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INTERNATIONAL ULTRAVIOLET EXPLORER (IUE) SATELLITE MISSION ANALYSIS

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CSC

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Under

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ABSTRACT

This technical memorandum presents the results of the mission analysis performed by Computer Sciences Corporation (CSC) in support of the International Ultraviolet Explorer (IUE) satellite. The launch window is open for three separate periods (for a total time of 7 months) during the year extending from July 20, 1977, to July 20, 1978. The synchronous orbit shadow constraint limits the launch window to approximately 88 minutes per day. Apogee boost motor fuel was computed to be 455 pounds (206 kilograms) and on-station weight was 931 pounds (422 kilograms). The target orbit is elliptical synchronous, with eccentricity 0.272 and 24 hour period.

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SECTION 1 - INTRODUCTION

The objective of the joint United States/European International Ultraviolet Explorer (IUE) satellite is to observe the ultraviolet spectra of stars, galaxies, and the brighter gaseous nebulae. The IUE spacecraft will be launched by a 2914 Delta rocket and placed in a 24-hour elliptical orbit over the Atlantic Ocean. In support of this mission, Computer Sciences Corporation (CSC) has extended the mission analysis by performing the following tasks:

1. The launch window analysis was updated to reflect a nominal launch date of July 20, 1977. The FORTRAN Launch Analysis Program (FLAP) was used to determine the launch opportunities as a function of launch date and right ascension of the ascending node. The launch window is presented for a 1-year period beginning July 20, 1977.

2. The spacecraft weight was increased to accommodate higher payload requirements. The Two-Body Error Analysis (TBERR) Program was used to resize the apogee boost motor (ABM), assuming an apogee yaw maneuver in order to satisfy tracking requirements in the synchronous orbit. The resulting ABM fuel weight is 455 pounds (206 kilograms) which corresponds to a velocity change of 3540 feet per second (1078.9 meters per second). The hydrazine fuel requirements were computed for a nominal drift rate of 6 degrees per day east. The study assumed that drift rate errors would be corrected. The 99th percentile hydrazine required for station acquisition is 23 pounds (10 kilograms).

3. The shadow time history of the elliptical synchronous orbit was reevaluated in light of recent changes in the constraints. To achieve maximum sunlight over a 5-year mission, a node and argument of perigee were selected to assure a high ecliptic inclination and apogee position well above the shadow cone of the Earth. The nominal node angle is 220 degrees and argument of perigee is 234 degrees.

4. The synchronous orbit inclination was chosen to satisfy tracking requirements at Goddard Space Flight Center (GSFC) and Villafranca del Castillo, Spain (VILFRA). The tracking time prediction program (SANDTRACKS) was used to determine tracking coverage as a function of inclination and station longitude.[1] If the nominal inclination is chosen to be 26.5 degrees, then the tracking constraints are satisfied. Furthermore, there is no significant loss of tracking time for points inside the .90 probability error ellipse centered at the nominal inclination.

5. The nominal trajectory parameters were computed for a July 20, 1977, launch. The transfer orbit node and argument of perigee were compensated for the apogee motor firing (AMF) maneuver. Second apogee was selected as nominal position for the AMF because of extensive tracking coverage from U.S. sites. The drift orbit was divided into three phases to achieve station acquisition in approximately 10 days. The nominal synchronous orbit has an eccentricity of 0.272, inclination of 26.5 degrees, and initial station longitude of about 42 degrees west.

Section 2 presents the launch window extending from July 20, 1977, to July 20, 1978. Section 3 updates the spacecraft weight breakdown, including a resized apogee boost motor and hydrazine fuel required for station acquisition. Section 4 outlines the nominal IUE mission profile, presents the trajectory constraints, and tabulates the nominal orbital elements designed to satisfy these constraints.

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[1] Station longitude is defined as geographic longitude of the ascending node when the spacecraft is at the ascending node.

SECTION 2 - LAUNCH WINDOW ANALYSIS

2.1 LAUNCH WINDOW CONSTRAINTS

The launch window analysis for IUE was updated to extend from July 20, 1977, for a 1-year period.[1] The launch window constraints assumed for this study are as follows:

- Maximum continuous shadow duration prior to AMF must be less than 60 minutes
- Third-stage solar aspect angle must lie between 45 and 135 degrees
- Fourth-stage solar aspect angle must lie between 45 and 135 degrees
- Earth-spacecraft-Sun separation angle must be between 30 and 150 degrees for the 3-hour period prior to apogee
- Minimum daily launch window duration must be at least 20 minutes
- Synchronous orbit shadow duration must be less than 72 minutes per revolution for the entire mission

The pre-AMF shadow constraint must be satisfied from fairing ejection up to AMF. The solar aspect angle is measured between the spacecraft spin axis and the spacecraft-Sun vector (Figure 2-1). The separation angle is measured between the spacecraft-Sun vector and the spacecraft-Earth vector (Figure 2-2). The third stage injects the satellite into the transfer orbit from the parking orbit. The fourth stage is the ABM and is used to inject the satellite into the desired drift orbit.

[1] Computer Sciences Corporation, 3000-2700-07TN, Launch Window Analysis for the International Ultraviolet Explorer (IUE) Satellite, J. H. Griffin, March 1975

2.2 LAUNCH WINDOW DEFINITION

The launch window is defined in terms of launch date and node of the parking orbit. The composite launch window plot is presented in Figure 2-3, and the individual constraints are plotted in Appendix D.

The acceptable launch periods are approximately as follows:

- July 20, 1977 - August 24, 1977
- November 10, 1977 - February 14, 1978
- May 9, 1978 - July 20, 1978

These dates are determined primarily by the third- and fourth-stage solar aspect angle constraints, which rule out a total of about 5 months of the year. The acceptable node values are limited by the synchronous shadow history constraints, which are discussed in detail in Section 4. These limits slope downward in order to account for node regression in the synchronous orbit. For example, on the launch date of July 20, 1977, the shadow history can be computed with a given initial node value. To achieve the same shadow history for a launch date 5 months later, for example, the initial node must be compensated by an amount equal to a 5-month node regression.

It should be noted that the synchronous orbit node values will be about 6 degrees less than the parking orbit nodes, because of the plane change at AMF. This is true for any launch date. In Figure 2-3, this constant node shift has been accounted for in plotting the node limits associated with the synchronous orbit shadow history constraints.

Also in Figure 2-3, note that there are no violations of the Earth-Sun separation angle constraint for the node range under consideration. This is due to the relatively high inclination of the orbit with respect to the ecliptic plane.

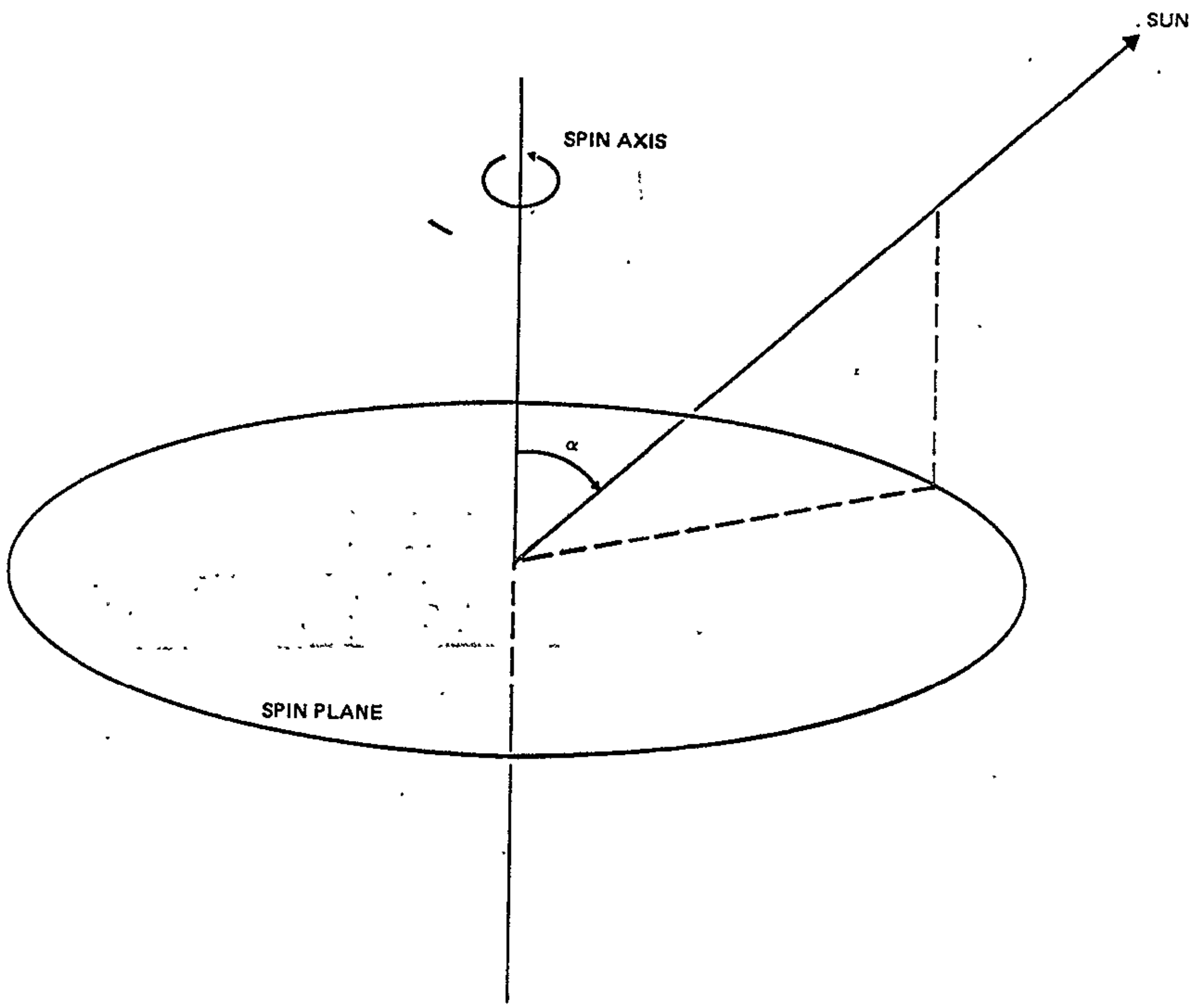

Figure 2-1. Definition of Solar Aspect Angle (α)

