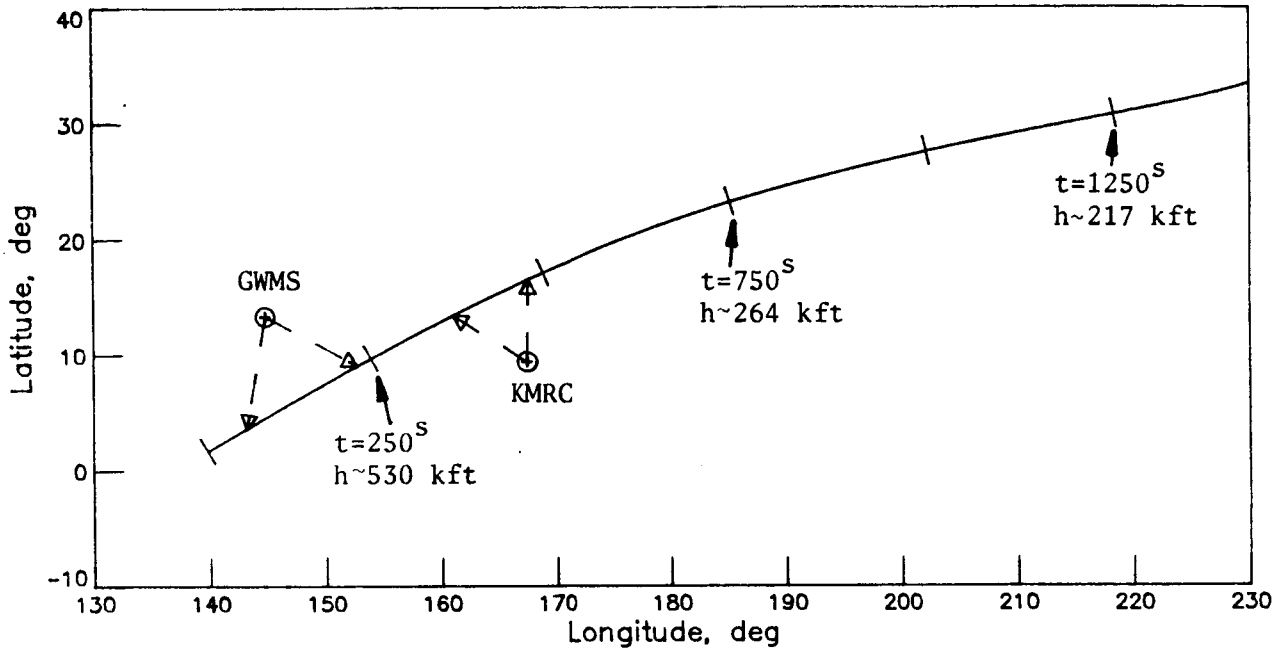
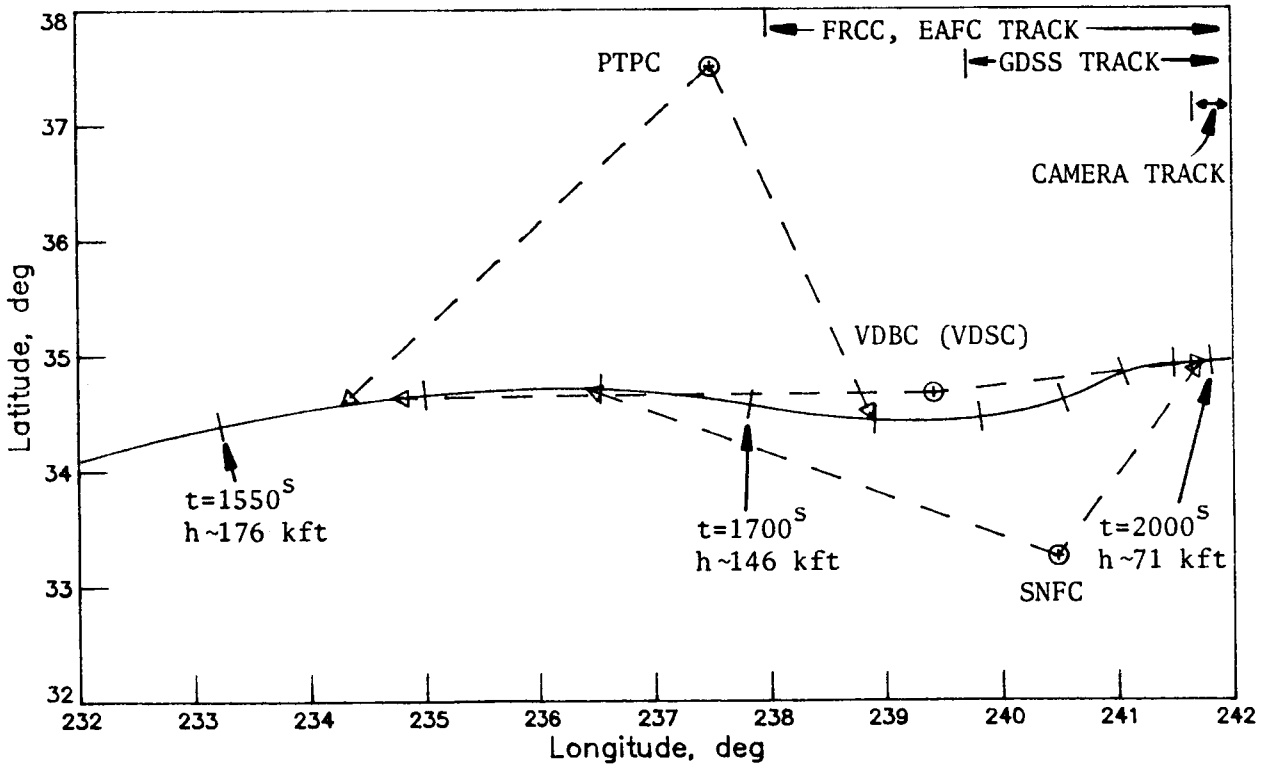


Figure I-2. STS-14 ground track from epoch to touchdown.

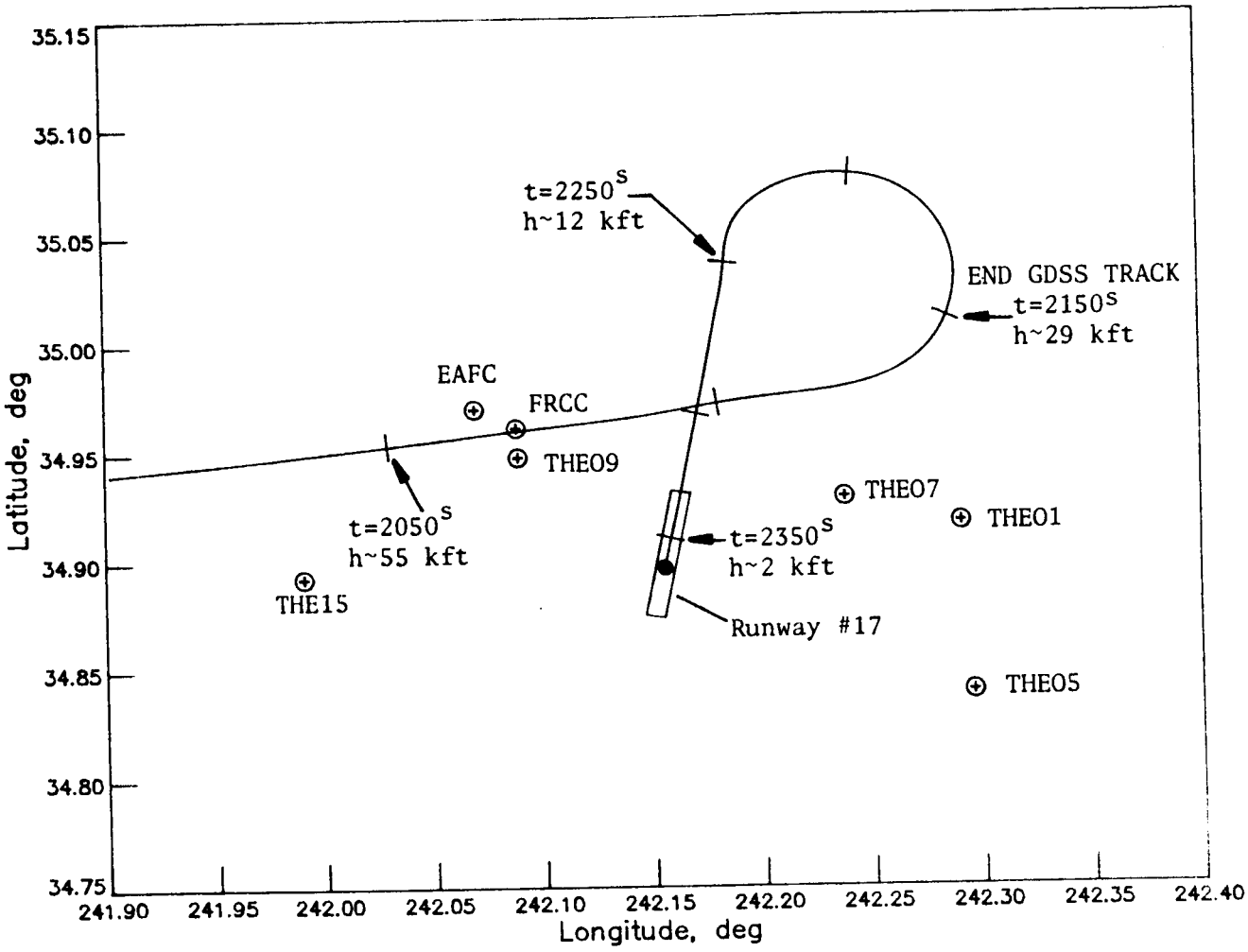


(a) Entry to California C-band acquisition.



(b) California C-band acquisition to final approach.

Figure I-3. Detailed tracking coverage for STS-14.



(c) Final approach and landing

Figure I-3. (concluded).

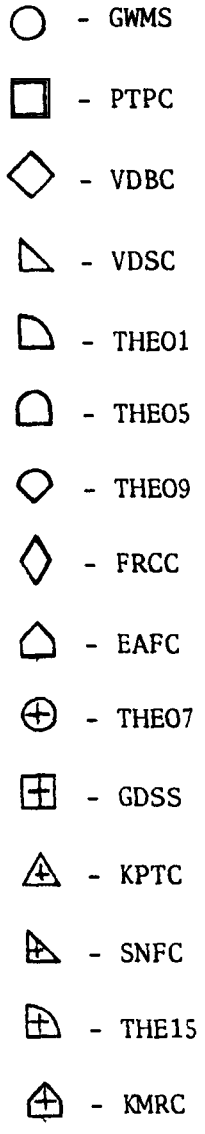


Figure I-4. Key for following three composite residual plots.

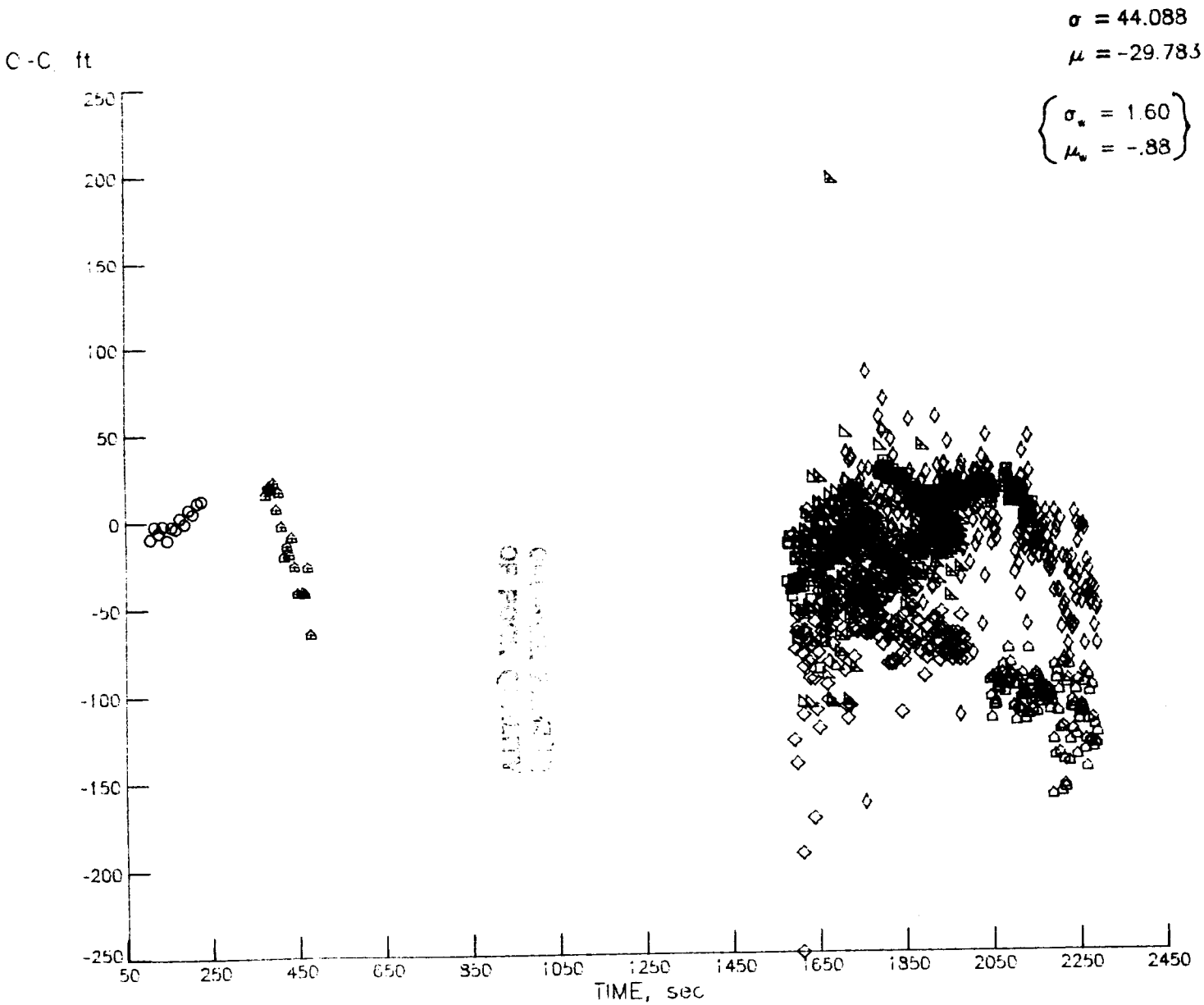


Figure I-5. STS-14 (41-D) composite range residuals.

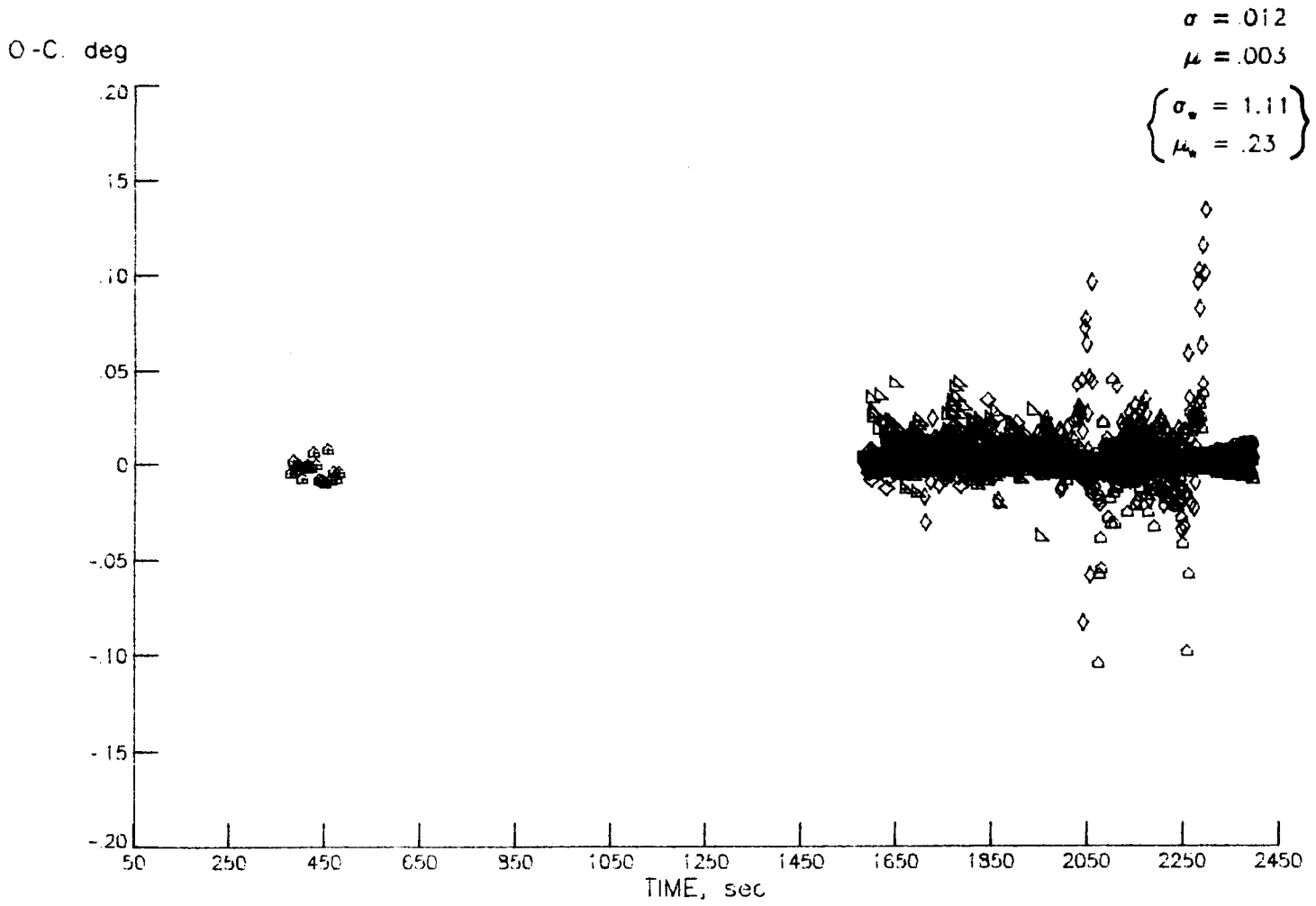


Figure I-6. STS-14 (41-D) composite azimuth residuals.

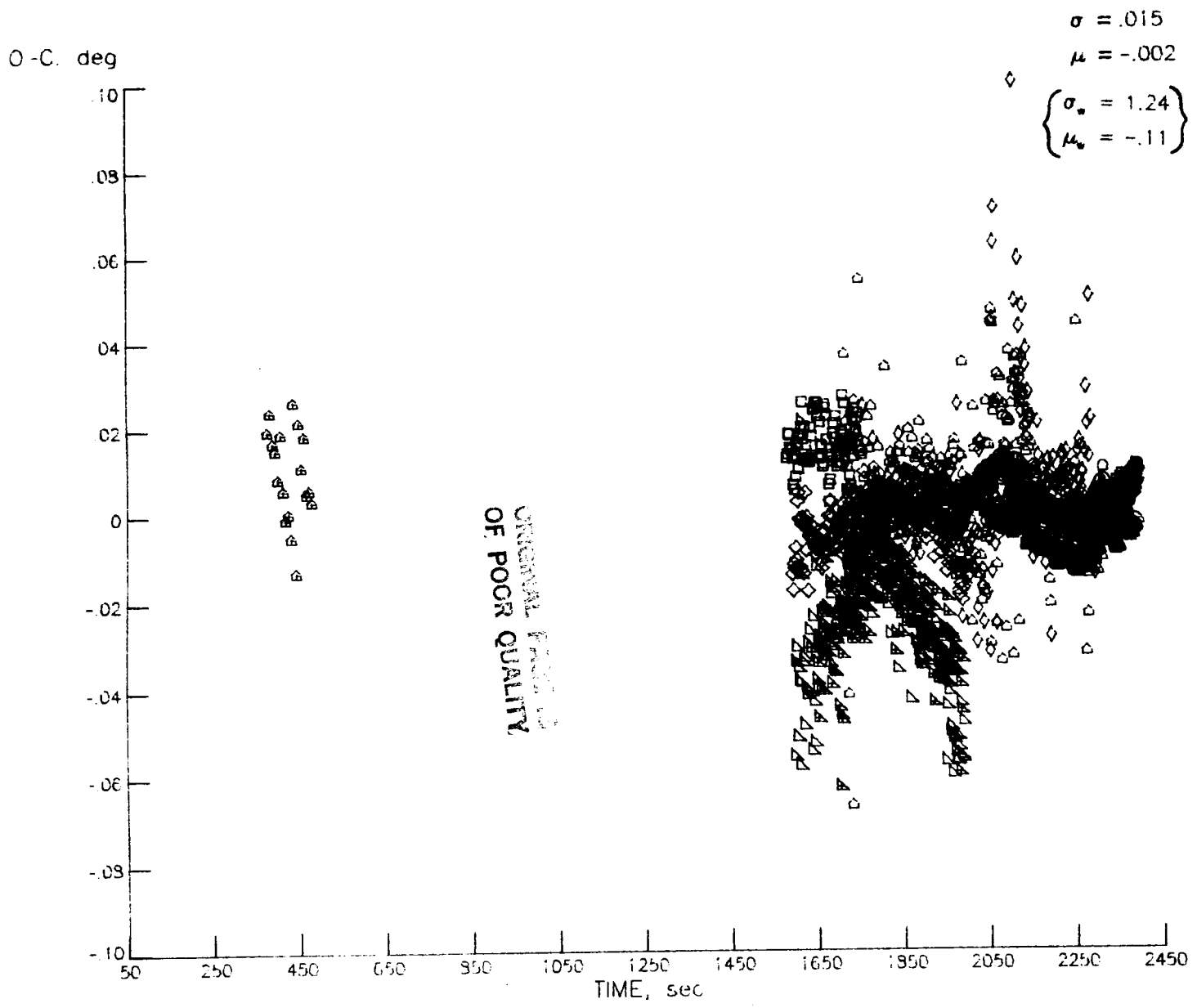


Figure I-7. STS-14 (41-D) composite elevation residuals.

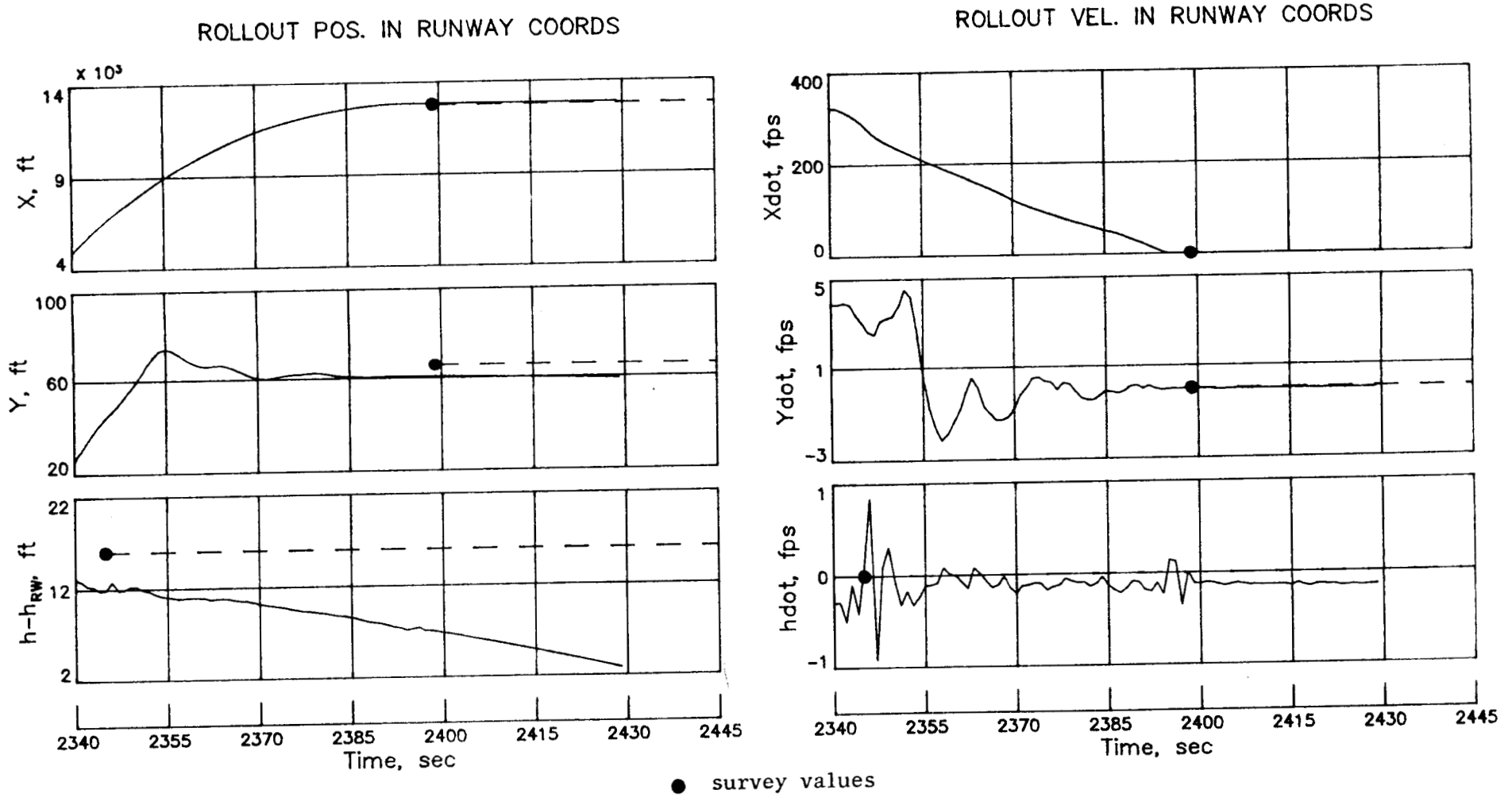


Figure I-8. Rollout position and velocity plots for STS-14.

II. Extended BET

This section presents comparisons of the available atmospheric source data which can be utilized with the inertial BET (BT14N02) for Extended BET development. These comparisons permit selection of a "best" atmosphere for the necessary air relative computations. Over the uppermost altitudes the selection process is somewhat arbitrary and involves comparisons of the two remote sources (LAIRS and NOAA (when available)) as well as the Air Force 1978 Reference Atmosphere Model. More recently, the Marshall Global Reference Atmosphere Model (GRAM) has also been incorporated. For the purposes of the LaRC analysis, the usual source of data is the LAIRS files which are developed by J. Mac Price of the Aerothermodynamics Branch. The available file for this flight is ST14MET/712662N. The equivalent NOAA "totem-pole" data were extracted from the JSC/TRW BET. Density (normalized to the 1976 Standard) and temperature comparisons based on these two remote sources as well as the previously mentioned models are shown as Figures II-1 and II-2, respectively. Differences between the two remote sources are exemplified by the shading thereon. Also shown are the derived quantities based on the measured normal acceleration and the predicted normal force coefficient, C_{N_p}. It is noted, as was the case for the other September entry (STS-8), that the GRAM model is too dense above h~240 kft. Other than this obvious disparity, the other three sources would appear plausible. For the purposes herein, the LAIRS data were adopted. Figures II-3, 4, and 5 show the actual LAIRS temperature, pressure, and density profiles.

LAIRS atmospheric wind components are presented versus altitude as Figure II-6. Above Mach 1 (h~50 kft) there exists virtually no mechanism to evaluate these winds. However, during subsonic flight alternate measurements are available. Figure II-7 shows jimsphere balloon measurements from three balloons spaced approximately 2^h apart. Figure II-8 shows data from two of these balloons with LAIRS data and two estimates. The two estimates are batch and deterministic filtering results using the Rockwell post-flight air data information derived using in situ pressure measurements from the Orbiter side probes. No real discrepancies are noted, at least in view of the accuracies of each source, and thus the LAIRS winds were adopted. The final figure, II-9, shows actual differences between the computed and measured value of the important air relative parameters;

angle-of-attack, side-slip angle, and true air speed. These differences, though non-trivial, are again within the accuracy of the evaluation/estimation process.

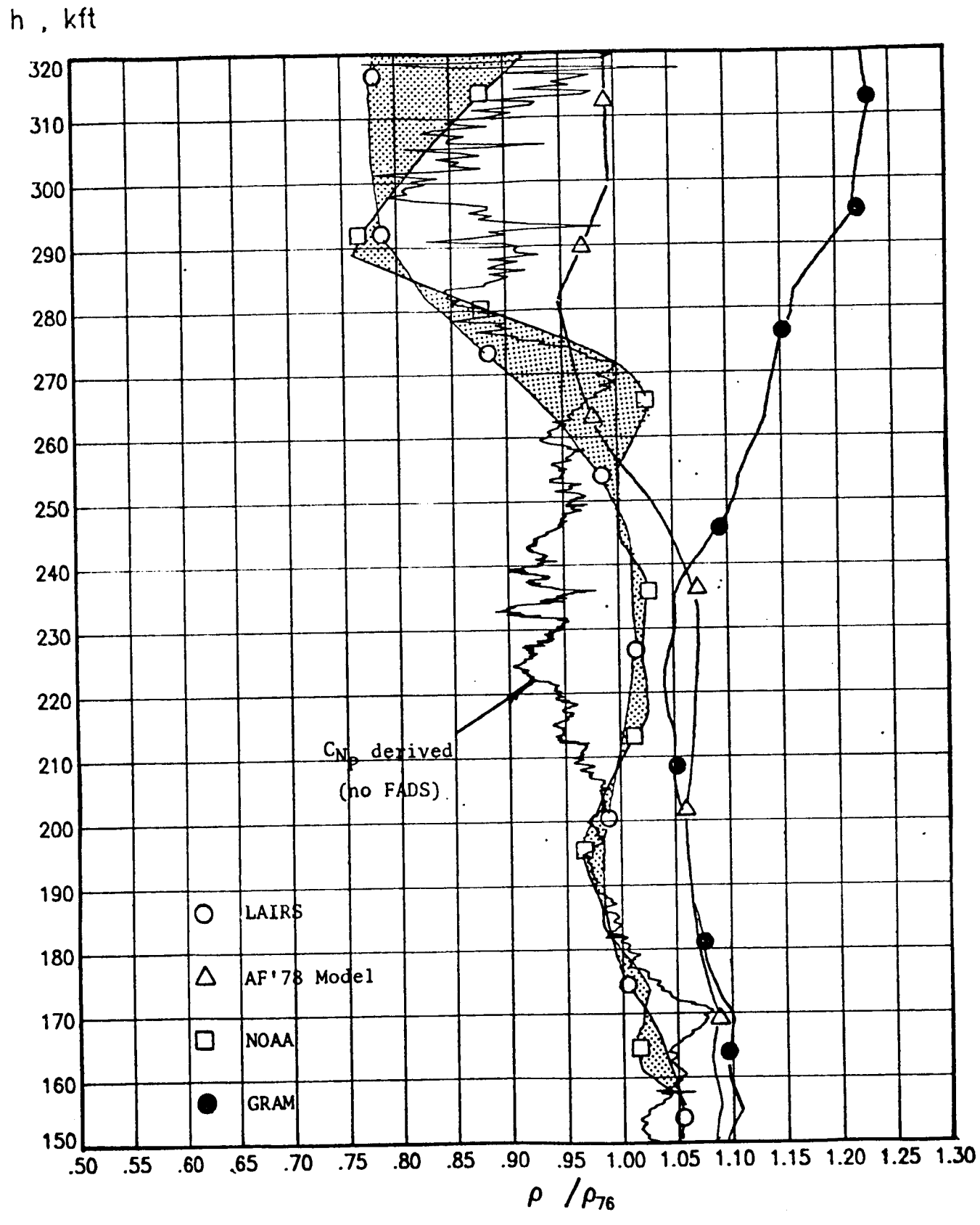


Figure II-1. Upper atmosphere density comparisons for STS-14 (41D).

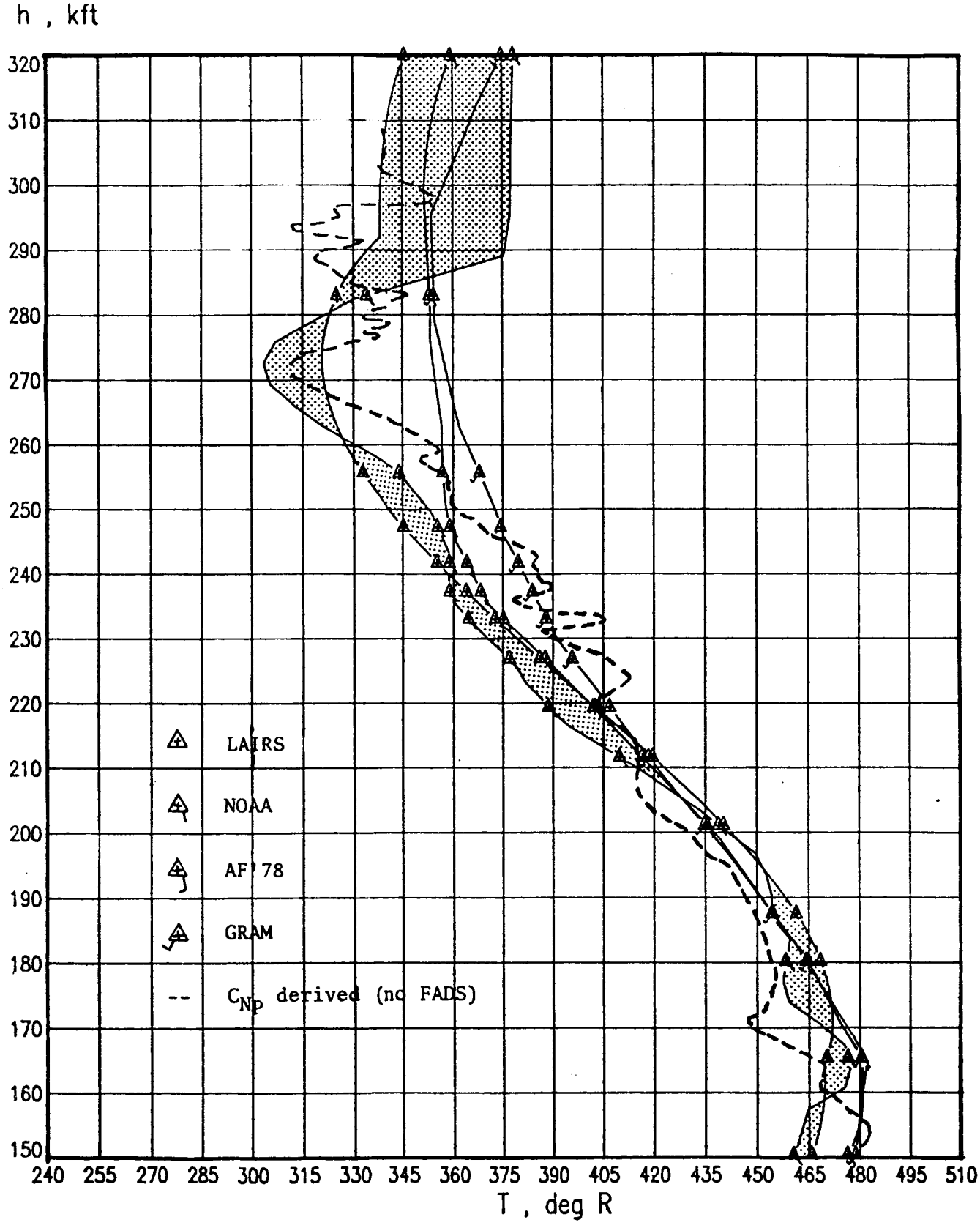


Figure II-2. Upper atmosphere temperature comparisons for STS-14 (41D).

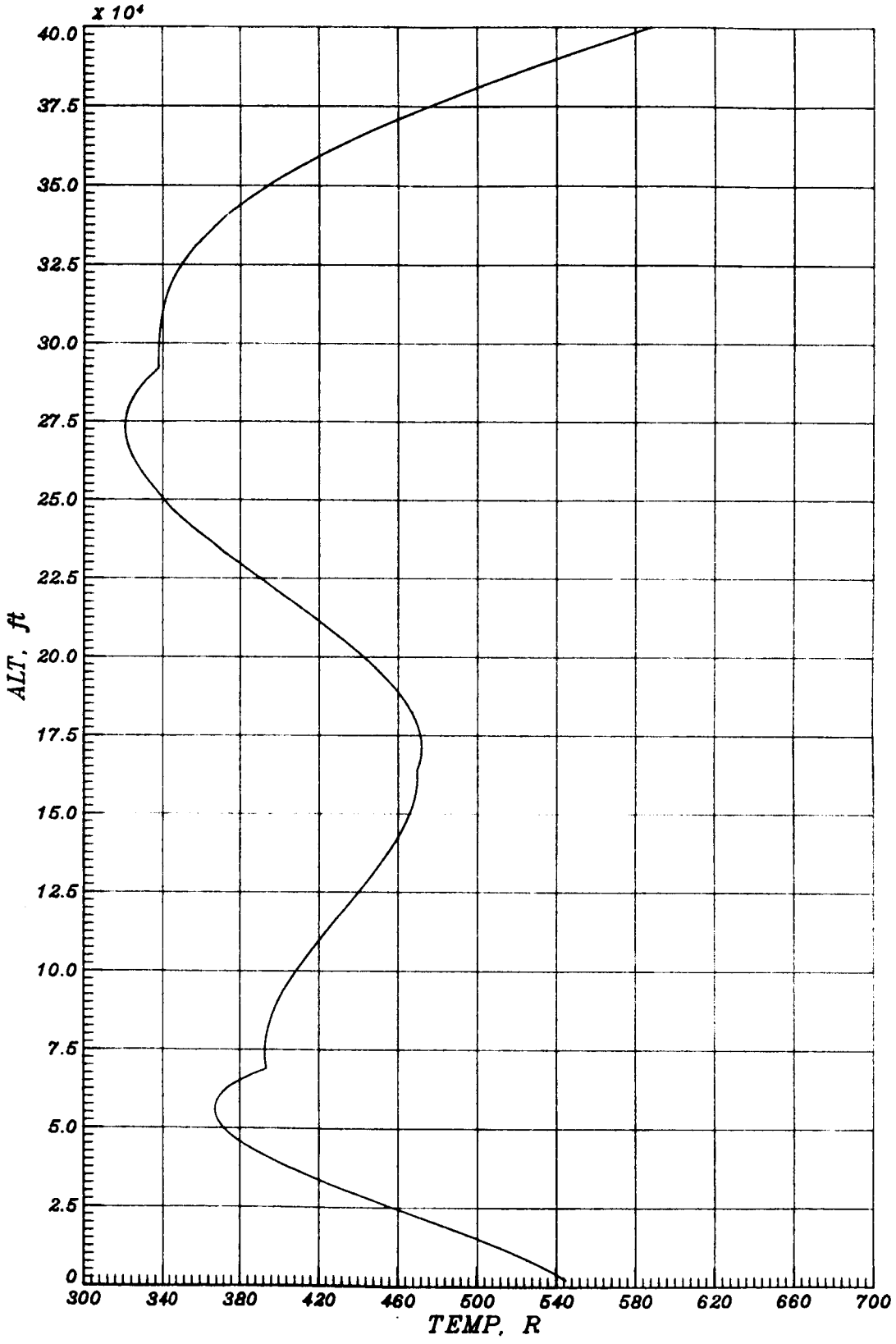


Figure II-3. Final STS-14 (41D) temperature profile.

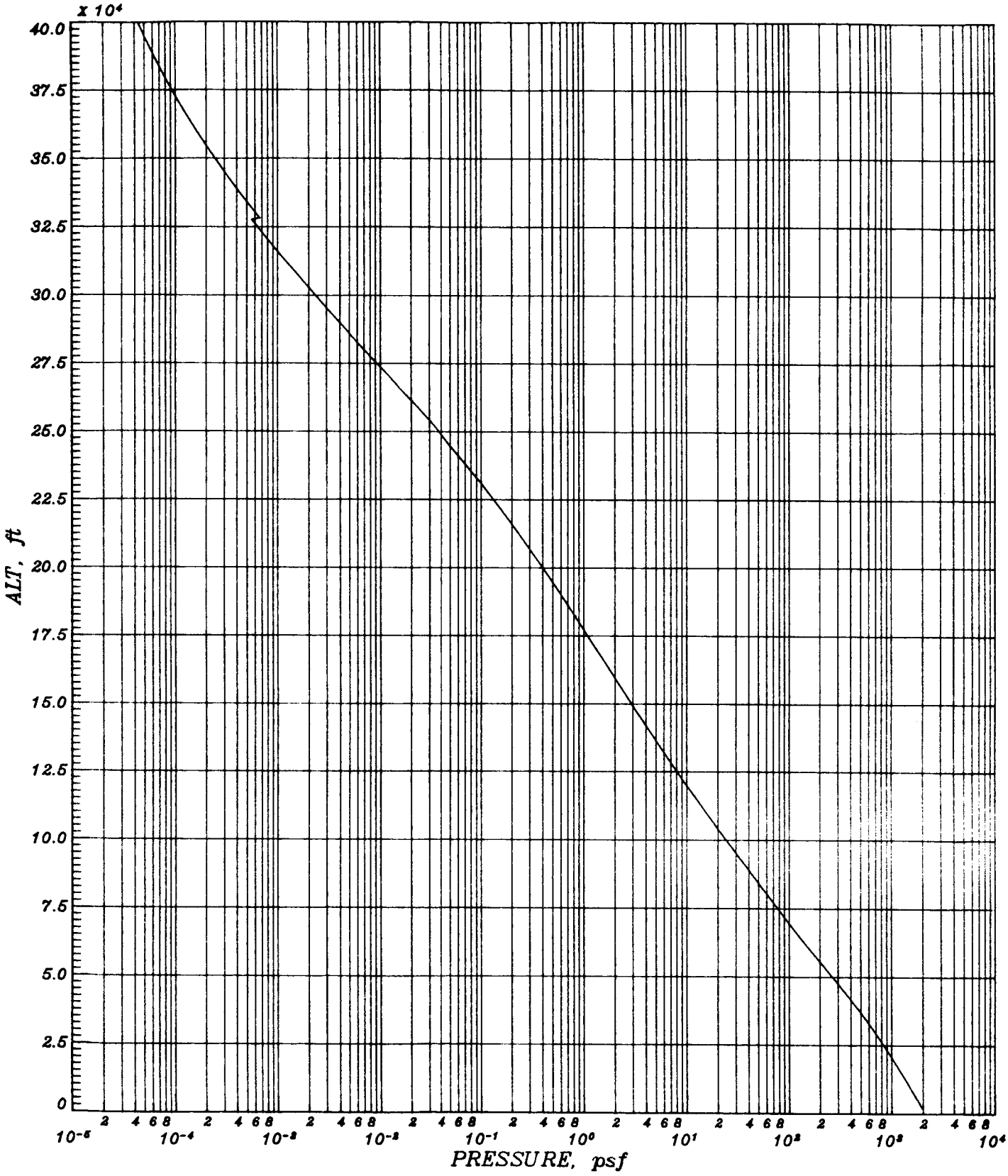


Figure II-4. Final STS-14 (41D) atmospheric pressure profile.