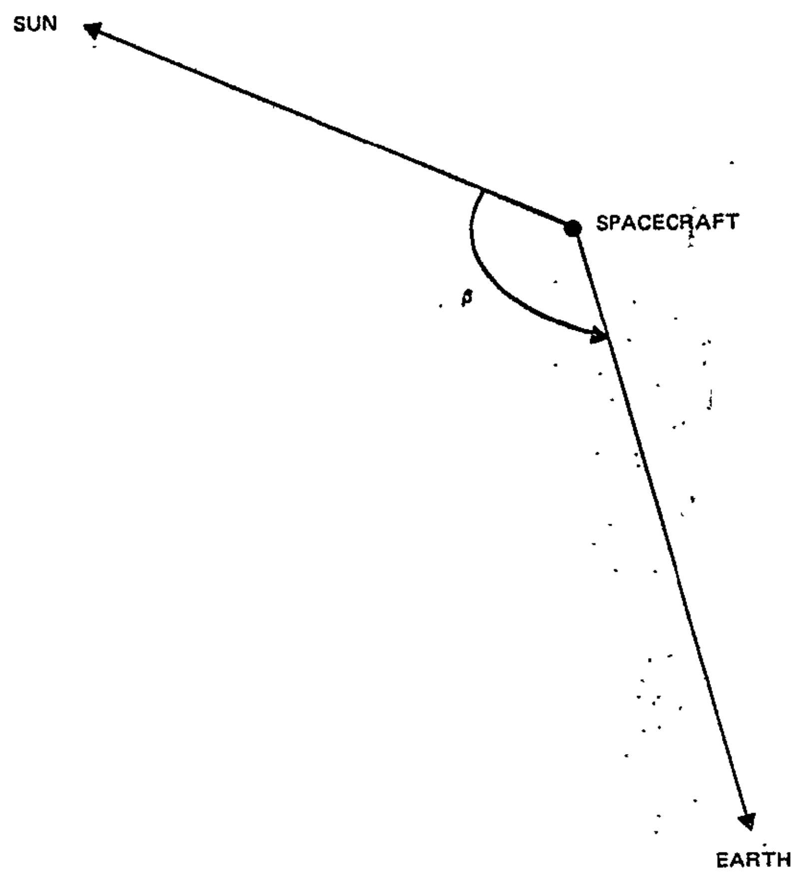

Figure 2-2. Definition of Separation Angle (β)

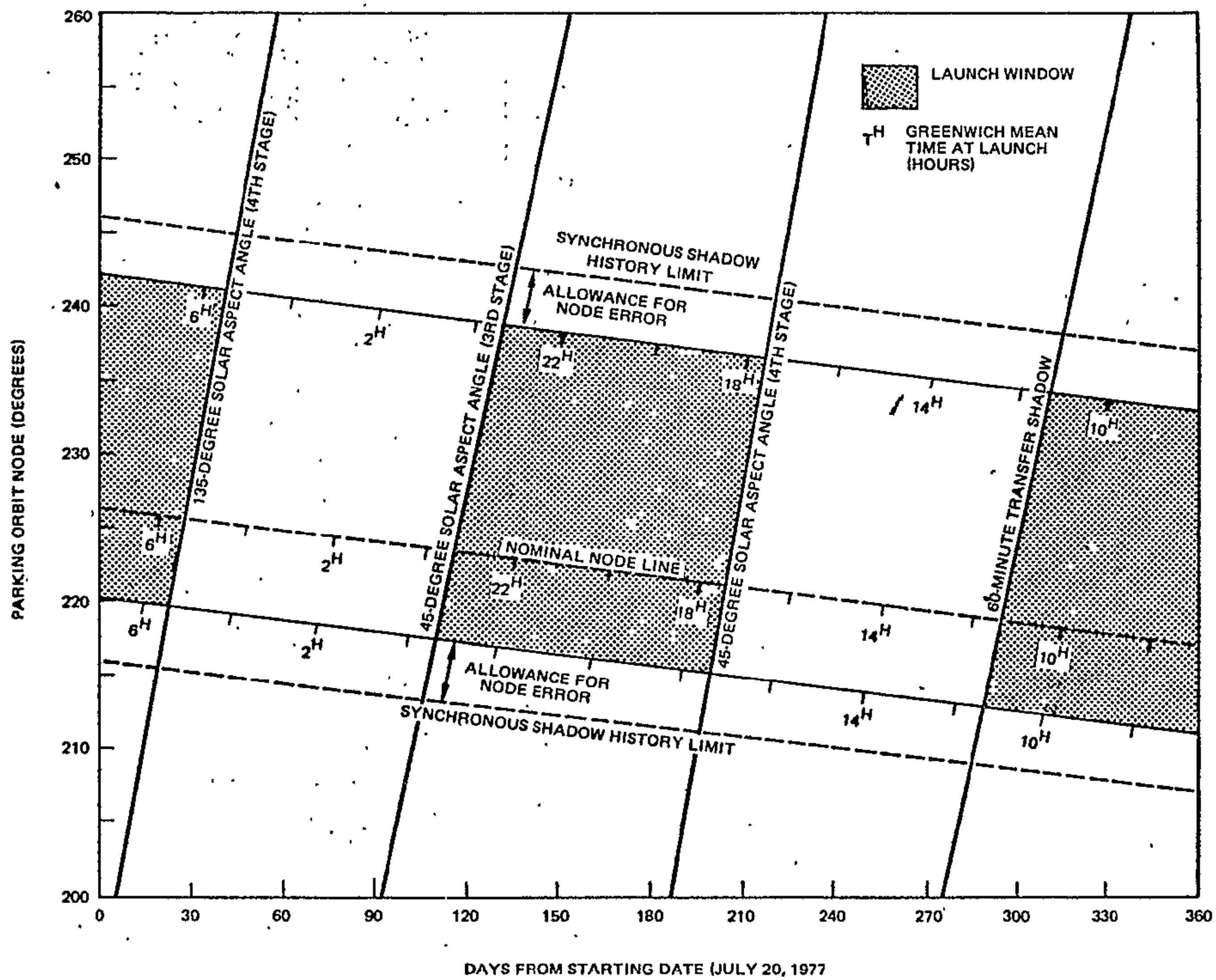

Figure 2-3. IUE Launch Window

SECTION 3 - FUEL REQUIREMENTS

3.1 APOGEE BOOST MOTOR SIZING

Using the TBERR Program, the ABM was resized to account for increased spacecraft weight. The transfer orbit inclination was 28.7 degrees (defined by launch azimuth) and the apogee bias was 5700[1] nautical miles (10556 kilometers). The target inclination was varied from 24.0 to 28.7 degrees, and the ABM fuel was computed assuming a nominal target drift rate of 6 degrees per day east. The ABM fuel penalty versus inclination is shown in Figure 3-1, where zero penalty represents no plane change between the transfer and synchronous orbits. The selection of the nominal inclination (26.5 degrees) is discussed in Section 4.2. For an inclination of 26.5 degrees, the impulsive velocity change (ΔV) is 3540 feet per second (1078.9 meters per second). The corresponding ABM fuel required is 455 pounds (206 kilograms), assuming an effective specific impulse of 280.6 seconds.

3.2 HYDRAZINE AND ON-STATION WEIGHT

To determine the station acquisition hydrazine required, a Monte Carlo simulation was performed using the TBERR Program. The covariance matrix for position and velocity at transfer orbit injection is presented in Table 3-1. Additional errors are introduced during the AMF. The ABM 3-sigma pointing error was assumed to be 5 degrees in both yaw and pitch. The 3-sigma error in ABM ΔV was assumed to be 0.75 percent.

Two hydrazine maneuvers were simulated in the drift orbit. If the sample drift rate deviated by more than 0.1 degree per day from the nominal value of 6 degrees per day, a hydrazine burn was performed to correct the drift rate back to the nominal value. A second hydrazine burn reduces the drift rate to zero to achieve a synchronous orbit. (The purpose of the drift orbit is to allow

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[1] This bias is a project requirement, imposed to limit eccentricity in the synchronous orbit.

the spacecraft to acquire a specified station longitude.) If the sample eccentricity was greater than nominal, two hydrazine burns were performed to achieve the synchronous orbit. The eccentricity was lowered to the nominal value, while the drift rate was reduced to zero. In either case, the 99th percentile[1] hydrazine fuel is 23 pounds (10 kilograms), assuming a specific impulse of 220 seconds. This does not include any fuel required for spin rate control or attitude trim maneuvers. Table 3-2 presents an approximate IUE weight breakdown. The pre-AMF and post-AMF reorientation hydrazine values are estimated to be 4 and 2 pounds, respectively. Histograms for pertinent parameters are presented in Appendix A.

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[1] For hydrazine used to acquire station, N percent of the sample values are less than the Nth percentile value.

Table 3-1. Covariance Matrix at Transfer Injection

	x	y	z	$\dot{x}$	$\dot{y}$	$\dot{z}$
x	116322450.0	−1528932.4	−30565341.0	59126.868	83.506098	−142975.58
y	−1528932.4	63602375.0	706100.71	−1191.2372	5900.6438	1863.5505
z	−30565341.0	706109.71	25449260.0	−22264.382	16.078010	64165.883
$\dot{x}$	59126.868	−1191.2372	−22264.382	255.0	117.07503	−200.2417
$\dot{y}$	83.506098	5900.6438	16.078010	117.07503	8836.1771	−0.11295046
$\dot{z}$	−142075.58	1863.5595	64165.883	−200.2417	−0.11295046	9050.9395

1. POSITION IN FEET; VELOCITY IN FEET/SECOND.

2. COORDINATE SYSTEM.
   $Z = \underline{R}$
   $Y = \underline{R} \times \underline{V}$
   $X = (\underline{R} \times \underline{V}) \times \underline{R}$
   WHERE $\underline{R}$ AND $\underline{V}$ ARE THE INERTIAL POSITION AND VELOCITY VECTORS.

Table 3-2. Approximate Weight Breakdown for IUE.

ITEM	ENGLISH UNITS	METRIC UNITS
WEIGHT AT THIRD STAGE BURN-OUT	1415 LBS	642 KG
PRE-AMF REORIENTATION HYDRAZINE (ESTIMATE)	−4	−2
WEIGHT AT AMF	1411	640
ABM PROPELLANT AND INERT CONSUMMABLES	−455	−206
POST-AMF WEIGHT	956	434
POST-AMF REORIENTATION HYDRAZINE (ESTIMATE)	−2	−1
STATION ACQUISITION HYDRAZINE (99TH PERCENTILE)	−23	−10
ON-STATION WEIGHT (99TH PERCENTILE)	931	422

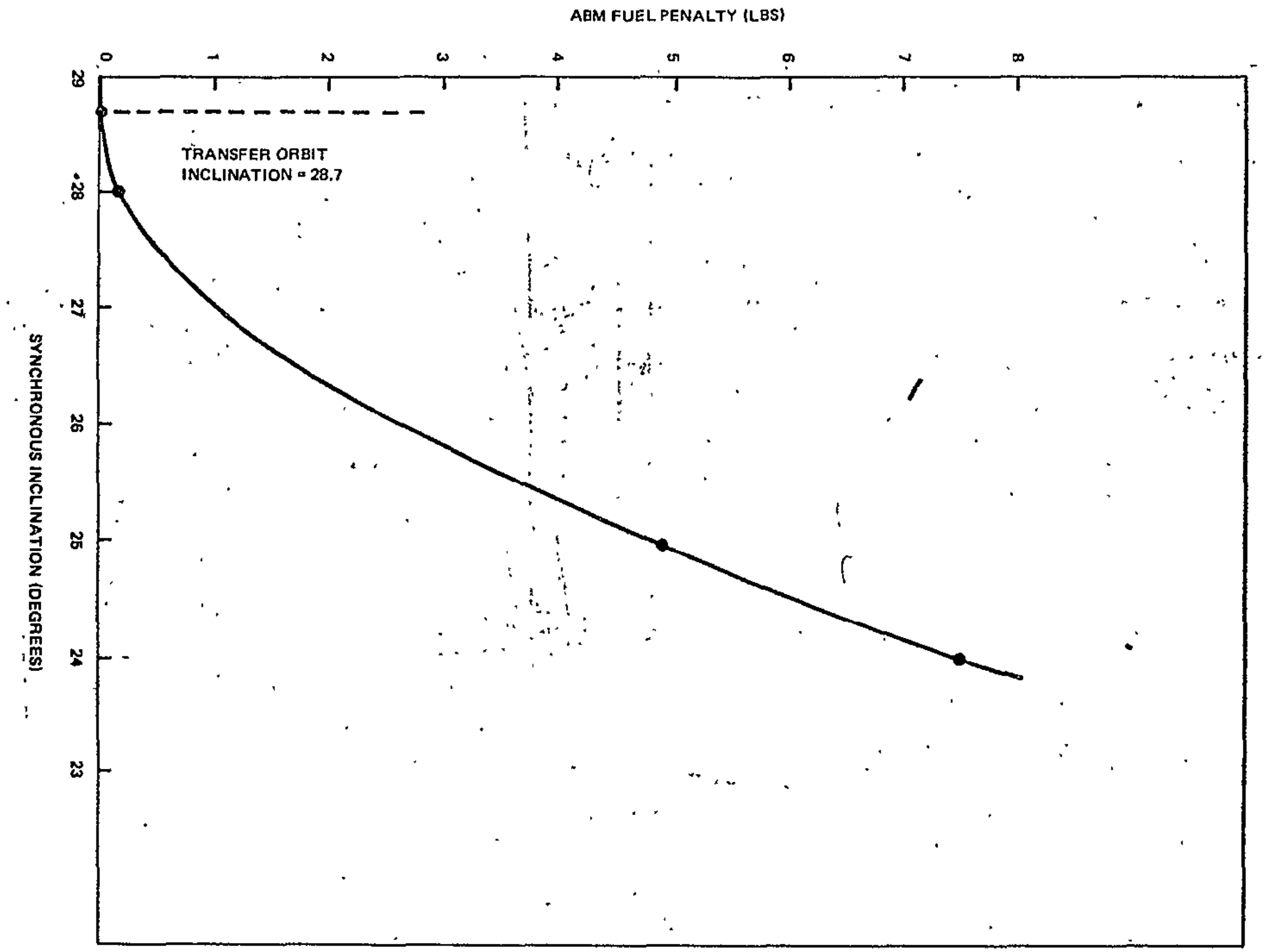


Figure 3-1. ABM Fuel Penalty Versus Inclination (for Fixed Apogee Bias and Fixed Drift Rate)

SECTION 4 - NOMINAL TRAJECTORY

4.1 SHADOW TIME CONSTRAINT

The nominal node and argument of perigee of the elliptical synchronous orbit were chosen to satisfy the shadow time constraint. Synchronous shadow duration must be less than 72 minutes per revolution over a 5-year mission. Due to the orbital eccentricity, the actual shadow durations could be as high as 95 minutes. To avoid these situations, the orientation geometry of the orbit plane must be controlled. The shadow constraint is satisfied when the orbit plane achieves a relatively high ecliptic inclination (Figure 4-1) and when the apogee position is well above the shadow cone of the Earth (Figure 4-2; ecliptic argument of perigee near 270 degrees). These conditions are met using an initial node of 220 degrees and argument of perigee of 234 degrees.

Figure 4-3 shows the 5-year synchronous orbit shadow history for the nominal elements. In generating this curve, semimajor axis, eccentricity, and inclination were held fixed, while node and argument of perigee were allowed to evolve at constant rates[1] of -0.024 and +0.027 degree per day, respectively. Figure 4-4 through 4-7 show the shadow histories for the 99th percentile values of argument of perigee for various node angles. For node angles from -10 to +20 degrees about the nominal value, the umbra shadow curves are acceptable and provide launch window durations of about 88 minutes per day (after compensating for possible node errors), as shown in Figure 2-3. For higher or lower node angles, the shadow curves are marginal or unacceptable, as shown in Appendix B.

4.2 TRACKING REQUIREMENTS

The synchronous orbit inclination was chosen to satisfy tracking requirements at GSFC and VILFRA. GSFC tracking time must be 24 hours per day, and

[1] This is due to the oblateness of the Earth, as reflected in the J2 coefficient in the gravitational potential.

VILFRA tracking time must be at least 10 hours per day. Figure 4-8 shows the GSFC tracking mask (NTTF 12-meter antenna) and a portion of the nominal tracking pattern. Figure 4-9 shows the VILFRA tracking mask and the nominal tracking pattern. The physical mask plus 10 degrees was used in computing all tracking time for VILFRA.

SANDTRACKS was used to compute tracking time as a function of inclination, argument of perigee, and longitude at the ascending node.[1] A representative sample of this data is presented in Table 4-1. The western-most limit of longitude at the ascending node is determined by the VILFRA tracking constraint, and the eastern-most limit is determined by the GSFC tracking constraint. Some of the longitude intervals, where both tracking requirements are satisfied, are indicated in Figure 4-10.

This figure also shows the .90 probability error ellipse for argument of perigee and inclination. The ellipse is centered at the nominal inclination of 26.5 degrees. Even though the ellipse extends into the region of tracking constraint violation, the loss of tracking time was not considered significant. For points A, B, and D on the ellipse, the VILFRA tracking time is about 9.4 hours when GSFC has 24 hours of coverage. At point C, the VILFRA coverage is 8.8 hours. As the orbit evolves, the inclination tends to decrease and the argument of perigee increases, resulting in better tracking coverage. If point C represents the initial conditions for the synchronous orbit, then after approximately 5 months the tracking requirements would be completely satisfied.

For nominal initial conditions, the orbit was allowed to evolve over a 5-year mission, and the longitude limits were determined as shown in Figure 4-11. To keep the orbit within these limits, it is necessary to perform stationkeeping maneuvers throughout the mission.

[1] This longitude is the geographic longitude of the ascending node when the spacecraft is at the ascending node.

4.3 NOMINAL MISSION PROFILE

The current nominal launch date for IUE is July 20, 1977. On this date, the launch window is open from approximately 6.9 to 8.4 hours GMT. This corresponds to a transfer node range of 220 to 242 degrees, or a synchronous node of 214 to 236 degrees.

IUE will be launched by a three-stage Delta 2914 vehicle from Cape Kennedy at a launch azimuth of 95 degrees. At an altitude of 100 nautical miles, it will be injected into a circular parking orbit with an inclination of 28.7 degrees. After coasting for about 26 minutes, the booster injects the spacecraft into a transfer orbit with an argument of perigee of 228.7 degrees. Following injection into the transfer orbit, the spacecraft orbit and attitude will be computed from tracking and telemetry data. The hydrazine reaction control system will then reorient the spacecraft into the apogee motor firing attitude. On the second apogee passage of the transfer orbit, the ABM will inject the satellite into a near-synchronous drifting orbit. The ABM will perform a plane change maneuver resulting in an inclination of 26.5 degrees, node of 220 degrees, and argument of perigee of 234 degrees. Drift rate will be controlled by the hydrazine system until the satellite acquires station. The final orbit will be elliptical synchronous.

4.4 NOMINAL ORBITAL ELEMENTS

The parking orbit is defined by the following parameters:

Parameter	Description
Altitude	100 nautical miles (185 kilometers)
Eccentricity	0
Inclination	28.7 degrees
Injection latitude	24.77 degrees
Injection longitude	59.49 degrees west
Injection azimuth	105.28 degrees

Parameter	Description
Time from launch to injection	539.37 seconds
Coast time	1599.35 seconds
Epoch date	July 20, 1977
Epoch time	$7^H\ 13^M\ 42^S$

The transfer, drift, and synchronous orbits are defined in Table 4-2. At AMF, the spin axis right ascension is 5.27 degrees, and the declination is 11.26 degrees, for the nominal orbit. Errors in the orbital elements are listed in Table 4-3 and shown in histogram form in Appendix A Figures 4-12 through 4-17 display the spacecraft groundtracks, while Appendix C presents the corresponding tracking coverage.

4.5 NOMINAL STATION ACQUISITION SEQUENCE

As presented in Table 4-2, the drift orbit is divided into three phases with drift rates of 6 and 2 degrees per day east. This represents only one of many possible station acquisition sequences to achieve a synchronous orbit. Table 4-4 indicates time to acquire station for easterly and westerly drift rates of 6 degrees per day, assuming AMF occurs on one of the first five transfer apogee passes (second apogee is nominal). Initial station longitude is near 42 degrees west. Figure 4-18 presents the station acquisition sequence in terms of longitude at the ascending node as a function of the number of revolutions in the drift orbit. After station longitude has been achieved, the higher order gravitational effects cause the orbit to deviate significantly away from the initial conditions. Figure 4-19 shows the evolution of the longitude at the ascending node if there are no stationkeeping maneuvers. Appendix E presents the evolution of the orbital elements and the groundtrack evolution.