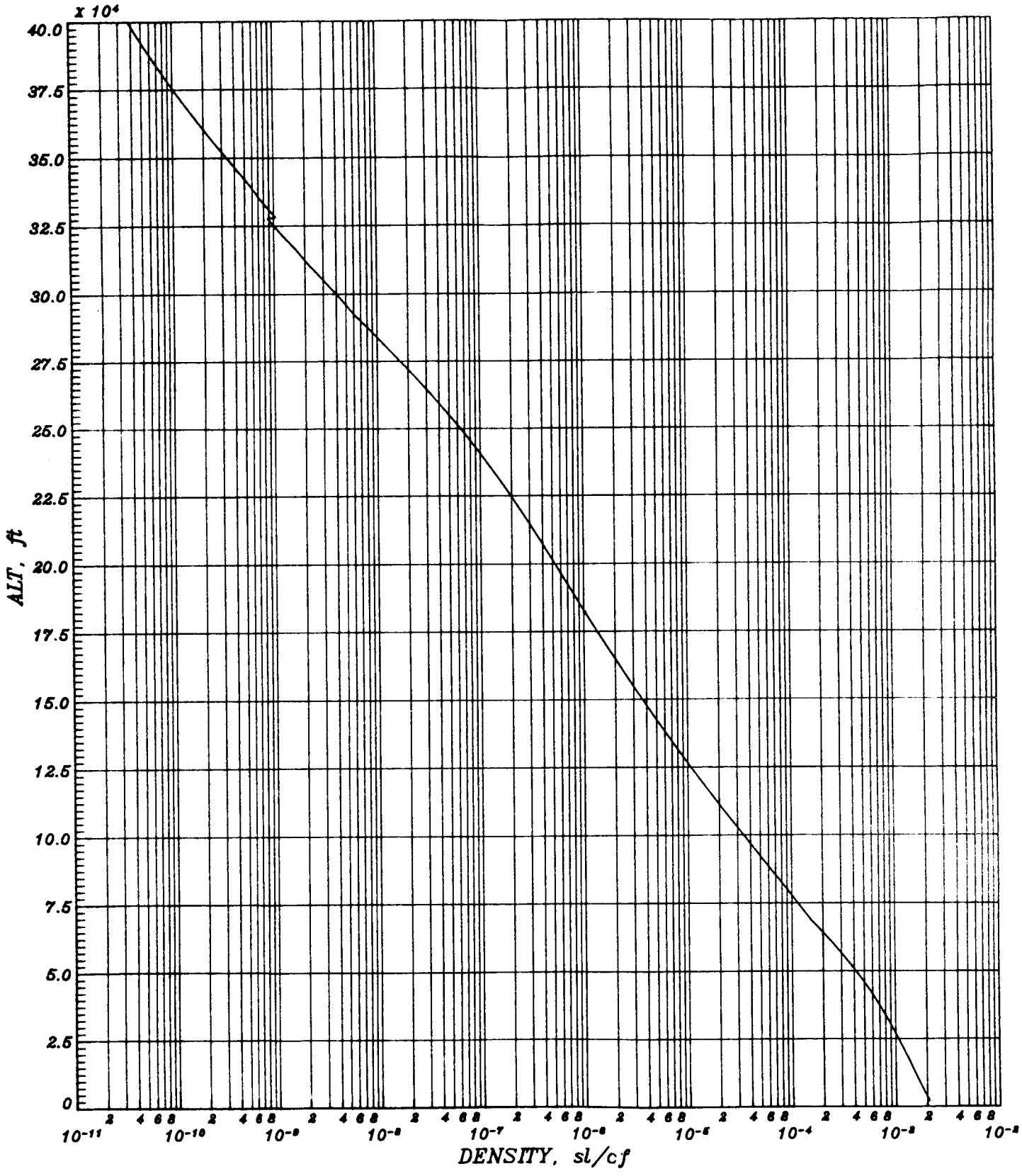


Figure II-5. Final STS-14 (41D) atmospheric density profile.

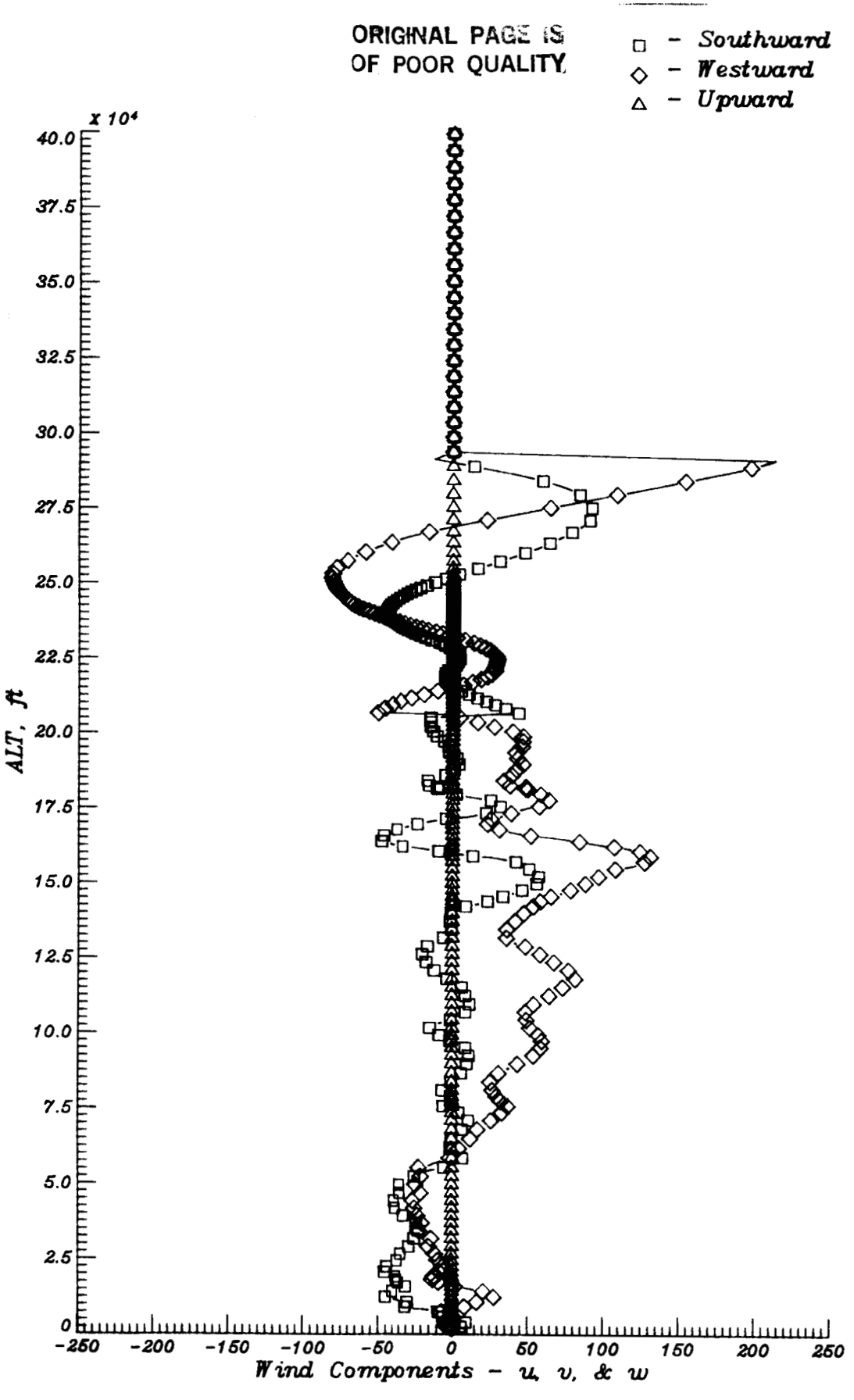


Figure II-6. Final STS-14 (41D) atmospheric wind profile.

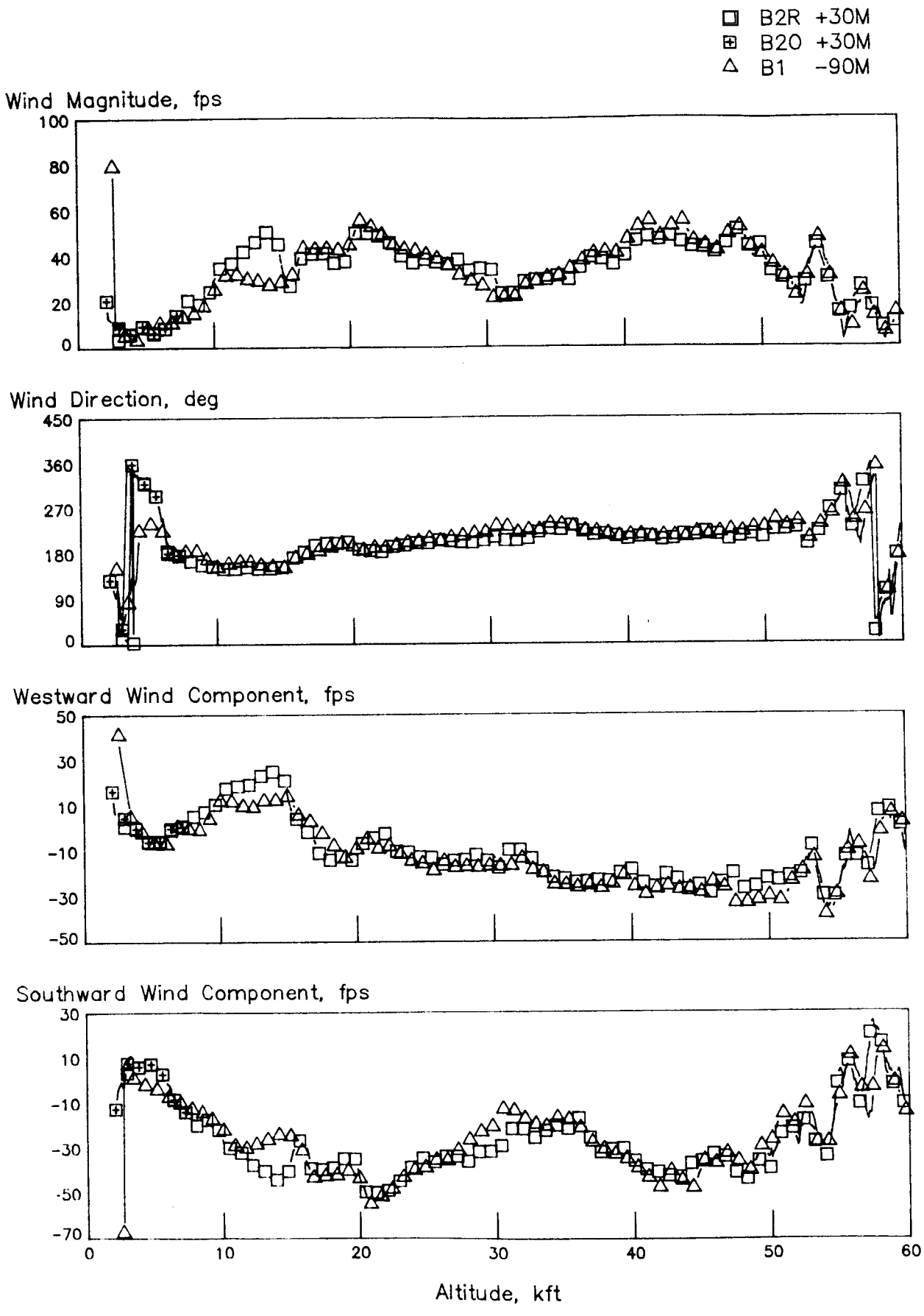


Fig. II-7. STS-14 Jimsphere Winds (2 Balloons)

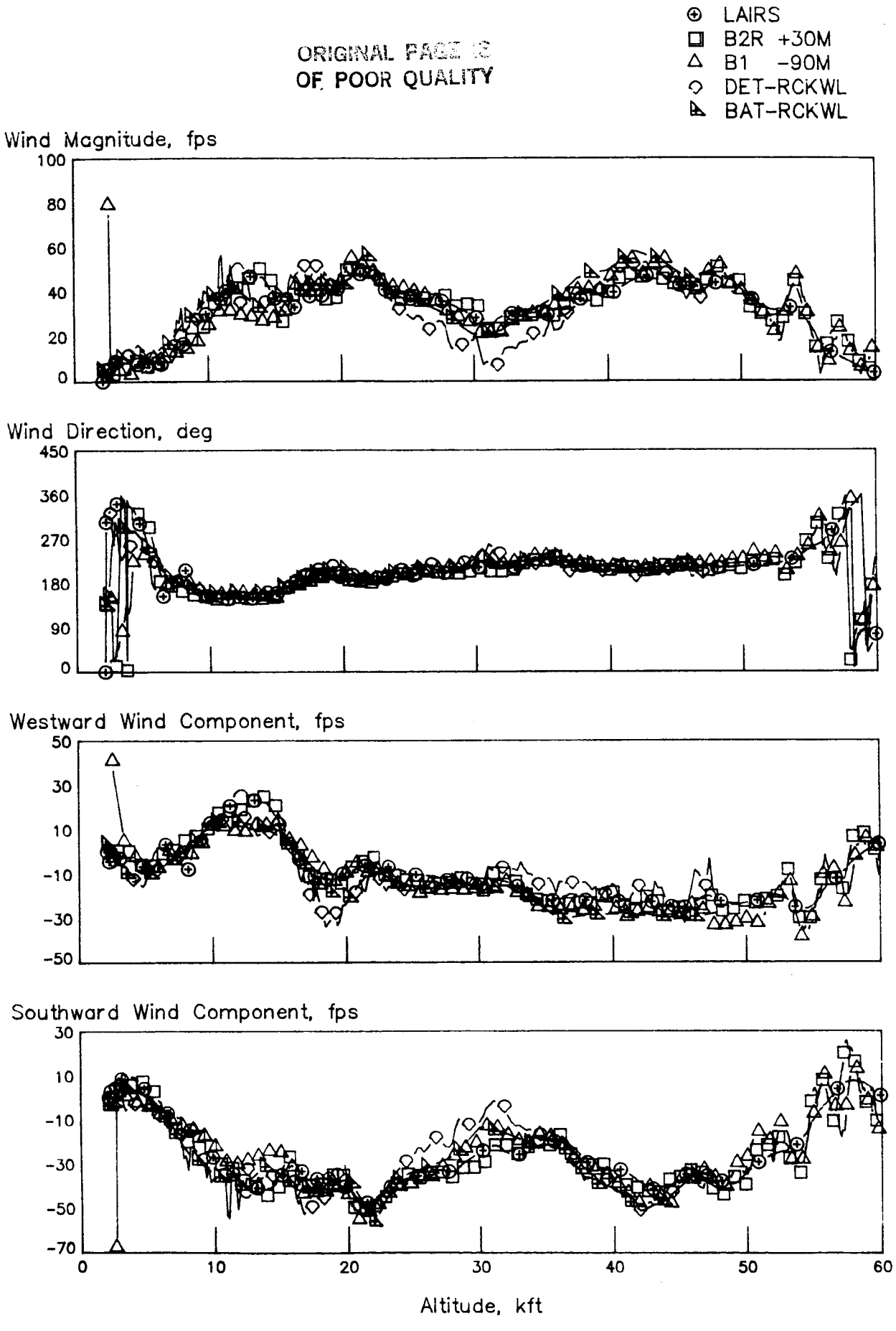


Fig. II-8. STS-14 Measured and Derived Winds

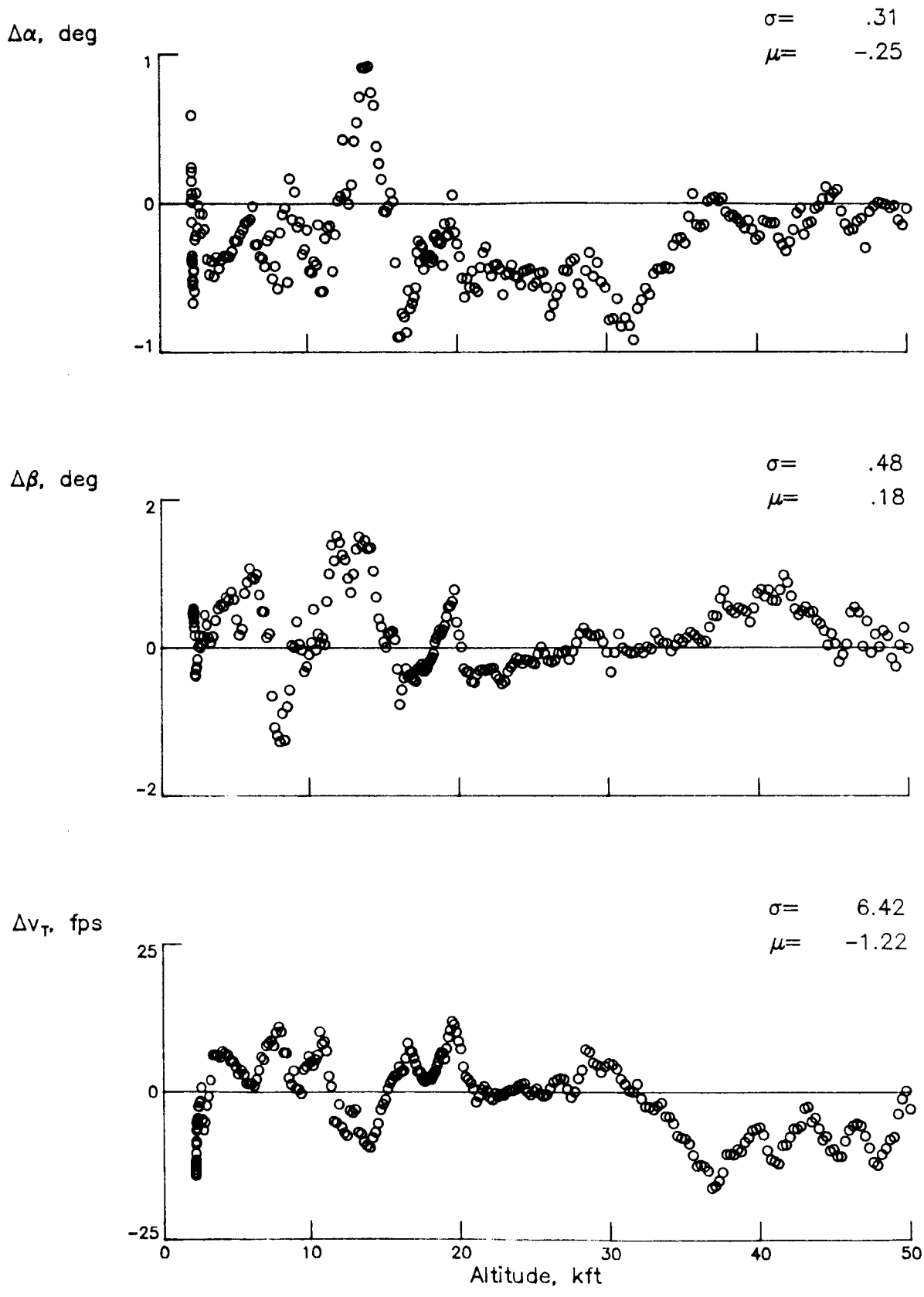


Fig. II-9. STS-14 ADP Differences, ST14ADS-ST14BET

III. Aerodynamic BET Discussion and Results

An AEROBET file was created based on the previously discussed Extended BET, ST14BET, utilizing the Operational Instrumentation recorded configuration information as well as the final spacecraft mass properties of Appendix A. Primary and back-up (duplicate) reels are NB1248 and NC0601, respectively. This section presents plots of some of the relevant parameters from the AEROBET, to include aerodynamic performance comparisons. Plots versus Mach No. are presented as semi-log plots and the shaded bands thereon are based on the previous eleven flights.

Altitude versus time is presented as Figure III-1. Altitude rate, dynamic pressure, and Mach No. are presented versus both time and altitude as Figures III-2 through III-4, respectively. $\bar{V}_\infty$ and Reynolds No. are plotted versus altitude in Figures III-5 and III-6. Air relative attitude angles versus Mach and altitude are next presented. The shading on Figure III-7 shows the range of α's encountered on the previous flights.

Spacecraft dynamic measurements, i.e., body axis components derived from IMU2, are plotted versus Mach No. in Figure III-9. Control surface deflections (vs. Mach and altitude) and RCS firings vs. Mach complete the configuration plots, viz, Figures III-10, 11, and 12. Again, the plots of control deflections versus Mach (Figure III-10) show the range of controller configurations flown previously. Some additional data base evaluation opportunities can be seen, e.g., more upward (negative) elevon deflections in the hypersonic regime; more downward (positive) body flap for $1<M<3$, and speed-brake deflections above Mach 3.

Performance comparisons, Figures III-13 through III-15, show that Discovery is, as expected, aerodynamically similar to her two sister ships. Presented as Figures III-13 and III-14 are force (C_L, C_D, C_N, C_A), moment (C_m) and performance (L/D) comparisons. These data are with respect to the 65 percent reference c.g. commensurate with the Orbiter data base. The shaded region represents (statistically) the first eleven flight results. These ensemble results reflect a $\pm 1\sigma$ band about the mean difference ((flight-predicts)/flight) and compare,

except for rather narrow regions, with Discovery results.* The final figure presented herein shows C_m comparisons at the flight c.g., to include flight, predicts, and expected variations. The hypersonic offset of ~0.028 due to real gas effects is suggested, which, for the most part, can be discounted by evoking "known" updates to the data base, i.e., the so-called Flight Assessment Deltas developed by project aerodynamicists.

*Note boundary layer transition occurrence at the rather high Mach No. (~16), most visible in ΔC_A, $\Delta L/D$ plots.

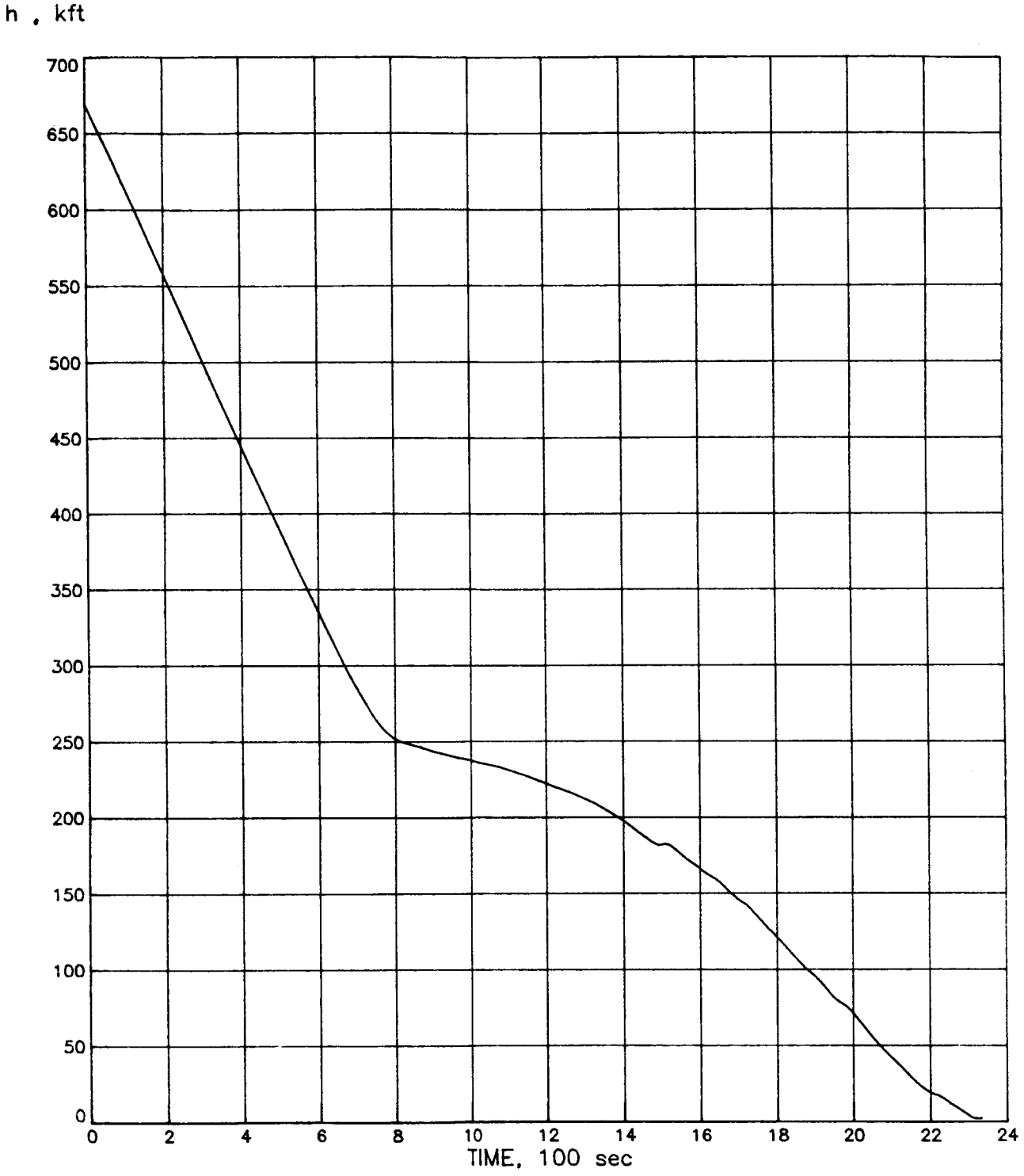
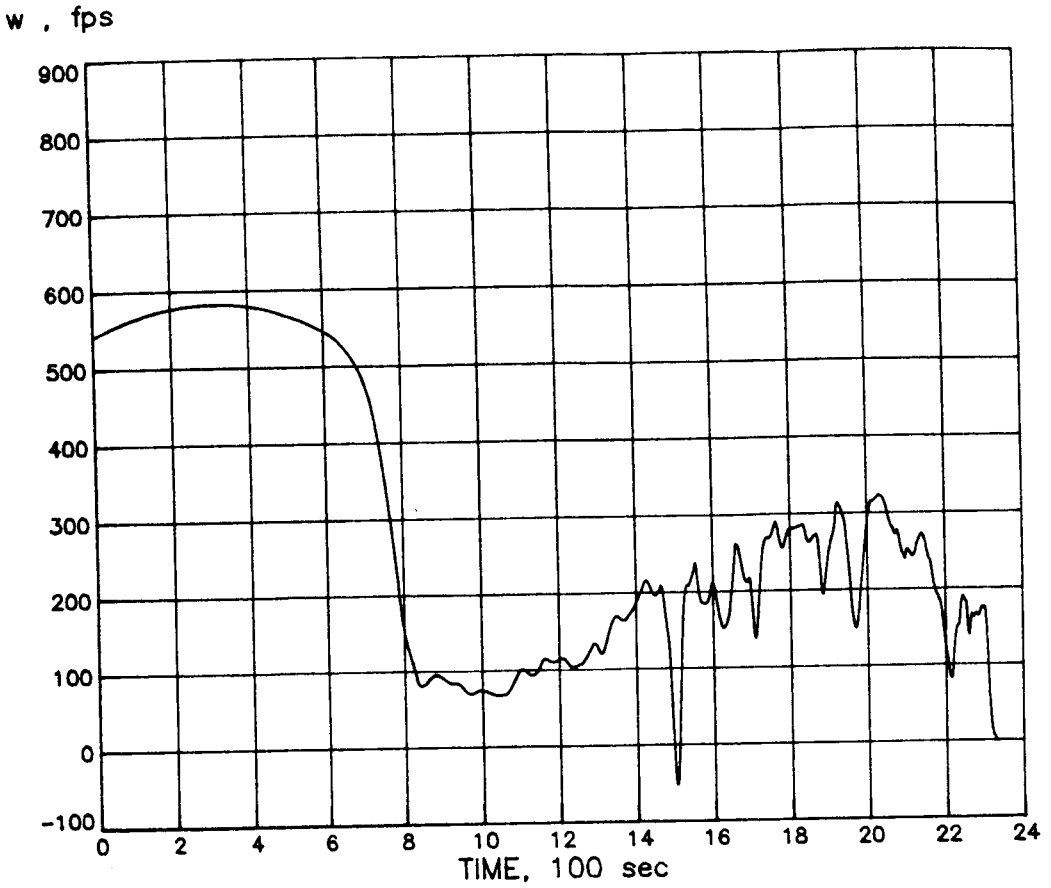


Figure III-1. STS-14 altitude time history



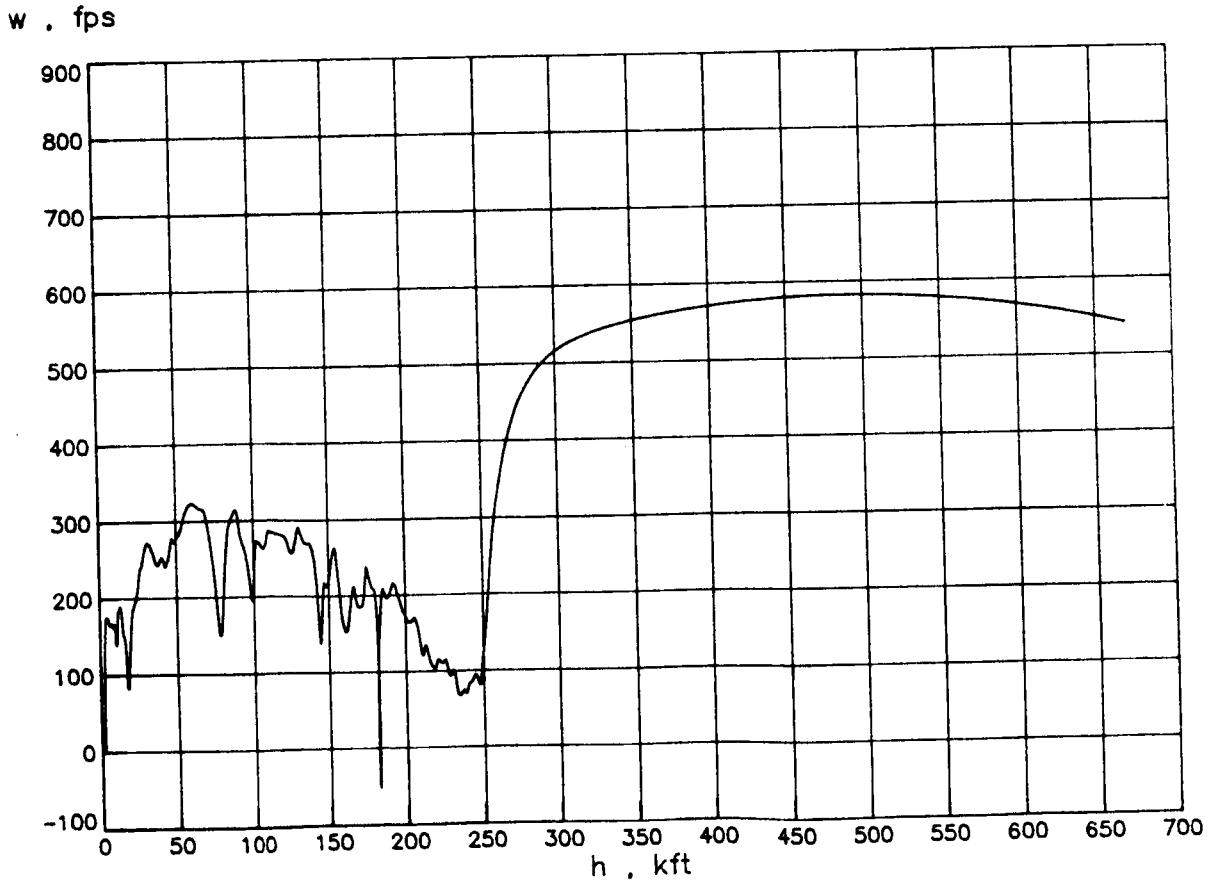
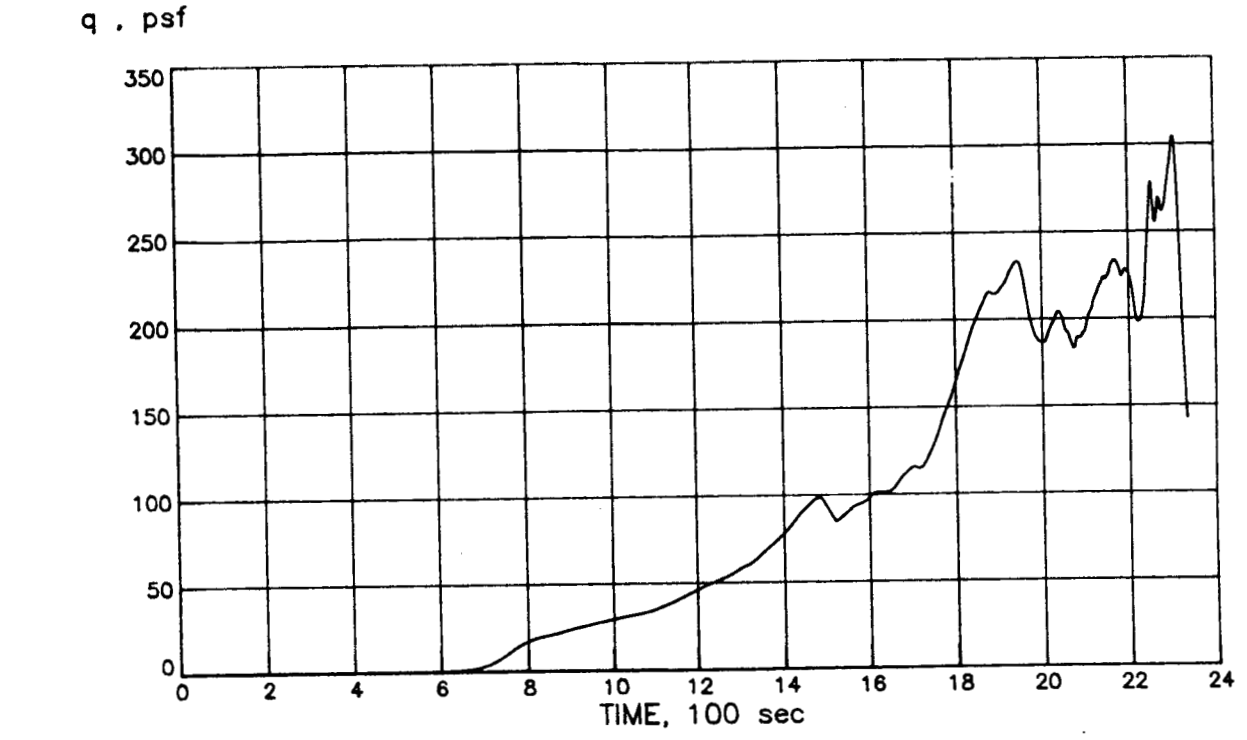


Figure III-2. STS-14 descent rate versus time and altitude ($\dot{h} = -w$)



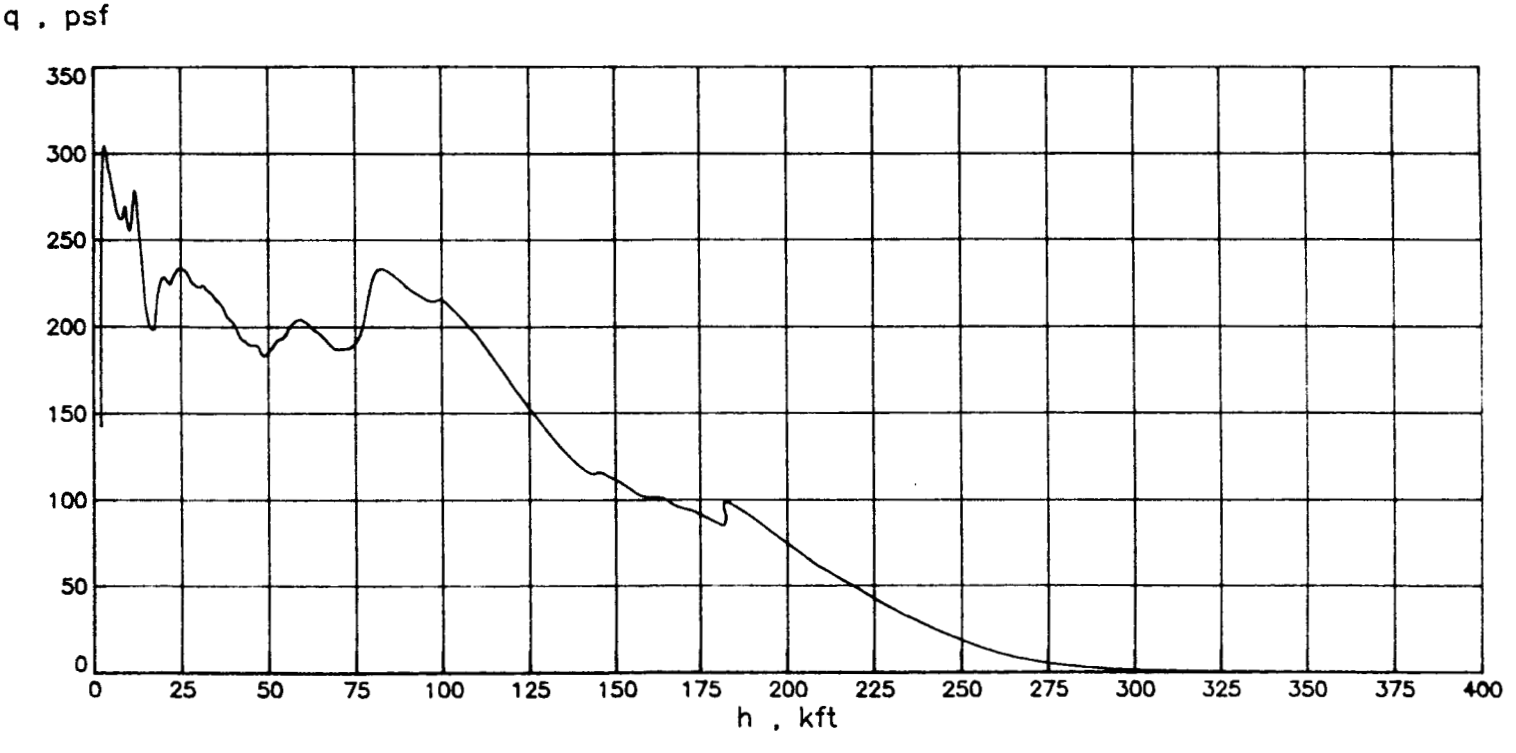
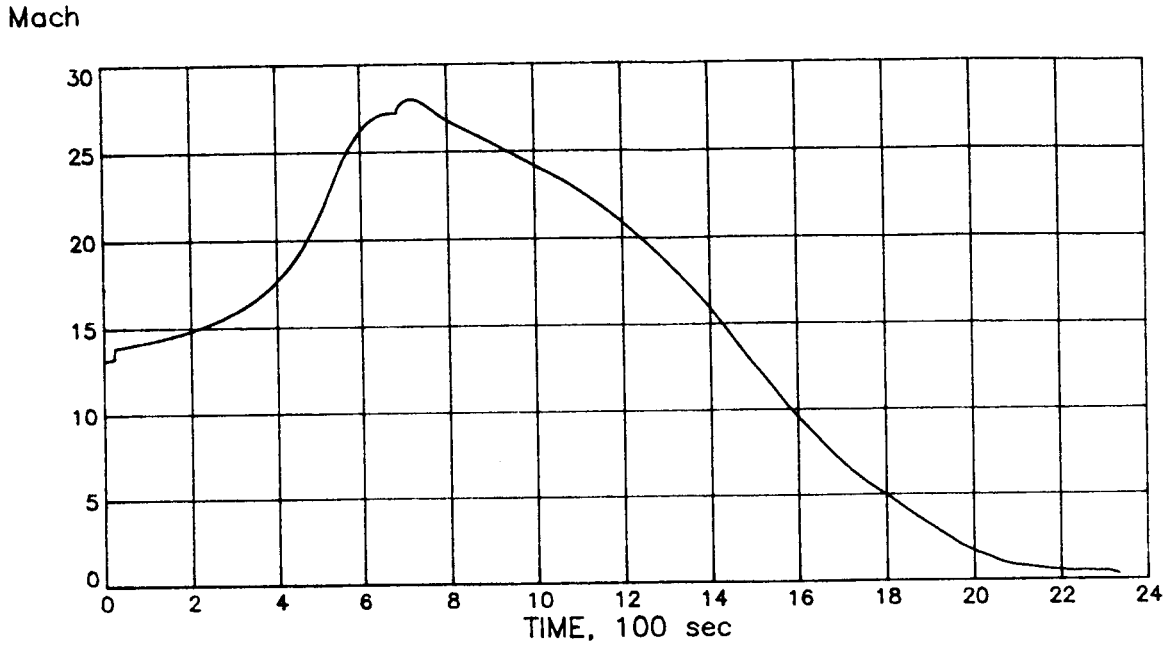


Figure III-3. STS-14 dynamic pressure vs. time and altitude



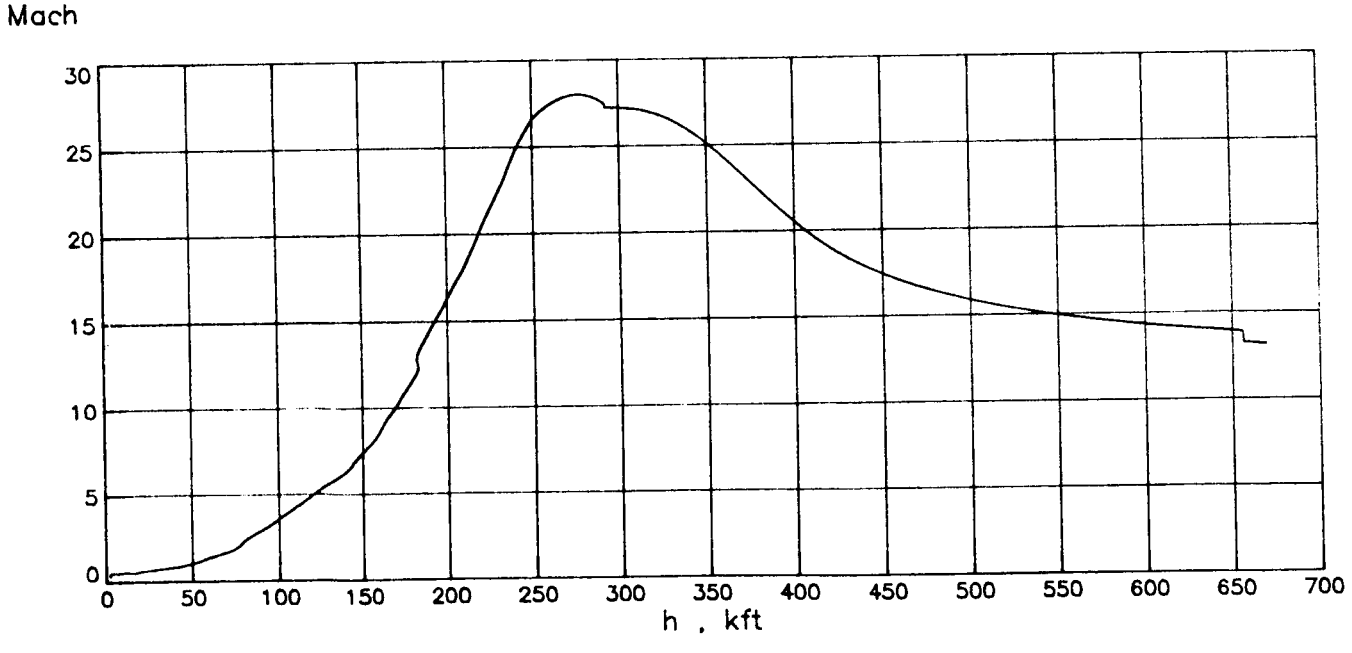


Figure III-4. STS-14 Mach number versus time and altitude

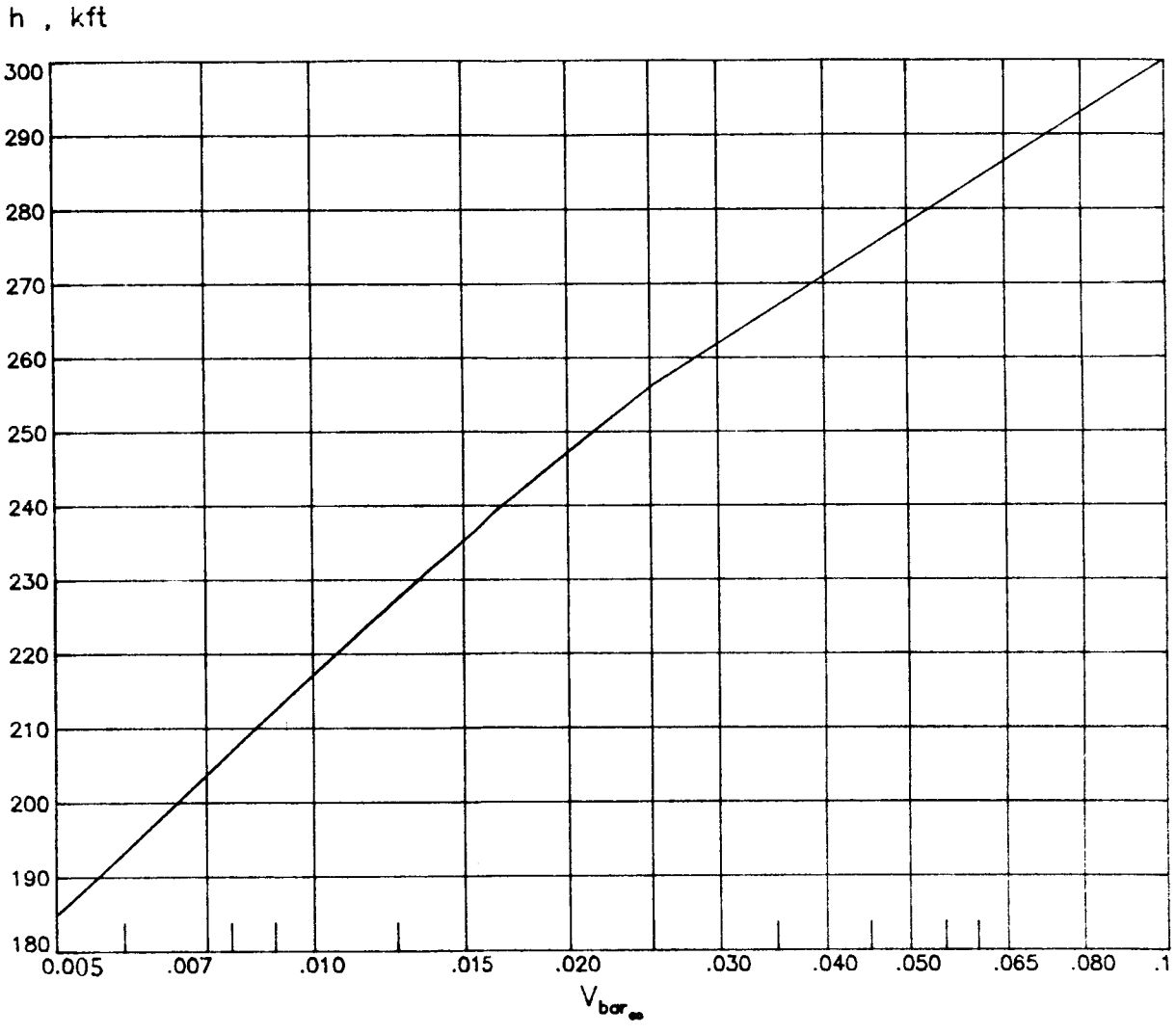


Figure III-5. STS-14 Vbar versus altitude

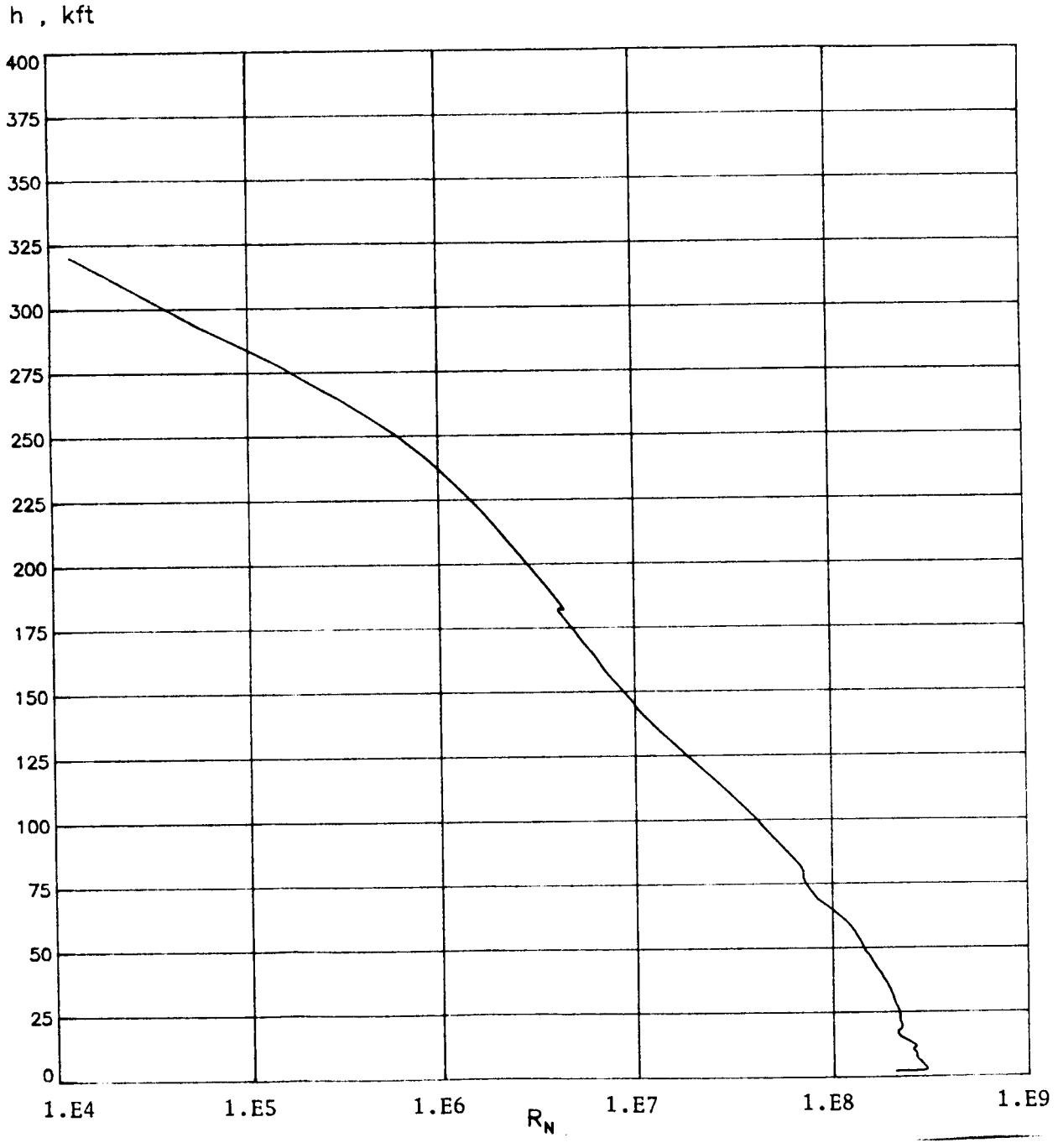


Figure III-6. STS-14 Rnum versus altitude

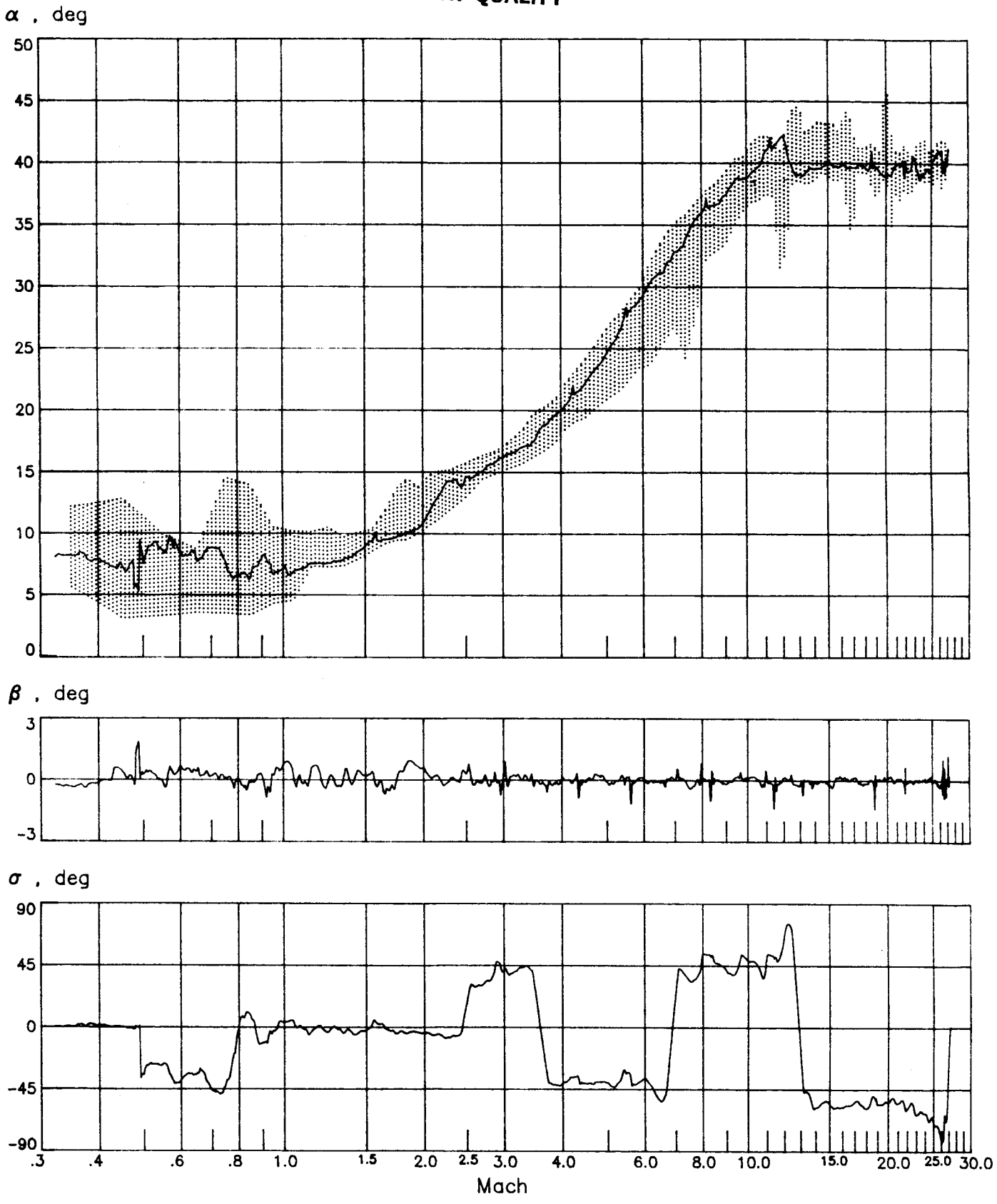


Figure III-7. STS-14 α, β and σ vs. Mach

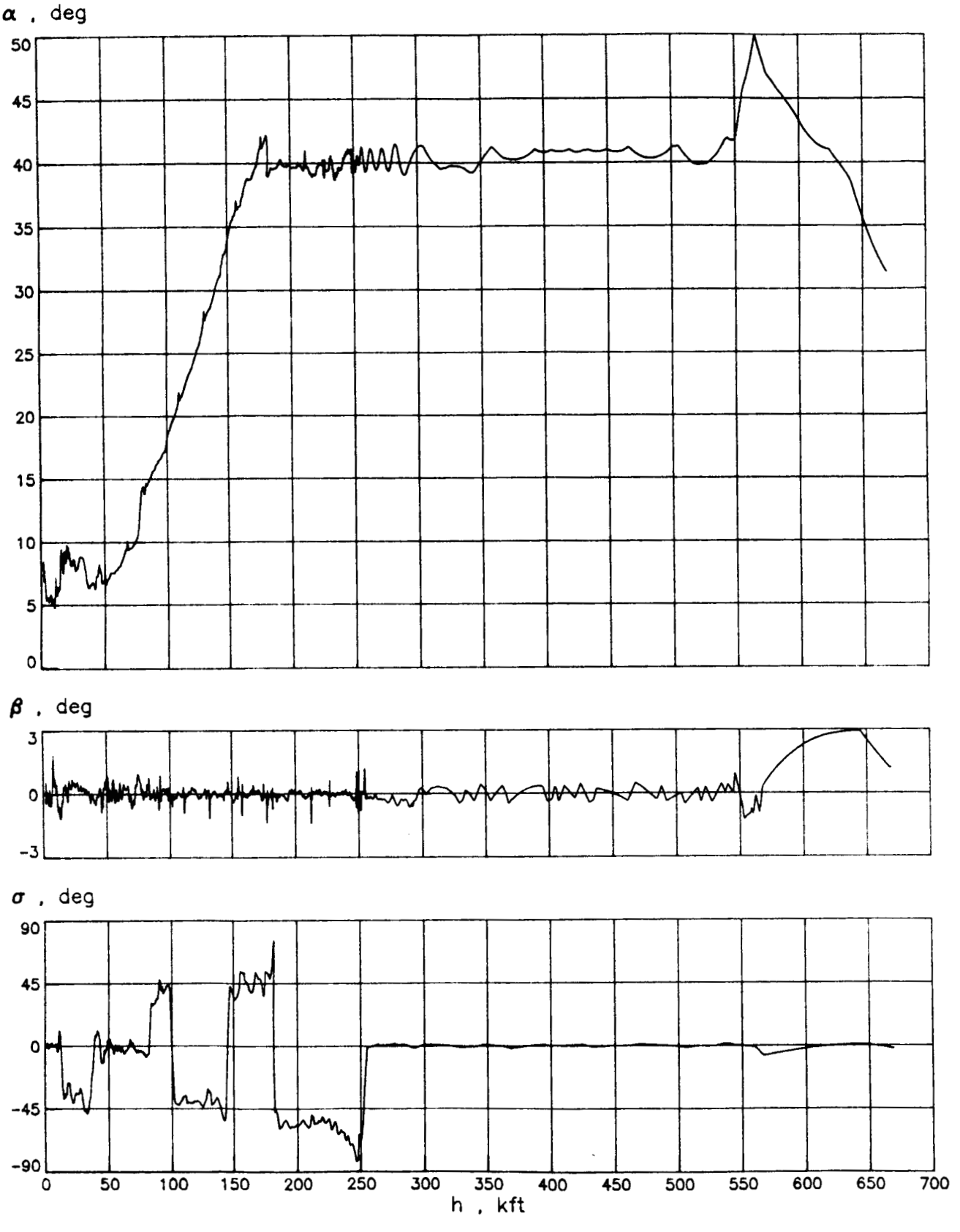


Figure III-8. STS-14 α, β and σ vs. h

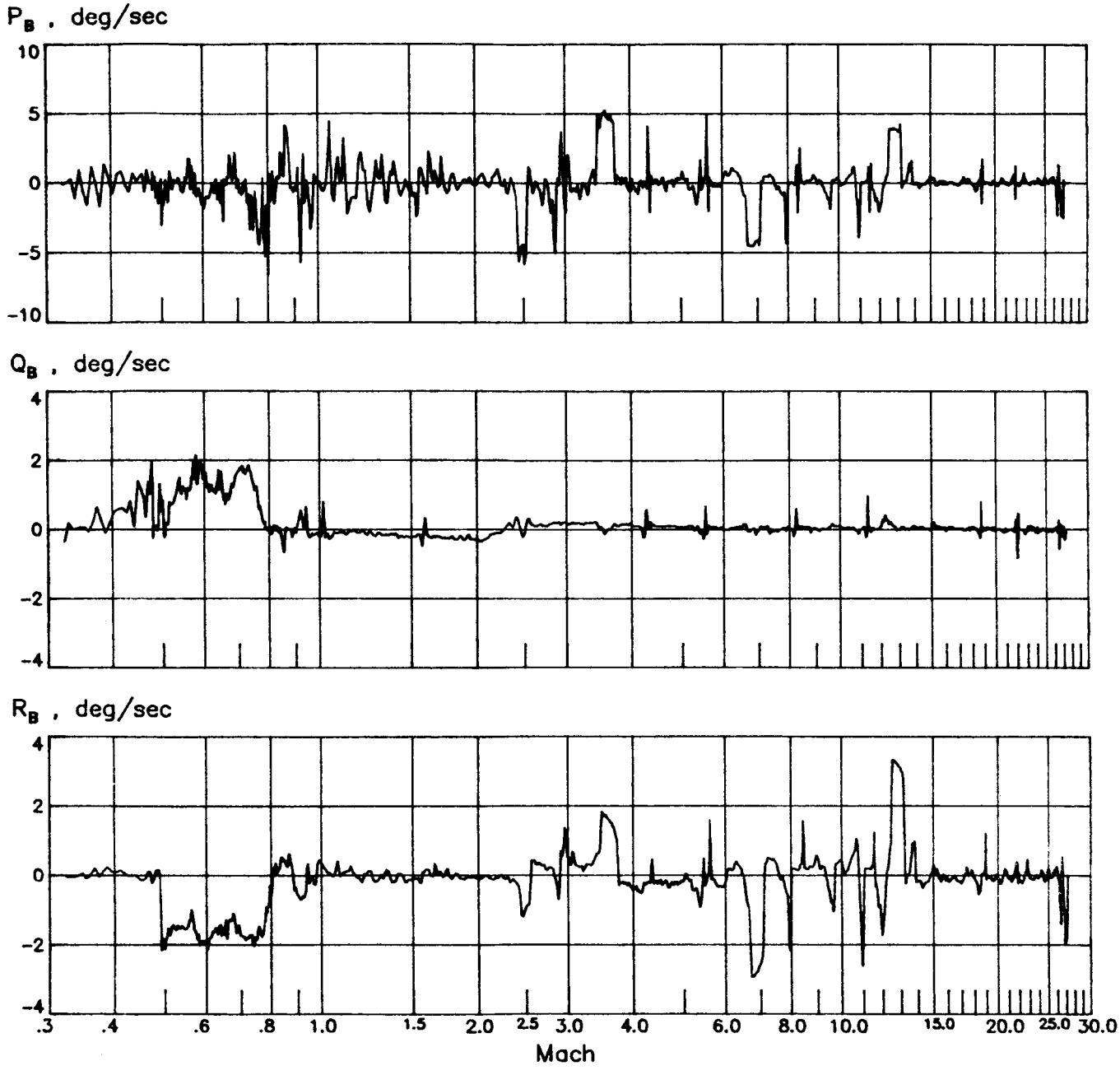


Figure III-9. STS-14 dynamic data vs. Mach

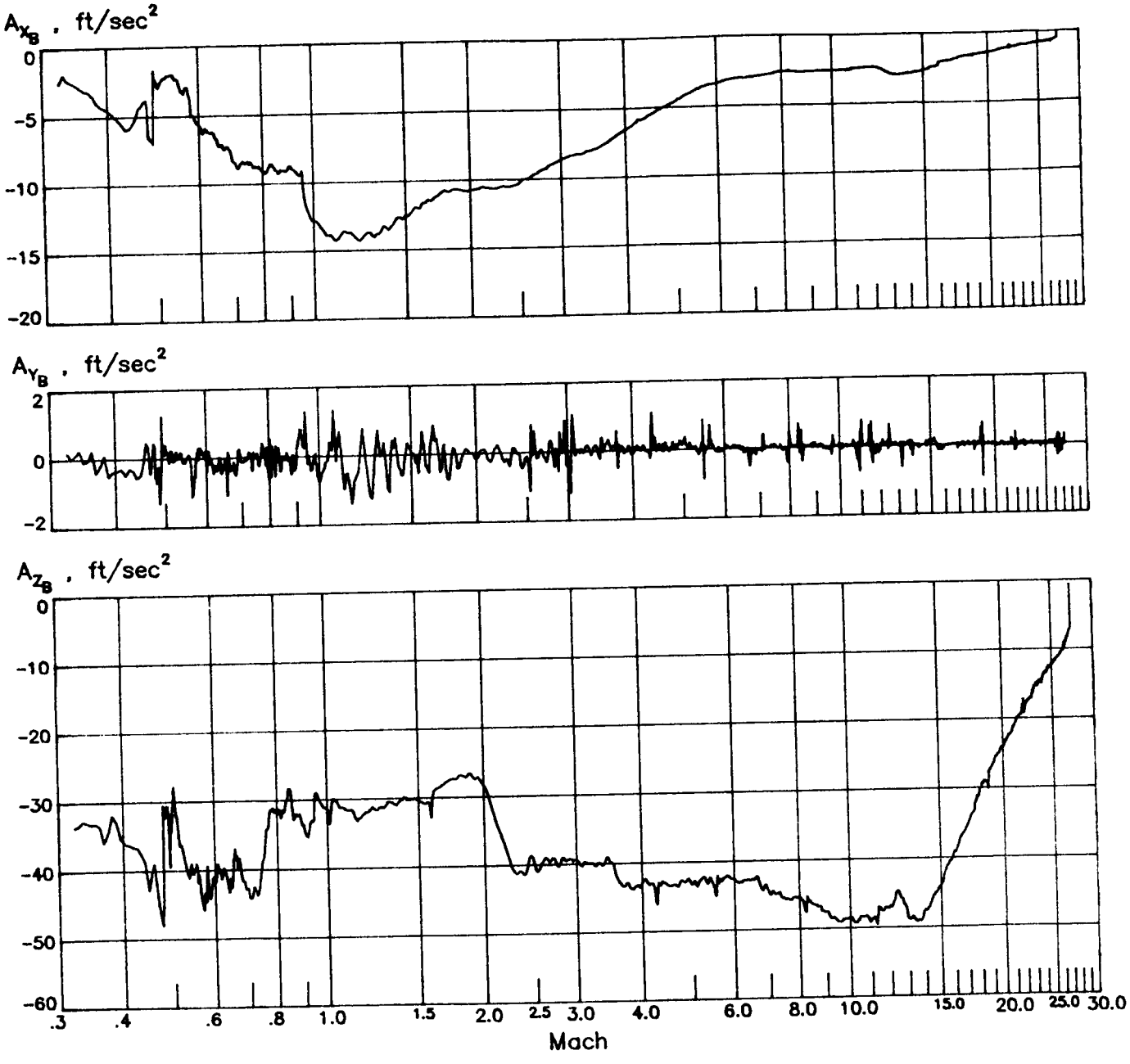


Figure III-9. (concluded)

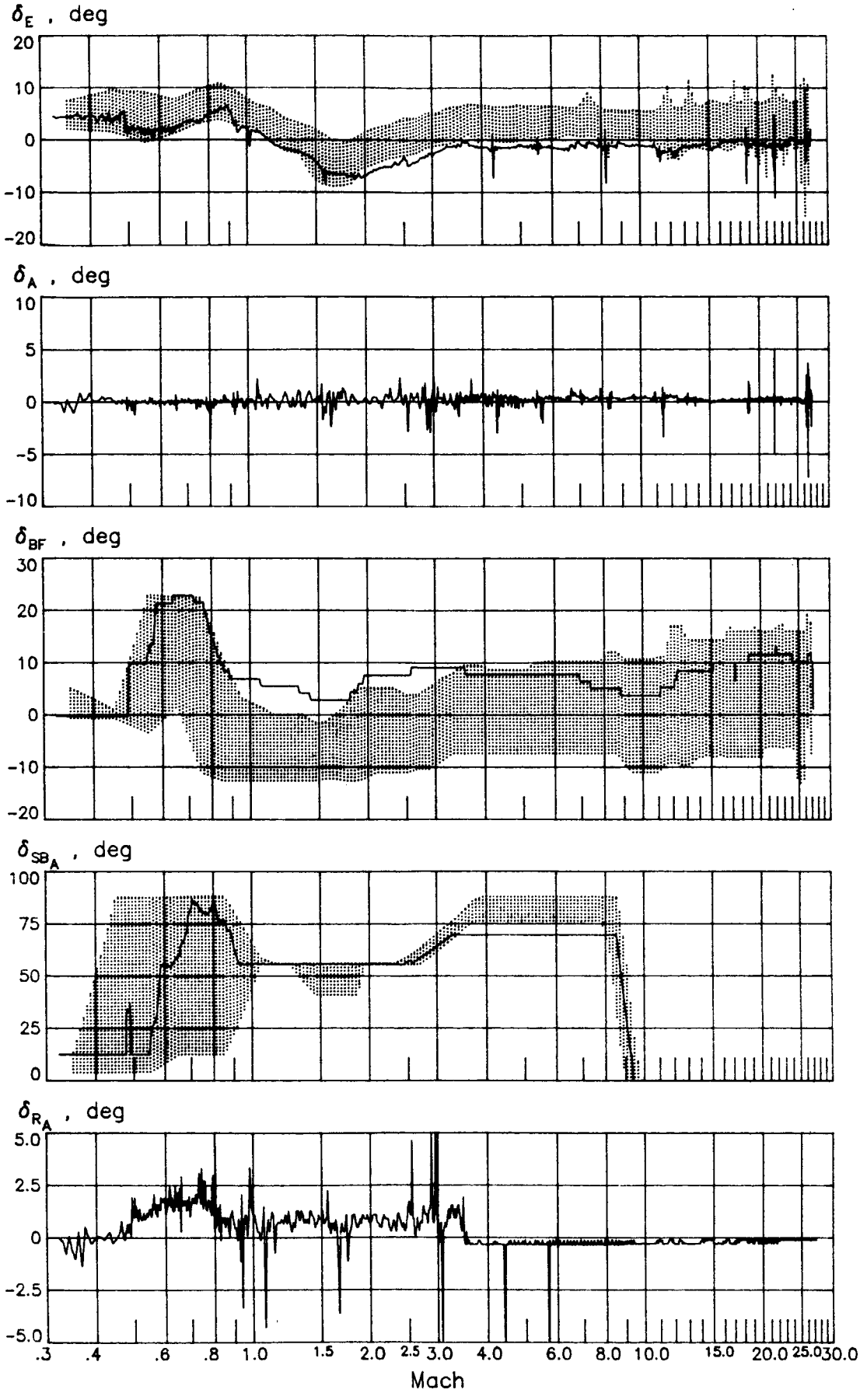


Figure III-10. STS-14 control surfaces vs. Mach

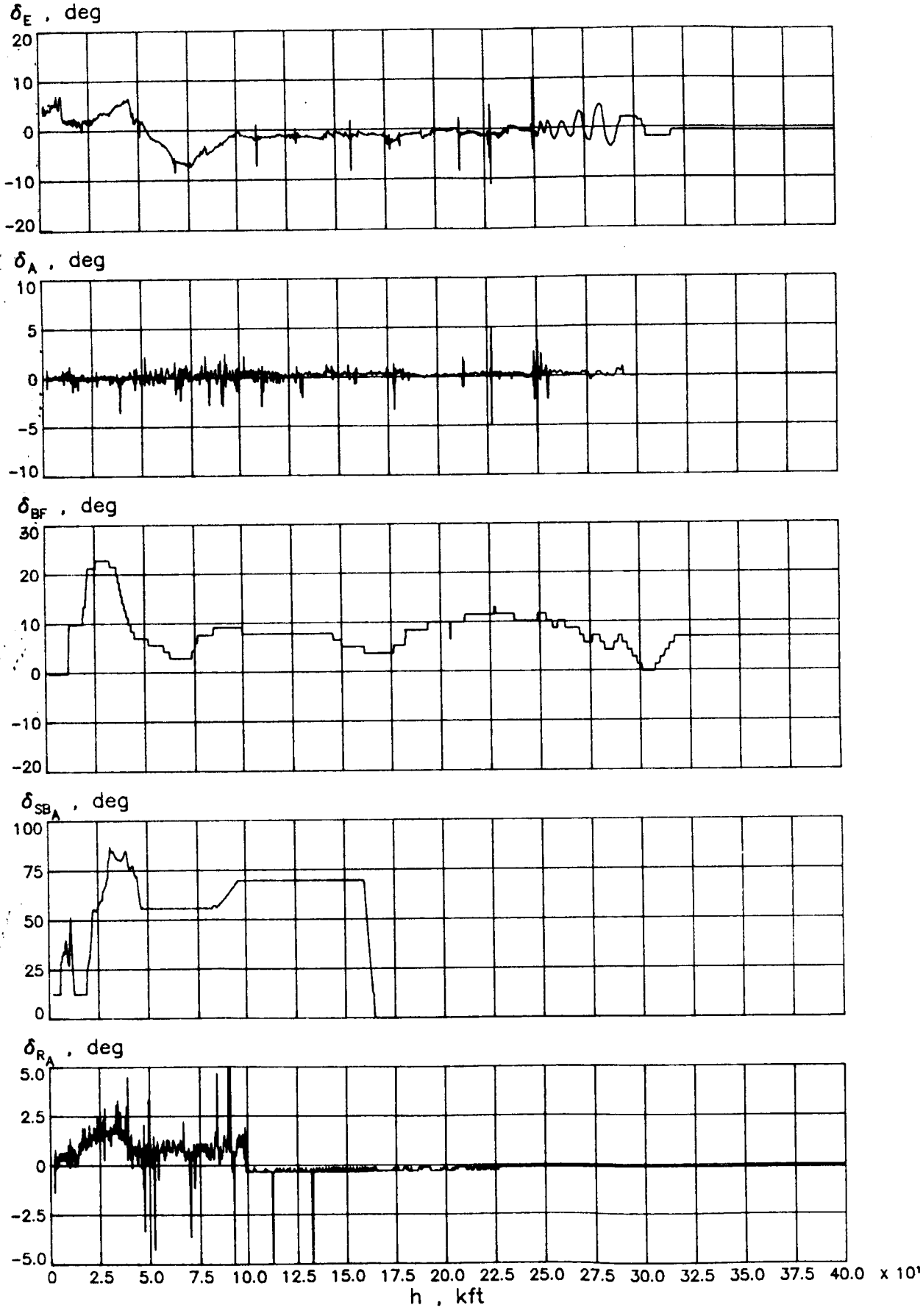


Figure III-11. STS-14 control surfaces vs. altitude

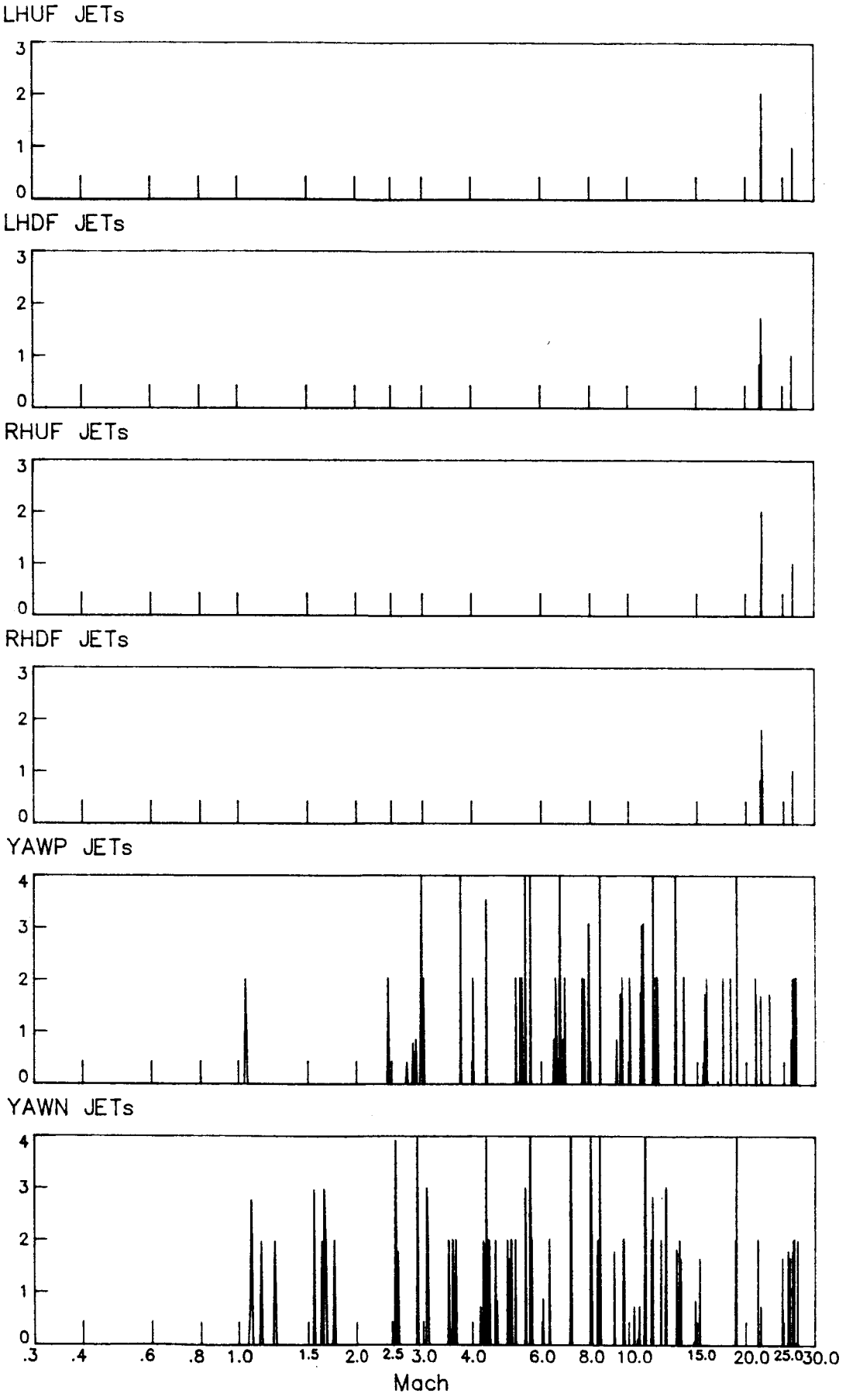


Figure III-12. STS-14 RCS firings vs. Mach

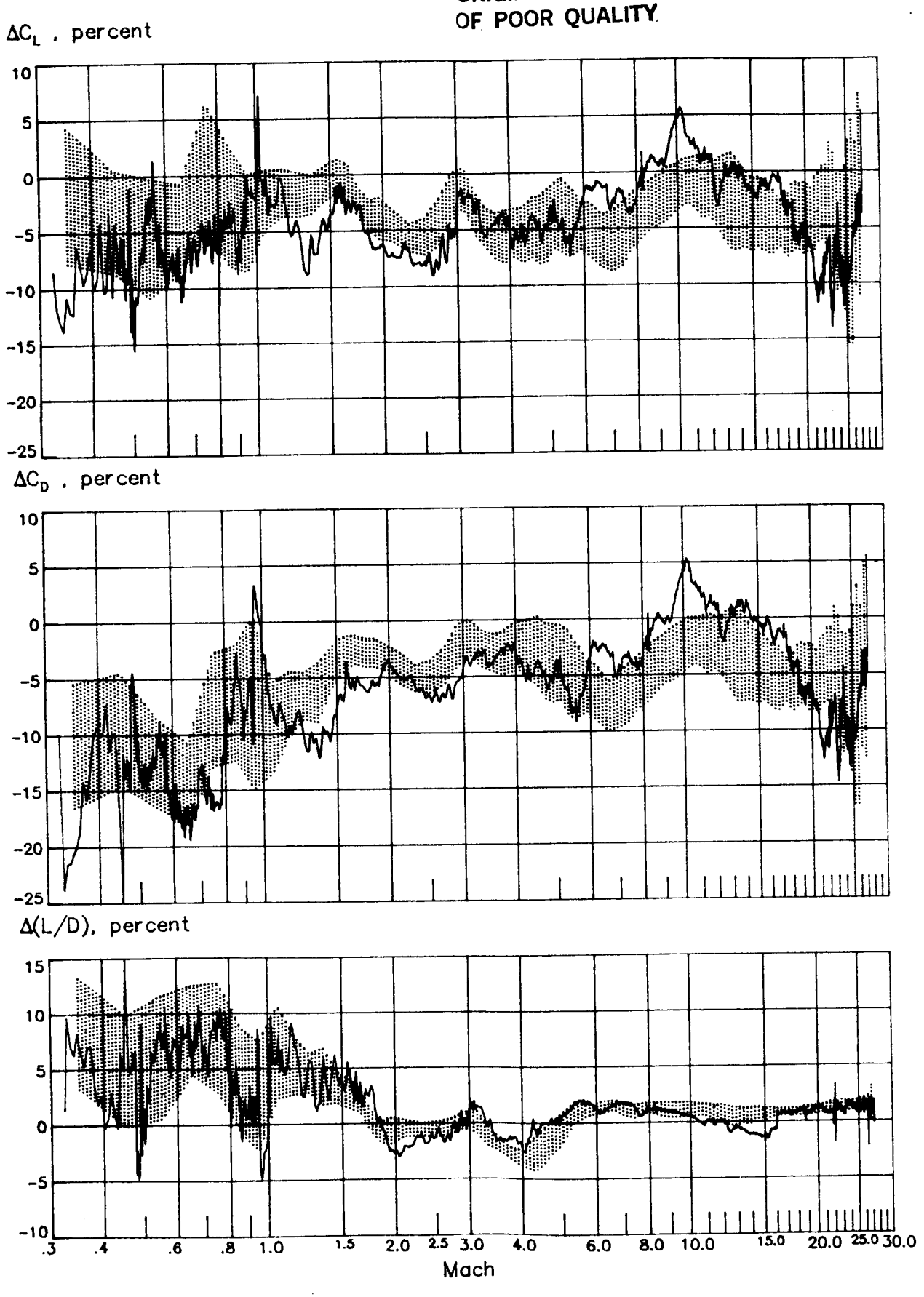


Figure III-13. STS-14 flight/data base differences vs. Mach

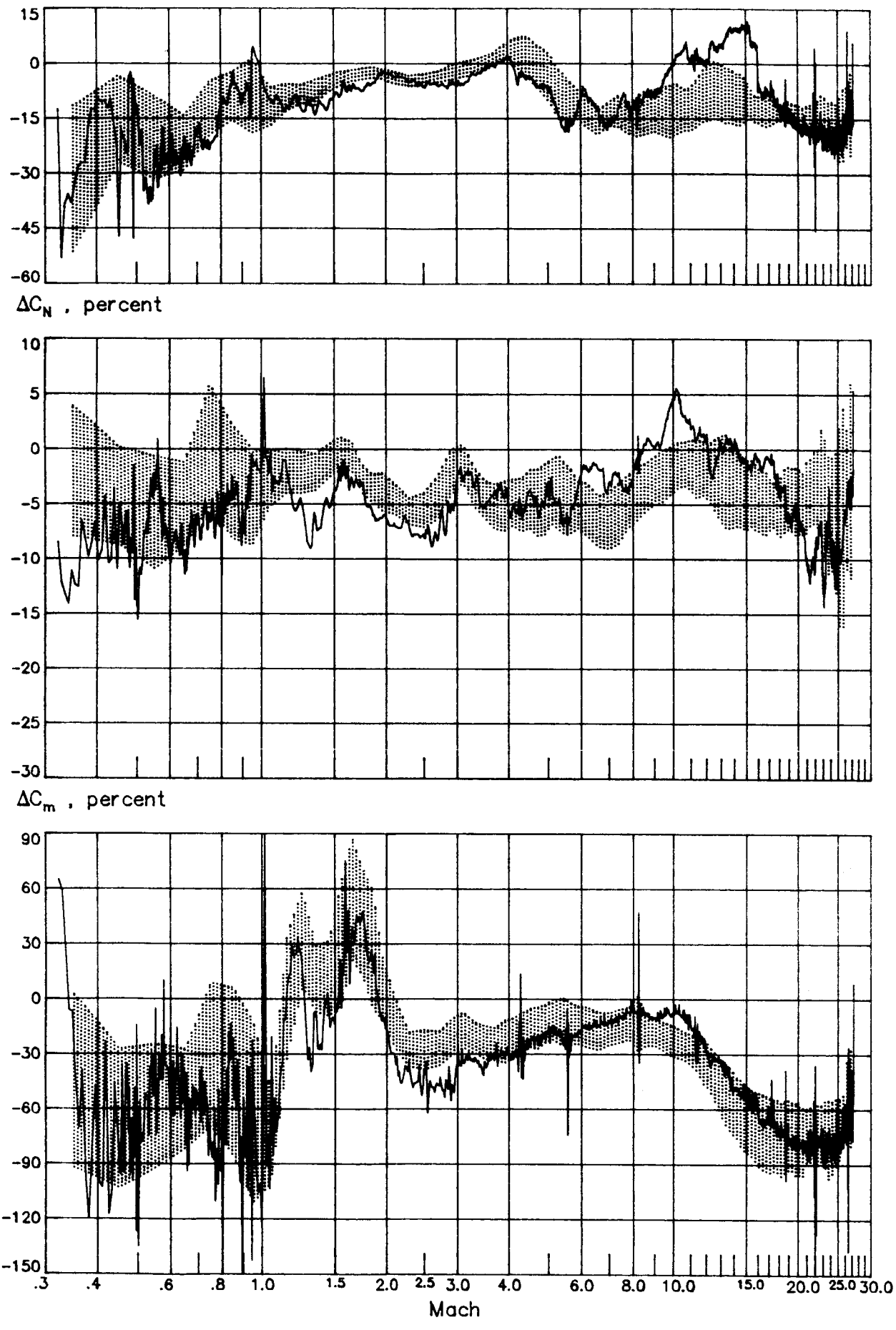


Figure III-14. STS-14 flight/data base differences vs. Mach

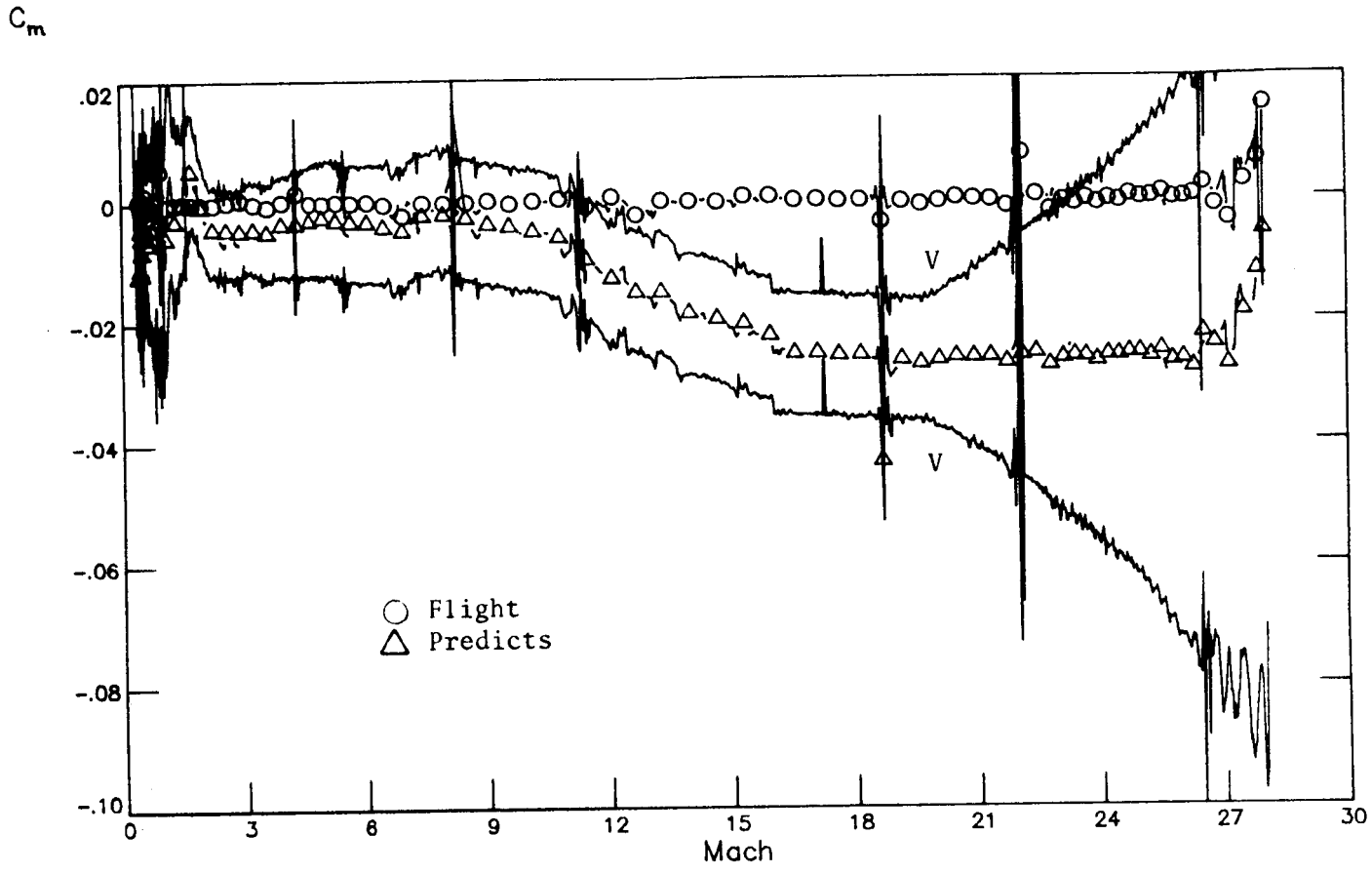


Figure III-15. STS-14 C_m comparisons vs. Mach
(at the flight c.g.)