Table 4-1. Longitude Intervals for Good Tracking

ARGUMENT OF PERIGEE (DEGREES)	VILFRA MINUS GSFC STATIONKEEPING LONGITUDES (DEGREES WEST)		
	INCLINATION = 25 DEG	INCLINATION = 26 DEG	INCLINATION = 26.5 DEG
226	44 – 36 = 8	44 – 38 = 6	44 – 38 = 6
230	44 – 34 = 10	44 – 36 = 8	44 – 36 = 8
234	44 – 32 = 12	44 – 34 = 10	44 – 40 = 4

Table 4-2. IUE Nominal Orbits

PARAMETER	TRANSFER ORBIT	DRIFT PHASE 1	DRIFT PHASE 2	DRIFT PHASE 3	SYNCHRONOUS ORBIT
SEMIMAJOR AXIS (KM)	29642	41703	42010	42119	42164
ECCENTRICITY	0.77858	0.26417	0.26955	0.27144	0.27221
INCLINATION (DEG)	28.7	26.5	26.5	26.5	26.5
ASCENDING NODE (DEG)	225.9	220	220	220	220
ARGUMENT OF PERIGEE (DEG)	228.7	234	234	234	234
MEAN ANOMALY (DEG)	0.0	180	0.0	0.0	0.0
EPOCH DATE	7/20/77	7/21/77	7/24/77	7/27/77	7/29/77
EPOCH TIME	$7^{H}49^{M}21^{S}$	$4^{H}53^{M}21^{S}$	$15^{H}17^{M}27^{S}$	$14^{H}41^{M}53^{S}$	$14^{H}29^{M}30^{S}$
DRIFT RATE (DEG/DAY EAST)		6.0	2.0	0.577	0.0
PERIOD (HR)	14.110	23.543	23.803	23.896	23.934
PERIGEE RADIUS (KM)	6563	30686.	30686	30686	30686
APOGEE RADIUS (KM)	52720	52720	53334	53552	53642

INITIAL STATION ≈ 42° W

Table 4-3: 99th Percentile Errors in Orbital Parameters

PARAMETER	TRANSFER ORBIT ERRORS		DRIFT ORBIT ERRORS		SYNCHRONOUS ORBIT ERRORS	
ECCENTRICITY	−0.003	+0.004	−.004	+0.007	−.014	+0.0
INCLINATION (DEG)	−0.2	+0.2	−1.0	+1.1	−1.0	+1.1
NODE (DEG)	−0.6	+0.6	−3.4	+3.1	−3.4	+3.1
ARGUMENT OF PERIGEE (DEG)	−1.0	+1.1	−5.6	+5.6	−5.6	+5.6
RADIUS OF PERIGEE (KM)	−3.6	+3.3	−696	+504	0.0	+590
RADIUS OF APOGEE (KM)	−972	+1004	−993	+1017	−590	0.0
DRIFT RATE (DEG/DAY)			−11.0	+9.9	0.0	0.0

Table 4-4. Time To Acquire Station for Easterly and Westerly Drift Rates

TRANSFER APOGEE PASS	DEGREES TO STATION		DAYS TO STATION	
	EAST	WEST	DRIFT 6 DEG/DAY	DRIFT 6 DEG/DAY
1	176	184	29	31
2	27	333	5	55
3	238	122	40	20
4	90	270	15	45
5	301	59	50	10