IV. MMLE Input File Generation (GTFILEs)

MMLE input files were generated for STS-14 maneuver analyses. Maneuver activity during this flight is summarized as Table IV herein. GTFILEs were generated using the IMU2 data as well as the RGA1/AA1 data. ACIP data are not available on any of the Discovery flights. Files created are on nine-track reels NW0766 (based on IMU2) and NR0101 (replacing IMU2 measurements with the merged, rectified, RGA1/AA1 data). The extent of bias removal for rectification of these latter data is shown as Figures IV-1. Here, 100 second sub-interval biases (relative to the more accurate IMU2 data) were computed. These plots start at t = 480 seconds from epoch (h~400 kft), i.e., well above appreciable signal in the accelerometry. Annotated on each sub-figure are the ensemble mean (μ_{avg}) over the entire time span as well as an estimate in the variation (1σ) of the mean difference over the arc.

STS-14 PTIs

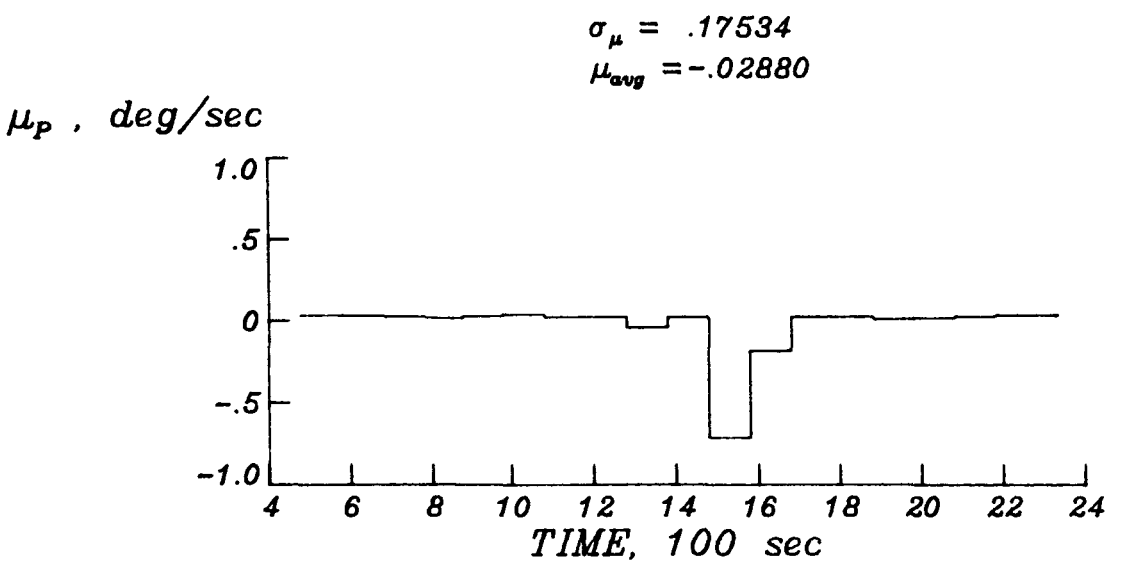
LATERAL/DIRECTIONAL

PTI#	DURATION (secs)	START TIME	TIME FROM EPOCH (secs)	STOP TIME	TIME FROM EPOCH (secs)
1	14	249:13:12:31.0	811	13:12:45.0	825
2	8.5	13:18:07.5	1147.5	13:18:16.0	1156
3	12	13:20:27.0	1287	13:20:39.0	1299
4	9	13:24:34.0	1534	13:24:43.0	1543
5	9	13:26:20.0	1640	13:26:29.0	1649
6	8.5	13:28:16.5	1756.5	13:28:25.0	1765
7	8	13:29:29.0	1829	13:29:37.0	1837
8	15	13:30:48.0	1908	13:31:03.0	1923
9	7.5	13:32:21.0	2001	13:32:28.5	2008.5
10	11.5	13:33:12.5	2052.5	13:33:24.0	2064
11	8	13:33:37.0	2077	13:33:45.0	2085

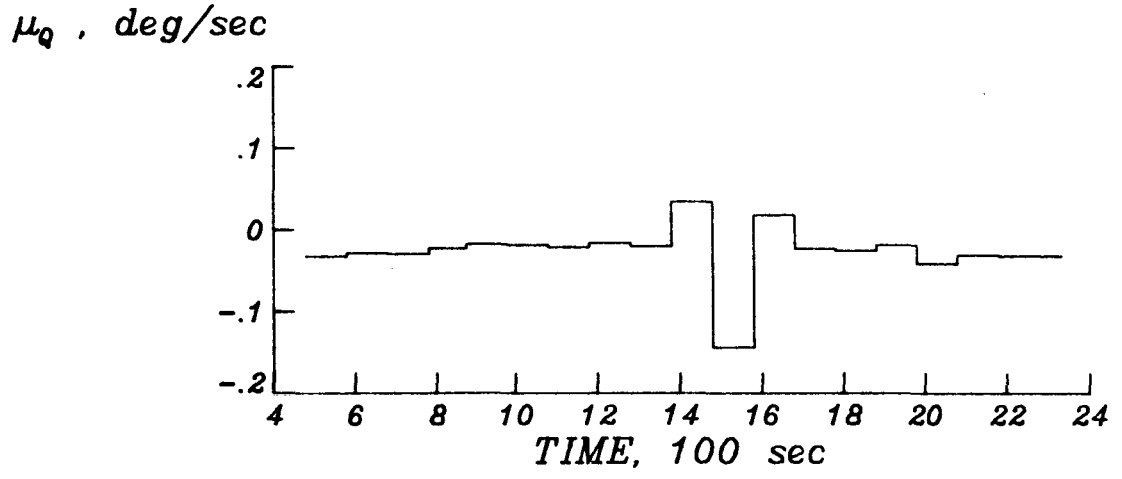
LONGITUDINAL

PTI#	DURATION (secs)	START TIME	TIME FROM EPOCH (secs)	STOP TIME	TIME FROM EPOCH (secs)
1	9.5	249:13:12:42.0	822	13:12:51.5	831.5
2	17.5	13:17:57.5	1137.5	13:18:15.0	1155
3	6	13:20:36.0	1296	13:20:42.0	1302
4	9	13:24:42.0	1542	13:24:51.0	1551
5	5	13:26:28.0	1648	13:26:33.0	1653
6	6	13:28:24.0	1764	13:28:30.0	1770
7	6	13:29:37.0	1837	13:29:43.0	1843
8	4	13:32:29.0	2009	13:32:33.0	2013
9	5	13:33:25.0	2065	13:33:30.0	2070
10	3	13:33:44.0	2084	13:33:47.0	2087

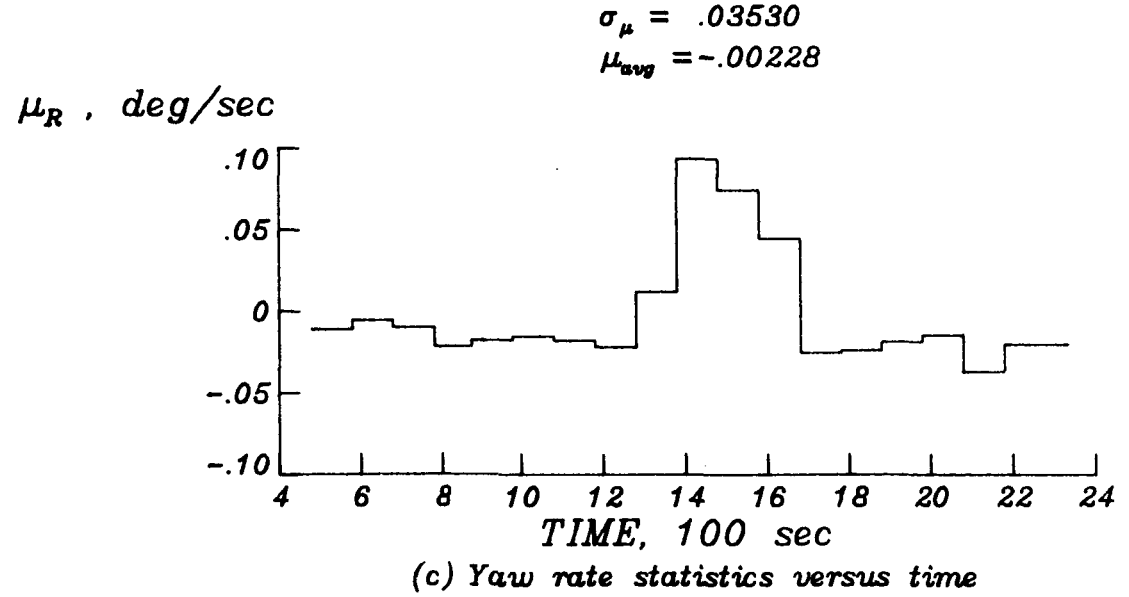
Table IV Aerodynamic extraction maneuvers for STS-14.



(a) Roll rate statistics versus time

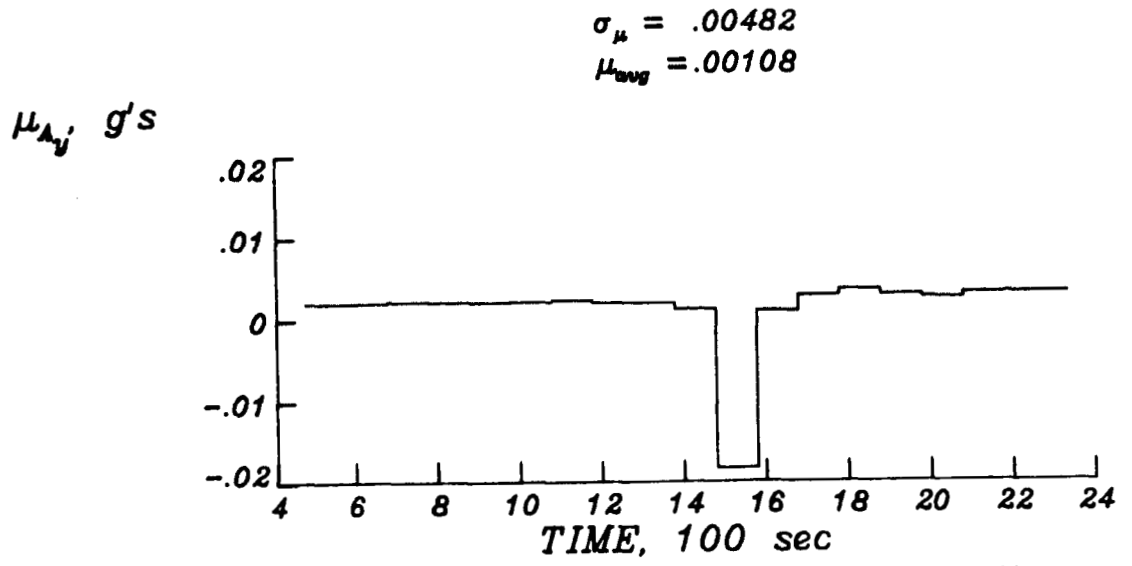


(b) Pitch rate statistics versus time

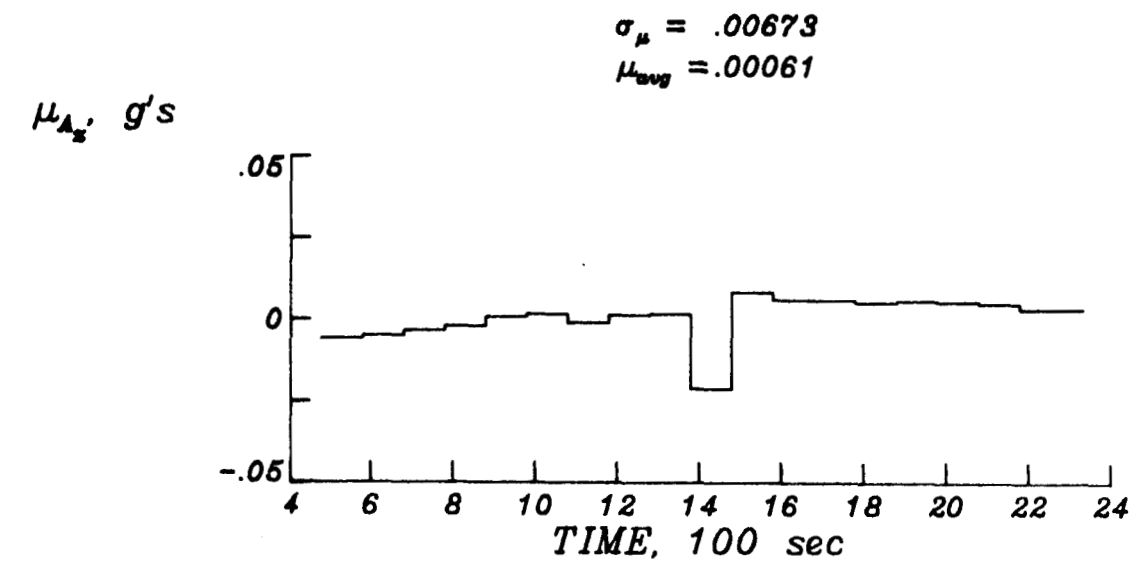


(c) Yaw rate statistics versus time

Figure IV-1. Dynamic data comparisons for STS-14.



(e) Y-body acceleration statistics versus time



(f) Z-body acceleration statistics versus time

Figure IV-1. (Concluded).

APPENDIX A

Spacecraft and Physical Constants

+++++IMU NBR 1 ATTITUDE INFORMATION+++++

...INERTIAL (FF50) TO ROTATING (ETOD)

-.99987753E+00	.15289406E-01	.33417625E-02
-.15289286E-01	-.99988311E+00	.61723721E-04
.33423156E-02	.10623000E-04	.99999441E+00

...ROTATING (ETOD) TO N-E-D

.22382694E-01	-.18899569E-01	.99957082E+00
-.64515346E+00	-.76405302E+00	0.
.76372510E+00	-.64487657E+00	-.29294687E-01

...NAV BASE TO S/C BODY

.98286611E+00	.11081625E-03	-.18432090E+00
-.35601724E-03	.99999910E+00	-.12972003E-02
.18432059E+00	.13340596E-02	.98286526E+00

...NAV BASE TO OUTER ROLL

.99999683E+00	-.22274768E-02	-.11707061E-02
.22274753E-02	.99999752E+00	-.26077272E-05
.11707090E-02	0.	.99999932E+00

...PLATFORM TO OUTER ROLL

.76891678E-01	.42385172E+00	-.90246135E+00
-.80436742E+00	-.50846260E+00	-.30733917E+00
-.58913481E+00	.74954255E+00	.30183682E+00

...INERTIAL (FF50) TO PLATFORM

.52808990E-01	-.75718081E+00	.65106714E+00
-.26077759E+00	.61889690E+00	.74091947E+00
-.96395344E+00	-.20891094E+00	-.16477245E+00

...S/C BODY TO N-E-D

.46823397E+00	-.85131582E+00	.23668481E+00
.72942144E+00	.52358210E+00	.44022907E+00
-.49869895E+00	-.33492648E-01	.86612795E+00

TABLE A-1

STS-14 IMU Attitude Matrices @ Epoch.

```
+++++IMU NBR 2 ATTITUDE INFORMATION+++++

...INERTIAL (FF50) TO ROTATING (ETOD)
        -.99987753E+00       .15289406E-01       .33417625E-02
        -.15289286E-01      -.99988311E+00       .61723721E-04
         .33423156E-02       .10623000E-04       .99999441E+00

...ROTATING (ETOD) TO N-E-D
         .22382694E-01      -.18899569E-01       .99957082E+00
        -.64515346E+00      -.76405302E+00      0.
         .76372510E+00      -.64487657E+00      -.29294687E-01

...NAV BASE TO S/C BODY
         .98286611E+00       .11081625E-03      -.18432090E+00
        -.35601724E-03       .99999910E+00      -.12972003E-02
         .18432059E+00       .13340596E-02       .98286526E+00

...NAV BASE TO OUTER ROLL
         .99999707E+00      -.14653600E-02      -.19236980E-02
         .14654087E-02       .99999892E+00       .23933827E-04
         .19236609E-02      -.26752760E-04       .99999810E+00

...PLATFORM TO OUTER ROLL
        -.21777010E+00       .71647936E+00       .66274643E+00
        -.77116723E+00      -.54252570E+00       .33311575E+00
         .59822788E+00      -.43854571E+00       .67067196E+00

...INERTIAL (FF50) TO PLATFORM
        -.77244341E+00       .14704973E+00       .61782485E+00
         .56492066E+00      -.28538144E+00       .77422351E+00
         .29016513E+00       .94706589E+00       .13736957E+00

...S/C BODY TO N-E-D
         .46740550E+00      -.85189071E+00       .23625452E+00
         .72898058E+00       .52258518E+00       .44214078E+00
        -.50011856E+00      -.34439758E-01       .86527169E+00
```

TABLE A-1 (Continued).

+++++IMU NAR 3 ATTITUDE INFORMATION+++++

...INERTIAL (EE50) TO ROTATING (ETOD)

-.99987753E+00	.15289406E-01	.33417625E-02
-.15289286E-01	-.99988311E+00	.61723721E-04
.33423156E-02	.10623000E-04	.99999441E+00

...ROTATING (ETOD) TO N-E-D

.22382694E-01	-.18899569E-01	.99957082E+00
-.44515346E+00	-.76405302E+00	0.
.76372510E+00	-.64487657E+00	-.29294687E-01

...NAV BASE TO S/C BODY

.98286611E+00	.11081625E-03	-.18432090E+00
-.35601724E-03	.99999910E+00	-.12972003E-02
.18432059E+00	.13340596E-02	.98286526E+00

...NAV BASE TO OUTER ROLL

.99999950E+00	-.67501024E-03	.72914753E-03
.67503720E-03	.99999977E+00	-.36723830E-04
-.72912257E-03	.37216013E-04	.99999973E+00

...PLATFORM TO OUTER ROLL

.88834251E+00	-.39263663E+00	.23808409E+00
-.39817090E+00	-.91692831E+00	-.26493220E-01
.22870831E+00	-.71263116E-01	-.97088286E+00

...INERTIAL (EE50) TO PLATFORM

.40786761E+00	.40278077E+00	.81939709E+00
-.61584222E+00	-.54119861E+00	.57257527E+00
.67407888E+00	-.73815423E+00	.27312030E-01

...S/C BODY TO N-E-D

.46629774E+00	-.85275411E+00	.23532775E+00
.72987297E+00	.52117095E+00	.44233806E+00
-.49985169E+00	-.34507510E-01	.86542320E+00

TABLE A-1 (Concluded).

Planet Parameters

Physical Model

Polar Radius:	20,855,591.48 ft
Equatorial Radius:	20,925,741.47 ft
Rotational Rate:	.7292115147E-4 rad/sec

Gravity Model

Central mass, μ:	.1407646853E17 ft^3/sec^2
J_2:	.10827E-2
C_{30}:	.256E-5
C_{40}:	.158E-5
C_{22}:	.157E-5
S_{22}:	-.897E-6

Runway 17 Location:

Altitude:	2090.ft (above ellipsoid)
Geodetic Latitude:	34.930885 deg
Longitude:	242.163116 deg
Azimuth:	190.072211 deg

Location of IMU relative to center-of-gravity in Body coordinates

(6-point table used for entry reconstruction)

TIME, sec	X_B, ft	Y_B, ft	Z_B, ft
0	56.1928	0.0250	-4.0417
480	56.1928	0.0250	-4.0417
1915	55.9761	0.0250	-4.1167
2314	55.9761	0.0250	-4.1167
2314.01	56.1094	0.0250	-4.3417
3000	56.1094	0.0250	-4.3417

Spacecraft aerodynamic reference parameters

Reference Area	2690 ft^2
Span	78.057 ft
Chord	39.567 ft

Average Attitude Computations @ Epoch (46740 sec)

	IMU1	IMU2	IMU3	μ	σ
ψ(deg)	57.3026	57.3329	57.4265	57.3540	0.0646
θ(deg)	29.9140	30.0078	29.9902	29.9707	0.0499
ϕ(deg)	-2.2145	-2.2793	-2.2834	-2.2591	0.0386

TABLE A-2

Planet and Spacecraft Data Used for

BT14N02, ST14BET, and AEROBET Generation

Weight and Center-of-Gravity (c.g.) Location

EVENT	TIME (sec from epoch)	WEIGHT (lbs)	X_{CG} (inches in Orbiter	Y_{CG} Structural	Z_{CG} Reference)
EI	480	203530.5	1093.5	-0.3	373.5
M3	1915	202466.5	1090.9	-0.3	372.6
Landing	2333	202336.5	1092.5	-0.3	369.9

Moments and Products of Inertia

EVENT	I_{XX}	I_{YY}	I_{ZZ}	I_{XY}	I_{XZ}	I_{YZ}
EI	895931.5	6738859.2	7024474.3	13829.3	181084.5	-2078.6
M3	887861.6	6679180.0	6968767.1	14375.9	163649.0	-1920.3
Landing	917348.1	6700003.2	6964771.4	14469.1	157153.9	-1961.3

NOTES

EI values assumed at epoch

Mach 3 values held constant until gear deploy (t=2314), landed values adopted thereafter

TABLE A-3

STS-14 mass properties.

APPENDIX B

Final residuals for STS-14 trajectory reconstruction

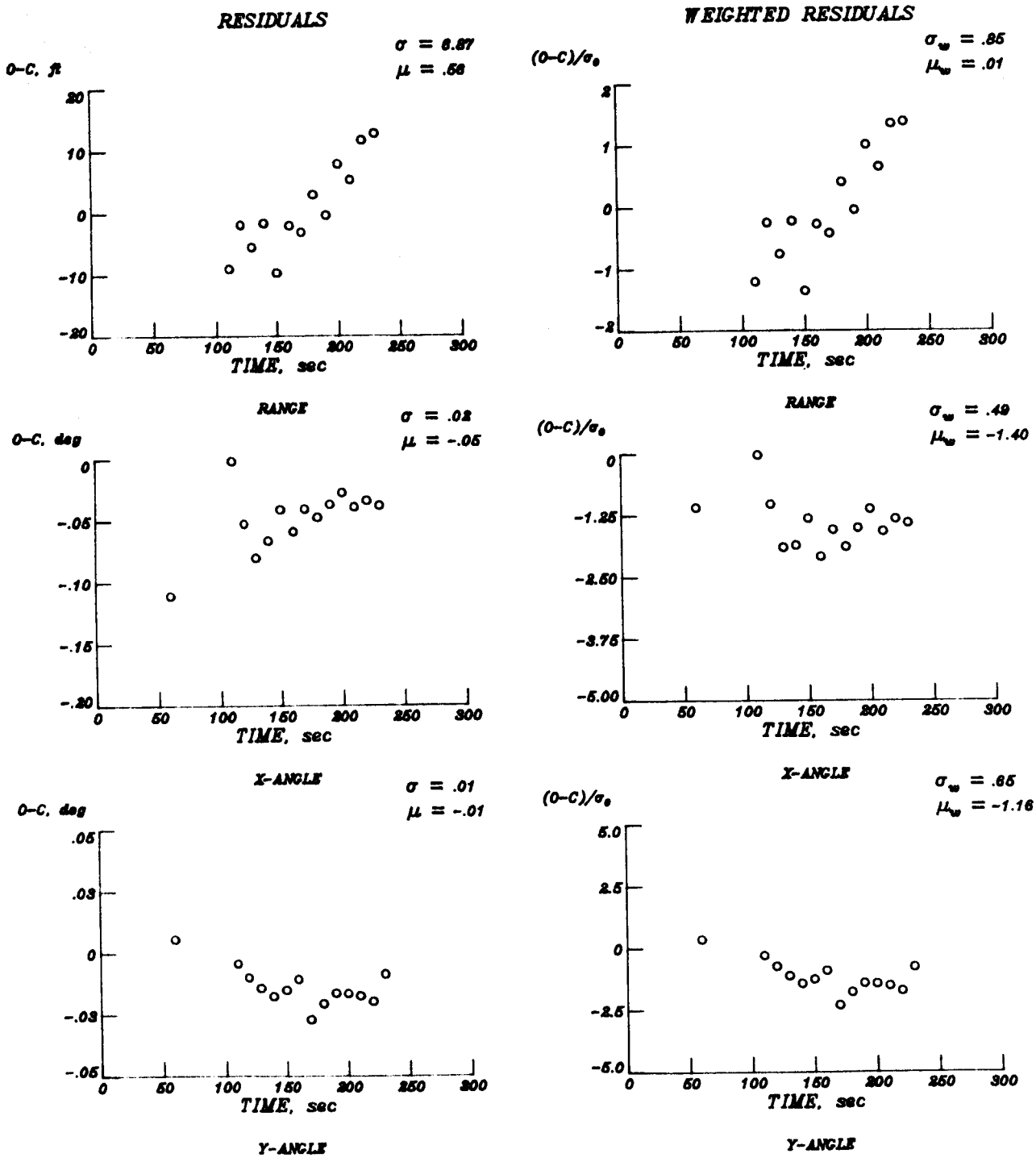


Fig. B-1. *Smoothed residuals versus time for GWMS*

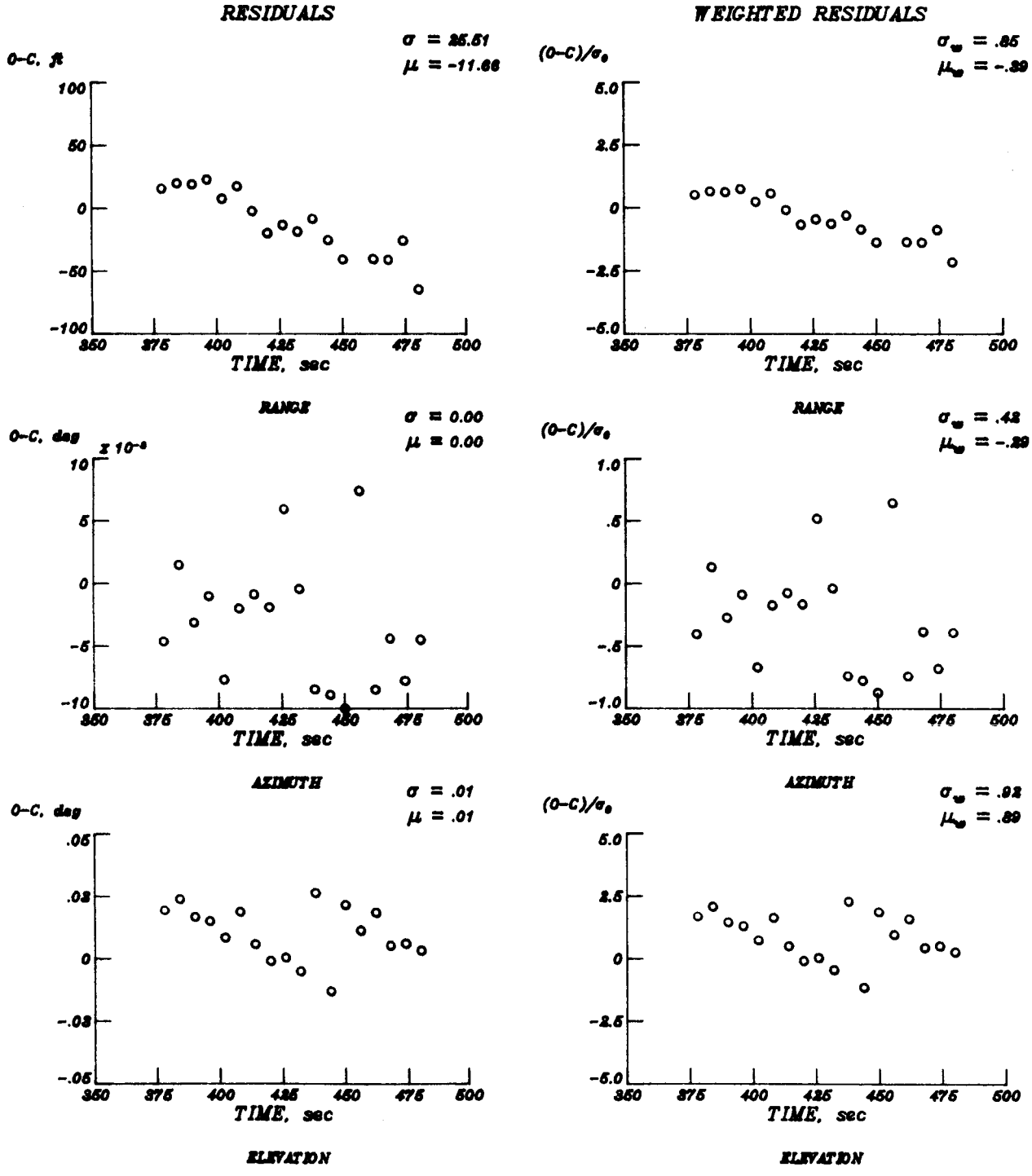


Fig. B-2. *Smoothed residuals versus time for KMRC*

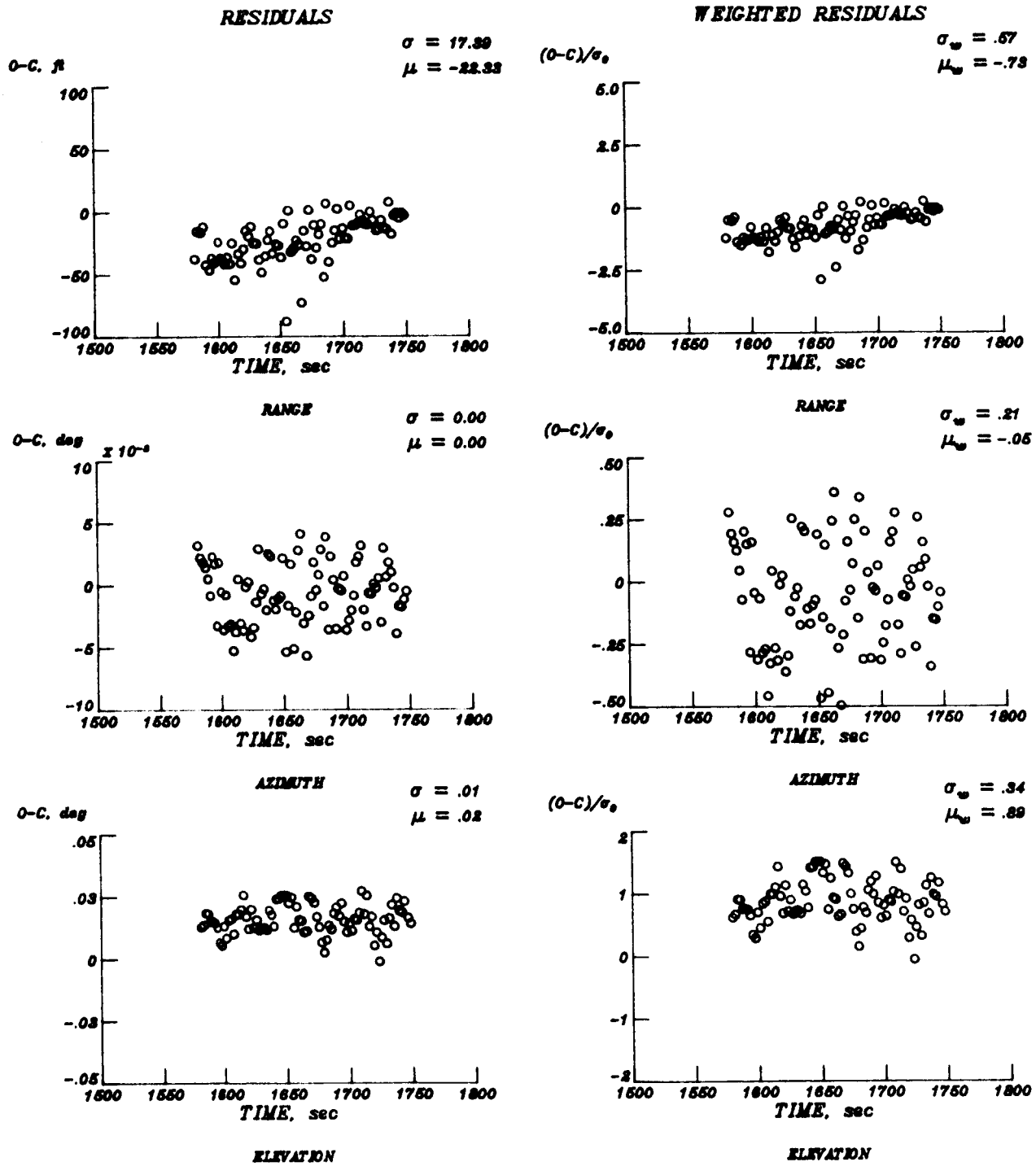


Fig. B-3. *Smoothed residuals versus time for PTPC*

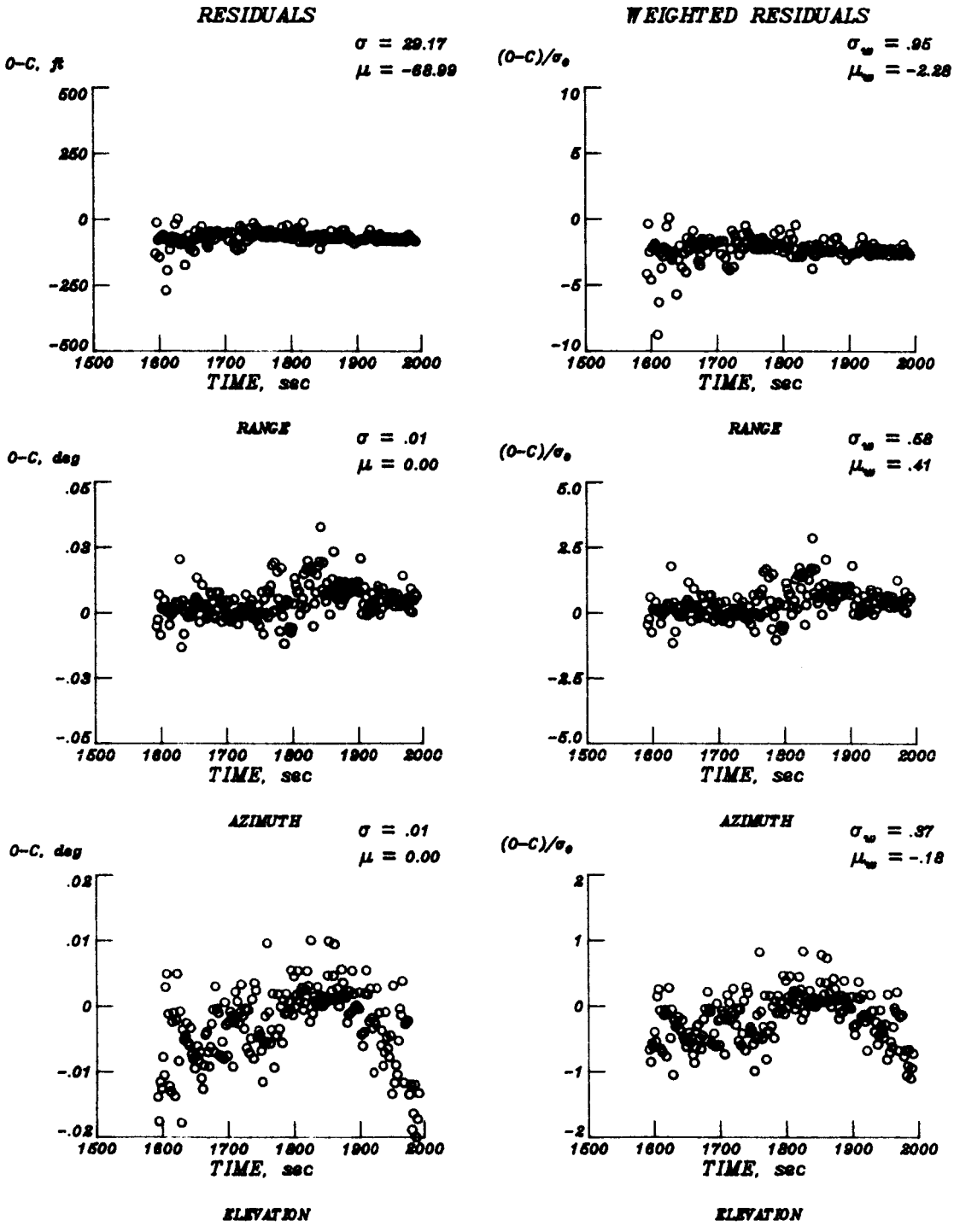


Fig. B-4. *Smoothed residuals versus time for VDBC*

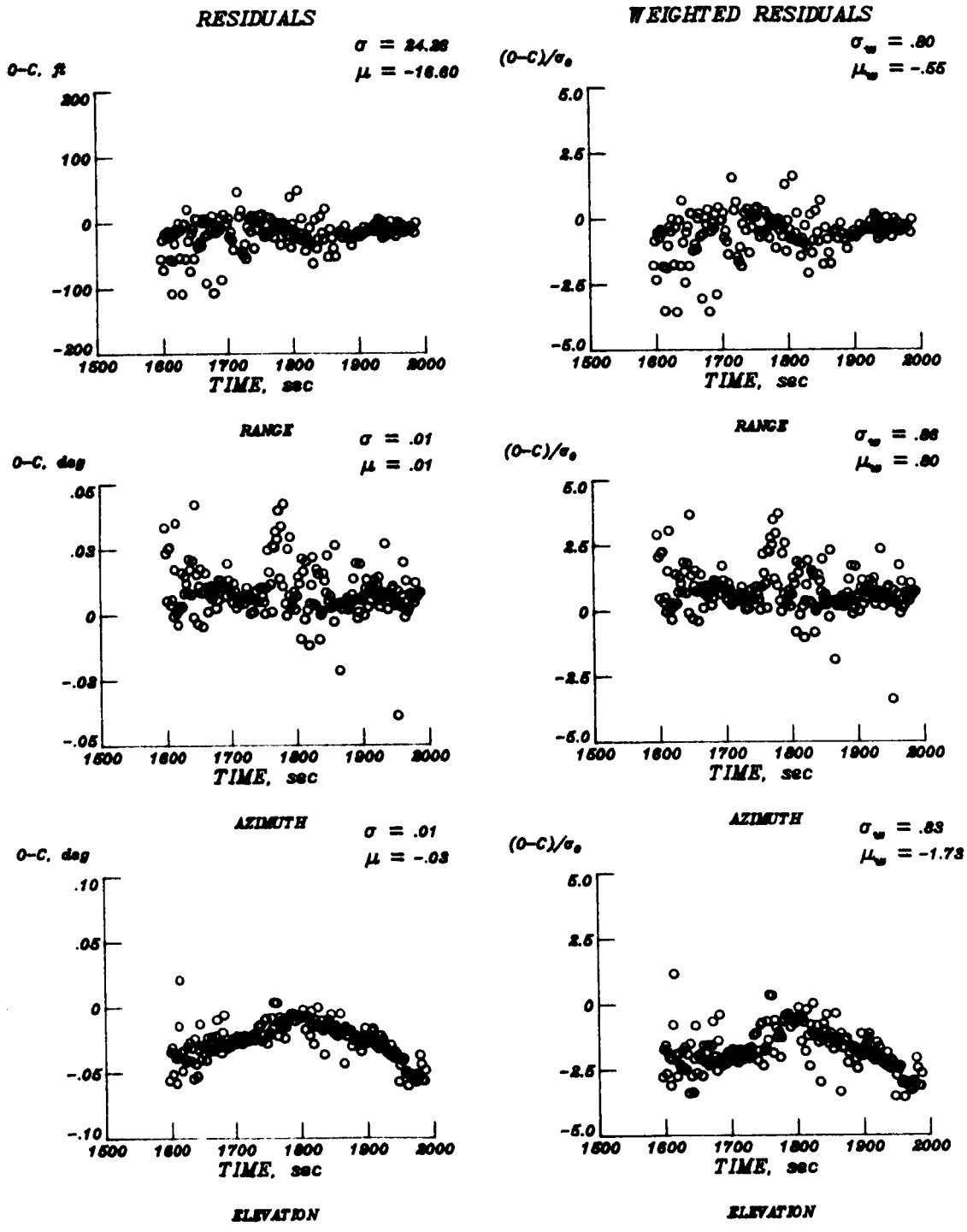


Fig. B-5. *Smoothed residuals versus time for VDSC*

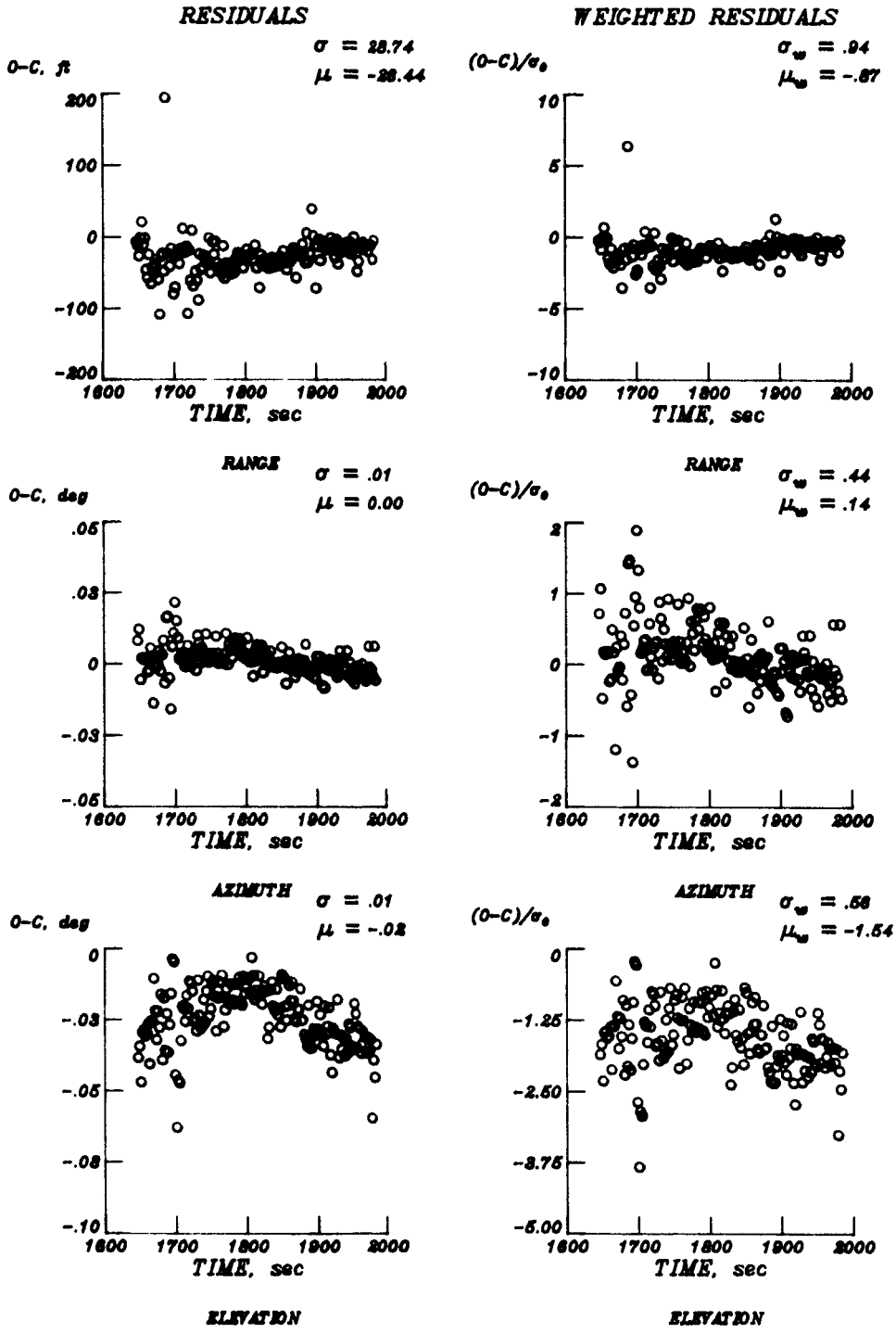


Fig. B-6. *Smoothed residuals versus time for SNFC*

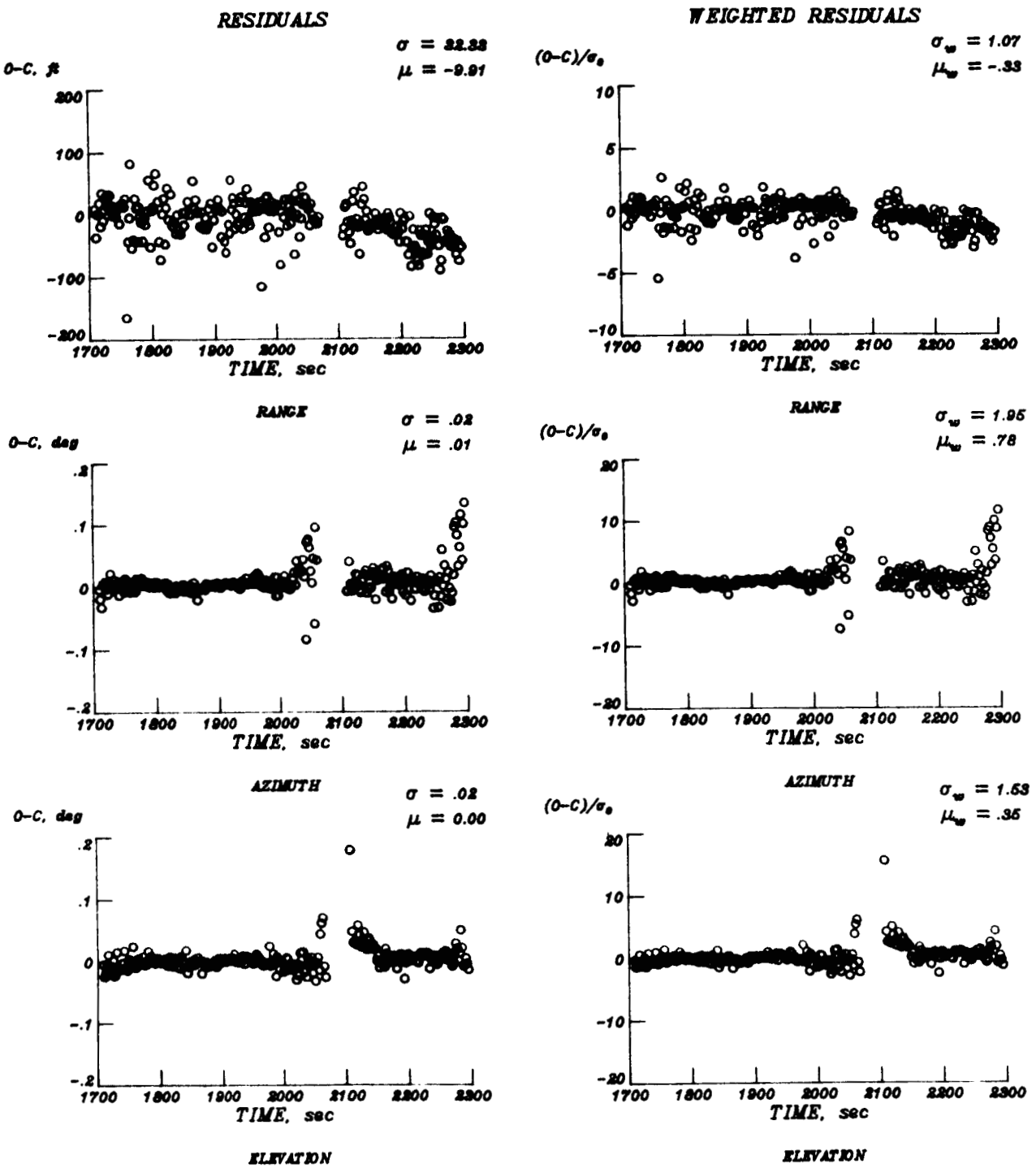


Fig. B-7. *Smoothed residuals versus time for FRCC*

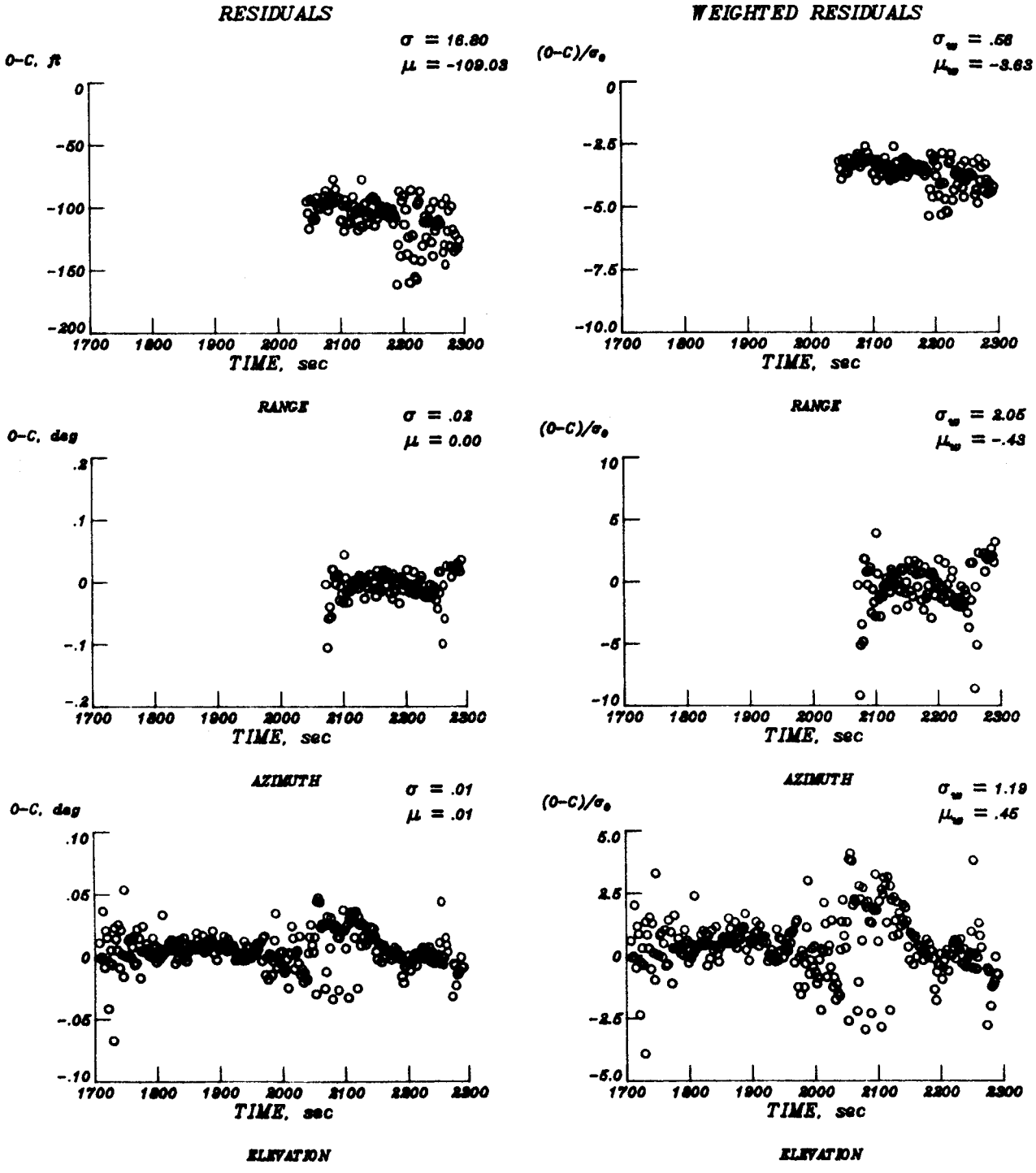


Fig. B-8. *Smoothed residuals versus time for EAFC*

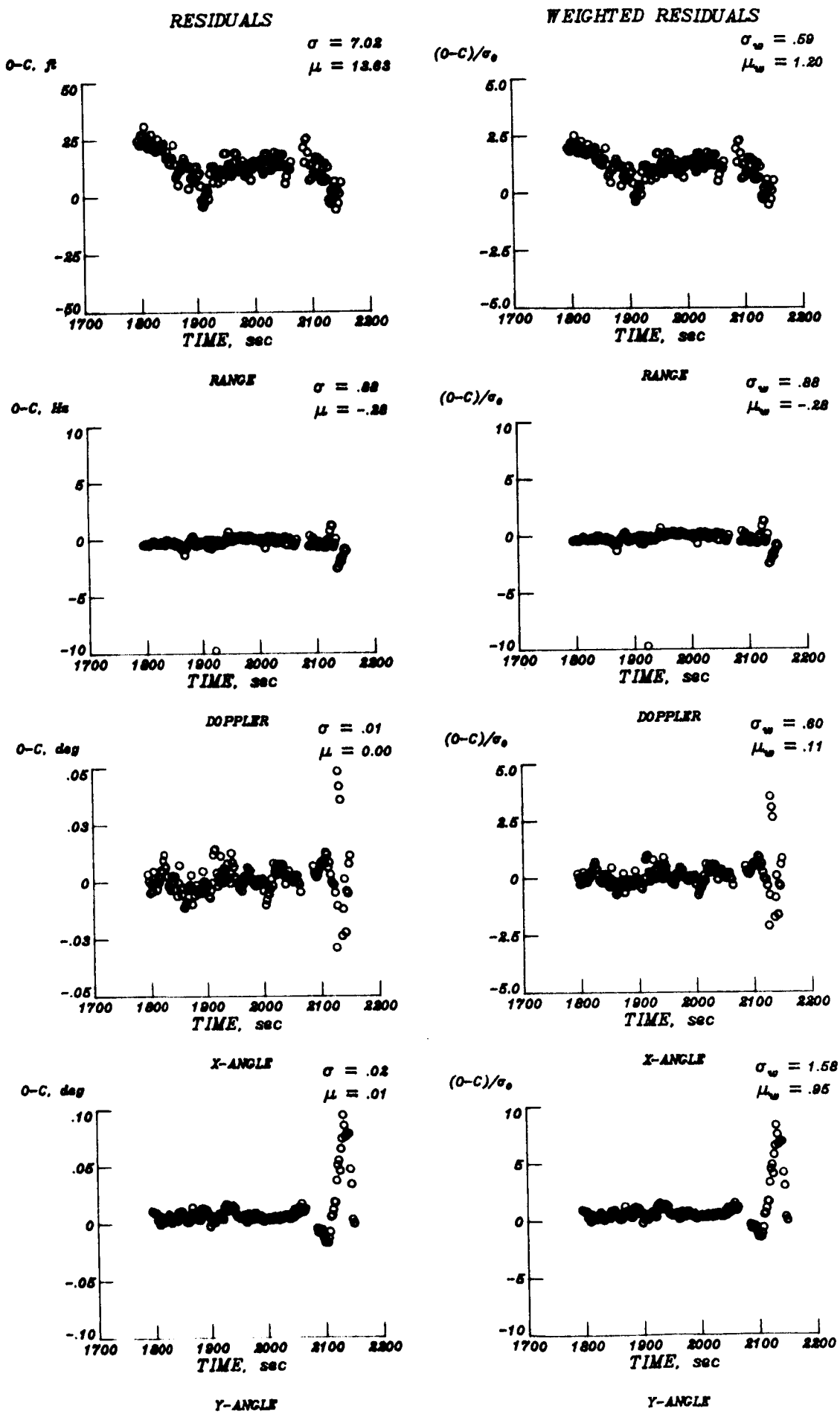


Fig. B-9. *Smoothed residuals versus time for GDSS*

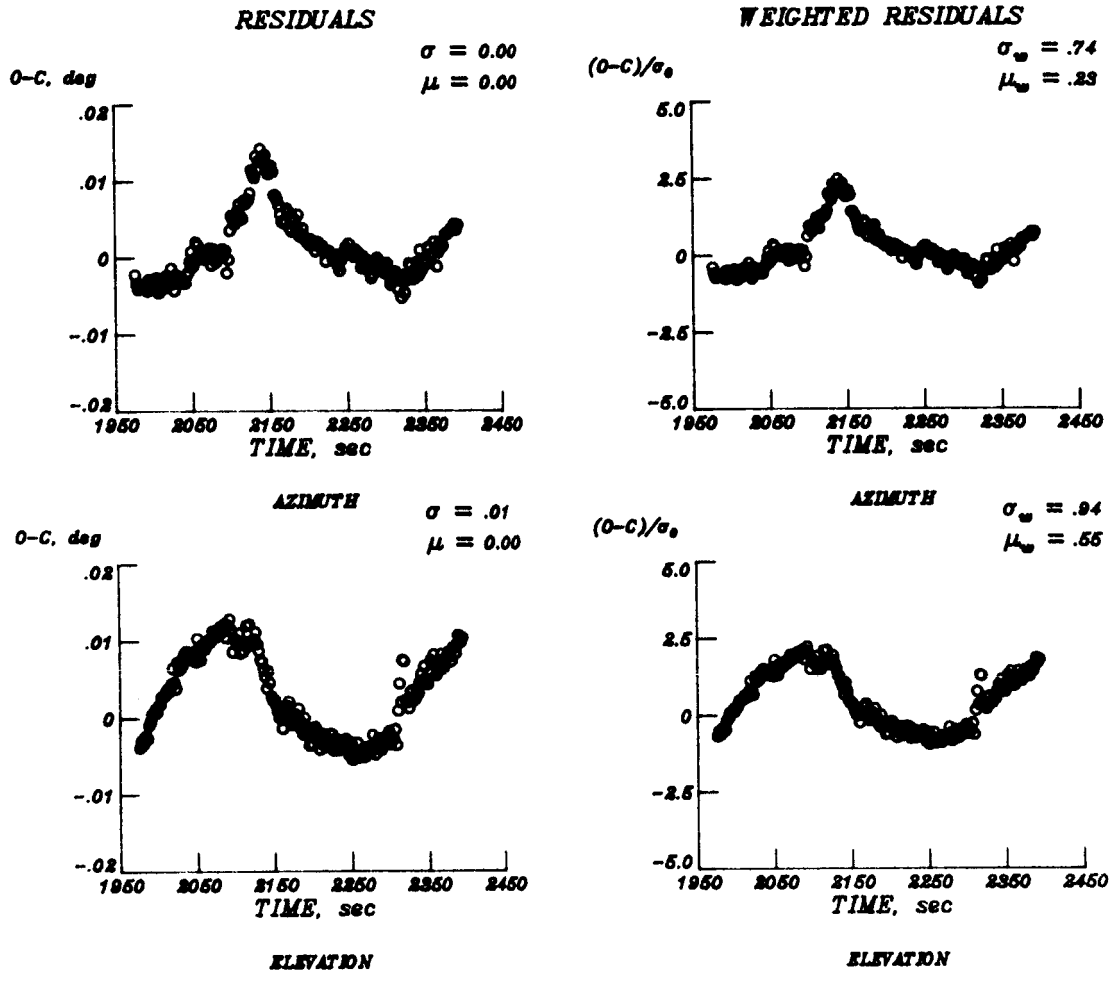


Fig. B-10. *Smoothed residuals versus time for THEO1*

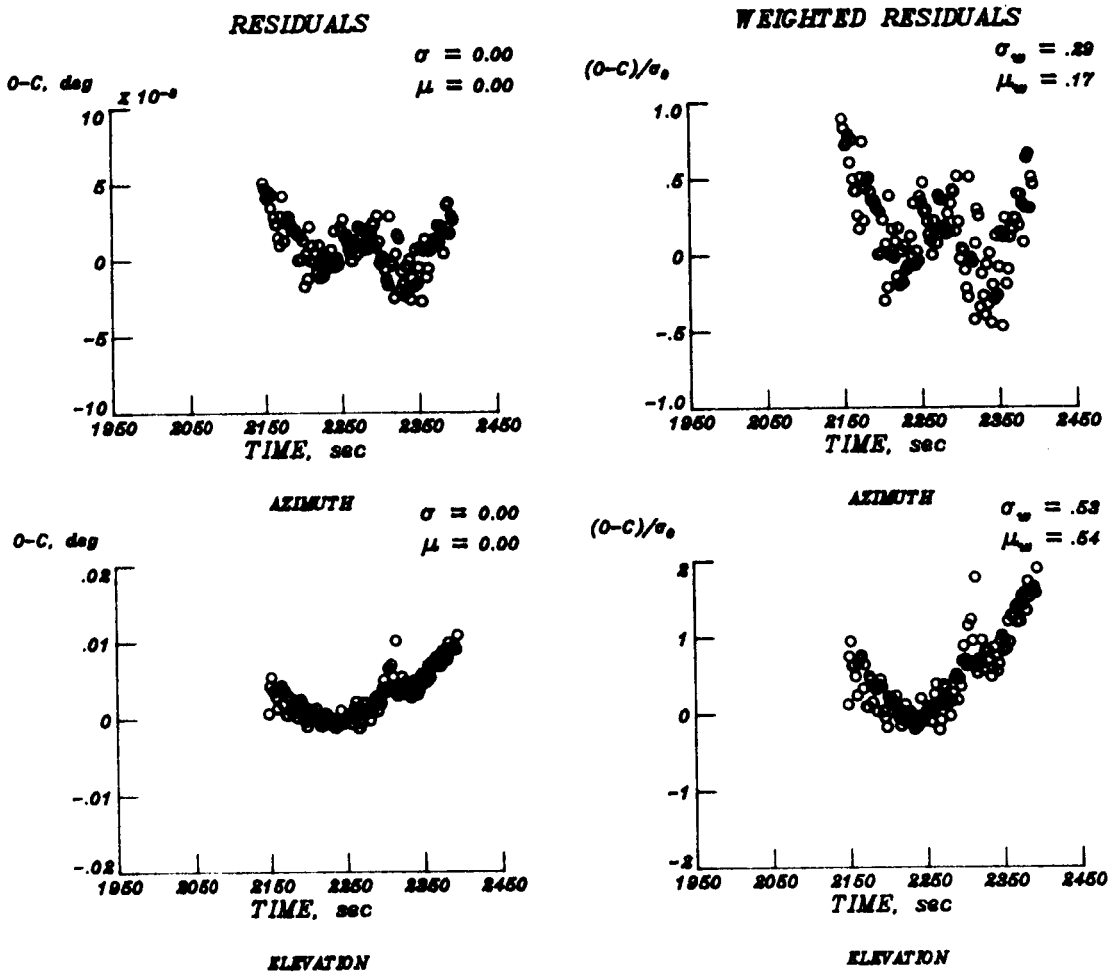


Fig. B-11. *Smoothed residuals versus time for THEOS*

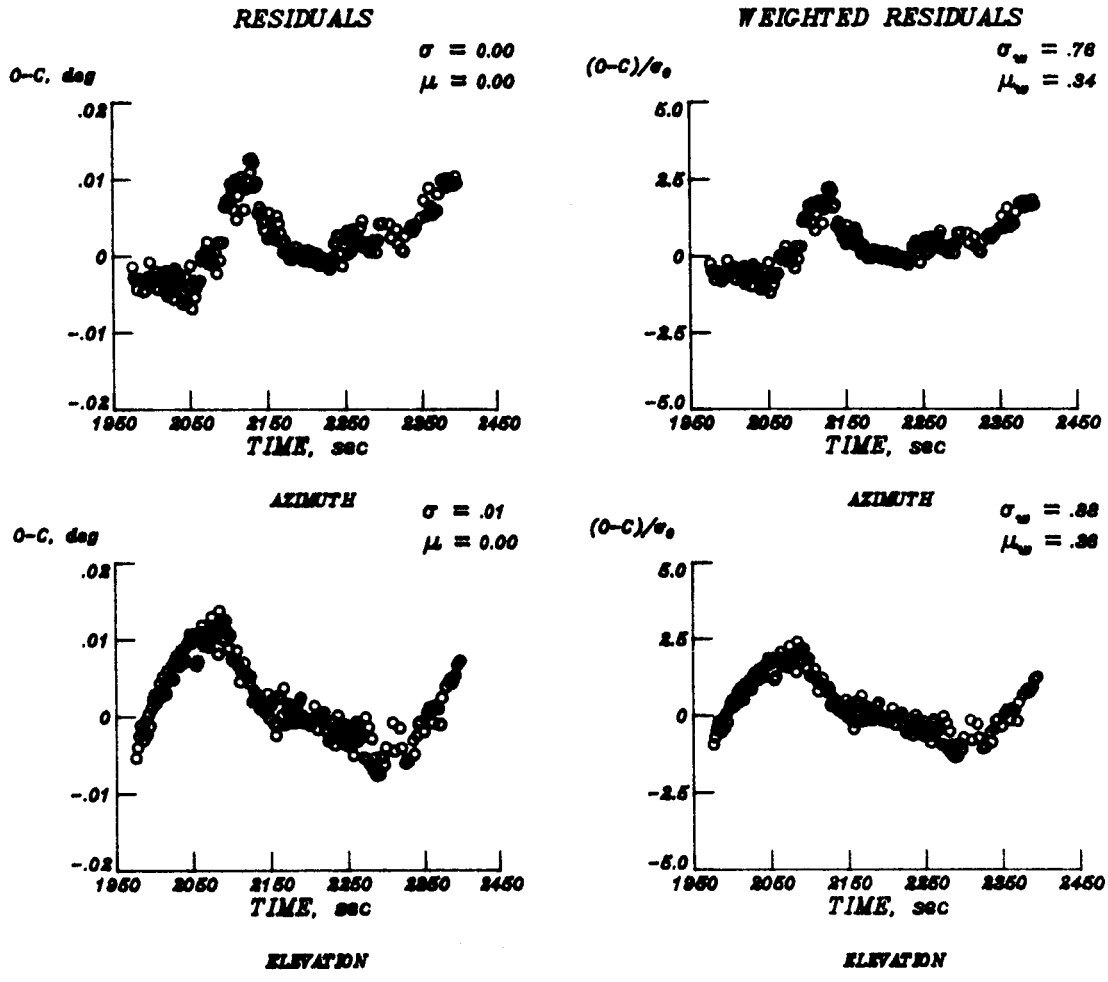


Fig. B-12. *Smoothed residuals versus time for THEO7*

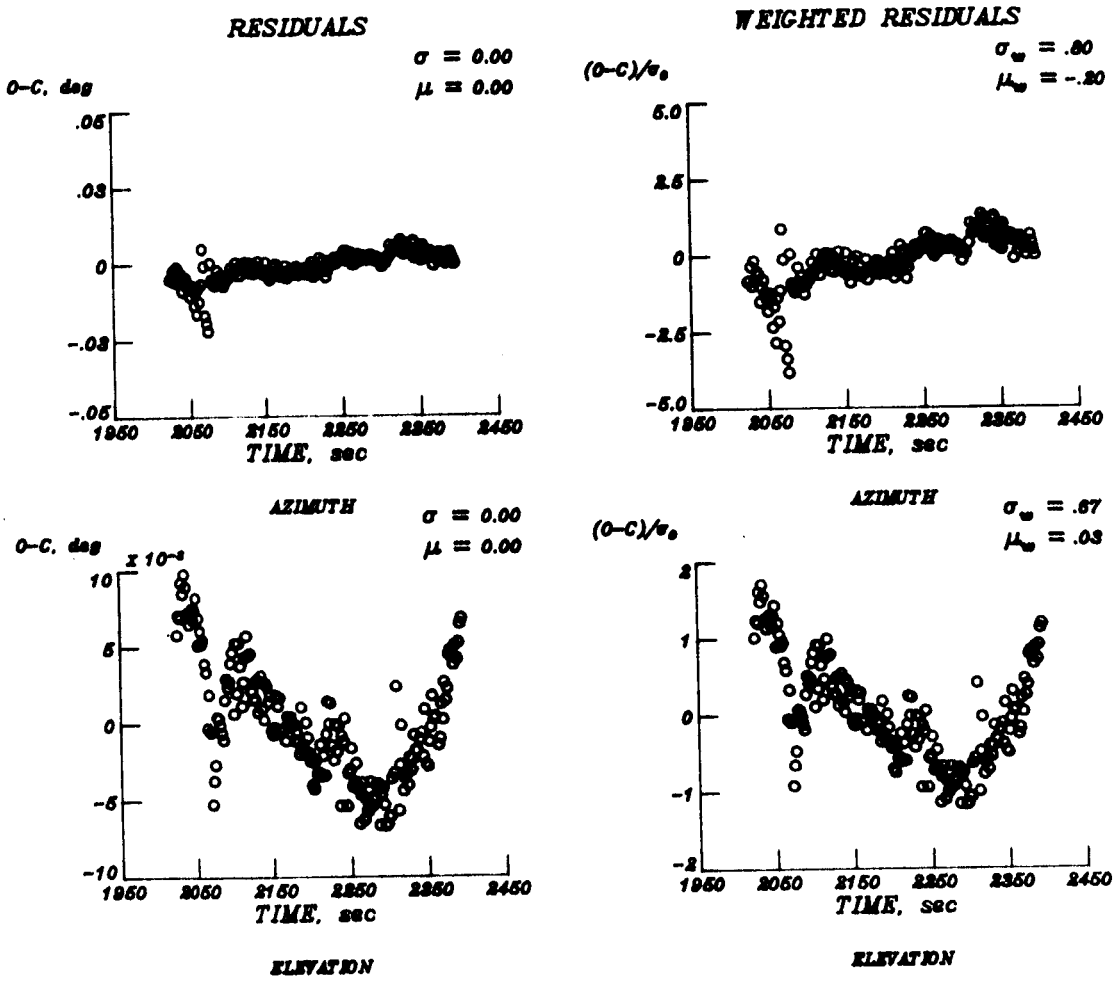


Fig. B-13. *Smoothed residuals versus time for THE09*

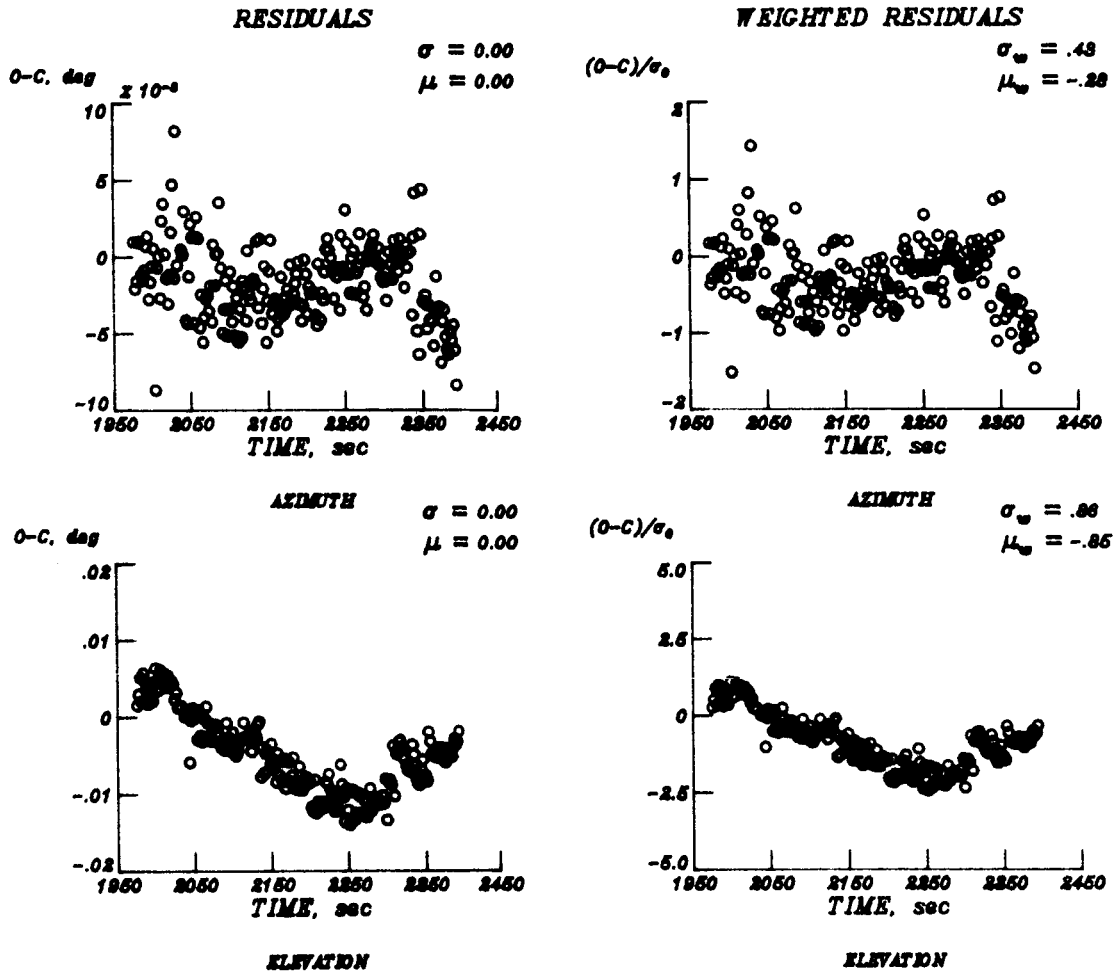


Fig. B-14. *Smoothed residuals versus time for THE15*

APPENDIX C

Listing of ST14BET air relative parameters

@ 2.0 sec

(t, h, V_A, γ_A, ψ_A, σ_A, β_A, α_A, M_A, q_A)

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*****************************************************************************************
*                                  LARC "EXTENDED" BET HEADER RECORD                    *
*****************************************************************************************

...DESCRIPTIVE DATA (  48-WORDS )
 ST14BET USING ST14MET(11/84),INERTIAL-BT14N02,NB1060 DYN. DATA.
     840905      2430 STS-14 INERTIAL BET /BT14N02/  (TREF=46740)
   INITIAL CONDITIONS FROM ARHOREN (ESOLVE) 11-2-84
   IMU NBR 2 EA SEQ 1 (TAPE NB0945)
   S,C-BAND, THEODOLITE, NO PSEUDO DATA
   SOLUTION SET--STATE, ACCELEROMETER SCALE FACTORS

...LABELS AND UNITS FOR DATA ITEMS
 (  1)  TIME          SEC          (  2)  VEL A        FT/SEC          (  3)  GAM A       DEG
 (  4)  HDG A         DEG          (  5)  ALTDE        FEET            (  6)  LATD        DEG
 (  7)  LONG          DEG          (  8)  SIGMAA       DEG             (  9)  BETA A      DEG
 ( 10)  ALPHAA        DEG          ( 11)  YAW E        DEG             ( 12)  PTCH E      DEG
 ( 13)  ROLL E        DEG          ( 14)  U            FT/SEC          ( 15)  V          FT/SEC
 ( 16)  W             FT/SEC       ( 17)  VEL R        FT/SEC          ( 18)  GAM R      DEG
 ( 19)  HDG R         DEG          ( 20)  SIGMAR       DEG             ( 21)  BETA R     DEG
 ( 22)  ALPHAR        DEG          ( 23)  U-WIND       FT/SEC          ( 24)  V-WIND     FT/SEC
 ( 25)  W-WIND        FT/SEC       ( 26)  SIG-VA       FT/SEC          ( 27)  SIG-GA     DEG
 ( 28)  SIG-HA        DEG          ( 29)  SIG-H        FEET            ( 30)  SIG-LA     DEG
 ( 31)  SIG-LO        DEG          ( 32)  SIG-SA       DEG             ( 33)  SIG-BA     DEG
 ( 34)  SIG-AA        DEG          ( 35)  SIG-YE       DEG             ( 36)  SIG-PE     DEG
 ( 37)  SIG-RE        DEG          ( 38)  SIG-U        FT/SEC          ( 39)  SIG-V      FT/SEC
 ( 40)  SIG-W         FT/SEC       ( 41)  MACH A       NONE            ( 42)  MACH R     NONE
 ( 43)  PINF          PSF          ( 44)  TEMP         DEG RANKIN      ( 45)  RHO        SLUGS/FT3
 ( 46)  Q A           PSF          ( 47)  Q R          PSF             ( 48)  PSTAG      PSF
 ( 49)  P             DEG/SEC      ( 50)  Q            DEG/SEC         ( 51)  R          DEG/SEC
 ( 52)  X ACCEL       FT/SEC/SEC   ( 53)  Y ACCEL      FT/SEC/SEC      ( 54)  Z ACCEL    FT/SEC/SEC
 ( 55)  CXB           NONE         ( 56)  CYB          NONE            ( 57)  CZB        NONE
 ( 58)  CL            NONE         ( 59)  CD           NONE            ( 60)  L/D        NONE
 ( 61)  CL-ROLL       NONE         ( 62)  CM-PITCH     NONE            ( 63)  CN-YAW     NONE
 ( 64)  PDOT          DEG/SEC2     ( 65)  QDOT         DEG/SEC2        ( 66)  RDOT       DEG/SEC2