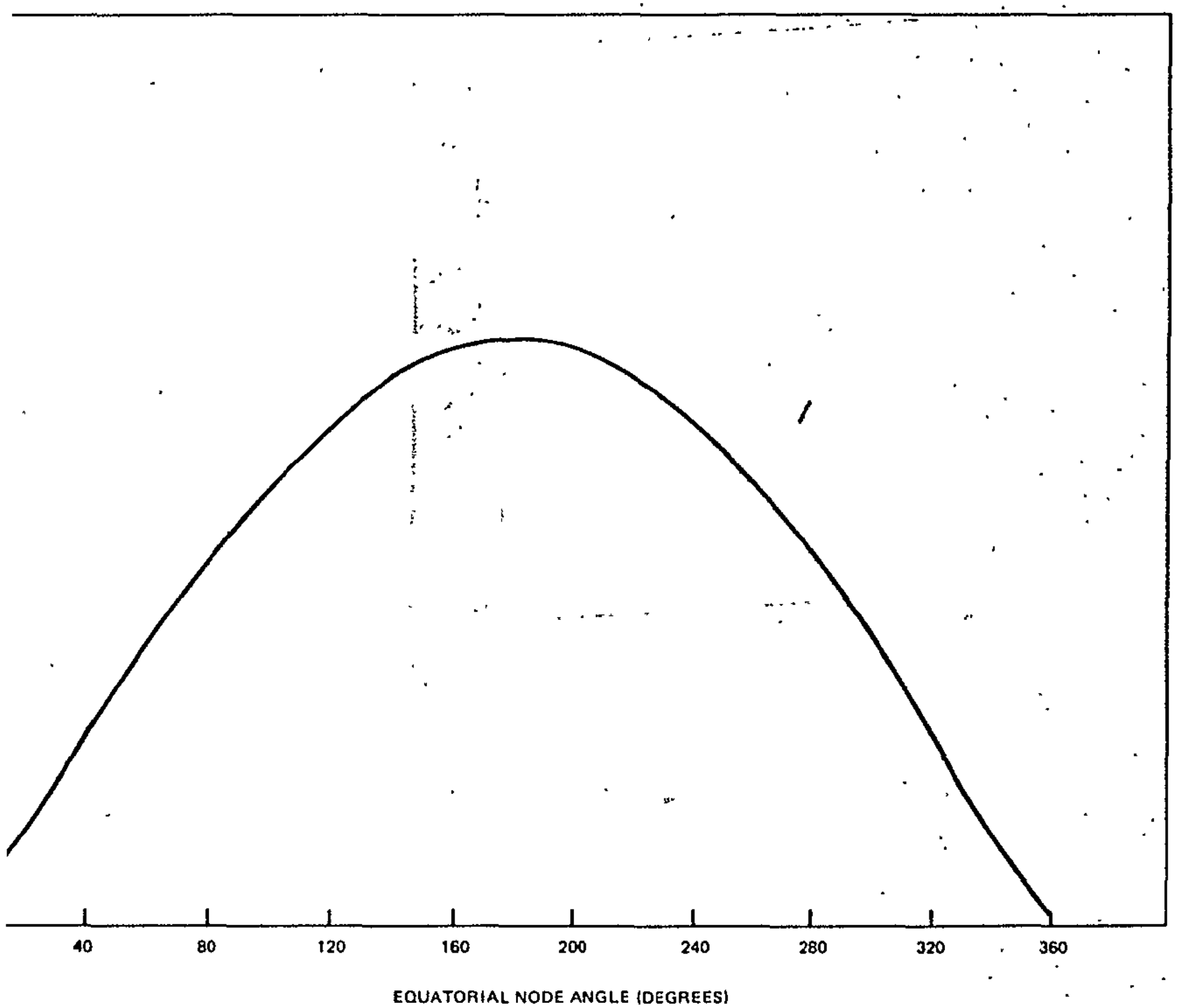


Figure 4-1. Ecliptic Inclination

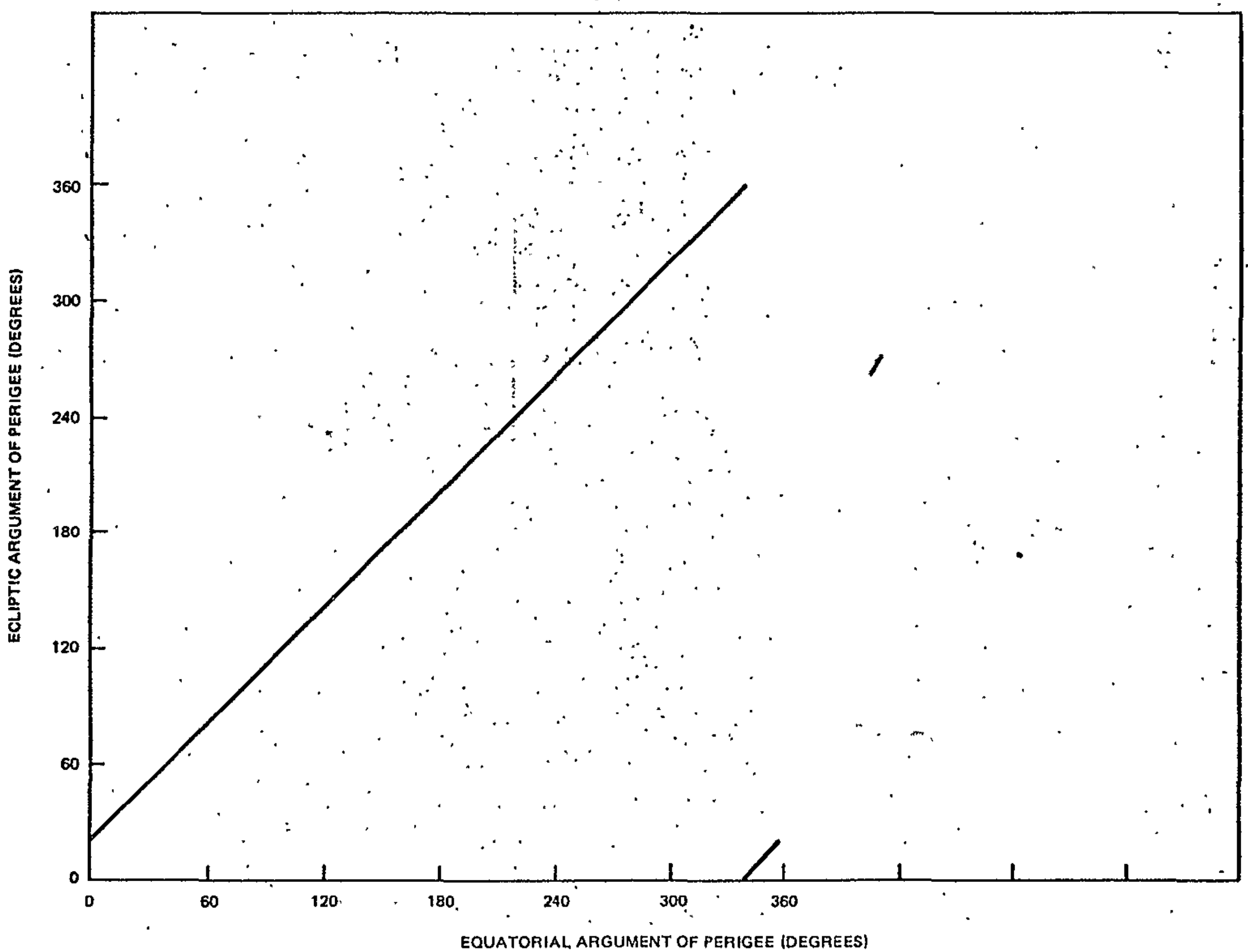


Figure 4-2. Ecliptic Argument of Perigee

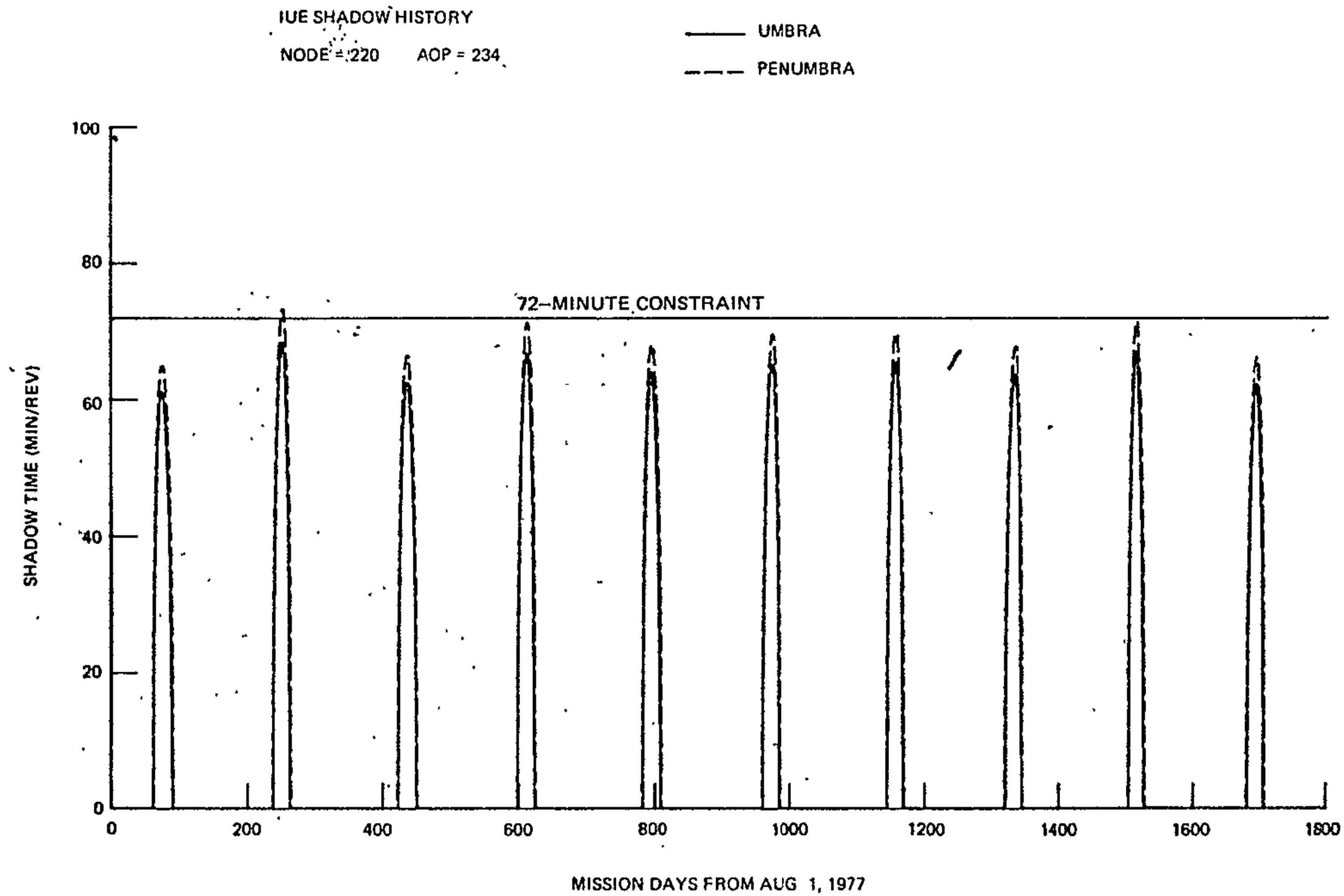


Figure 4-3. Nominal Synchronous Orbit Shadow History

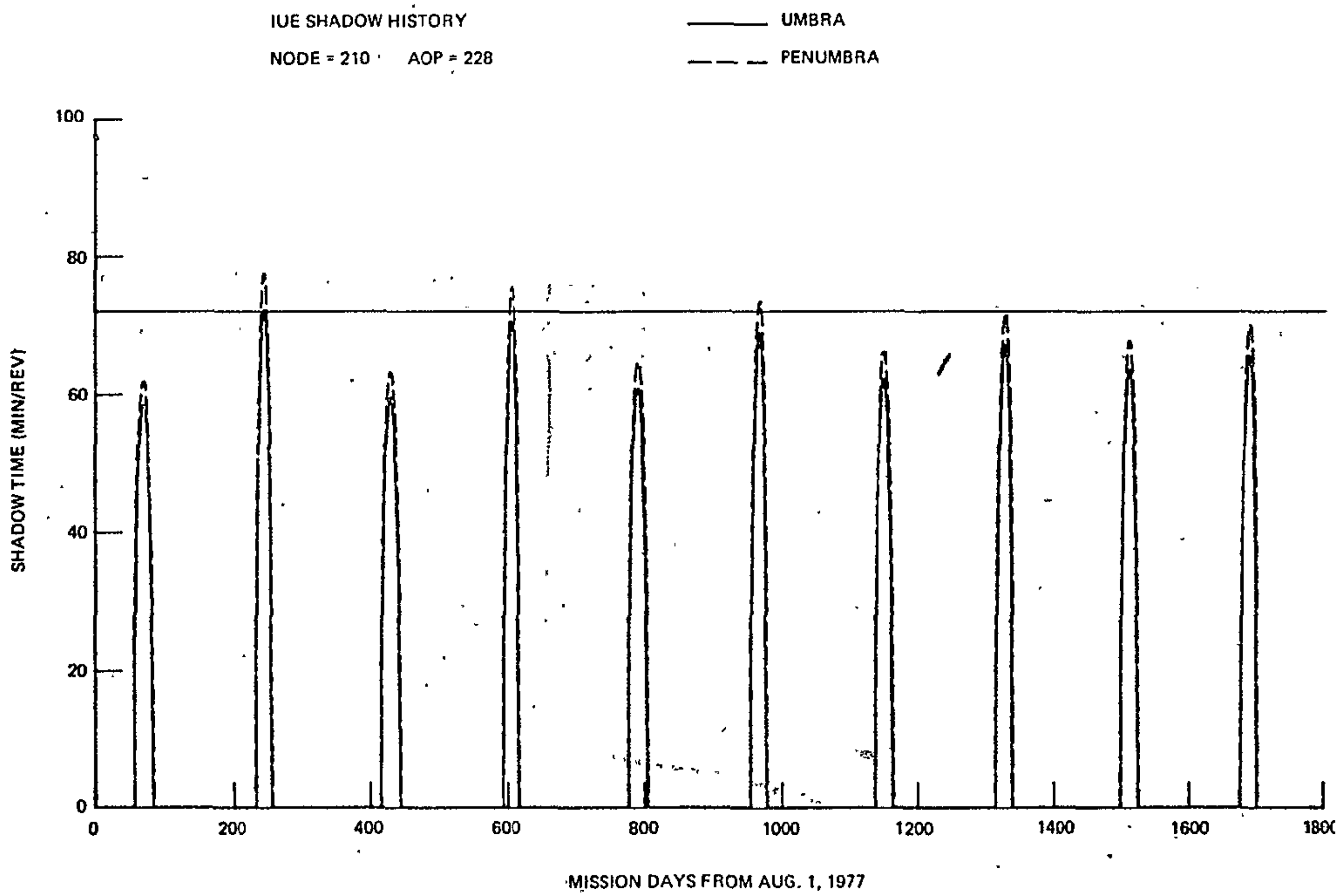


Figure 4-4. Synchronous Orbit Shadow for 99th Percentile Low Argument of Perigee and Node Angle 10 Degrees Below Nominal

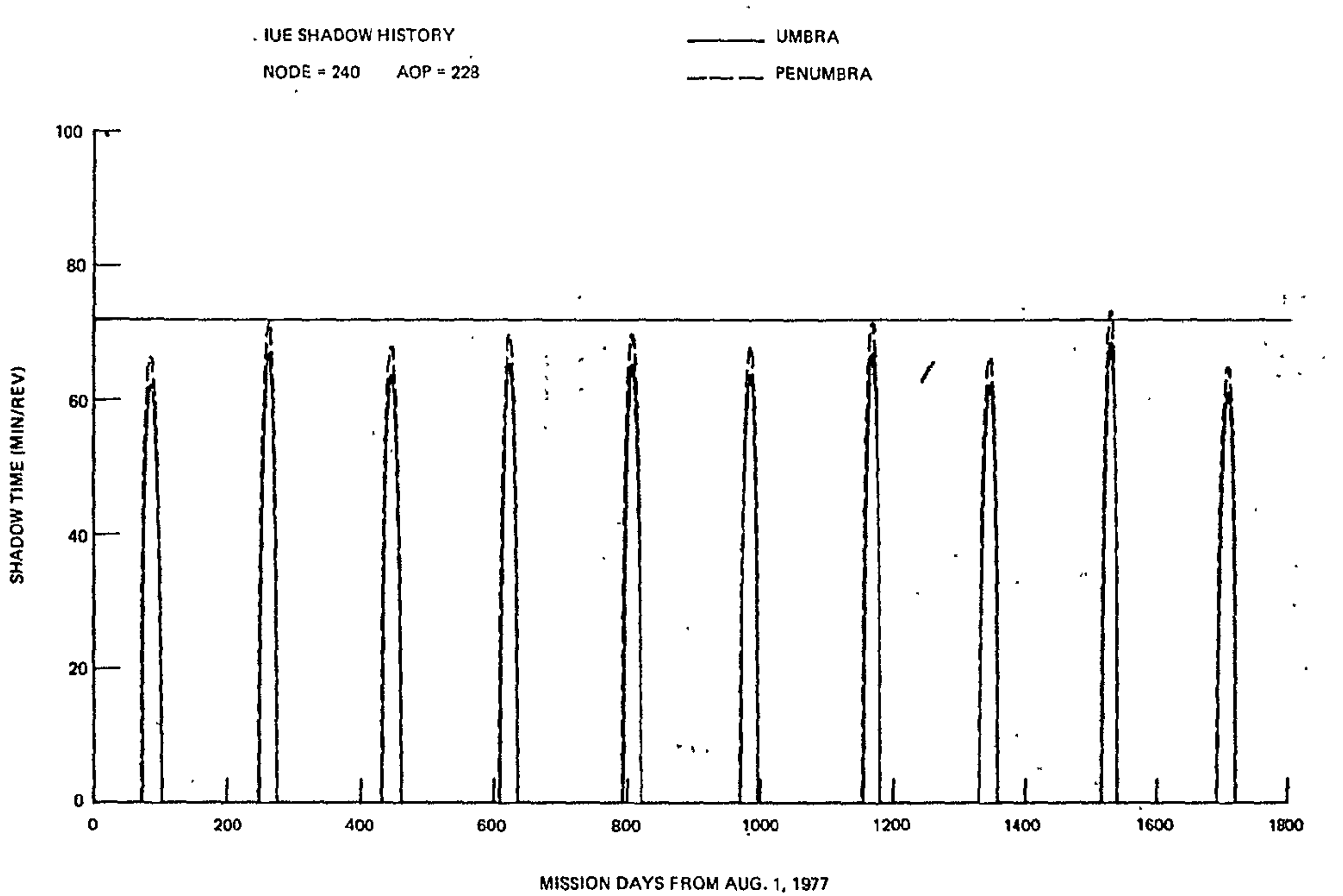


Figure 4-5. Synchronous Orbit Shadow for 99th Percentile Low Argument of Perigee and Node Angle 20 Degrees Above Nominal

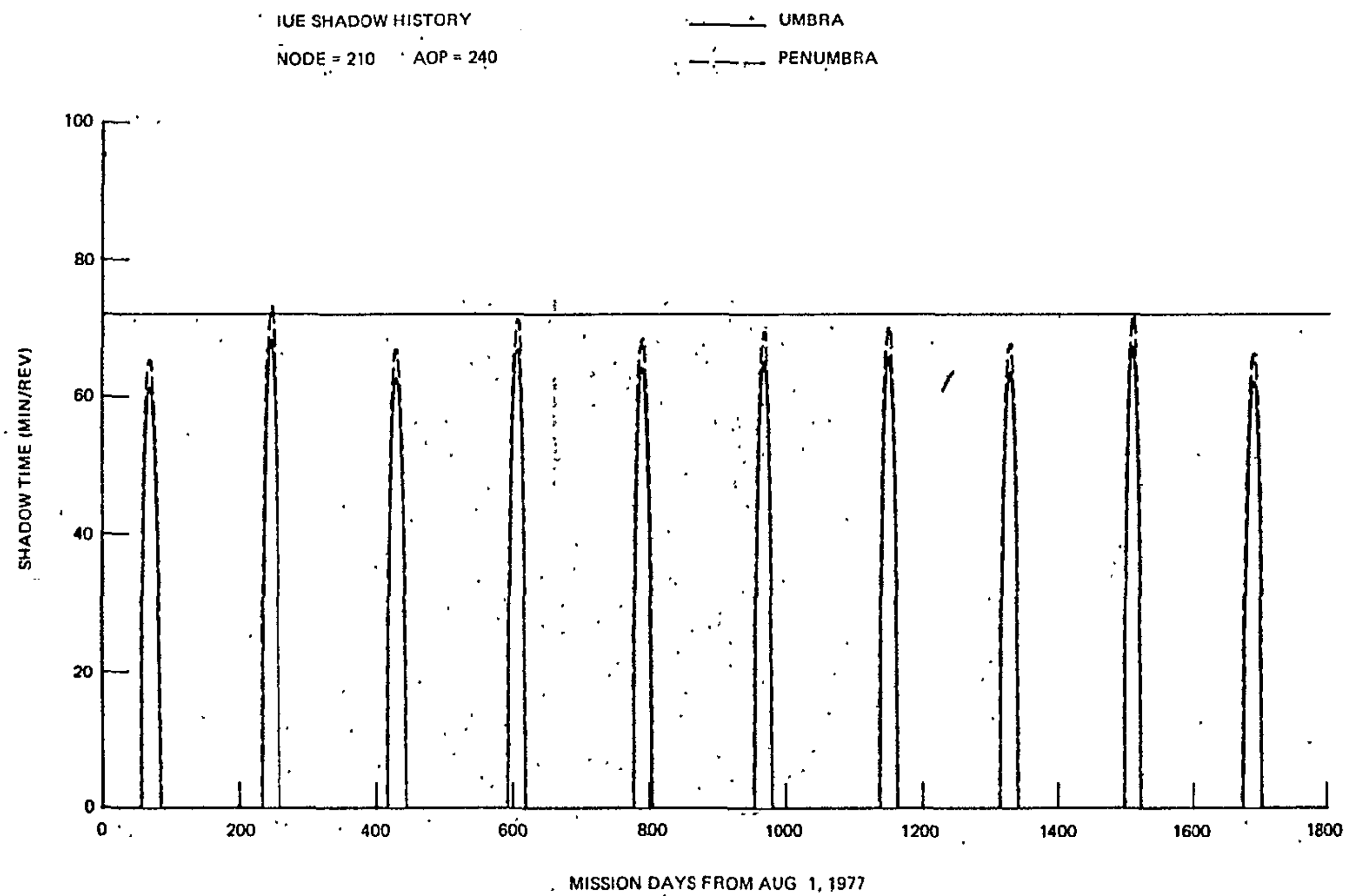


Figure 4-6. Synchronous Orbit Shadow for 99th Percentile High Argument of Perigee and Node Angle 10 Degrees Below Nominal

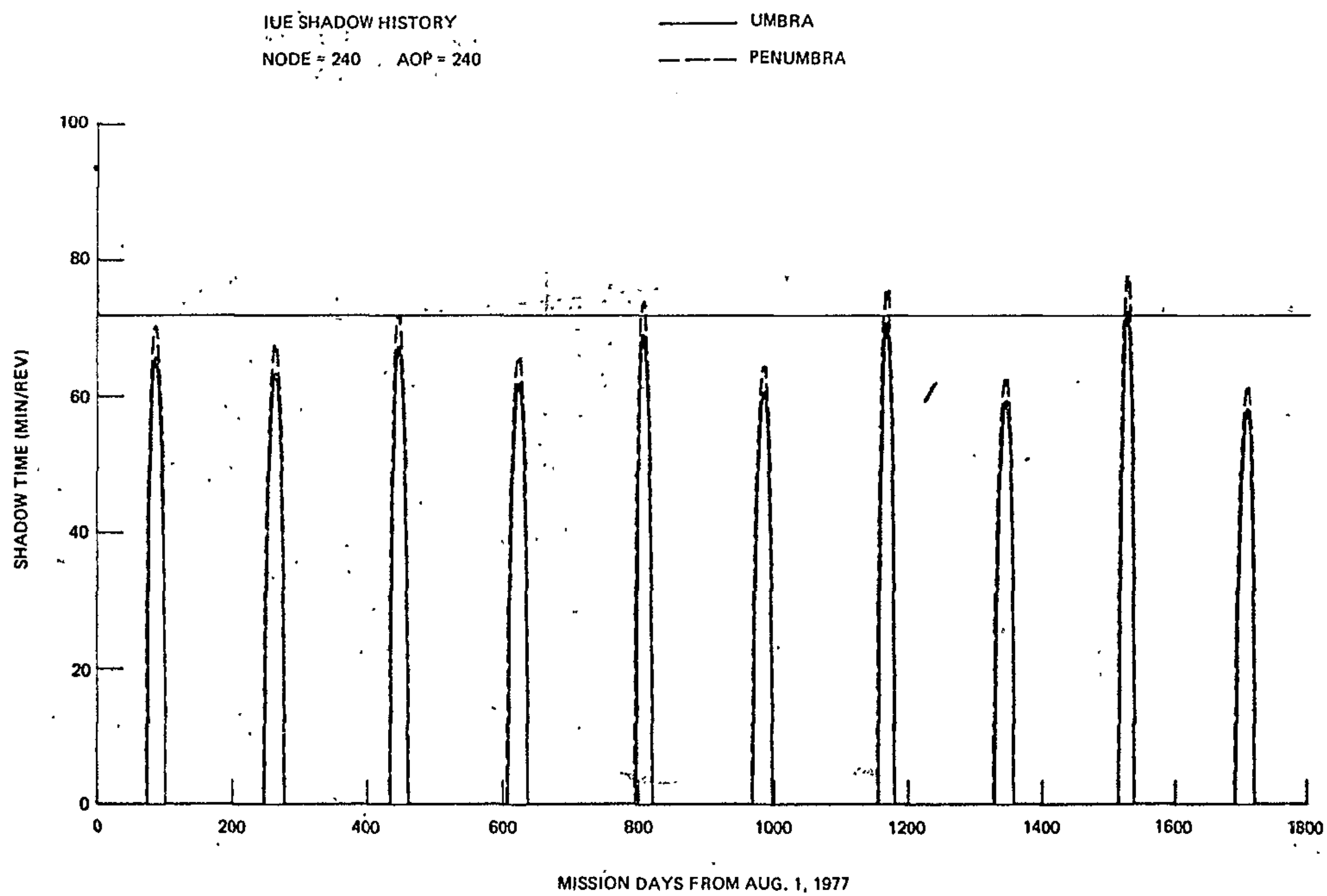


Figure 4-7. Synchronous Orbit Shadow for 99th Percentile High Argument of Perigee and Node Angle 20 Degrees Above Nominal