...NUMERICAL DATA
 ISERNO    1  NWDS  66  IUNITS    2
 EPOCH      .46740000E+05  RADE       .20925741E+08  RADP       .20855591E+08  OMEGA      .72921151E-04
```

ORIGINAL PAGE IS OF POOR QUALITY

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
0.0	668971.8	24077.7	-1.289	59.768	-1.996	1.203	31.377	13.178	.000
2.0	667892.5	24079.0	-1.290	59.772	-1.942	1.197	31.523	13.185	.000
4.0	666812.3	24080.4	-1.292	59.777	-1.762	1.278	31.711	13.192	.000
6.0	665731.2	24081.7	-1.293	59.781	-1.590	1.354	31.905	13.199	.000
8.0	664649.4	24083.1	-1.294	59.785	-1.425	1.433	32.110	13.207	.000
10.0	663566.7	24084.4	-1.295	59.790	-1.256	1.504	32.323	13.214	.000
12.0	662483.2	24085.8	-1.296	59.795	-1.103	1.583	32.540	13.222	.000
14.0	661398.9	24087.2	-1.297	59.799	-.950	1.659	32.764	13.229	.000
16.0	660313.7	24088.5	-1.298	59.804	-.802	1.740	33.006	13.237	.000
18.0	659227.8	24089.9	-1.299	59.810	-.658	1.821	33.245	13.244	.000
20.0	658141.1	24091.2	-1.300	59.815	-.515	1.896	33.493	13.252	.000
22.0	657053.7	24092.6	-1.301	59.820	-.386	1.980	33.753	13.260	.000
24.0	655965.5	24094.0	-1.302	59.826	-.242	2.060	34.022	13.898	.000
26.0	654876.5	24095.3	-1.304	59.832	-.121	2.139	34.298	13.905	.000
28.0	653786.7	24096.7	-1.305	59.838	.008	2.221	34.583	13.913	.000
30.0	652696.2	24098.1	-1.306	59.844	.138	2.305	34.876	13.921	.000
32.0	651604.9	24099.5	-1.307	59.850	.250	2.390	35.167	13.929	.000
34.0	650512.9	24100.8	-1.308	59.856	.372	2.469	35.479	13.936	.000
36.0	649420.2	24102.2	-1.309	59.863	.479	2.554	35.795	13.944	.000
38.0	648326.7	24103.6	-1.310	59.869	.587	2.646	36.115	13.952	.000
40.0	647232.5	24104.9	-1.311	59.876	.693	2.733	36.460	13.960	.000
42.0	646137.5	24106.3	-1.312	59.883	.787	2.821	36.795	13.968	.000
44.0	645041.9	24107.7	-1.313	59.890	.892	2.910	37.147	13.976	.000
46.0	643945.5	24109.1	-1.314	59.897	.889	2.929	37.513	13.984	.000
48.0	642848.4	24110.4	-1.315	59.904	.873	2.926	37.893	13.993	.000
50.0	641750.7	24111.8	-1.315	59.912	.843	2.921	38.269	14.001	.000
52.0	640652.3	24113.2	-1.316	59.919	.808	2.915	38.551	14.009	.000
54.0	639553.2	24114.5	-1.317	59.927	.794	2.915	38.782	14.018	.000
56.0	636453.5	24115.9	-1.318	59.935	.755	2.913	38.965	14.026	.000
58.0	637353.2	24117.3	-1.319	59.943	.722	2.904	39.148	14.035	.000

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
60.0	636252.1	24118.7	-1.320	59.951	.685	2.903	39.287	14.043	.000
62.0	635150.4	24120.1	-1.321	59.960	.640	2.903	39.441	14.052	.000
64.0	634048.1	24121.4	-1.322	59.968	.599	2.896	39.607	14.061	.000
66.0	632945.1	24122.8	-1.323	59.977	.553	2.887	39.767	14.069	.000
68.0	631841.6	24124.2	-1.324	59.986	.504	2.877	39.940	14.078	.000
70.0	630737.3	24125.6	-1.325	59.995	.453	2.875	40.070	14.087	.000
72.0	629632.4	24127.0	-1.325	60.004	.386	2.863	40.201	14.096	.000
74.0	628527.0	24128.4	-1.326	60.013	.334	2.860	40.346	14.105	.000
76.0	627420.9	24129.7	-1.327	60.022	.268	2.851	40.501	14.114	.000
78.0	626314.1	24131.1	-1.328	60.032	.199	2.829	40.661	14.124	.000
80.0	625206.8	24132.5	-1.329	60.041	.133	2.818	40.834	14.133	.000
82.0	624098.8	24133.9	-1.330	60.051	.066	2.807	41.016	14.142	.000
84.0	622990.4	24135.3	-1.330	60.061	-.006	2.800	41.038	14.151	.000
86.0	621881.4	24136.7	-1.331	60.071	-.079	2.791	41.062	14.161	.000
88.0	620771.8	24138.1	-1.332	60.082	-.155	2.777	41.094	14.170	.000
90.0	619661.6	24139.5	-1.333	60.092	-.249	2.761	41.134	14.180	.000
92.0	618550.8	24140.9	-1.334	60.103	-.334	2.738	41.187	14.190	.000
94.0	617439.5	24142.3	-1.334	60.113	-.410	2.729	41.237	14.200	.000
96.0	616327.6	24143.7	-1.335	60.124	-.505	2.715	41.309	14.209	.000
98.0	615215.2	24145.1	-1.336	60.135	-.605	2.688	41.382	14.219	.000
100.0	614102.2	24146.5	-1.337	60.146	-.704	2.666	41.469	14.229	.000
102.0	612988.7	24147.8	-1.337	60.158	-.805	2.643	41.563	14.239	.000
104.0	611874.6	24149.3	-1.338	60.169	-.905	2.622	41.667	14.250	.000
106.0	610760.0	24150.6	-1.339	60.181	-1.014	2.594	41.777	14.260	.000
108.0	609644.8	24152.0	-1.340	60.192	-1.121	2.575	41.891	14.270	.000
110.0	608529.2	24153.4	-1.341	60.204	-1.238	2.542	42.016	14.281	.000
112.0	607413.0	24154.8	-1.341	60.216	-1.343	2.516	42.155	14.291	.000
114.0	606296.4	24156.3	-1.342	60.228	-1.476	2.484	42.295	14.302	.000
116.0	605179.3	24157.7	-1.343	60.241	-1.587	2.453	42.453	14.312	.000
118.0	604061.6	24159.1	-1.343	60.253	-1.713	2.420	42.615	14.323	.000

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
120.0	602943.5	24160.5	-1.344	60.266	-1.843	2.385	42.790	14.334	.000
122.0	601824.9	24161.9	-1.345	60.278	-1.971	2.345	42.968	14.345	.000
124.0	600705.8	24163.3	-1.345	60.291	-2.102	2.314	43.153	14.356	.000
126.0	599586.3	24164.7	-1.346	60.304	-2.239	2.268	43.351	14.367	.000
128.0	598466.2	24166.1	-1.347	60.318	-2.382	2.218	43.556	14.378	.000
130.0	597345.7	24167.5	-1.347	60.331	-2.530	2.171	43.773	14.389	.000
132.0	596224.8	24168.9	-1.348	60.344	-2.666	2.137	43.943	14.401	.000
134.0	595103.5	24170.3	-1.349	60.358	-2.809	2.093	44.116	14.412	.000
136.0	593981.7	24171.7	-1.349	60.372	-2.967	2.036	44.295	14.424	.000
138.0	592859.5	24173.1	-1.350	60.386	-3.109	1.989	44.463	14.435	.000
140.0	591736.9	24174.5	-1.350	60.400	-3.269	1.937	44.608	14.447	.000
142.0	590613.9	24176.0	-1.351	60.414	-3.424	1.880	44.749	14.459	.000
144.0	589490.4	24177.3	-1.352	60.428	-3.587	1.826	44.913	14.471	.000
146.0	588366.6	24178.8	-1.352	60.443	-3.747	1.768	45.072	14.483	.000
148.0	587242.4	24180.2	-1.353	60.458	-3.912	1.709	45.252	14.495	.000
150.0	586117.7	24181.6	-1.353	60.472	-4.075	1.651	45.403	14.508	.000
152.0	584992.7	24183.0	-1.354	60.487	-4.253	1.586	45.536	14.520	.000
154.0	583867.3	24184.4	-1.355	60.503	-4.425	1.512	45.679	14.533	.000
156.0	582741.5	24185.8	-1.355	60.518	-4.600	1.446	45.830	14.545	.000
158.0	581615.4	24187.2	-1.356	60.533	-4.777	1.381	45.996	14.558	.000
160.0	580488.9	24188.7	-1.356	60.549	-4.958	1.310	46.163	14.571	.000
162.0	579362.0	24190.1	-1.357	60.565	-5.143	1.232	46.343	14.584	.000
164.0	578234.8	24191.5	-1.357	60.580	-5.330	1.154	46.497	14.597	.000
166.0	577107.3	24192.9	-1.358	60.596	-5.520	1.077	46.639	14.610	.000
168.0	575979.4	24194.3	-1.358	60.613	-5.706	.994	46.788	14.623	.000
170.0	574851.2	24195.8	-1.359	60.629	-5.903	.914	46.949	14.637	.000
172.0	573722.6	24197.2	-1.359	60.645	-6.093	.827	47.281	14.650	.000
174.0	572593.7	24198.6	-1.360	60.662	-6.297	.735	47.651	14.664	.000
176.0	571464.5	24200.0	-1.360	60.679	-6.506	.640	48.043	14.678	.000
178.0	570334.9	24201.5	-1.361	60.696	-6.700	.544	48.439	14.692	.000

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
180.0	569205.0	24202.9	-1.361	60.713	-6.905	.448	48.842	14.706	.000
182.0	568074.8	24204.3	-1.362	60.730	-7.106	.342	49.256	14.720	.000
184.0	566944.4	24205.7	-1.362	60.747	-7.067	-.141	49.709	14.734	.000
186.0	565813.8	24207.1	-1.362	60.764	-6.400	-.666	49.856	14.749	.000
188.0	564683.4	24208.5	-1.362	60.782	-5.423	-.772	49.192	14.763	.000
190.0	563552.6	24209.9	-1.363	60.800	-4.076	-.423	48.591	14.778	.000
192.0	562421.6	24211.4	-1.363	60.817	-2.739	-.131	48.026	14.793	.000
194.0	561290.4	24212.8	-1.364	60.836	-1.994	-.564	47.534	14.808	.000
196.0	560158.9	24214.2	-1.364	60.854	-1.298	-1.003	47.069	14.823	.000
198.0	559027.1	24215.7	-1.364	60.872	-.716	-.742	46.625	14.838	.000
200.0	557895.1	24217.1	-1.365	60.891	-.656	-.987	46.248	14.853	.000
202.0	556762.9	24218.5	-1.365	60.910	-.563	-1.027	45.858	14.869	.000
204.0	555630.5	24219.9	-1.365	60.929	-.478	-1.086	45.351	14.885	.000
206.0	554498.1	24221.4	-1.366	60.948	-.414	-1.160	44.599	14.900	.000
208.0	553365.4	24222.8	-1.366	60.967	-.342	-1.230	43.867	14.916	.000
210.0	552232.6	24224.2	-1.366	60.986	-.202	-.725	43.140	14.933	.000
212.0	551099.5	24225.6	-1.367	61.006	-.065	-.394	42.418	14.949	.000
214.0	549966.3	24227.1	-1.367	61.025	.049	-.080	41.731	14.965	.000
216.0	548832.5	24228.6	-1.368	61.045	.170	.228	41.711	14.982	.000
218.0	547698.6	24230.1	-1.368	61.065	.279	.528	41.701	14.999	.000
220.0	546564.5	24231.5	-1.368	61.085	.398	.844	41.704	15.016	.000
222.0	545430.2	24233.0	-1.368	61.105	.170	.590	41.764	15.033	.000
224.0	544295.8	24234.4	-1.369	61.125	.109	.020	41.865	15.050	.000
226.0	543161.4	24235.8	-1.369	61.146	.452	.136	41.808	15.068	.000
228.0	542026.8	24237.2	-1.369	61.167	.793	.263	41.712	15.085	.000
230.0	540892.1	24238.7	-1.369	61.187	1.124	.379	41.496	15.103	.000
232.0	539757.3	24240.1	-1.370	61.208	1.233	.286	41.273	15.121	.000
234.0	538622.4	24241.5	-1.370	61.230	1.221	.074	41.083	15.139	.000
236.0	537487.3	24242.9	-1.370	61.251	1.272	.155	40.893	15.158	.000
238.0	536352.1	24244.4	-1.370	61.272	1.352	.339	40.712	15.176	.001

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
240.0	535216.8	24245.8	-1.371	61.294	1.307	.414	40.547	15.195	.001
242.0	534081.3	24247.3	-1.371	61.316	1.034	.273	40.422	15.214	.001
244.0	532945.8	24248.7	-1.371	61.337	.761	.138	40.304	15.233	.001
246.0	531810.1	24250.1	-1.371	61.359	.485	.007	40.196	15.252	.001
248.0	530674.4	24251.5	-1.371	61.382	.212	-.126	40.087	15.272	.001
250.0	529538.6	24253.0	-1.372	61.404	-.077	-.264	39.994	15.291	.001
252.0	528402.6	24254.4	-1.372	61.426	-.375	-.404	39.901	15.311	.001
254.0	527266.6	24255.9	-1.372	61.449	-.435	-.341	39.851	15.332	.001
256.0	526130.6	24257.3	-1.372	61.472	-.395	-.162	39.823	15.352	.001
258.0	524994.5	24258.7	-1.372	61.495	-.354	.011	39.803	15.372	.001
260.0	523858.3	24260.1	-1.372	61.518	-.308	.178	39.787	15.393	.001
262.0	522722.1	24261.6	-1.372	61.541	-.300	.280	39.779	15.414	.001
264.0	521585.8	24263.0	-1.373	61.564	-.370	.039	39.782	15.435	.001
266.0	520449.5	24264.4	-1.373	61.588	-.441	-.187	39.788	15.457	.001
268.0	519313.2	24265.9	-1.373	61.612	-.488	-.392	39.806	15.479	.001
270.0	518176.8	24267.3	-1.373	61.635	-.295	-.095	39.845	15.501	.001
272.0	517040.4	24268.7	-1.373	61.659	-.096	.215	39.900	15.523	.001
274.0	515904.0	24270.2	-1.373	61.683	-.224	.163	39.988	15.545	.001
276.0	514767.6	24271.6	-1.373	61.708	-.360	.088	40.090	15.568	.001
278.0	513631.1	24273.0	-1.373	61.732	-.497	.008	40.204	15.591	.001
280.0	512494.7	24274.5	-1.373	61.757	-.653	-.073	40.323	15.614	.001
282.0	511358.3	24275.9	-1.373	61.781	-.800	-.152	40.451	15.637	.001
284.0	510221.9	24277.3	-1.373	61.806	-.946	-.236	40.589	15.661	.001
286.0	509085.5	24278.8	-1.373	61.831	-1.095	-.318	40.737	15.685	.001
288.0	507949.2	24280.2	-1.374	61.857	-1.255	-.405	40.898	15.709	.001
290.0	506812.9	24281.6	-1.374	61.882	-1.410	-.493	41.057	15.734	.001
292.0	505676.7	24283.1	-1.374	61.908	-1.318	-.350	41.223	15.758	.001
294.0	504540.6	24284.5	-1.373	61.933	-1.159	-.121	41.217	15.783	.001
296.0	503404.6	24285.9	-1.373	61.959	-1.020	.004	41.197	15.809	.001
298.0	502268.6	24287.3	-1.373	61.985	-.916	-.046	41.175	15.834	.001

TIME (SEC)	ALTDc (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
300.0	501132.7	24288.8	-1.373	62.011	-.820	-.079	41.171	15.860	.001
302.0	499996.9	24290.2	-1.373	62.037	-.726	-.125	41.082	15.886	.001
304.0	498861.2	24291.6	-1.373	62.064	-.633	-.158	40.969	15.913	.001
306.0	497725.6	24293.0	-1.373	62.090	-.533	-.199	40.864	15.940	.001
308.0	496590.1	24294.5	-1.373	62.117	-.446	-.241	40.770	15.967	.001
310.0	495454.7	24295.9	-1.373	62.144	-.368	-.274	40.681	15.994	.001
312.0	494319.4	24297.3	-1.373	62.171	-.284	-.315	40.606	16.022	.001
314.0	493184.2	24298.8	-1.373	62.198	-.205	-.359	40.539	16.050	.001
316.0	492049.1	24300.2	-1.373	62.226	-.113	-.350	40.481	16.079	.001
318.0	490914.1	24301.6	-1.373	62.253	.021	-.119	40.433	16.108	.001
320.0	489779.2	24303.0	-1.373	62.281	.148	.087	40.393	16.137	.001
322.0	488644.5	24304.5	-1.373	62.308	.269	.304	40.357	16.166	.001
324.0	487509.9	24305.9	-1.373	62.336	.312	.162	40.327	16.196	.001
326.0	486375.5	24307.3	-1.372	62.364	.324	-.033	40.303	16.227	.001
328.0	485241.2	24308.8	-1.372	62.393	.346	-.226	40.287	16.257	.001
330.0	484107.1	24310.2	-1.372	62.421	.400	-.267	40.284	16.288	.001
332.0	482973.1	24311.6	-1.372	62.450	.478	-.204	40.289	16.320	.001
334.0	481839.3	24313.1	-1.372	62.478	.543	-.145	40.292	16.351	.001
336.0	480705.7	24314.5	-1.372	62.507	.617	-.082	40.315	16.384	.001
338.0	479572.3	24315.9	-1.372	62.536	.681	-.023	40.337	16.416	.001
340.0	478439.0	24317.3	-1.371	62.566	.748	.030	40.369	16.449	.001
342.0	477305.9	24318.8	-1.371	62.595	.802	.089	40.418	16.483	.001
344.0	476173.1	24320.2	-1.371	62.624	.856	.145	40.470	16.517	.001
346.0	475040.4	24321.6	-1.371	62.654	.909	.198	40.526	16.551	.001
348.0	473908.0	24323.0	-1.371	62.684	.956	.247	40.595	16.586	.002
350.0	472775.8	24324.5	-1.370	62.714	.990	.302	40.672	16.621	.002
352.0	471643.8	24325.9	-1.370	62.744	1.036	.350	40.756	16.656	.002
354.0	470512.0	24327.3	-1.370	62.774	1.072	.397	40.853	16.693	.002
356.0	469380.5	24328.8	-1.370	62.805	1.102	.444	40.955	16.729	.002
358.0	468249.2	24330.2	-1.369	62.835	1.131	.487	41.057	16.766	.002

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
360.0	467116.2	24331.6	-1.369	62.806	.991	.388	41.138	16.804	.002
362.0	465987.5	24333.0	-1.369	62.897	.795	.223	41.156	16.842	.002
364.0	464857.1	24334.4	-1.369	62.928	.594	.058	41.066	16.881	.002
366.0	463727.0	24335.9	-1.368	62.959	.389	-.109	40.984	16.920	.002
368.0	462597.2	24337.3	-1.368	62.990	.177	-.270	40.916	16.960	.002
370.0	461467.6	24338.7	-1.366	63.022	.050	-.361	40.866	17.000	.002
372.0	460338.3	24340.1	-1.367	63.054	.060	-.311	40.841	17.041	.002
374.0	459209.4	24341.6	-1.367	63.085	.054	-.269	40.825	17.082	.002
376.0	458080.7	24343.0	-1.367	63.117	.057	-.223	40.810	17.124	.002
378.0	456952.3	24344.4	-1.366	63.149	.055	-.187	40.813	17.167	.002
380.0	455824.3	24345.8	-1.366	63.182	.047	-.152	40.821	17.210	.002
382.0	454696.6	24347.3	-1.366	63.214	.028	-.118	40.834	17.254	.002
384.0	453569.2	24348.7	-1.365	63.247	.011	-.083	40.861	17.298	.002
386.0	452442.1	24350.1	-1.365	63.279	-.015	-.061	40.899	17.343	.002
388.0	451315.3	24351.5	-1.365	63.312	-.038	-.031	40.939	17.389	.003
390.0	450188.9	24352.9	-1.364	63.345	-.068	-.003	40.985	17.436	.003
392.0	449062.9	24354.4	-1.364	63.379	-.094	.024	40.986	17.483	.003
394.0	447937.2	24355.8	-1.364	63.412	-.131	.045	40.944	17.530	.003
396.0	446811.9	24357.2	-1.363	63.446	-.181	.076	40.904	17.579	.003
398.0	445687.0	24358.6	-1.363	63.479	-.221	.101	40.868	17.628	.003
400.0	444562.4	24360.0	-1.362	63.513	-.268	.121	40.840	17.678	.003
402.0	443438.2	24361.4	-1.362	63.547	-.315	.135	40.827	17.729	.003
404.0	442314.4	24362.8	-1.361	63.581	-.372	.157	40.828	17.781	.003
406.0	441190.9	24364.2	-1.361	63.615	-.431	.171	40.827	17.833	.003
408.0	440067.9	24365.7	-1.361	63.650	-.493	.187	40.844	17.886	.003
410.0	438945.3	24367.1	-1.360	63.684	-.562	.203	40.864	17.940	.003
412.0	437823.1	24368.5	-1.360	63.719	-.625	.214	40.890	17.995	.004
414.0	436701.3	24369.9	-1.359	63.754	-.724	.113	40.925	18.051	.004
416.0	435579.9	24371.3	-1.359	63.789	-.859	-.149	40.971	18.108	.004
418.0	434459.0	24372.7	-1.358	63.824	-.936	-.346	40.974	18.165	.004

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
420.0	433336.5	24374.1	-1.358	63.860	-.856	-.387	40.946	18.224	.004
422.0	432218.5	24375.6	-1.357	63.895	-.783	-.441	40.918	18.283	.004
424.0	431098.9	24377.0	-1.357	63.931	-.590	-.373	40.912	18.344	.004
426.0	429979.9	24378.4	-1.356	63.967	-.300	-.213	40.872	18.405	.004
428.0	428861.2	24379.8	-1.356	64.003	-.016	-.061	40.838	18.468	.005
430.0	427743.0	24381.2	-1.355	64.039	.267	.092	40.809	18.532	.005
432.0	426625.4	24382.6	-1.355	64.075	.544	.242	40.793	18.596	.005
434.0	425508.1	24384.0	-1.354	64.112	.812	.391	40.780	18.662	.005
436.0	424391.4	24385.4	-1.353	64.148	.937	.413	40.794	18.729	.005
438.0	423275.1	24386.8	-1.353	64.185	.862	.233	40.844	18.797	.005
440.0	422159.4	24388.2	-1.352	64.222	.787	.067	40.897	18.867	.005
442.0	421044.1	24389.6	-1.352	64.259	.702	-.106	40.958	18.937	.006
444.0	419929.4	24391.0	-1.351	64.297	.634	-.217	41.003	19.009	.006
446.0	418815.2	24392.4	-1.350	64.334	.607	-.126	40.955	19.083	.006
448.0	417701.5	24393.9	-1.350	64.372	.569	-.042	40.912	19.157	.006
450.0	416588.4	24395.3	-1.349	64.409	.532	.036	40.878	19.233	.006
452.0	415475.8	24396.7	-1.349	64.447	.503	.124	40.855	19.310	.007
454.0	414363.7	24398.1	-1.348	64.485	.445	.199	40.838	19.389	.007
456.0	413252.2	24399.5	-1.347	64.523	.402	.278	40.837	19.470	.007
458.0	412141.2	24400.9	-1.347	64.562	.339	.342	40.830	19.552	.007
460.0	411030.8	24402.3	-1.346	64.600	.230	.183	40.836	19.635	.008
462.0	409921.0	24403.6	-1.345	64.639	.109	-.011	40.850	19.720	.008
464.0	408811.6	24405.0	-1.345	64.678	-.014	-.205	40.872	19.808	.008
466.0	407702.9	24406.4	-1.344	64.717	-.110	-.351	40.905	19.896	.009
468.0	406594.8	24407.8	-1.343	64.756	.134	-.002	40.929	19.985	.009
470.0	405487.2	24409.3	-1.343	64.795	.291	.277	40.949	20.075	.009
472.0	404380.3	24410.6	-1.342	64.835	.178	.264	40.892	20.167	.010
474.0	403274.0	24412.0	-1.341	64.874	.003	-.057	40.833	20.259	.010
476.0	402168.3	24413.4	-1.340	64.914	-.049	-.278	40.799	20.352	.010
478.0	401063.3	24414.8	-1.340	64.954	.084	-.312	40.788	20.446	.011

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
480.0	399958.8	24416.2	-1.339	64.994	.226	-.347	40.799	20.541	.011
482.0	398854.9	24417.6	-1.338	65.034	.355	-.374	40.812	20.637	.012
484.0	397751.7	24419.0	-1.338	65.075	.533	-.190	40.832	20.733	.012
486.0	396649.1	24420.4	-1.337	65.115	.705	.029	40.853	20.830	.013
488.0	395547.1	24421.7	-1.336	65.156	.891	.248	40.885	20.928	.013
490.0	394445.8	24423.1	-1.335	65.197	.936	.350	40.937	21.027	.014
492.0	393345.2	24424.5	-1.334	65.238	.874	.353	41.017	21.127	.015
494.0	392245.3	24425.9	-1.334	65.279	.818	.352	40.925	21.227	.015
496.0	391146.1	24427.2	-1.333	65.320	.742	.348	40.820	21.328	.016
498.0	390047.5	24428.6	-1.332	65.362	.664	.341	40.730	21.429	.017
500.0	388949.7	24430.0	-1.331	65.403	.581	.324	40.647	21.531	.017
502.0	387852.5	24431.4	-1.330	65.445	.489	.314	40.568	21.633	.018
504.0	386756.0	24432.8	-1.329	65.487	.400	.299	40.501	21.736	.019
506.0	385660.2	24434.1	-1.329	65.529	.304	.275	40.443	21.839	.020
508.0	384565.1	24435.5	-1.328	65.571	.201	.256	40.387	21.943	.021
510.0	383470.8	24436.9	-1.327	65.614	.091	.231	40.341	22.047	.022
512.0	382377.1	24438.2	-1.326	65.656	-.030	.198	40.300	22.151	.023
514.0	381284.1	24439.6	-1.325	65.699	-.148	.172	40.266	22.256	.024
516.0	380191.9	24440.9	-1.324	65.742	-.276	.137	40.243	22.360	.025
518.0	379100.4	24442.3	-1.323	65.785	-.398	.103	40.227	22.465	.026
520.0	378009.7	24443.7	-1.323	65.828	-.546	.060	40.214	22.570	.027
522.0	376919.8	24445.0	-1.322	65.871	-.689	.019	40.211	22.675	.028
524.0	375830.6	24446.4	-1.321	65.915	-.839	-.030	40.204	22.780	.030
526.0	374742.2	24447.7	-1.320	65.959	-.988	-.080	40.213	22.885	.031
528.0	373654.5	24449.0	-1.319	66.002	-1.151	-.133	40.225	22.990	.033
530.0	372567.6	24450.4	-1.318	66.046	-1.318	-.193	40.237	23.094	.034
532.0	371481.6	24451.7	-1.317	66.091	-1.490	-.253	40.258	23.199	.036
534.0	370396.3	24453.1	-1.316	66.135	-1.665	-.310	40.282	23.303	.038
536.0	369311.8	24454.4	-1.315	66.179	-1.850	-.380	40.307	23.406	.040
538.0	368228.2	24455.7	-1.314	66.224	-2.033	-.471	40.342	23.510	.042

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
540.0	367145.4	24457.1	-1.313	66.269	-1.682	-.239	40.428	23.613	.044
542.0	366063.4	24458.4	-1.312	66.313	-1.279	.007	40.528	23.715	.046
544.0	364982.3	24459.7	-1.311	66.359	-.916	.158	40.630	23.817	.049
546.0	363902.0	24461.0	-1.310	66.404	-.550	.311	40.733	23.918	.051
548.0	362822.5	24462.4	-1.309	66.449	-.327	.337	40.841	24.019	.054
550.0	361744.0	24463.7	-1.308	66.495	-.211	.262	40.972	24.118	.057
552.0	360666.3	24465.0	-1.307	66.540	-.102	.192	41.093	24.217	.060
554.0	359589.6	24466.3	-1.305	66.586	.005	.119	41.173	24.315	.063
556.0	358513.8	24467.5	-1.304	66.632	.092	.037	41.173	24.413	.066
558.0	357439.0	24468.8	-1.303	66.678	.176	-.051	41.034	24.509	.070
560.0	356365.1	24470.1	-1.302	66.725	.248	-.142	40.901	24.604	.074
562.0	355292.1	24471.4	-1.301	66.771	.308	-.238	40.770	24.698	.078
564.0	354220.1	24472.7	-1.300	66.818	.365	-.351	40.635	24.790	.082
566.0	353149.1	24473.9	-1.299	66.865	.470	-.217	40.499	24.882	.086
568.0	352079.0	24475.2	-1.297	66.912	.569	-.078	40.356	24.972	.091
570.0	351009.9	24476.4	-1.296	66.959	.653	.052	40.213	25.061	.096
572.0	349941.7	24477.7	-1.295	67.006	.698	.153	40.055	25.149	.101
574.0	348874.6	24479.0	-1.294	67.053	.734	.250	39.899	25.235	.107
576.0	347808.5	24480.2	-1.293	67.101	.762	.334	39.735	25.319	.113
578.0	346743.4	24481.4	-1.291	67.149	.774	.412	39.567	25.402	.119
580.0	345679.4	24482.6	-1.290	67.196	.639	.361	39.408	25.484	.126
582.0	344616.4	24483.9	-1.289	67.244	.367	.207	39.276	25.563	.133
584.0	343554.5	24485.1	-1.287	67.293	.086	.044	39.211	25.642	.140
586.0	342493.6	24486.3	-1.286	67.341	-.213	-.126	39.210	25.718	.148
588.0	341433.8	24487.6	-1.285	67.390	-.528	-.304	39.237	25.792	.157
590.0	340375.1	24488.8	-1.284	67.438	-.668	-.314	39.320	25.865	.166
592.0	339317.4	24490.0	-1.282	67.487	-.645	-.198	39.402	25.936	.175
594.0	338261.0	24491.1	-1.281	67.536	-.655	-.094	39.476	26.005	.185
596.0	337205.7	24492.3	-1.279	67.585	-.680	-.012	39.545	26.072	.196
598.0	336151.5	24493.5	-1.278	67.634	-.741	.058	39.601	26.138	.207

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
600.0	335098.6	24494.6	-1.276	67.684	-.805	.108	39.647	26.201	.219
602.0	334046.8	24495.8	-1.275	67.733	-.913	.129	39.678	26.262	.231
604.0	332996.2	24496.9	-1.274	67.783	-1.078	-.087	39.707	26.321	.245
606.0	331946.8	24498.1	-1.272	67.833	-1.257	-.319	39.721	26.379	.259
608.0	330898.7	24499.2	-1.271	67.883	-1.256	-.390	39.736	26.434	.274
610.0	329851.9	24500.3	-1.269	67.933	-1.236	-.427	39.744	26.487	.289
612.0	328806.3	24501.4	-1.267	67.983	-1.173	-.412	39.748	26.538	.306
614.0	327762.1	24502.5	-1.266	68.034	-.966	-.276	39.754	26.587	.263
616.0	326719.2	24503.6	-1.264	68.084	-.779	-.166	39.749	26.634	.278
618.0	325677.7	24504.6	-1.262	68.135	-.620	-.074	39.730	26.679	.294
620.0	324637.6	24505.6	-1.261	68.186	-.493	-.012	39.692	26.722	.311
622.0	323598.9	24506.6	-1.259	68.237	-.372	.044	39.641	26.763	.329
624.0	322561.8	24507.7	-1.257	68.288	-.266	.095	39.576	26.802	.348
626.0	321526.1	24508.6	-1.255	68.340	-.170	.141	39.578	26.839	.368
628.0	320492.0	24509.6	-1.253	68.391	-.082	.189	39.555	26.874	.390
630.0	319459.6	24510.5	-1.251	68.443	.003	.234	39.528	26.907	.412
632.0	318428.8	24511.3	-1.249	68.495	.081	.256	39.492	26.939	.436
634.0	317399.6	24512.2	-1.247	68.547	.151	.269	39.591	26.968	.461
636.0	316372.2	24513.1	-1.245	68.599	.217	.278	39.693	26.995	.488
638.0	315346.6	24513.9	-1.243	68.652	.285	.289	39.793	27.021	.516
640.0	314322.8	24514.7	-1.241	68.704	.373	.301	39.891	27.045	.546
642.0	313300.9	24515.4	-1.238	68.757	.458	.324	39.990	27.067	.578
644.0	312281.0	24516.2	-1.236	68.810	.529	.327	40.098	27.087	.612
646.0	311263.0	24516.9	-1.234	68.862	.593	.316	40.215	27.106	.647
648.0	310247.0	24517.6	-1.231	68.916	.666	.297	40.344	27.123	.684
650.0	309233.0	24518.3	-1.229	66.969	.730	.282	40.487	27.139	.724
652.0	308221.2	24518.9	-1.226	69.022	.802	.267	40.657	27.153	.766
654.0	307211.4	24519.5	-1.224	69.076	.869	.243	40.851	27.165	.809
656.0	306203.9	24520.1	-1.221	69.129	.917	.200	41.068	27.177	.855
658.0	305198.7	24520.6	-1.218	69.183	.938	.133	41.261	27.187	.905

TIME (SEC)	ALTDR (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
660.0	304195.9	24521.0	-1.215	69.237	.945	.054	41.339	27.195	.956
662.0	303195.6	24521.4	-1.212	69.292	.939	-.034	41.336	27.203	1.011
664.0	302197.9	24521.8	-1.209	69.346	.942	.044	41.309	27.209	1.069
666.0	301202.8	24522.1	-1.206	69.400	.930	.148	41.243	27.215	1.129
668.0	300210.3	24522.4	-1.203	69.455	.871	.219	41.148	27.219	1.192
670.0	299220.7	24522.6	-1.200	69.510	.753	.250	41.036	27.222	1.259
672.0	298233.8	24522.8	-1.196	69.565	.543	.225	40.889	27.225	1.330
674.0	297249.9	24523.0	-1.193	69.620	.249	.127	40.725	27.226	1.404
676.0	296269.0	24523.0	-1.189	69.675	-.155	-.046	40.527	27.227	1.481
678.0	295291.5	24523.0	-1.185	69.730	-.636	-.252	40.287	27.228	1.563
680.0	294317.5	24522.8	-1.181	69.786	-1.025	-.346	40.035	27.227	1.649
682.0	293347.0	24522.6	-1.176	69.841	-1.344	-.349	39.759	27.226	1.739
684.0	292380.4	24522.3	-1.172	69.897	-1.461	-.618	39.465	27.225	1.834
686.0	291417.6	24717.7	-1.158	70.135	-1.312	-.520	39.182	27.488	1.969
688.0	290456.8	24715.1	-1.154	70.163	-1.110	-.626	39.027	27.555	2.085
690.0	289504.0	24711.6	-1.149	70.191	-.693	-.571	39.053	27.618	2.206
692.0	288553.7	24707.2	-1.144	70.219	-.164	-.412	39.198	27.675	2.334
694.0	287607.9	24702.0	-1.138	70.247	.298	-.301	39.470	27.727	2.468
696.0	286666.8	24695.5	-1.133	70.274	.651	-.283	39.863	27.773	2.608
698.0	285730.7	24689.0	-1.127	70.305	.918	-.313	40.405	27.816	2.756
700.0	284799.8	24682.1	-1.122	70.339	1.093	-.318	40.969	27.853	2.911
702.0	283874.3	24674.6	-1.115	70.374	1.163	-.282	41.349	27.887	3.072
704.0	282954.6	24666.6	-1.109	70.411	1.114	-.317	41.428	27.916	3.242
706.0	282040.8	24658.1	-1.102	70.450	.978	-.435	41.311	27.940	3.419
708.0	281132.9	24649.1	-1.095	70.492	.841	-.546	40.958	27.960	3.603
710.0	280231.4	24639.4	-1.088	70.535	.841	-.560	40.409	27.976	3.796
712.0	279336.3	24629.9	-1.081	70.580	.994	-.482	39.847	27.988	3.996
714.0	278447.9	24620.3	-1.074	70.626	1.274	-.330	39.429	27.997	4.205
716.0	277566.2	24610.4	-1.066	70.674	1.587	-.205	39.334	28.002	4.422
718.0	276691.8	24600.3	-1.058	70.723	1.836	-.108	39.416	28.003	4.648

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
720.0	275824.6	24590.0	-1.049	70.773	1.691	-.190	39.696	28.001	4.882
722.0	274965.7	24579.3	-1.040	70.824	1.465	-.287	40.171	27.996	5.125
724.0	274115.1	24568.4	-1.030	70.875	1.211	-.384	40.710	27.987	5.376
726.0	273273.8	24556.8	-1.019	70.928	1.021	-.429	41.017	27.975	5.635
728.0	272442.3	24544.7	-1.008	70.982	.921	-.420	41.108	27.960	5.901
730.0	271621.0	24532.3	-.996	71.038	.912	-.336	40.961	27.942	6.176
732.0	270810.6	24518.7	-.984	71.095	.868	-.301	40.563	27.920	6.457
734.0	270011.2	24506.3	-.971	71.153	.821	-.271	40.016	27.897	6.747
736.0	269222.9	24494.1	-.959	71.212	.754	-.278	39.621	27.872	7.043
738.0	268446.1	24482.2	-.945	71.272	.713	-.276	39.456	27.846	7.347
740.0	267681.0	24470.2	-.932	71.333	.709	-.261	39.477	27.818	7.658
742.0	266928.0	24458.5	-.918	71.394	.711	-.265	39.684	27.789	7.975
744.0	266187.5	24446.9	-.903	71.456	.750	-.266	40.034	27.758	8.298
746.0	265460.0	24435.4	-.888	71.519	.824	-.268	40.456	27.726	8.627
748.0	264745.9	24424.0	-.872	71.583	.976	-.237	40.836	27.693	8.961
750.0	264045.6	24412.7	-.856	71.646	1.194	-.161	41.059	27.659	9.299
752.0	263359.7	24401.3	-.840	71.711	1.278	-.042	41.053	27.624	9.641
754.0	262688.4	24390.0	-.822	71.777	1.100	-.074	40.841	27.588	9.986
756.0	262032.0	24378.9	-.805	71.842	.799	-.191	40.444	27.552	10.333
758.0	261390.7	24368.0	-.788	71.909	.551	-.247	39.928	27.516	10.683
760.0	260764.6	24357.5	-.770	71.976	.419	-.218	39.524	27.479	11.035
762.0	260153.8	24347.0	-.752	72.043	.320	-.160	39.313	27.442	11.387
764.0	259558.6	24336.5	-.734	72.109	.185	-.137	39.322	27.405	11.739
766.0	258979.2	24325.9	-.715	72.176	-.063	-.186	39.565	27.368	12.091
768.0	258416.4	24314.9	-.695	72.243	-.300	-.227	39.980	27.330	12.441
770.0	257871.0	24303.7	-.674	72.311	-.475	-.212	40.554	27.292	12.787
772.0	257343.7	24291.4	-.653	72.378	-.591	-.138	40.994	27.253	13.128
774.0	256835.1	24279.6	-.631	72.445	-.786	-.118	41.228	27.215	13.465
776.0	256345.6	24267.8	-.608	72.512	-.995	-.268	41.178	27.177	13.795
778.0	255875.6	24256.2	-.585	72.579	-.953	-.257	40.844	27.140	14.118

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
780.0	255424.9	24244.8	-.563	72.648	-1.421	.678	40.330	27.104	14.434
782.0	254993.8	24233.7	-.540	72.715	-5.052	1.145	39.940	27.069	14.741
784.0	254582.3	24222.6	-.517	72.779	-10.893	.311	39.834	27.035	15.039
786.0	254190.3	24211.5	-.494	72.842	-16.834	-.018	39.962	27.001	15.327
788.0	253817.6	24200.2	-.471	72.901	-22.527	.053	40.223	26.968	15.604
790.0	253464.3	24188.7	-.449	72.956	-28.372	.074	40.465	26.936	15.869
792.0	253129.1	24177.0	-.428	73.009	-34.315	.025	40.579	26.904	16.124
794.0	252811.1	24165.3	-.408	73.060	-40.257	.038	40.420	26.873	16.367
796.0	252509.2	24153.4	-.390	73.107	-46.265	.097	40.061	26.843	16.600
798.0	252221.6	24141.7	-.375	73.152	-52.221	-.286	39.736	26.813	16.824
800.0	251946.0	24130.1	-.362	73.196	-56.115	-.794	39.467	26.784	17.041
802.0	251681.3	24118.7	-.349	73.238	-58.271	-.227	39.303	26.756	17.250
804.0	251426.9	24107.3	-.338	73.281	-60.649	.087	39.297	26.728	17.453
806.0	251181.6	24095.6	-.327	73.321	-63.254	-.200	39.497	26.701	17.650
808.0	250944.9	24084.0	-.317	73.362	-65.145	-.221	39.775	26.674	17.840
810.0	250716.2	24071.6	-.309	73.400	-66.520	-.223	40.041	26.647	18.025
812.0	250494.9	24059.0	-.300	73.438	-67.555	-.191	40.203	26.619	18.203
814.0	250280.4	24046.3	-.292	73.476	-67.446	.330	40.236	26.592	18.377
816.0	250072.8	24033.6	-.284	73.513	-67.710	-.414	40.085	26.566	18.546
818.0	249872.1	24021.0	-.277	73.551	-68.169	-.789	39.970	26.540	18.710
820.0	249677.6	24008.3	-.268	73.588	-66.199	-.328	40.035	26.514	18.870
822.0	249490.6	23995.4	-.259	73.625	-65.139	.222	40.105	26.488	19.023
824.0	249311.5	23982.1	-.250	73.662	-64.940	-.115	39.847	26.462	19.169
826.0	249140.2	23969.7	-.241	73.700	-64.410	-.157	39.227	26.438	19.310
828.0	248976.5	23957.0	-.231	73.737	-63.763	-.157	39.634	26.414	19.444
830.0	248821.3	23943.9	-.220	73.775	-63.466	.548	40.197	26.390	19.570
832.0	248675.5	23930.3	-.210	73.811	-66.552	.946	40.720	26.366	19.687
834.0	248537.0	23916.2	-.203	73.845	-71.690	-.199	41.064	26.341	19.797
836.0	248402.6	23901.9	-.199	73.878	-74.112	-.558	41.072	26.317	19.902
838.0	246272.1	23887.7	-.195	73.911	-75.444	.119	40.888	26.293	20.005

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
840.0	248144.1	23873.6	-.193	73.944	-78.021	.081	40.764	26.270	20.106
842.0	248017.0	23859.6	-.193	73.977	-80.147	-.361	40.708	26.246	20.206
844.0	247889.8	23845.6	-.193	74.009	-81.135	-.231	40.676	26.223	20.307
846.0	247761.8	23831.4	-.195	74.042	-81.833	-.178	40.702	26.199	20.409
848.0	247632.7	23817.2	-.196	74.074	-82.234	-.203	40.798	26.175	20.512