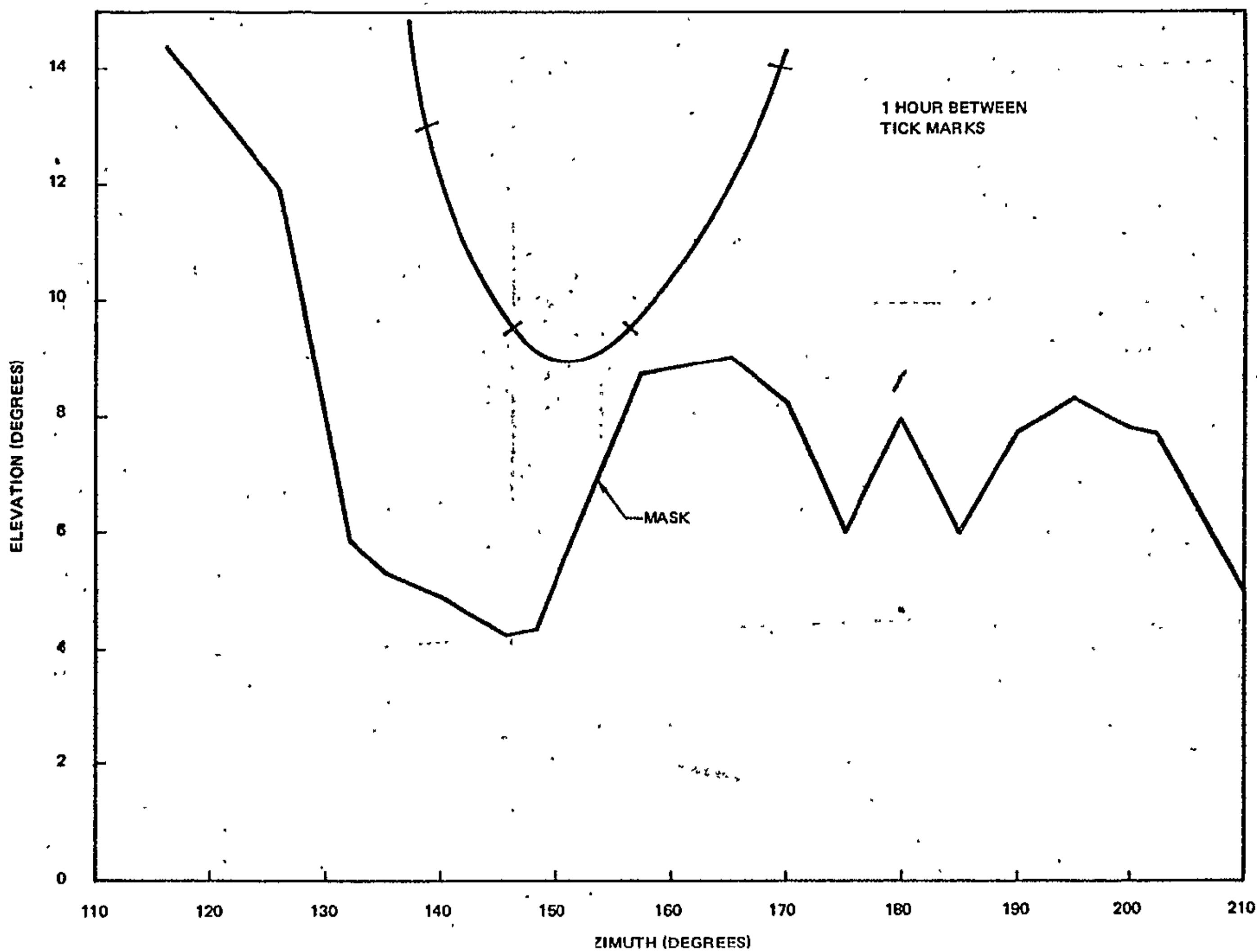


Figure 4-8. GSFC Tracking Mask and Nominal Tracking Pattern

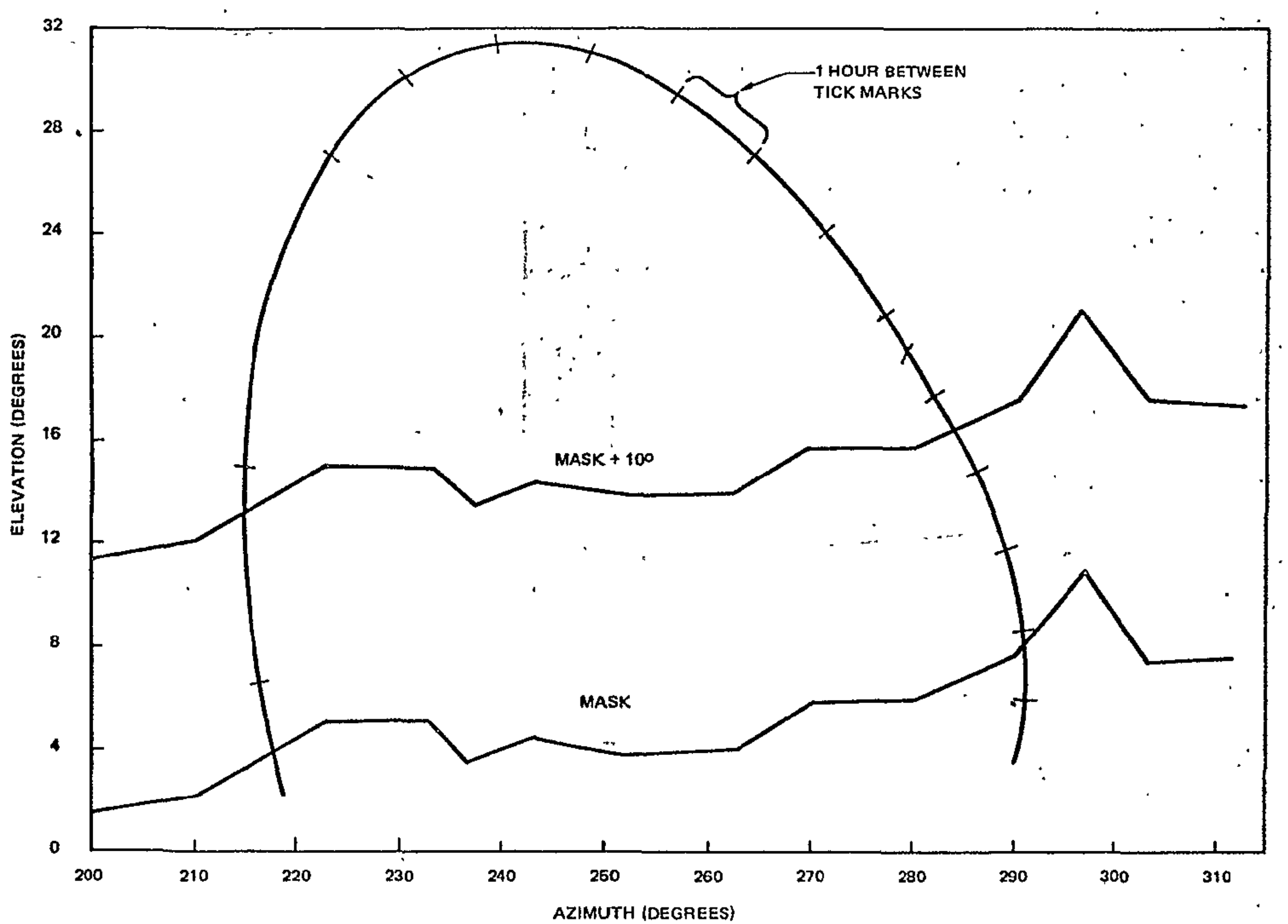


Figure 4-9. VILFRA Tracking Mask and Nominal Tracking Pattern

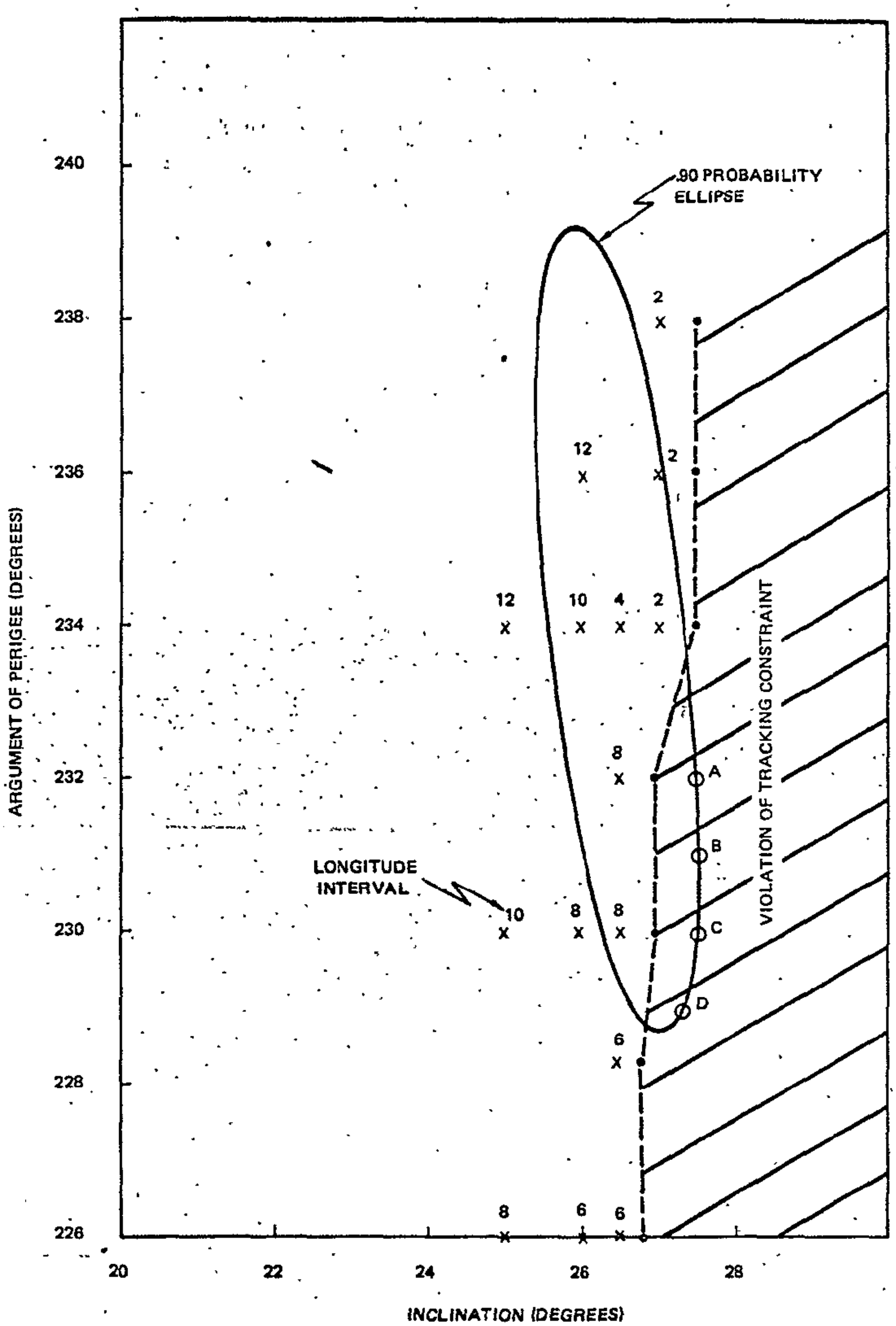


Figure 4-10. Longitude Intervals for Acceptable Tracking Coverage