850.0	247502.1	23802.9	-.198	74.106	-82.451	-.141	40.922	26.151	20.617
852.0	247369.9	23788.4	-.200	74.138	-82.724	-.167	41.001	26.127	20.724
854.0	247235.9	23773.9	-.203	74.169	-82.928	-.188	41.005	26.103	20.833
856.0	247099.7	23759.4	-.206	74.201	-83.040	-.186	40.970	26.078	20.944
858.0	246961.2	23744.9	-.208	74.232	-83.121	-.227	40.917	26.053	21.058
860.0	246820.2	23730.3	-.212	74.264	-83.022	-.292	40.890	26.028	21.175
862.0	246676.6	23715.6	-.215	74.295	-82.618	-.294	40.895	26.003	21.295
864.0	246530.5	23700.9	-.218	74.326	-82.108	-.295	40.928	25.977	21.418
866.0	246382.1	23686.1	-.221	74.357	-81.494	-.324	40.977	25.952	21.544
868.0	246231.6	23671.3	-.223	74.386	-80.738	-.323	41.018	25.926	21.672
870.0	246079.2	23656.3	-.225	74.419	-79.800	-.287	41.055	25.899	21.803
872.0	245925.4	23641.2	-.227	74.449	-78.874	-.223	41.073	25.873	21.935
874.0	245770.6	23626.1	-.228	74.480	-78.084	-.215	41.063	25.846	22.069
876.0	245615.2	23610.9	-.229	74.511	-77.472	-.250	40.976	25.820	22.204
878.0	245459.3	23595.8	-.229	74.542	-76.836	-.219	40.854	25.793	22.341
880.0	245303.1	23580.8	-.230	74.572	-76.207	-.196	40.744	25.766	22.479
882.0	245146.7	23565.8	-.230	74.603	-75.597	-.246	40.716	25.740	22.617
884.0	244990.4	23550.7	-.229	74.634	-74.877	-.168	40.724	25.713	22.756
886.0	244834.4	23535.5	-.229	74.665	-74.257	-.173	40.777	25.686	22.895
888.0	244679.1	23520.2	-.228	74.696	-73.660	-.204	40.824	25.659	23.034
890.0	244524.7	23504.8	-.227	74.726	-73.023	-.133	40.862	25.632	23.172
892.0	244371.4	23489.0	-.226	74.757	-72.565	-.099	40.839	25.605	23.309
894.0	244219.2	23473.6	-.224	74.788	-72.252	-.067	40.746	25.578	23.446
896.0	244068.4	23458.2	-.223	74.819	-72.061	-.099	40.626	25.552	23.582
898.0	243918.7	23442.9	-.221	74.849	-71.772	-.091	40.551	25.525	23.717

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
900.0	243770.3	23427.6	-.220	74.880	-71.423	-.060	40.547	25.499	23.852
902.0	243623.1	23412.1	-.218	74.910	-71.067	-.062	40.555	25.472	23.985
904.0	243477.5	23396.6	-.216	74.941	-70.702	-.001	40.588	25.445	24.118
906.0	243333.5	23381.0	-.214	74.971	-70.615	.056	40.610	25.419	24.248
908.0	243191.1	23365.3	-.213	75.000	-70.687	.015	40.555	25.392	24.378
910.0	243050.0	23349.7	-.211	75.030	-70.715	.016	40.442	25.366	24.506
912.0	242910.1	23334.1	-.210	75.060	-70.671	.084	40.331	25.340	24.633
914.0	242771.3	23318.6	-.209	75.090	-70.780	.050	40.297	25.314	24.760
916.0	242633.4	23302.9	-.208	75.119	-70.899	.015	40.319	25.288	24.886
918.0	242496.3	23287.2	-.207	75.149	-71.022	-.005	40.349	25.261	25.012
920.0	242359.7	23271.3	-.207	75.178	-71.125	-.020	40.382	25.235	25.137
922.0	242223.7	23255.4	-.206	75.206	-71.211	-.019	40.381	25.209	25.262
924.0	242087.9	23239.4	-.206	75.235	-71.286	-.027	40.301	25.182	25.386
926.0	241952.3	23223.4	-.206	75.263	-71.341	-.025	40.189	25.156	25.511
928.0	241816.8	23207.4	-.206	75.291	-71.379	-.005	40.067	25.129	25.636
930.0	241681.1	23191.3	-.206	75.319	-71.319	-.084	39.970	25.103	25.762
932.0	241545.2	23175.2	-.207	75.346	-70.954	-.094	39.895	25.076	25.888
934.0	241409.4	23159.0	-.207	75.374	-70.319	-.060	39.841	25.050	26.014
936.0	241273.6	23142.9	-.206	75.401	-69.653	-.032	39.765	25.023	26.141
938.0	241138.7	23127.0	-.205	75.430	-69.028	-.082	39.667	24.997	26.268
940.0	241004.3	23110.9	-.204	75.457	-68.206	-.018	39.575	24.970	26.394
942.0	240871.0	23094.9	-.203	75.486	-67.405	.026	39.558	24.944	26.520
944.0	240739.2	23078.8	-.201	75.514	-66.863	.046	39.556	24.918	26.643
946.0	240609.2	23062.4	-.199	75.541	-66.385	.024	39.548	24.892	26.765
948.0	240481.2	23046.0	-.196	75.568	-65.867	.039	39.540	24.865	26.884
950.0	240355.3	23029.6	-.193	75.596	-65.318	.083	39.499	24.839	27.001
952.0	240231.7	23013.3	-.191	75.624	-64.924	.094	39.481	24.813	27.116
954.0	240110.6	22996.8	-.187	75.652	-64.675	.192	39.474	24.787	27.227
956.0	239992.0	22980.2	-.184	75.680	-64.835	.147	39.473	24.761	27.336
958.0	239875.8	22963.6	-.182	75.707	-64.988	.151	39.439	24.736	27.441

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
960.0	239751.5	22947.1	-.179	75.735	-65.167	.153	39.422	24.710	27.545
962.0	239649.0	22930.7	-.178	75.762	-65.431	.137	39.428	24.685	27.647
964.0	239537.8	22914.2	-.176	75.790	-65.782	.081	39.433	24.660	27.747
966.0	239427.6	22897.9	-.175	75.817	-66.078	.089	39.430	24.635	27.847
968.0	239317.9	22881.4	-.175	75.844	-66.362	.112	39.455	24.610	27.946
970.0	239208.7	22864.7	-.175	75.871	-66.735	.099	39.531	24.584	28.044
972.0	239099.6	22847.9	-.175	75.897	-67.135	.097	39.587	24.559	28.142
974.0	238990.3	22831.3	-.175	75.924	-67.532	.069	39.597	24.534	28.241
976.0	238880.2	22814.3	-.176	75.950	-67.707	.059	39.590	24.508	28.340
978.0	238769.4	22797.5	-.177	75.975	-67.818	.092	39.569	24.482	28.440
980.0	238657.7	22780.4	-.179	76.000	-68.020	.076	39.556	24.457	28.542
982.0	238544.8	22763.2	-.180	76.025	-68.169	-.022	39.563	24.431	28.644
984.0	238430.7	22745.8	-.182	76.049	-67.941	-.020	39.601	24.404	28.748
986.0	238315.4	22728.3	-.183	76.073	-67.545	.012	39.628	24.378	28.854
988.0	238199.2	22710.6	-.185	76.096	-67.177	-.004	39.590	24.351	28.960
990.0	238082.3	22693.0	-.186	76.120	-66.805	-.033	39.473	24.324	29.068
992.0	237964.7	22675.4	-.186	76.144	-66.368	-.043	39.357	24.297	29.177
994.0	237846.5	22658.3	-.187	76.167	-65.888	-.052	39.246	24.271	29.288
996.0	237727.9	22641.0	-.188	76.191	-65.318	-.028	39.192	24.245	29.400
998.0	237608.8	22623.7	-.188	76.216	-64.669	.012	39.203	24.218	29.512
1000.0	237489.7	22606.4	-.188	76.240	-64.087	-.014	39.231	24.191	29.625
1002.0	237370.7	22589.0	-.188	76.265	-63.466	-.043	39.252	24.165	29.738
1004.0	237252.2	22571.5	-.187	76.290	-62.817	.088	39.255	24.138	29.850
1006.0	237134.7	22553.8	-.186	76.314	-62.675	.090	39.246	24.111	29.960
1008.0	237018.0	22536.1	-.185	76.339	-62.646	.010	39.219	24.085	30.070
1010.0	236902.0	22518.5	-.184	76.363	-62.492	.042	39.040	24.058	30.179
1012.0	236786.6	22500.9	-.184	76.387	-62.363	.033	38.937	24.031	30.287
1014.0	236671.8	22483.2	-.183	76.412	-62.254	.035	38.987	24.005	30.395
1016.0	236557.6	22465.2	-.182	76.435	-62.170	.042	39.141	23.978	30.501
1018.0	236444.7	22446.8	-.181	76.458	-62.130	.046	39.212	23.951	30.605

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1020.0	236332.5	22428.4	-.180	76.480	-62.134	.024	39.202	23.924	30.708
1022.0	236221.0	22409.9	-.179	76.503	-62.133	.027	39.186	23.896	30.809
1024.0	236110.3	22391.2	-.178	76.525	-62.147	.055	39.174	23.869	30.909
1026.0	236000.5	22372.1	-.177	76.546	-62.295	.001	39.178	23.841	31.008
1028.0	235891.6	22352.8	-.176	76.566	-62.375	-.041	39.132	23.814	31.104
1030.0	235783.3	22333.7	-.175	76.587	-62.175	-.014	38.971	23.786	31.201
1032.0	235675.5	22314.7	-.175	76.607	-62.010	-.011	38.824	23.759	31.296
1034.0	235568.2	22295.9	-.174	76.628	-61.869	-.017	38.723	23.731	31.393
1036.0	235461.2	22277.2	-.174	76.649	-61.719	-.016	38.662	23.704	31.489
1038.0	235354.3	22258.6	-.174	76.671	-61.552	-.023	38.684	23.677	31.585
1040.0	235247.4	22239.8	-.174	76.692	-61.391	-.023	38.713	23.650	31.681
1042.0	235140.7	22221.1	-.174	76.713	-61.232	-.024	38.690	23.623	31.777
1044.0	235033.9	22202.4	-.174	76.734	-61.065	-.032	38.679	23.596	31.873
1046.0	234927.1	22183.7	-.174	76.755	-60.895	-.033	38.769	23.569	31.970
1048.0	234820.2	22164.7	-.175	76.776	-60.735	-.039	38.934	23.542	32.066
1050.0	234713.4	22145.5	-.175	76.797	-60.564	-.020	39.068	23.515	32.161
1052.0	234606.5	22127.5	-.175	76.817	-60.417	-.011	39.079	23.488	32.260
1054.0	234499.5	22108.4	-.175	76.838	-60.465	.047	39.120	23.461	32.356
1056.0	234392.2	22089.2	-.176	76.859	-60.707	.006	39.248	23.434	32.453
1058.0	234284.3	22069.5	-.177	76.878	-60.965	-.018	39.408	23.405	32.548
1060.0	234175.9	22049.7	-.178	76.898	-61.144	.025	39.528	23.377	32.645
1062.0	234066.6	22029.8	-.179	76.917	-61.438	.002	39.520	23.349	32.742
1064.0	233956.1	22010.0	-.181	76.936	-61.767	-.055	39.511	23.321	32.842
1066.0	233843.6	21990.5	-.184	76.956	-61.997	-.024	39.525	23.293	32.946
1068.0	233728.7	21971.2	-.188	76.976	-62.175	.006	39.568	23.265	33.054
1070.0	233611.0	21951.8	-.191	76.996	-62.347	.033	39.778	23.236	33.165
1072.0	233490.3	21932.0	-.196	77.015	-62.532	.039	39.981	23.207	33.280
1074.0	233366.6	21912.1	-.200	77.034	-62.715	.045	40.146	23.178	33.400
1076.0	233239.5	21892.0	-.205	77.052	-62.883	.043	40.263	23.149	33.524
1078.0	233108.9	21871.8	-.209	77.070	-63.035	.051	40.256	23.119	33.653

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1080.0	232974.5	21851.7	-.215	77.088	-63.173	.046	40.226	23.089	33.788
1082.0	232836.1	21831.6	-.220	77.106	-63.294	.049	40.225	23.058	33.929
1084.0	232693.4	21811.3	-.226	77.123	-63.411	.030	40.309	23.027	34.076
1086.0	232546.5	21790.6	-.232	77.139	-63.537	.011	40.499	22.996	34.229
1088.0	232395.3	21769.7	-.238	77.154	-63.520	-.038	40.574	22.964	34.388
1090.0	232239.6	21749.8	-.244	77.170	-63.247	.006	40.496	22.932	34.554
1092.0	232079.9	21727.4	-.249	77.184	-63.052	-.034	40.404	22.899	34.725
1094.0	231916.1	21706.3	-.255	77.199	-62.762	-.085	40.376	22.866	34.904
1096.0	231748.4	21684.7	-.259	77.212	-62.207	-.054	40.351	22.832	35.088
1098.0	231577.6	21662.5	-.263	77.224	-61.621	-.145	40.317	22.798	35.274
1100.0	231404.3	21640.3	-.266	77.236	-60.498	-.153	40.141	22.763	35.466
1102.0	231229.2	21619.1	-.268	77.246	-58.870	-.069	39.884	22.729	35.664
1104.0	231053.5	21597.0	-.269	77.260	-57.617	-.088	39.689	22.695	35.861
1106.0	230878.0	21575.0	-.268	77.274	-56.476	-.029	39.521	22.660	36.058
1108.0	230703.4	21553.2	-.267	77.289	-55.820	-.031	39.405	22.626	36.256
1110.0	230529.8	21531.1	-.266	77.303	-55.409	-.065	39.408	22.592	36.451
1112.0	230357.7	21509.0	-.264	77.318	-54.935	-.056	39.414	22.558	36.645
1114.0	230187.0	21486.8	-.262	77.333	-54.517	-.018	39.395	22.523	36.837
1116.0	230018.2	21464.3	-.259	77.348	-54.349	-.012	39.382	22.489	37.026
1118.0	229851.3	21441.7	-.257	77.363	-54.234	-.005	39.365	22.454	37.212
1120.0	229686.3	21419.0	-.255	77.377	-54.166	-.020	39.354	22.420	37.395
1122.0	229523.2	21396.3	-.253	77.392	-54.317	.052	39.352	22.386	37.575
1124.0	229361.5	21373.5	-.251	77.406	-54.762	-.017	39.357	22.352	37.754
1126.0	229200.8	21350.6	-.250	77.419	-55.178	-.016	39.364	22.318	37.931
1128.0	229040.7	21327.6	-.250	77.433	-55.635	-.006	39.368	22.283	38.107
1130.0	228880.8	21304.3	-.250	77.445	-56.198	-.022	39.367	22.249	38.282
1132.0	228720.7	21281.0	-.251	77.456	-56.661	-.061	39.378	22.214	38.458
1134.0	228559.8	21257.6	-.253	77.467	-57.051	-.071	39.381	22.180	38.635
1136.0	228397.8	21233.8	-.255	77.478	-57.474	-.067	39.380	22.145	38.814
1138.0	228234.5	21210.1	-.257	77.487	-57.908	-.106	39.367	22.110	38.995

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1140.0	228068.9	21186.6	-.261	77.496	-58.298	-.142	40.142	22.075	39.181
1142.0	227901.6	21161.6	-.263	77.503	-58.579	-.078	39.897	22.038	39.365
1144.0	227731.7	21136.3	-.267	77.510	-58.961	-.087	40.200	22.001	39.552
1146.0	227559.4	21112.4	-.272	77.518	-59.396	-.103	38.823	21.965	39.750
1148.0	227382.8	21089.1	-.276	77.527	-59.782	-.129	38.989	21.930	39.957
1150.0	227201.7	21065.4	-.284	77.535	-58.912	.641	39.066	21.894	40.171
1152.0	227016.3	21041.5	-.291	77.544	-60.232	-.613	39.208	21.858	40.392
1154.0	226826.2	21017.1	-.298	77.550	-60.017	-.088	39.647	21.821	40.620
1156.0	226631.2	20991.8	-.304	77.556	-59.478	-.243	40.117	21.782	40.854
1158.0	226432.4	20965.9	-.309	77.561	-58.077	-.103	40.247	21.743	41.093
1160.0	226230.9	20939.7	-.312	77.567	-56.797	-.097	40.209	21.703	41.336
1162.0	226026.0	20913.4	-.314	77.574	-55.517	-.056	40.087	21.664	41.582
1164.0	225824.7	20887.0	-.314	77.582	-54.477	.010	39.980	21.624	41.829
1166.0	225621.4	20860.7	-.314	77.590	-53.801	-.002	39.875	21.584	42.078
1168.0	225418.8	20834.3	-.313	77.598	-53.144	.015	39.839	21.544	42.325
1170.0	225217.1	20807.8	-.312	77.607	-52.716	.019	39.907	21.505	42.572
1172.0	225016.7	20781.0	-.310	77.616	-52.460	.086	39.940	21.465	42.816
1174.0	224817.8	20753.0	-.309	77.626	-52.575	.072	39.922	21.424	43.053
1176.0	224620.1	20725.9	-.308	77.634	-52.715	.091	39.911	21.384	43.293
1178.0	224423.3	20698.8	-.307	77.641	-52.955	.078	39.915	21.344	43.531
1180.0	224227.2	20671.6	-.307	77.649	-53.221	.096	39.907	21.304	43.769
1182.0	224031.4	20644.2	-.307	77.655	-53.580	.078	39.920	21.264	44.006
1184.0	223835.7	20616.4	-.307	77.661	-53.964	.098	39.922	21.224	44.242
1186.0	223639.9	20588.4	-.308	77.665	-54.356	.049	39.924	21.183	44.478
1188.0	223443.8	20560.1	-.309	77.668	-54.556	.081	39.914	21.143	44.714
1190.0	223247.0	20531.8	-.310	77.671	-54.641	.067	39.856	21.102	44.952
1192.0	223049.4	20503.4	-.312	77.674	-54.715	.100	39.843	21.061	45.191
1194.0	222851.2	20474.7	-.313	77.676	-54.936	.086	39.852	21.020	45.431
1196.0	222651.9	20445.7	-.315	77.677	-55.095	.038	39.813	20.978	45.673
1198.0	222451.6	20416.7	-.317	77.677	-55.104	.086	39.701	20.937	45.917

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1200.0	222250.1	20387.7	-.319	77.678	-55.215	.047	39.617	20.895	46.164
1202.0	222047.2	20356.4	-.322	77.677	-55.205	.007	39.658	20.853	46.413
1204.0	221843.1	20328.7	-.324	77.675	-55.126	-.043	39.719	20.811	46.663
1206.0	221638.2	20298.4	-.325	77.673	-54.768	-.070	39.689	20.768	46.913
1208.0	221432.9	20268.9	-.326	77.675	-54.212	-.070	39.532	20.726	47.168
1210.0	221227.7	20238.5	-.326	77.673	-53.663	-.092	39.388	20.683	47.419
1212.0	221023.0	20208.0	-.325	77.670	-52.993	-.102	39.281	20.640	47.669
1214.0	220819.5	20177.6	-.323	77.667	-52.200	-.033	39.165	20.598	47.918
1216.0	220617.6	20147.1	-.321	77.665	-51.536	.016	39.082	20.555	48.165
1218.0	220418.0	20116.5	-.318	77.663	-51.181	.091	39.060	20.512	48.407
1220.0	220220.8	20085.6	-.315	77.660	-51.036	.107	39.064	20.470	48.643
1222.0	220026.4	20054.6	-.311	77.656	-50.939	.164	39.044	20.427	48.874
1224.0	219834.8	20023.4	-.308	77.652	-50.993	.213	39.022	20.385	49.099
1226.0	219645.7	19992.1	-.305	77.648	-51.277	.198	39.034	20.342	49.318
1228.0	219459.0	19960.4	-.302	77.642	-51.717	.184	39.077	20.299	49.532
1230.0	219274.4	19928.6	-.300	77.635	-52.271	.189	39.095	20.257	49.741
1232.0	219090.9	19896.7	-.299	77.627	-52.883	.173	39.089	20.214	49.948
1234.0	218908.1	19864.6	-.299	77.617	-53.344	.137	39.104	20.172	50.152
1236.0	218725.6	19832.0	-.299	77.606	-53.770	.128	39.116	20.128	50.354
1238.0	218543.0	19799.3	-.300	77.594	-54.024	.106	39.132	20.085	50.555
1240.0	218360.1	19766.2	-.301	77.581	-54.243	.126	39.107	20.042	50.756
1242.0	218176.8	19732.3	-.302	77.566	-54.602	.053	39.074	19.997	50.953
1244.0	217992.8	19698.8	-.304	77.550	-54.602	.006	39.009	19.953	51.154
1246.0	217807.7	19665.6	-.306	77.535	-54.394	.032	38.932	19.910	51.358
1248.0	217621.5	19632.2	-.309	77.519	-54.117	.072	38.953	19.866	51.565
1250.0	217434.3	19598.8	-.311	77.504	-53.908	.076	38.984	19.822	51.773
1252.0	217246.1	19565.2	-.312	77.488	-53.675	.105	38.975	19.778	51.983
1254.0	217057.2	19531.6	-.314	77.471	-53.631	.187	38.977	19.734	52.193
1256.0	216867.5	19497.4	-.315	77.453	-53.910	.150	39.097	19.689	52.403
1258.0	216677.2	19462.7	-.317	77.434	-54.278	.102	39.167	19.644	52.612

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1260.0	216485.7	19428.0	-.320	77.413	-54.680	.069	39.132	19.599	52.823
1262.0	216292.5	19393.1	-.324	77.392	-55.051	.046	39.118	19.554	53.037
1264.0	216096.9	19358.2	-.328	77.370	-55.403	.004	39.131	19.509	53.256
1266.0	215898.4	19323.0	-.333	77.346	-55.643	-.011	39.187	19.463	53.480
1268.0	215696.9	19287.6	-.339	77.321	-55.734	.020	39.253	19.417	53.708
1270.0	215491.9	19252.0	-.344	77.296	-55.779	.030	39.304	19.370	53.944
1272.0	215283.3	19216.2	-.351	77.270	-55.767	.034	39.372	19.324	54.187
1274.0	215071.0	19180.3	-.357	77.244	-55.694	.078	39.438	19.277	54.436
1276.0	214854.9	19142.6	-.363	77.213	-55.669	.084	39.519	19.228	54.685
1278.0	214635.2	19105.8	-.369	77.185	-55.761	.043	39.625	19.180	54.947
1280.0	214411.9	19068.5	-.375	77.154	-55.858	.013	39.660	19.131	55.213
1282.0	214185.1	19031.2	-.382	77.123	-55.917	-.010	39.612	19.082	55.488
1284.0	213954.7	18993.6	-.388	77.091	-55.864	.039	39.614	19.033	55.769
1286.0	213720.5	18955.8	-.394	77.058	-55.858	.062	39.651	18.984	56.058
1288.0	213482.7	18917.8	-.401	77.024	-56.021	-.012	39.692	18.934	56.354
1290.0	213240.2	18879.6	-.407	76.989	-53.040	-.264	39.767	18.884	56.660
1292.0	212997.5	18841.1	-.405	76.960	-51.089	.256	39.760	18.834	56.965
1294.0	212756.0	18802.6	-.406	76.928	-52.558	-1.384	39.627	18.784	57.269
1296.0	212514.5	18763.9	-.406	76.895	-51.046	-.450	39.680	18.733	57.571
1298.0	212274.5	18724.7	-.404	76.864	-50.315	-.130	40.502	18.683	57.868
1300.0	212038.3	18682.2	-.397	76.827	-49.942	-.050	40.782	18.629	58.136
1302.0	211807.1	18640.6	-.390	76.791	-49.639	-.041	40.295	18.577	58.399
1304.0	211580.9	18598.9	-.383	76.755	-49.495	.020	40.020	18.525	58.649
1306.0	211359.6	18558.2	-.377	76.719	-50.181	.028	39.779	18.474	58.895
1308.0	211142.0	18517.9	-.373	76.681	-51.367	.050	39.583	18.424	59.135
1310.0	210926.4	18477.8	-.373	76.642	-52.809	.017	39.436	18.374	59.372
1312.0	210710.7	18437.9	-.375	76.600	-54.304	.024	39.392	18.324	59.610
1314.0	210493.0	18397.8	-.381	76.554	-55.858	-.042	39.414	18.274	59.852
1316.0	210271.3	18357.5	-.389	76.506	-56.976	-.096	39.454	18.224	60.101
1318.0	210044.1	18317.0	-.400	76.456	-57.627	-.147	39.504	18.174	60.362

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1320.0	209810.4	18276.5	-.411	76.405	-58.082	-.147	39.536	18.123	60.639
1322.0	209569.6	18235.5	-.424	76.352	-58.442	-.161	39.625	18.072	60.929
1324.0	209321.4	18194.2	-.437	76.296	-58.640	-.142	39.715	18.020	61.234
1326.0	209065.5	18152.7	-.450	76.240	-58.768	-.166	39.770	17.968	61.557
1328.0	208801.6	18110.9	-.464	76.182	-58.720	-.152	39.810	17.915	61.897
1330.0	208530.2	18068.2	-.476	76.122	-58.629	-.143	39.891	17.861	62.250
1332.0	208251.8	18026.0	-.489	76.055	-58.296	-.215	39.889	17.807	62.623
1334.0	207966.7	17983.2	-.500	75.994	-57.660	-.235	39.792	17.753	63.009
1336.0	207675.3	17940.3	-.511	75.933	-57.080	-.166	39.813	17.698	63.412
1338.0	207378.8	17896.7	-.519	75.871	-56.787	-.171	39.856	17.643	63.822
1340.0	207077.8	17852.9	-.528	75.808	-56.501	-.176	39.852	17.587	64.244
1342.0	206772.7	17808.8	-.536	75.745	-56.186	-.169	39.856	17.531	64.675
1344.0	206464.0	17797.2	-.541	75.903	-55.933	-.059	40.015	17.507	65.353
1346.0	206153.0	17754.3	-.545	75.843	-55.753	-.093	39.928	17.452	65.813
1348.0	205840.1	17711.3	-.549	75.782	-55.065	-.124	39.833	17.397	66.278
1350.0	205526.3	17668.2	-.551	75.721	-54.157	-.066	39.736	17.342	66.747
1352.0	205213.0	17625.1	-.551	75.661	-53.586	.002	39.657	17.288	67.216
1354.0	204900.9	17581.9	-.550	75.599	-53.255	.047	39.617	17.233	67.683
1356.0	204590.4	17538.3	-.548	75.537	-53.009	.112	39.637	17.178	68.144
1358.0	204282.3	17494.2	-.546	75.474	-53.097	.144	39.642	17.123	68.597
1360.0	203976.4	17449.8	-.544	75.409	-53.379	.148	39.640	17.068	69.043
1362.0	203672.5	17404.9	-.542	75.341	-53.798	.133	39.652	17.013	69.482
1364.0	203370.2	17359.7	-.542	75.272	-54.279	.151	39.650	16.957	69.915
1366.0	203068.7	17314.2	-.542	75.199	-54.766	.100	39.653	16.902	70.345
1368.0	202767.6	17268.2	-.544	75.125	-55.146	.087	39.649	16.846	70.771
1370.0	202466.2	17222.1	-.546	75.048	-55.532	.075	39.646	16.790	71.197
1372.0	202164.1	17175.6	-.550	74.969	-55.922	.057	39.642	16.734	71.624
1374.0	201860.5	17127.9	-.554	74.888	-56.305	.019	39.631	16.676	72.045
1376.0	201554.9	17083.9	-.560	74.805	-56.603	-.002	39.637	16.623	72.504
1378.0	201246.7	17036.7	-.566	74.720	-56.737	.012	39.615	16.566	72.945

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1380.0	200935.6	16989.3	-.573	74.634	-56.725	.050	39.607	16.509	73.391
1382.0	200621.5	16941.5	-.579	74.546	-56.665	.087	39.625	16.452	73.845
1384.0	200304.6	16893.2	-.586	74.457	-56.617	.117	39.693	16.395	74.303
1386.0	199984.8	16844.3	-.593	74.366	-56.653	.105	39.769	16.337	74.765
1388.0	199662.3	16794.9	-.599	74.273	-56.650	.149	39.841	16.278	75.231
1390.0	199337.2	16744.5	-.605	74.177	-56.764	.165	39.905	16.219	75.697
1392.0	199009.7	16693.5	-.612	74.078	-57.039	.135	39.949	16.159	76.164
1394.0	198679.5	16641.6	-.619	73.976	-57.433	.087	39.930	16.098	76.633
1396.0	198346.2	16587.6	-.627	73.866	-57.830	.040	39.898	16.035	77.092
1398.0	198008.7	16534.9	-.637	73.759	-57.857	.151	39.734	15.974	77.575
1400.0	197666.7	16482.2	-.648	73.652	-58.047	.133	39.691	15.913	78.074
1402.0	197319.7	16428.9	-.658	73.543	-58.030	.238	39.700	15.851	78.581
1404.0	196968.1	16375.0	-.669	73.431	-58.253	.159	39.732	15.788	79.099
1406.0	196611.5	16320.6	-.680	73.316	-58.184	.129	39.753	15.725	79.626
1408.0	196250.2	16265.7	-.690	73.201	-57.893	.141	39.732	15.662	80.166
1410.0	195884.4	16210.8	-.701	73.085	-57.672	.124	39.707	15.599	80.719
1412.0	195514.4	16155.5	-.710	72.968	-57.866	.141	39.721	15.535	81.284
1414.0	195140.0	16097.1	-.722	72.852	-58.262	.045	39.797	15.469	81.832
1416.0	194760.2	16040.9	-.735	72.730	-58.494	-.039	39.827	15.404	82.420
1418.0	194374.6	15984.4	-.748	72.606	-58.796	-.266	39.809	15.340	83.025
1420.0	193982.9	15927.4	-.762	72.479	-58.449	-.341	39.879	15.275	83.645
1422.0	193586.1	15870.0	-.773	72.351	-57.677	-.325	39.916	15.210	84.280
1424.0	193185.6	15812.0	-.781	72.221	-57.015	-.242	40.161	15.144	84.923
1426.0	192783.3	15752.8	-.786	72.089	-56.528	-.248	40.272	15.077	85.560
1428.0	192380.6	15693.4	-.788	71.956	-55.603	-.261	40.206	15.011	86.199
1430.0	191979.2	15634.9	-.787	71.817	-54.465	-.184	40.070	14.945	86.847
1432.0	191581.3	15578.0	-.783	71.688	-53.923	-.143	39.940	14.882	87.503
1434.0	191187.7	15518.1	-.777	71.556	-53.557	-.112	39.836	14.815	88.113
1436.0	190799.3	15457.8	-.770	71.423	-53.350	-.050	39.789	14.749	88.703
1438.0	190416.5	15396.8	-.763	71.288	-53.481	-.013	39.736	14.682	89.268

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1440.0	190039.2	15335.5	-.756	71.151	-53.842	-.033	39.679	14.616	89.813
1442.0	189880.5	15274.0	-.752	71.011	-54.242	-.048	39.629	14.549	90.339
1444.0	189297.7	15212.0	-.748	70.869	-54.647	-.040	39.587	14.483	90.846
1446.0	188932.0	15149.5	-.747	70.724	-55.142	-.033	39.558	14.416	91.338
1448.0	188568.6	15084.8	-.746	70.574	-55.823	-.035	39.582	14.347	91.795
1450.0	188206.6	15021.0	-.748	70.420	-56.692	-.031	39.595	14.280	92.257
1452.0	187844.3	14956.7	-.754	70.261	-57.531	-.136	39.589	14.212	92.712
1454.0	187480.5	14891.9	-.762	70.098	-58.021	-.168	39.533	14.143	93.167
1456.0	187114.0	14827.0	-.771	69.933	-58.230	-.111	39.500	14.075	93.628
1458.0	186744.6	14761.7	-.781	69.765	-58.452	-.064	39.496	14.007	94.095
1460.0	186371.5	14696.6	-.793	69.596	-58.862	-.117	39.498	13.938	94.575
1462.0	185993.5	14631.2	-.807	69.424	-59.201	-.142	39.526	13.870	95.069
1464.0	185609.6	14564.9	-.822	69.249	-57.610	-.376	39.593	13.801	95.571
1466.0	185224.3	14493.2	-.821	69.090	-54.352	-.032	39.607	13.727	96.006
1468.0	184844.4	14426.2	-.808	68.924	-51.466	-.161	39.540	13.658	96.483
1470.0	184475.7	14359.8	-.784	68.765	-48.915	-.012	39.437	13.589	96.926
1472.0	184122.7	14294.1	-.754	68.611	-47.490	-.006	39.298	13.522	97.320
1474.0	183787.8	14228.6	-.720	68.456	-47.073	-.034	39.228	13.455	97.648
1476.0	183471.8	14163.4	-.685	68.299	-46.795	-.038	39.153	13.389	97.908
1478.0	183174.5	14098.7	-.651	68.143	-46.609	-.019	39.038	13.324	98.104
1480.0	182895.6	14034.6	-.617	67.985	-46.768	.057	38.951	13.260	98.238
1482.0	182633.6	13970.9	-.589	67.823	-46.707	-.577	38.970	13.197	98.312
1484.0	182387.7	13907.1	-.550	67.671	-39.102	-.291	39.090	13.133	98.321
1486.0	182170.5	13844.2	-.477	67.556	-29.524	-.086	39.097	13.071	98.232
1488.0	181995.5	13779.6	-.380	67.485	-20.031	-.187	39.038	13.008	97.960
1490.0	181872.2	13718.9	-.267	67.463	-10.307	-.266	39.032	12.950	97.552
1492.0	181805.9	13653.8	-.146	67.489	-.363	-.257	39.058	12.887	96.869
1494.0	181796.4	13589.5	-.030	67.567	9.663	-.241	39.015	12.826	96.001
1496.0	181838.7	13525.9	.072	67.696	19.772	-.222	39.068	12.766	95.105
1498.0	181924.7	13462.4	.156	67.874	29.953	-.196	39.227	12.706	94.214

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1500.0	182042.8	13399.2	.210	68.095	40.145	-.196	39.381	12.647	93.331
1502.0	182177.2	13336.4	.228	68.355	50.361	-.173	39.568	12.588	92.458
1504.0	182309.6	13273.6	.205	68.647	60.599	-.120	39.802	12.528	91.589
1506.0	182418.8	13211.1	.132	68.963	69.440	.259	40.029	12.469	90.728
1508.0	182485.5	13149.1	.030	69.289	72.721	.187	40.117	12.411	89.880
1510.0	182502.0	13087.5	-.083	69.617	74.460	.022	40.346	12.353	89.039
1512.0	182464.8	13025.5	-.204	69.947	75.413	.043	40.670	12.294	88.197
1514.0	182371.7	12963.0	-.328	70.279	75.564	-.002	41.090	12.235	87.353
1516.0	182222.3	12899.1	-.453	70.615	75.342	.064	41.590	12.175	86.494
1518.0	182017.4	12834.3	-.576	70.953	73.869	.124	41.795	12.114	85.628
1520.0	181760.2	12770.3	-.688	71.290	70.620	.144	42.096	12.053	84.884
1522.0	181458.1	12706.6	-.781	71.618	66.242	.122	42.151	11.990	85.002
1524.0	181120.7	12643.4	-.851	71.935	60.973	.046	42.130	11.927	85.236
1526.0	180759.0	12580.0	-.898	72.240	57.090	-.086	42.047	11.863	85.541
1528.0	180381.2	12516.5	-.933	72.537	54.281	-.055	41.900	11.800	85.897
1530.0	179992.5	12453.4	-.955	72.824	51.236	-.157	41.773	11.737	86.291
1532.0	179598.3	12390.2	-.967	73.103	49.584	-.188	41.675	11.674	86.702
1534.0	179201.6	12326.7	-.974	73.379	48.515	-.161	41.547	11.611	87.115
1536.0	178805.2	12266.2	-.973	73.625	48.883	-.501	41.507	11.551	87.569
1538.0	178407.6	12202.0	-.989	73.910	51.572	.170	41.431	11.487	87.972
1540.0	178004.2	12137.9	-1.006	74.199	50.388	-1.362	41.177	11.424	88.395
1542.0	177595.5	12073.4	-1.025	74.491	52.011	-.207	41.181	11.361	88.829
1544.0	177179.5	12008.2	-1.048	74.789	52.327	-.167	41.685	11.297	89.277
1546.0	176756.4	11938.6	-1.068	75.101	52.712	-.113	41.722	11.229	89.682
1548.0	176326.4	11869.9	-1.092	75.416	52.962	-.141	41.225	11.162	90.122
1550.0	175886.3	11801.2	-1.117	75.735	53.327	-.115	41.083	11.096	90.588
1552.0	175441.5	11727.3	-1.146	76.058	53.537	.060	40.969	11.024	91.003
1554.0	174984.8	11657.4	-1.171	76.390	48.896	.484	40.819	10.957	91.512
1556.0	174528.4	11587.4	-1.154	76.691	40.297	-.302	40.608	10.889	92.017
1558.0	174086.9	11518.4	-1.114	76.967	36.718	-.169	40.204	10.823	92.486

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1560.0	173665.6	11450.3	-1.066	77.235	36.188	-.330	39.961	10.758	92.892
1562.0	173264.9	11382.5	-1.024	77.514	38.639	-.195	39.797	10.693	93.230
1564.0	172880.6	11314.9	-.994	77.814	41.647	-.046	39.694	10.629	93.508
1566.0	172507.6	11247.3	-.975	78.129	43.628	.005	39.615	10.565	93.741
1568.0	172142.3	11175.4	-.965	78.436	45.272	.068	39.502	10.497	93.870
1570.0	171781.5	11108.5	-.961	78.823	46.648	.119	39.409	10.434	94.061
1572.0	171423.2	11041.5	-.962	79.168	47.711	.167	39.339	10.371	94.238
1574.0	171065.6	10974.9	-.966	79.520	48.316	.179	39.280	10.308	94.414
1576.0	170708.0	10908.5	-.971	79.876	48.417	.148	39.152	10.246	94.588
1578.0	170350.0	10842.7	-.977	80.234	48.429	.169	39.020	10.184	94.772
1580.0	169991.6	10777.7	-.983	80.592	48.211	.141	38.904	10.124	94.966
1582.0	169632.5	10713.8	-.990	80.947	48.069	.094	38.795	10.064	95.180
1584.0	169272.2	10650.6	-.999	81.304	48.677	.069	38.762	10.005	95.404
1586.0	168909.6	10587.8	-1.013	81.669	49.782	.111	38.740	9.947	95.643
1588.0	168542.1	10525.6	-1.034	82.038	50.748	.102	38.725	9.889	95.907
1590.0	168167.8	10464.0	-1.060	82.412	51.538	.062	38.706	9.832	96.203
1592.0	167785.0	10402.9	-1.091	82.791	52.324	.088	38.690	9.776	96.541
1594.0	167391.9	10342.4	-1.126	83.175	52.998	.105	38.676	9.721	96.928
1596.0	166986.8	10282.7	-1.167	83.561	52.041	.414	38.747	9.666	97.372
1598.0	166571.8	10223.0	-1.188	83.936	48.196	.110	38.787	9.612	97.856
1600.0	166154.7	10163.8	-1.193	84.295	45.458	.183	38.753	9.558	98.359
1602.0	165740.3	10105.6	-1.184	84.648	42.764	.152	38.700	9.505	98.869
1604.0	165333.2	10051.5	-1.163	84.991	40.865	.162	38.579	9.456	99.432
1606.0	164936.4	9993.4	-1.136	85.310	39.356	.128	38.456	9.404	99.874
1608.0	164551.7	9935.5	-1.105	85.618	38.569	.079	38.305	9.352	100.271
1610.0	164179.9	9877.7	-1.073	85.920	38.192	-.011	38.163	9.299	100.616
1612.0	163821.0	9819.9	-1.041	86.220	38.583	-.047	38.065	9.246	100.867
1614.0	163474.7	9761.6	-1.010	86.523	39.111	-.072	37.943	9.190	101.033
1616.0	163140.0	9703.5	-.984	86.828	39.640	-.028	37.736	9.135	101.150
1618.0	162815.2	9646.0	-.960	87.132	39.806	-.109	37.531	9.081	101.234

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1620.0	162499.2	9590.6	-.941	87.432	40.558	-.164	37.410	9.029	101.323
1622.0	162190.1	9536.0	-.928	87.715	41.886	-.174	37.347	8.977	101.395
1624.0	161885.5	9478.5	-.923	88.034	43.420	-.136	37.279	8.923	101.382
1626.0	161582.5	9420.8	-.927	88.361	44.352	-.171	37.159	8.869	101.352
1628.0	161279.2	9363.0	-.934	88.693	44.988	-.106	37.025	8.815	101.316
1630.0	160974.1	9305.7	-.947	89.027	45.456	-.077	36.718	8.761	101.290
1632.0	160665.3	9248.5	-.965	89.364	46.050	-.005	36.676	8.707	101.275
1634.0	160351.8	9191.0	-.987	89.705	46.532	.044	36.656	8.653	101.266
1636.0	160032.1	9133.5	-1.013	90.048	46.682	.012	36.622	8.600	101.275
1638.0	159705.5	9075.8	-1.041	90.391	46.924	.026	36.594	8.546	101.300
1640.0	159371.2	9017.8	-1.072	90.737	47.291	.099	36.566	8.491	101.343
1642.0	159028.9	8958.1	-1.108	91.050	50.054	-.174	36.571	8.436	101.375
1644.0	158672.6	8899.9	-1.176	91.425	52.915	.478	36.462	8.382	101.489
1646.0	158295.8	8841.8	-1.242	91.797	51.474	-1.009	36.386	8.328	101.680
1648.0	157901.6	8783.6	-1.314	92.177	53.122	.050	36.335	8.273	101.934
1650.0	157485.3	8724.0	-1.388	92.567	53.046	-.016	37.069	8.218	102.239
1652.0	157050.5	8662.5	-1.460	92.969	53.173	.017	36.612	8.161	102.568
1654.0	156595.6	8602.5	-1.539	93.372	53.461	.094	36.218	8.106	103.010
1656.0	156118.9	8542.7	-1.623	93.781	53.594	.087	36.030	8.051	103.542
1658.0	155619.5	8478.5	-1.714	94.225	53.177	.556	35.852	7.992	104.058
1660.0	155097.9	8419.3	-1.783	94.628	45.684	.344	35.875	7.938	104.783
1662.0	154566.6	8360.4	-1.796	94.982	40.301	-.215	35.687	7.884	105.550
1664.0	154040.7	8302.2	-1.799	95.326	38.478	.062	35.518	7.831	106.328
1666.0	153516.9	8244.4	-1.791	95.660	36.662	.008	35.440	7.778	107.097
1668.0	153000.3	8186.8	-1.772	95.987	35.291	-.212	35.296	7.726	107.841
1670.0	152493.6	8131.0	-1.746	96.302	34.715	-.304	35.141	7.676	108.587
1672.0	151997.8	8074.0	-1.717	96.626	33.893	-.335	34.904	7.624	109.251
1674.0	151513.7	8017.4	-1.685	96.947	33.436	-.371	34.637	7.573	109.872
1676.0	151042.1	7961.1	-1.651	97.273	33.635	-.412	34.442	7.522	110.439
1678.0	150582.5	7905.1	-1.621	97.610	34.697	-.304	34.185	7.471	110.956

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1680.0	150133.2	7849.5	-1.598	97.960	36.014	-.167	33.900	7.420	111.434
1682.0	149692.2	7794.2	-1.582	98.328	37.473	-.015	33.667	7.370	111.876
1684.0	149256.7	7740.2	-1.578	98.717	38.690	.044	33.264	7.321	112.322
1686.0	148823.6	7686.4	-1.583	99.109	40.022	.083	33.161	7.273	112.758
1688.0	148391.1	7632.4	-1.595	99.515	41.383	.107	33.104	7.224	113.181
1690.0	147957.0	7578.4	-1.615	99.936	42.331	.132	33.006	7.175	113.605
1692.0	147519.6	7524.7	-1.641	100.364	42.875	.130	32.860	7.127	114.046
1694.0	147077.1	7471.6	-1.669	100.794	39.063	.579	32.826	7.079	114.519
1696.0	146636.3	7417.9	-1.644	101.166	29.288	.074	32.832	7.031	114.963
1698.0	146211.3	7364.2	-1.573	101.456	19.508	.031	32.667	6.982	115.326
1700.0	145811.3	7310.3	-1.474	101.663	9.588	.115	32.420	6.934	115.551
1702.0	145440.9	7258.7	-1.365	101.762	-.853	.155	32.078	6.887	115.699
1704.0	145100.5	7207.7	-1.259	101.756	-11.503	.102	32.049	6.840	115.711
1706.0	144787.9	7156.0	-1.166	101.644	-22.265	.055	31.994	6.793	115.559
1708.0	144496.2	7104.5	-1.114	101.425	-32.979	.056	31.843	6.746	115.300
1710.0	144212.1	7053.8	-1.128	101.121	-43.450	-.094	31.560	6.700	115.023
1712.0	143918.1	7004.5	-1.206	100.755	-48.649	-.278	31.219	6.655	114.828
1714.0	143603.9	6956.2	-1.310	100.375	-51.139	-.095	31.090	6.611	114.753
1716.0	143264.9	6907.9	-1.432	99.975	-53.189	-.088	31.143	6.567	114.790
1718.0	142897.5	6860.4	-1.566	99.570	-54.015	-.113	31.149	6.524	114.981
1720.0	142500.6	6812.5	-1.702	99.166	-53.492	-.103	31.037	6.481	115.292
1722.0	142075.4	6764.2	-1.831	98.750	-52.561	-.093	30.956	6.438	115.725
1724.0	141624.1	6716.1	-1.951	98.336	-51.015	-.074	30.853	6.395	116.281
1726.0	141149.7	6668.1	-2.059	97.928	-49.295	-.071	30.744	6.353	116.955
1728.0	140655.0	6620.2	-2.153	97.525	-47.423	-.109	30.636	6.310	117.724
1730.0	140145.2	6572.6	-2.232	97.128	-45.212	-.082	30.513	6.268	118.581
1732.0	139622.9	6523.8	-2.294	96.739	-43.324	-.032	30.347	6.225	119.459
1734.0	139092.2	6477.2	-2.343	96.340	-42.119	-.049	30.185	6.185	120.457
1736.0	138555.5	6429.9	-2.384	95.958	-41.036	-.121	30.012	6.143	121.461
1738.0	138014.8	6382.8	-2.416	95.580	-39.626	-.134	29.773	6.102	122.493

* ST14BET USING ST14ET(11/84),INERTIAL-BT14NG2,NB1C6U DYN. DATA.

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1740.0	137472.4	5336.0	-2.438	95.212	-38.180	-.072	29.565	6.061	123.550
1742.0	136936.4	5289.6	-2.452	94.851	-37.348	.030	29.357	6.020	124.620
1744.0	136389.5	5244.8	-2.467	94.487	-37.474	.115	29.132	5.981	125.751
1746.0	135849.0	6197.1	-2.487	94.109	-38.229	.127	29.015	5.939	126.763
1748.0	135307.9	6151.7	-2.512	93.733	-38.940	.141	28.892	5.900	127.877
1750.0	134764.9	6107.0	-2.545	93.348	-39.635	.123	28.710	5.861	129.029
1752.0	134216.2	6062.9	-2.586	92.958	-40.396	.070	28.574	5.823	130.232
1754.0	133666.4	6019.2	-2.633	92.560	-41.138	.012	28.475	5.785	131.488
1756.0	133106.6	5974.7	-2.685	92.152	-41.725	-.106	28.394	5.746	132.745
1758.0	132544.3	5931.9	-2.737	91.740	-41.707	-.139	28.314	5.709	134.120
1760.0	131974.1	5889.0	-2.783	91.321	-41.301	-.047	28.214	5.672	135.534
1762.0	131398.8	5846.9	-2.836	90.896	-42.465	-1.149	28.029	5.636	137.022
1764.0	130818.5	5805.0	-2.853	90.505	-34.468	.030	28.059	5.600	138.561
1766.0	130244.6	5763.6	-2.834	90.159	-33.060	.145	27.630	5.564	140.095
1768.0	129678.9	5723.9	-2.803	89.832	-32.759	.153	28.360	5.530	141.674
1770.0	129126.0	5680.7	-2.761	89.469	-33.322	.090	27.764	5.493	143.007
1772.0	128583.7	5639.2	-2.736	89.101	-32.324	-.231	27.300	5.457	144.356
1774.0	128052.0	5598.2	-2.697	88.761	-31.086	.159	26.942	5.421	145.669
1776.0	127530.9	5558.0	-2.672	88.409	-33.213	.247	26.539	5.386	146.961
1778.0	127016.4	5517.9	-2.668	88.013	-36.702	.145	26.390	5.351	148.211
1780.0	126505.1	5476.6	-2.680	87.567	-39.194	.014	26.255	5.315	149.380
1782.0	125993.9	5436.2	-2.710	87.096	-40.252	-.030	25.942	5.280	150.595
1784.0	125479.7	5396.8	-2.755	86.625	-41.188	-.030	25.650	5.245	151.889
1786.0	124960.1	5357.7	-2.809	86.137	-42.372	-.062	25.547	5.211	153.234
1788.0	124433.7	5318.5	-2.872	85.628	-43.553	-.154	25.425	5.177	154.628
1790.0	123899.4	5279.3	-2.937	85.104	-43.345	-.151	25.285	5.143	156.078
1792.0	123358.1	5239.9	-2.994	84.573	-43.072	-.153	25.130	5.109	157.565
1794.0	122811.6	5201.2	-3.042	84.033	-42.695	-.212	24.940	5.075	159.138
1796.0	122260.8	5162.2	-3.091	83.502	-41.543	-.223	24.739	5.041	160.728
1798.0	121706.6	5123.2	-3.127	82.981	-40.608	-.110	24.551	5.007	162.354

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1800.0	121151.4	5084.0	-3.154	82.452	-40.320	-.035	24.365	4.973	163.970
1802.0	120596.0	5044.9	-3.182	81.926	-39.849	.049	24.142	4.939	165.607
1804.0	120040.3	5006.3	-3.211	81.405	-39.632	.199	23.940	4.905	167.277
1806.0	119483.6	4968.8	-3.242	80.877	-39.639	.229	23.790	4.873	169.037
1808.0	118926.5	4929.6	-3.271	80.336	-39.972	.137	23.657	4.838	170.693
1810.0	118369.1	4890.1	-3.299	79.788	-39.799	.209	23.527	4.804	172.328
1812.0	117811.7	4850.4	-3.329	79.236	-39.888	.223	23.402	4.769	173.950
1814.0	117253.7	4810.4	-3.361	78.678	-39.886	.255	23.268	4.734	175.558
1816.0	116695.5	4769.9	-3.390	78.102	-40.297	.223	23.115	4.698	177.125
1818.0	116137.4	4727.3	-3.424	77.486	-41.338	.025	22.948	4.660	178.529
1820.0	115578.4	4686.4	-3.464	76.882	-41.092	.048	22.746	4.623	180.061
1822.0	115018.3	4645.7	-3.499	76.282	-40.677	.123	22.550	4.587	181.613
1824.0	114457.9	4605.1	-3.533	75.678	-40.656	.078	22.363	4.551	183.163
1826.0	113897.1	4564.4	-3.570	75.063	-41.106	-.090	22.167	4.515	184.708
1828.0	113335.8	4523.9	-3.606	74.451	-40.727	-.075	21.964	4.478	186.260
1830.0	112774.2	4483.4	-3.641	73.847	-40.655	-.076	21.787	4.442	187.809
1832.0	112212.0	4443.5	-3.681	73.229	-40.614	-.237	21.658	4.406	189.399
1834.0	111649.2	4403.6	-3.718	72.613	-41.170	-.474	21.510	4.371	190.990
1836.0	111085.7	4363.7	-3.748	71.996	-36.979	-.010	21.493	4.335	192.574
1838.0	110527.5	4323.7	-3.734	71.423	-35.934	.177	21.272	4.299	194.091
1840.0	109976.6	4282.1	-3.711	70.806	-36.053	-.000	21.916	4.261	195.379
1842.0	109436.2	4240.0	-3.662	70.184	-36.597	-.160	21.314	4.222	196.484
1844.0	108909.0	4200.2	-3.652	69.587	-36.455	-.121	20.844	4.186	197.700
1846.0	108385.8	4161.0	-3.650	68.991	-37.280	.023	20.645	4.150	198.886
1848.0	107867.2	4121.9	-3.661	68.370	-38.700	.011	20.476	4.114	200.014
1850.0	107351.0	4083.1	-3.690	67.734	-39.806	-.005	20.289	4.079	201.131
1852.0	106834.2	4044.9	-3.739	67.093	-40.179	.059	20.103	4.044	202.286
1854.0	106315.5	4007.1	-3.790	66.457	-40.975	.043	19.952	4.009	203.486
1856.0	105794.6	3968.7	-3.846	65.770	-42.121	-.106	19.887	3.974	204.609
1858.0	105271.0	3930.0	-3.907	65.060	-42.540	-.217	19.733	3.938	205.711

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1860.0	104744.2	3891.7	-3.969	64.354	-42.096	-.105	19.628	3.903	206.847
1862.0	104214.6	3853.3	-4.028	63.638	-41.885	-.142	19.496	3.867	207.976
1864.0	103683.3	3814.7	-4.079	62.913	-41.884	-.250	19.363	3.831	209.071
1866.0	103151.1	3774.4	-4.128	62.239	-41.330	-.196	19.210	3.794	209.960
1868.0	102618.4	3736.7	-4.175	61.518	-40.556	-.057	18.971	3.758	211.102
1870.0	102084.7	3699.8	-4.223	60.798	-37.862	-.584	18.815	3.724	212.318
1872.0	101556.1	3662.8	-4.170	60.177	-28.446	-.256	18.816	3.690	213.442
1874.0	101046.0	3626.0	-4.022	59.722	-18.374	-.121	18.667	3.655	214.361
1876.0	100563.9	3589.7	-3.816	59.458	-8.574	-.206	18.460	3.621	215.009
1878.0	100114.1	3553.6	-3.588	59.404	1.751	-.154	18.243	3.587	215.323
1880.0	99695.9	3520.7	-3.381	59.545	12.484	-.006	17.913	3.555	215.644
1882.0	99302.3	3485.8	-3.258	59.922	22.864	-.010	17.544	3.522	215.438
1884.0	98921.5	3451.4	-3.230	60.473	32.052	-.319	17.427	3.489	215.111
1886.0	98541.0	3417.1	-3.318	61.206	40.953	.301	17.233	3.456	214.767
1888.0	98148.6	3383.4	-3.471	61.992	41.882	-.049	17.139	3.424	214.572
1890.0	97741.1	3349.4	-3.639	62.818	43.813	.045	17.165	3.391	214.466
1892.0	97317.3	3315.2	-3.817	63.692	44.790	.210	17.095	3.358	214.446
1894.0	96876.5	3281.1	-4.001	64.572	44.313	.218	17.024	3.326	214.579
1896.0	96419.6	3247.7	-4.176	65.405	43.311	.011	16.981	3.294	214.930
1898.0	95947.6	3213.5	-4.343	66.282	43.142	.087	16.894	3.261	215.275
1900.0	95462.3	3179.3	-4.509	67.173	42.779	.278	16.743	3.228	215.723
1902.0	94963.9	3145.3	-4.661	68.044	40.888	.177	16.626	3.195	216.297
1904.0	94455.0	3111.3	-4.799	68.910	40.290	.248	16.572	3.163	216.920
1906.0	93937.1	3077.1	-4.926	69.773	39.296	.185	16.510	3.130	217.574
1908.0	93411.6	3042.6	-5.045	70.644	38.480	.116	16.456	3.096	218.198
1910.0	92880.2	3008.0	-5.151	71.518	38.616	-.322	16.412	3.063	218.826
1912.0	92342.1	2973.2	-5.288	72.438	42.553	.893	16.238	3.029	219.447
1914.0	91794.7	2938.8	-5.442	73.358	40.122	-.015	16.144	2.996	220.167
1916.0	91237.9	2904.3	-5.603	74.281	41.972	-.733	16.132	2.963	220.920
1918.0	90666.8	2869.6	-5.857	75.321	47.178	-.046	15.950	2.929	221.727

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1920.0	90074.8	2834.1	-6.153	76.401	47.565	.029	15.784	2.894	222.579
1922.0	89452.3	2800.0	-6.381	77.436	39.845	-.060	15.662	2.861	223.793
1924.0	88840.9	2765.9	-6.505	78.362	36.037	-.032	15.605	2.828	225.066
1926.0	88217.4	2731.9	-6.582	79.220	33.340	-.326	15.539	2.795	226.307
1928.0	87596.0	2697.5	-6.623	80.109	33.583	.049	15.363	2.761	227.392
1930.0	86976.5	2662.4	-6.666	80.989	32.242	.155	15.150	2.727	228.257
1932.0	86365.2	2629.1	-6.698	81.818	30.390	-.147	15.008	2.694	229.293
1934.0	85757.2	2595.9	-6.709	82.649	29.867	-.134	14.917	2.661	230.211
1936.0	85156.2	2563.0	-6.718	83.496	29.967	-.067	14.733	2.628	231.049
1938.0	84561.5	2530.6	-6.727	84.327	28.894	-.269	14.584	2.596	231.829
1940.0	83973.9	2498.3	-6.727	85.207	30.542	.056	14.467	2.564	232.460
1942.0	83393.7	2466.3	-6.705	86.191	27.773	.777	14.623	2.532	232.990
1944.0	82826.5	2433.4	-6.545	86.882	16.645	.276	14.486	2.499	233.085
1946.0	82280.5	2401.1	-6.350	87.279	7.340	.471	13.884	2.467	232.969
1948.0	81767.4	2369.5	-6.159	87.346	-3.165	.112	13.866	2.435	232.629
1950.0	81272.1	2336.9	-5.927	87.199	-6.177	-.077	14.259	2.402	231.744
1952.0	80805.6	2302.8	-5.627	86.998	-6.779	.003	14.380	2.368	230.139
1954.0	80369.8	2269.1	-5.336	86.715	-6.409	.112	14.253	2.334	228.197
1956.0	79963.0	2234.7	-5.045	86.476	-7.821	-.076	14.287	2.299	225.705
1958.0	79585.3	2199.9	-4.752	86.208	-7.916	-.171	14.105	2.263	222.736
1960.0	79234.5	2165.5	-4.502	85.939	-8.106	-.278	13.719	2.228	219.485
1962.0	78905.2	2132.2	-4.325	85.722	-6.430	-.076	13.323	2.194	216.169
1964.0	78591.4	2099.9	-4.218	85.565	-5.484	.161	12.985	2.161	212.853
1966.0	78287.6	2068.6	-4.175	85.416	-5.623	.215	12.668	2.129	209.583
1968.0	77989.5	2038.3	-4.197	85.254	-6.100	.118	12.269	2.098	206.422
1970.0	77691.1	2009.1	-4.303	85.111	-5.489	.139	11.808	2.068	203.434
1972.0	77386.8	1981.1	-4.490	85.013	-4.392	.303	11.348	2.039	200.701
1974.0	77071.1	1956.0	-4.753	85.055	-4.181	.551	10.943	2.014	198.630
1976.0	76739.7	1930.1	-5.072	84.972	-4.532	.565	10.688	1.987	196.482
1978.0	76390.0	1904.8	-5.433	84.887	-4.284	.599	10.461	1.961	194.567

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1980.0	76020.0	1880.2	-5.826	84.814	-3.839	.700	10.347	1.936	192.972
1982.0	75629.4	1855.9	-6.212	84.744	-3.415	.803	10.315	1.911	191.553
1984.0	75218.3	1832.3	-6.627	84.676	-3.266	.925	10.097	1.887	190.394
1986.0	74785.2	1809.2	-7.066	84.578	-3.684	.931	10.095	1.863	189.483
1988.0	74331.1	1786.1	-7.483	84.422	-4.600	.740	10.048	1.839	188.709
1990.0	73856.9	1762.2	-7.917	84.106	-4.072	.402	9.879	1.815	187.850
1992.0	73362.4	1739.6	-8.356	83.975	-2.945	.425	9.798	1.791	187.407
1994.0	72848.6	1717.4	-8.773	83.821	-3.816	.289	9.765	1.768	187.143
1996.0	72317.0	1695.3	-9.191	83.613	-4.832	-.193	9.648	1.746	186.987
1998.0	71767.9	1673.3	-9.610	83.462	-3.313	-.378	9.589	1.723	186.922
2000.0	71202.4	1651.3	-10.017	83.350	-2.847	-.373	9.517	1.700	186.932
2002.0	70621.7	1628.0	-10.419	83.306	-2.102	-.457	9.527	1.676	186.713
2004.0	70027.6	1606.0	-10.792	83.307	-1.296	-.683	9.497	1.653	186.820
2006.0	69421.8	1584.2	-11.143	83.374	2.256	-.144	9.420	1.630	186.984
2008.0	68805.4	1562.8	-11.483	83.482	2.212	-.106	9.362	1.608	187.456
2010.0	68180.0	1541.0	-11.797	83.585	2.145	-.341	9.675	1.591	189.018
2012.0	67551.6	1518.3	-11.938	83.797	3.848	-.065	9.723	1.573	190.276
2014.0	66923.3	1497.4	-12.150	84.164	4.664	.409	9.369	1.556	191.890
2016.0	66293.3	1475.7	-12.347	84.291	.376	.261	9.316	1.537	193.230
2018.0	65662.7	1453.9	-12.554	84.313	-1.283	.206	9.118	1.519	194.429
2020.0	65030.8	1432.2	-12.779	84.276	-2.184	.213	8.901	1.500	195.568
2022.0	64397.1	1411.0	-13.020	84.196	-2.993	.248	8.697	1.481	196.722
2024.0	63760.9	1388.6	-13.288	84.063	-3.009	.411	8.570	1.460	197.450
2026.0	63122.4	1367.2	-13.544	83.921	-4.356	.413	8.388	1.441	198.363
2028.0	62481.9	1347.2	-13.791	83.750	-5.602	.034	8.259	1.422	199.539
2030.0	61839.4	1327.6	-14.058	83.526	-5.073	-.257	8.052	1.404	200.751
2032.0	61194.5	1308.6	-14.295	83.365	-2.719	.054	8.027	1.386	202.052
2034.0	60549.2	1288.7	-14.515	83.334	-1.579	.560	7.983	1.366	202.930
2036.0	59905.0	1269.1	-14.699	83.130	-4.035	.180	7.858	1.347	203.724
2038.0	59262.7	1249.0	-14.907	82.821	-3.298	-.328	7.760	1.327	204.209

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2040.0	58621.7	1226.7	-15.152	82.533	-1.850	-.344	7.696	1.304	203.784
2042.0	57983.0	1204.4	-15.344	82.506	.356	.097	7.674	1.281	203.138
2044.0	57348.6	1181.8	-15.534	82.483	-1.583	.173	7.541	1.258	202.146
2046.0	56719.3	1159.2	-15.696	82.347	-3.771	-.420	7.526	1.234	200.917
2048.0	56095.5	1136.5	-15.885	82.454	-1.306	-.137	7.537	1.210	199.385
2050.0	55478.0	1111.3	-16.052	82.724	.870	.675	7.539	1.183	196.703
2052.0	54868.6	1089.2	-16.140	82.943	-1.347	.669	7.551	1.160	194.844
2054.0	54269.3	1069.3	-16.141	83.048	-4.539	.084	7.495	1.138	193.471
2056.0	53681.0	1051.9	-16.140	82.932	-3.101	-.157	7.239	1.119	192.733
2058.0	53100.3	1036.7	-16.198	82.912	-1.678	-.197	7.152	1.102	192.568
2060.0	52526.2	1019.9	-16.269	83.023	1.093	.225	7.050	1.084	191.651
2062.0	51958.5	1002.9	-16.392	83.200	-.601	-.363	6.981	1.065	190.414
2064.0	51395.8	984.5	-16.571	83.437	4.877	.572	6.718	1.044	188.445
2066.0	50835.5	968.0	-16.835	83.903	4.503	.877	6.577	1.026	187.070
2068.0	50276.0	952.2	-16.963	84.349	3.572	.846	7.383	1.008	185.785
2070.0	49725.1	936.8	-17.040	84.735	3.662	.503	6.974	.991	184.455
2072.0	49178.9	922.4	-17.196	85.246	3.418	.571	6.830	.974	183.366
2074.0	48634.6	910.9	-17.411	85.311	-2.086	.442	6.802	.961	183.278
2076.0	48088.3	902.4	-17.727	85.061	-2.812	.208	6.679	.951	184.375
2078.0	47536.5	898.2	-18.005	84.794	-3.069	.281	6.840	.945	187.195
2080.0	46983.6	891.5	-17.930	84.486	-3.816	-.612	7.628	.937	188.940
2082.0	46440.2	882.0	-17.808	84.173	-6.697	-.354	7.686	.925	189.390
2084.0	45907.4	872.4	-17.566	83.444	-10.839	-.419	8.233	.914	189.585
2086.0	45389.7	861.9	-17.244	82.716	-11.334	.176	8.072	.901	189.228
2088.0	44884.4	853.3	-17.099	81.896	-12.263	.290	7.767	.891	189.461
2090.0	44387.0	845.3	-17.073	81.155	-11.857	.258	7.306	.881	189.863
2092.0	43893.8	838.2	-17.065	80.596	-5.650	-.015	7.254	.872	190.580
2094.0	43405.3	832.2	-17.016	80.560	2.630	-.147	7.228	.864	191.666
2096.0	42922.7	824.7	-16.931	80.933	5.143	-.121	6.902	.855	191.983
2098.0	42440.9	818.1	-17.326	81.314	8.761	-.123	6.263	.847	192.664

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2100.0	41949.4	813.0	-17.812	81.853	10.156	-.261	6.418	.840	194.110
2102.0	41449.8	808.6	-18.116	82.462	11.066	-.526	6.637	.834	195.849
2104.0	40946.1	804.9	-18.298	83.200	10.325	-.282	6.768	.828	197.972
2106.0	40442.3	801.7	-18.284	83.825	7.460	-.377	6.791	.823	200.354
2108.0	39941.1	797.5	-18.285	84.301	7.488	-.281	6.758	.817	202.146
2110.0	39444.1	791.6	-18.219	84.993	6.980	-.117	6.598	.809	203.027
2112.0	38950.8	786.2	-18.246	85.489	4.373	.028	6.597	.802	204.042
2114.0	38461.2	780.4	-18.213	85.306	-3.456	.032	6.559	.795	204.847
2116.0	37975.2	776.1	-18.235	84.623	-11.852	-.111	6.517	.788	206.297
2118.0	37489.9	773.8	-18.360	83.108	-18.802	-.427	6.334	.784	208.818
2120.0	37001.4	770.6	-18.583	81.396	-19.509	-.192	6.375	.779	210.912
2122.0	36508.8	766.2	-18.898	79.480	-25.175	.008	6.533	.773	212.318
2124.0	36010.3	761.6	-19.282	76.992	-33.123	.163	6.886	.767	213.588
2126.0	35503.9	755.9	-19.859	73.876	-38.127	.108	6.994	.759	214.321
2128.0	34987.2	751.2	-20.270	70.439	-38.828	.115	7.673	.753	215.619
2130.0	34466.9	746.9	-20.556	66.626	-43.468	.081	7.863	.747	217.110
2132.0	33941.2	742.3	-20.931	62.478	-45.354	.252	8.209	.740	218.449
2134.0	33409.8	737.3	-21.360	57.815	-48.233	.258	8.565	.733	219.576
2136.0	32873.4	731.7	-21.665	52.710	-48.852	.044	8.793	.726	220.271
2138.0	32335.1	726.7	-21.898	47.595	-47.340	.234	8.752	.719	221.339
2140.0	31795.3	721.9	-22.122	42.505	-47.088	.295	8.807	.712	222.509
2142.0	31254.6	717.3	-22.252	37.204	-46.713	.228	8.841	.706	223.704
2144.0	30716.5	710.5	-22.304	31.886	-45.552	.188	8.792	.697	223.509
2146.0	30183.1	702.8	-22.324	26.897	-41.474	.289	8.806	.688	222.612
2148.0	29657.4	697.4	-22.153	22.229	-39.534	.383	8.479	.681	223.039
2150.0	29139.5	692.8	-21.883	17.936	-34.835	.227	8.348	.675	223.895
2152.0	28633.7	688.4	-21.477	14.165	-32.362	.203	7.969	.669	224.749
2154.0	28137.5	684.3	-21.275	10.722	-31.406	.161	7.960	.663	225.656
2156.0	27651.1	681.4	-20.858	7.353	-30.227	.333	7.776	.659	227.295
2158.0	27173.4	679.5	-20.642	4.003	-33.677	.590	7.805	.655	229.497

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2160.0	26699.0	676.9	-20.664	.410	-33.345	.422	7.858	.652	231.250
2162.0	26227.9	673.4	-20.512	-3.415	-34.656	.463	8.456	.647	232.300
2164.0	25768.2	669.1	-19.938	-7.591	-34.742	.505	8.379	.641	232.734
2166.0	25322.1	665.8	-19.389	-11.893	-34.659	.334	8.644	.637	233.690
2168.0	24892.8	661.2	-18.756	-16.034	-33.790	.462	8.328	.631	233.553
2170.0	24476.9	656.3	-18.432	-20.030	-33.818	.553	8.179	.625	233.084
2172.0	24069.9	651.4	-18.192	-23.986	-33.993	.563	8.199	.619	232.574
2174.0	23672.3	646.2	-17.869	-28.183	-35.181	.434	8.127	.613	231.657
2176.0	23282.2	640.5	-17.774	-32.429	-36.330	.500	8.146	.606	230.320
2178.0	22896.3	634.9	-17.735	-36.950	-38.827	.698	8.626	.600	229.002
2180.0	22514.6	629.0	-17.766	-41.861	-40.695	.432	8.697	.593	227.438
2182.0	22136.0	622.2	-17.657	-47.148	-40.649	.268	9.240	.586	225.131
2184.0	21765.9	617.6	-17.463	-52.476	-41.126	.267	8.805	.580	224.292
2186.0	21396.0	615.9	-17.629	-57.384	-39.014	.325	9.095	.578	225.612
2188.0	21030.7	613.6	-17.055	-62.558	-38.355	.412	9.615	.575	226.365
2190.0	20678.7	611.8	-16.465	-67.470	-36.581	.502	9.496	.572	227.433
2192.0	20340.7	609.9	-15.674	-72.204	-34.595	.659	9.791	.569	228.362
2194.0	20023.9	606.8	-14.673	-77.044	-33.469	.405	9.327	.566	228.202
2196.0	19728.0	603.6	-13.721	-81.496	-29.810	.043	8.705	.562	227.802
2198.0	19452.0	600.1	-12.883	-85.246	-27.268	-.353	8.471	.558	226.975
2200.0	19194.7	596.2	-12.012	-88.715	-26.424	-.314	8.363	.554	225.789
2202.0	18953.0	592.1	-11.447	-92.015	-26.684	-.083	8.651	.549	224.304
2204.0	18725.4	587.7	-10.795	-95.555	-27.730	.012	8.821	.545	222.427
2206.0	18512.7	582.5	-10.186	-99.248	-27.885	.060	8.713	.539	219.960
2208.0	18312.3	577.3	-9.567	-102.926	-27.083	.131	9.263	.534	217.283
2210.0	18128.3	570.4	-8.862	-106.550	-26.830	.262	9.210	.527	213.269
2212.0	17957.0	563.5	-8.505	-110.011	-27.090	.358	8.965	.520	209.198
2214.0	17790.7	556.8	-8.477	-113.311	-26.539	.401	8.971	.514	205.261
2216.0	17625.0	550.5	-8.791	-116.585	-27.726	.473	8.312	.508	201.663
2218.0	17447.8	545.9	-9.715	-119.672	-29.413	.290	7.846	.503	199.305

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2220.0	17248.1	542.9	-11.356	-122.698	-32.784	.245	7.664	.500	198.287
2222.0	17018.9	540.9	-12.824	-126.300	-34.561	.370	8.322	.498	198.153
2224.0	16766.6	539.4	-13.932	-130.191	-34.290	.274	8.470	.496	198.539
2226.0	16494.6	538.5	-14.982	-134.167	-34.735	.243	8.928	.494	199.443
2228.0	16207.3	536.9	-15.779	-138.332	-34.886	.178	9.113	.492	199.983
2230.0	15907.7	537.0	-16.242	-142.967	-35.659	.318	9.459	.492	201.752
2232.0	15604.4	537.8	-16.297	-148.402	-36.718	-.059	9.049	.492	204.185
2234.0	15299.2	540.2	-16.276	-153.775	-34.718	-.369	8.758	.493	207.824
2236.0	14991.0	543.4	-16.659	-158.494	-37.317	-.412	7.620	.496	212.255
2238.0	14665.0	549.2	-17.798	-163.133	-36.452	-.389	6.743	.500	218.887
2240.0	14314.2	557.7	-18.738	-167.520	-31.506	-.777	6.308	.507	227.984
2242.0	13945.5	565.7	-19.169	-171.432	-29.359	-1.146	6.288	.514	237.123
2244.0	13567.5	573.0	-19.265	-174.744	-21.519	-1.160	6.049	.520	245.974
2246.0	13184.6	578.3	-19.163	-176.608	-12.044	-1.082	6.244	.524	253.327
2248.0	12804.3	583.8	-18.636	-177.743	-4.522	-.699	6.356	.528	261.054
2250.0	12430.7	591.5	-18.150	-178.436	-1.358	-.851	5.741	.534	270.857
2252.0	12059.6	594.4	-17.977	-178.252	7.484	-.728	5.852	.536	276.501
2254.0	11690.6	593.4	-17.823	-177.269	8.865	-.810	6.326	.534	278.521
2256.0	11340.6	583.8	-16.180	-175.425	11.105	-.253	7.244	.525	272.309
2258.0	11033.0	573.6	-14.573	-173.503	10.381	-.019	6.413	.515	265.291
2260.0	10748.0	564.2	-14.210	-172.236	6.946	.393	5.619	.506	258.729
2262.0	10467.9	557.9	-14.602	-171.731	1.700	.454	4.782	.500	255.101
2264.0	10169.3	556.6	-16.120	-171.906	-2.757	.079	4.915	.498	256.108
2266.0	9846.3	557.5	-16.917	-171.861	-4.158	.313	5.323	.499	259.347
2268.0	9514.9	559.2	-17.353	-172.030	-2.364	.709	5.473	.499	263.451
2270.0	9179.1	562.4	-17.100	-172.199	.600	.522	5.469	.502	269.050
2272.0	8846.7	559.5	-16.794	-171.739	1.395	.484	5.378	.499	268.900
2274.0	8520.5	554.8	-17.234	-170.972	1.844	1.006	5.012	.494	266.884
2276.0	8186.7	547.2	-17.677	-169.912	-.118	1.819	5.484	.487	262.132
2278.0	7849.9	544.1	-17.915	-169.805	.233	1.614	5.724	.483	261.771

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2280.0	7513.1	541.8	-17.820	-169.993	-.091	1.244	5.823	.481	262.076
2282.0	7179.5	540.9	-17.751	-170.895	.807	.166	5.766	.479	263.769
2284.0	6847.1	539.9	-17.710	-171.031	.664	-.189	5.711	.478	265.386
2286.0	6514.9	540.2	-17.845	-171.106	1.085	-.367	5.550	.478	268.246
2288.0	6179.6	542.0	-18.008	-170.961	1.360	-.514	5.204	.479	272.640
2290.0	5838.5	542.5	-18.309	-170.713	1.750	-.577	5.252	.479	275.961
2292.0	5490.1	543.2	-18.740	-169.934	2.480	-.022	5.419	.479	279.447
2294.0	5136.9	544.2	-18.772	-169.456	1.137	.217	5.598	.479	283.432
2296.0	4783.7	545.0	-18.699	-169.438	.586	-.126	5.640	.480	287.182
2298.0	4431.8	544.3	-18.662	-169.440	1.789	-.533	5.500	.479	289.498
2300.0	4078.7	545.4	-18.760	-169.290	.732	-.357	5.503	.479	293.716
2302.0	3725.3	547.2	-18.581	-169.322	.258	-.272	5.881	.480	298.678
2304.0	3383.7	548.2	-17.324	-169.203	.388	-.056	6.473	.481	302.808
2306.0	3074.5	547.1	-14.944	-169.298	-1.243	.118	7.056	.479	304.384
2308.0	2811.6	544.3	-12.587	-169.563	-1.290	-.053	7.247	.477	303.657
2310.0	2600.9	537.8	-9.400	-169.703	-1.308	.177	7.552	.471	298.320
2312.0	2447.9	528.6	-6.785	-169.851	-.489	.090	6.981	.463	289.542
2314.0	2334.5	518.1	-5.270	-169.818	.073	.331	7.093	.453	279.074
2316.0	2254.5	502.1	-3.335	-169.841	.766	.593	7.158	.439	262.758
2318.0	2202.4	486.6	-2.337	-170.362	.197	-.032	7.305	.426	247.182
2320.0	2167.0	469.1	-1.523	-170.357	1.527	.002	7.653	.410	229.901
2322.0	2145.4	451.6	-.811	-170.252	.875	-.207	7.861	.395	213.178
2324.0	2131.4	435.2	-.789	-170.061	2.302	-.224	7.832	.380	198.083
2326.0	2118.0	419.4	-.419	-169.949	1.818	-.226	8.463	.367	184.012
2328.0	2112.1	404.0	-.160	-169.744	.019	-.382	8.161	.353	170.815
2330.0	2108.1	389.6	-.066	-169.693	.505	-.285	8.203	.341	158.868
2332.0	2104.9	375.9	-.050	-169.681	.108	-.261	8.291	.329	147.933
2334.0	2103.8	361.8	.156	-169.648	.616	-.162	7.574	.316	137.036
2336.0	2103.5	349.6	.157	-169.479	.970	-.169	7.000	.306	127.907
2338.0	2103.4	338.0	.164	-169.293	1.048	-.095	6.680	.296	119.605

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2340.0	2103.1	326.6	.098	-169.227	1.082	.095	6.321	.286	111.658
2342.0	2102.3	314.4	.076	-169.191	.966	.243	4.517	.275	103.501
2344.0	2101.8	298.3	.071	-169.313	.660	.333	1.703	.261	93.148
2346.0	2102.8	272.2	.227	-169.406	.437	.275	-3.702	.238	77.568
2348.0	2102.0	252.4	.300	-169.189	.626	.542	-3.801	.221	66.685
2350.0	2102.2	238.6	.096	-169.107	.747	.318	-3.644	.209	59.597
2352.0	2101.7	225.7	.104	-168.757	.811	.906	-3.654	.197	53.326
2354.0	2101.2	213.3	.125	-169.469	1.006	1.474	-3.637	.186	47.614
2356.0	2101.0	201.0	.133	-170.259	.855	.764	-3.641	.176	42.313
2358.0	2101.0	189.5	.203	-170.591	.852	.434	-3.725	.166	37.588
2360.0	2101.0	178.3	.184	-170.312	.700	.349	-3.711	.156	33.297
2362.0	2100.8	167.1	.157	-169.840	.605	.073	-3.699	.146	29.229
2364.0	2100.9	155.2	.127	-170.078	.897	.944	-3.698	.136	25.227
2366.0	2100.7	144.1	.080	-170.381	.815	.845	-3.673	.126	21.747
2368.0	2100.5	131.4	.140	-170.488	.736	.499	-3.759	.115	18.072
2370.0	2100.2	117.0	.092	-170.186	.724	.145	-3.737	.102	14.323
2372.0	2099.9	106.0	.098	-169.751	.707	.335	-3.739	.093	11.752
2374.0	2099.8	96.1	.076	-169.658	.734	.531	-3.714	.084	9.659
2376.0	2099.4	86.6	.078	-169.839	.796	.643	-3.739	.076	7.847
2378.0	2099.3	77.1	.121	-169.630	.702	.612	-3.813	.067	6.217
2380.0	2099.1	68.9	.079	-170.125	.785	.638	-3.736	.060	4.973
2382.0	2098.9	60.8	.001	-170.313	.716	.307	-3.652	.053	3.872
2384.0	2098.7	52.5	.078	-170.032	.724	.379	-3.733	.046	2.887
2386.0	2098.4	46.2	-.074	-170.098	.752	.412	-3.558	.040	2.234
2388.0	2098.1	36.8	.008	-169.914	.760	.175	-3.678	.032	1.416
2390.0	2097.9	26.6	-.098	-169.778	.764	.329	-3.575	.023	.743
2392.0	2097.5	15.0	-.356	-169.746	.777	.453	-3.354	.013	.236
2394.0	2097.2	3.3	-3.659	-171.548	.886	-1.192	-.028	.003	.012
2396.0	2097.4	.4	-59.430	176.925	11.455	-5.817	56.441	.000	.000
2398.0	2097.1	.1	-23.023	-5.919	-174.470	14.681	152.779	.000	.000

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
2400.0	2096.6	.1	-61.378	157.665	29.133	-14.031	61.686	.000	.000
2402.0	2096.6	.1	-62.641	54.774	138.060	-18.264	106.416	.000	.000
2404.0	2096.3	.2	-68.095	125.681	62.460	-18.841	76.491	.000	.000
2406.0	2096.1	.1	-62.506	156.521	30.453	-13.948	62.974	.000	.000
2408.0	2095.8	.2	-62.132	136.521	50.010	-21.254	68.942	.000	.000
2410.0	2095.6	.2	-71.467	149.333	39.085	-11.143	72.140	.000	.000
2412.0	2095.3	.2	-67.688	146.173	41.558	-14.431	69.926	.000	.000
2414.0	2095.0	.2	-66.884	131.329	56.395	-18.791	73.869	.000	.000
2416.0	2094.7	.1	-60.271	139.059	46.942	-21.834	66.629	.000	.000
2418.0	2094.4	.2	-68.235	139.852	47.967	-15.729	72.052	.000	.000
2420.0	2094.2	.2	-59.206	134.356	51.473	-24.192	67.831	.000	.000
2422.0	2093.9	.2	-66.123	142.703	44.691	-16.495	69.701	.000	.000
2424.0	2093.6	.2	-60.040	142.736	43.185	-20.709	65.075	.000	.000
2426.0	2093.3	.2	-59.795	134.677	51.299	-23.630	68.093	.000	.000
2428.0	2093.0	.2	-58.202	145.219	40.207	-20.980	62.696	.000	.000

APPENDIX D

STS-14 (41-D) Source and Output Products for Archival

D.1 STS-14 Output Products

(a) FILES

NAME	USER CATALOG	DESCRIPTION
BT14N02	169750N	Final reconstructed trajectory (40 word format per AMA 81-1)
ST14BET	274885C	Final extended BET (66 word format per AMA 81-11)
NAVB41D	389102C	STS-14 onboard nav BET (66 word format)
ST14MET	712662N	Final LAIRS file
TRWS41D	274885C	Reformatted JSC/TRW BET (66 word format)
IMRGA14	274885C	Signal difference file (IMU2 - RGA1/AA1)

(b) TAPES

REEL NO.	DESCRIPTION
NB1248	STS-14 AEROBET (201 words per AMA 82-9)
NC0601	Duplicate of above
NW0766	25 Hz IMU2 GTFILE (62 words per AMA 81-20)
NR0101	25 Hz RGA1/AA1 GTFILE (62 words per AMA 81-20)
NE0716	25 Hz RGA1/AA1 for NR0101
NR0116	25 Hz bias rectified RGA1/AA1 file for GTFILE generation
NB0946	Final STS-14 residuals for BT14N02
NC0943	Edited tracking tape
NB1056	1 Hz OI-2 for AEROBET
NB1060	20 Hz IMU2 file in body axes for ST14BET, AEROBET, and GTFILE (calibrated per BT14N02 solution)
NB0945	Dynamic data (input for trajectory reconstruction)- 20 Hz IMU2 data in platform coordinates (second CDC record)

D.2 Source Tapes Received via NASA LaRC

(a) T/M TAPES

REEL NO.	DESCRIPTION
NA0930	OI-1
NB1202/NC0110	OI-2
NA1015	OI-3 (source for RGA1/AA1 data)
NA1004	OI-4
NU1207/NU1277	OI-1 from CBET1F

(b) TRACKING TAPES

REEL NO.	DESCRIPTION
NU0927	JSC/TRW tracking data
NT0571	Goddard Space Flight Center data
JH41D4	AFFTC theodolite data

(c) OTHER

REEL NO.	DESCRIPTION
NB0833	JSC/TRW Descent BET
JH41D1	Jimsphere data (balloon 1; landing - $1\frac{1}{2}$ hours)
JH41D2	Jimsphere data (balloon 2; landing + 30 minutes; optical track)
JH41D3	Jimsphere data (balloon 2; landing + 30 minutes; radar track)

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15. Supplementary Notes

Langley Technical Monitor: Harold R. Compton

16. Abstract

Trajectory reconstruction results for the first Discovery flight are presented. Spacecraft dynamic measurements from IMU2 were utilized in conjunction with the ground based tracking data from two S-band stations, eight C-band, and five cameras at Edwards Air Force Base to determine the spacecraft trajectory from epoch through roll-out on Runway 17. Specifics as to the trajectory reconstruction are discussed in Section I herein. The final inertial profile is BT14N02/UN=169750N. Merging of this file with the final LAIRS atmosphere is discussed in Section II. The final Extended BET is ST14BET/UN=274885C. Section III presents plots of relevant parameters from the AEROBET as well as aerodynamic performance comparison results. High frequency files for maneuver extraction were also generated as discussed in Section IV. Appendices are attached which contain (A) spacecraft and physical parameters utilized, (B) final residuals obtained from the data fitting process, (C) listing of trajectory parameters, and (D) archival information.

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