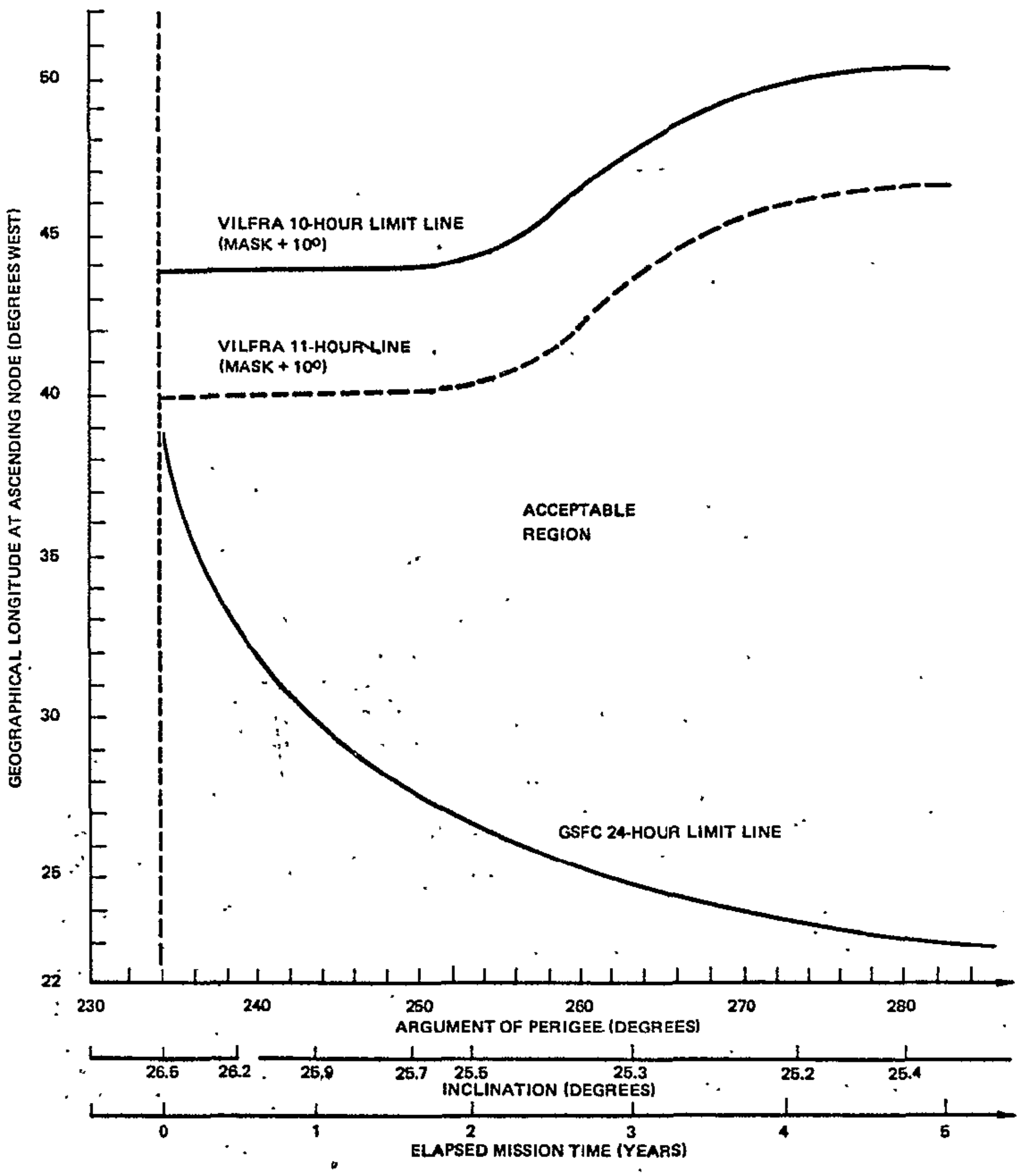


Figure 4-11. Stationkeeping Limits for Nominal Orbit

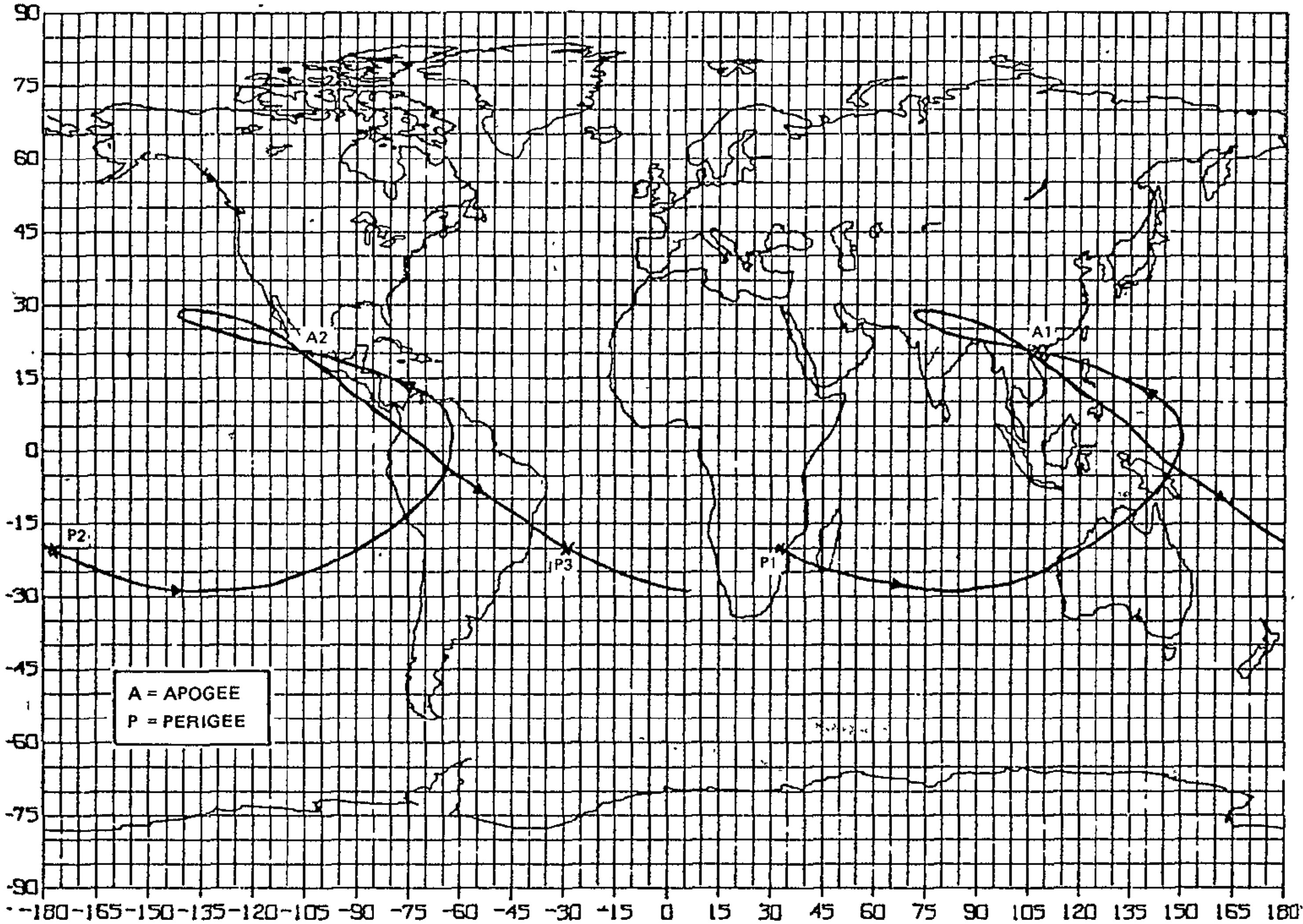


Figure 4-12. Groundtrack for Transfer Orbit (Apogee 1 and 2)

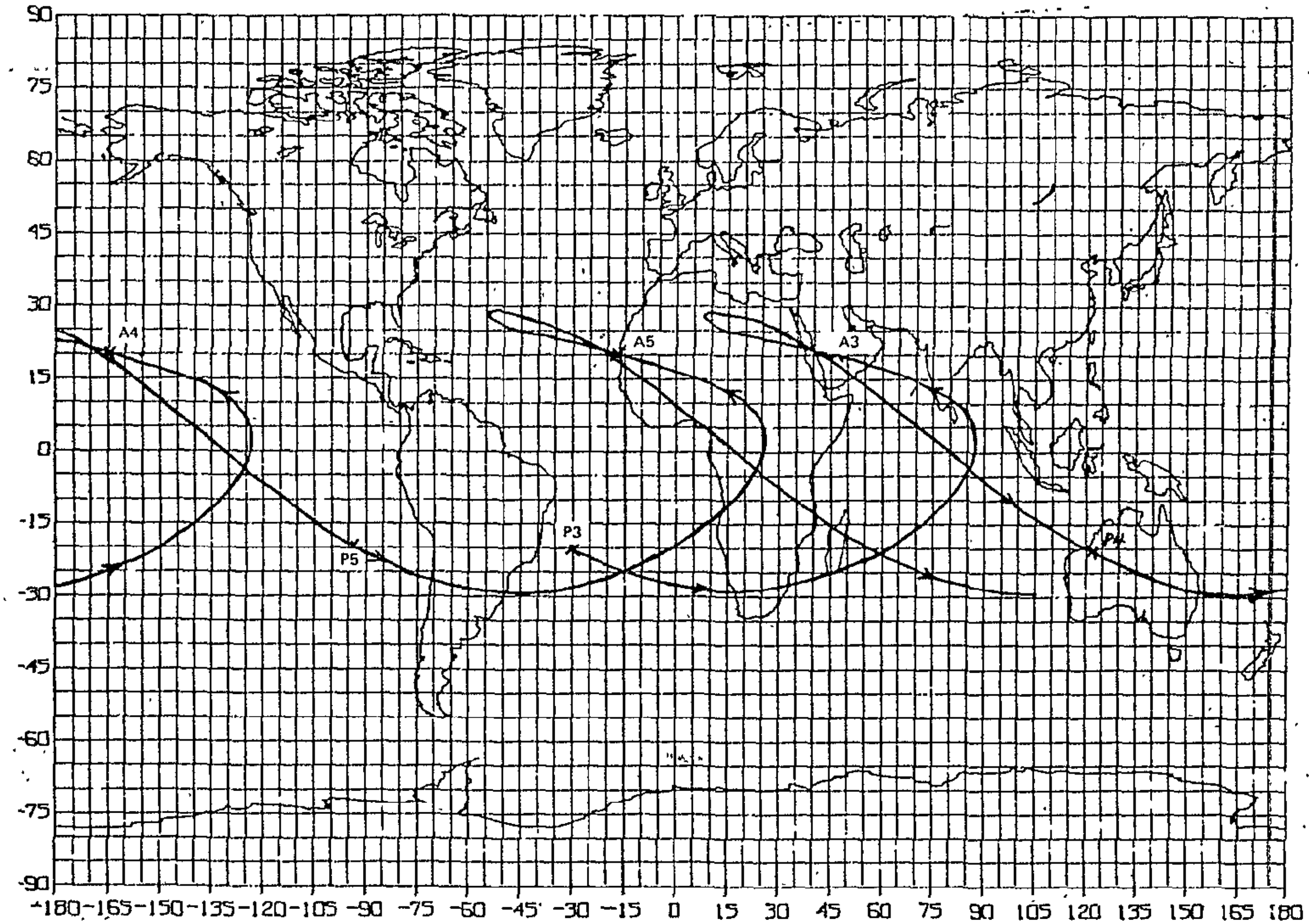


Figure 4-13. Groundtrack for Transfer Orbit (Apogee 3, 4, and 5)

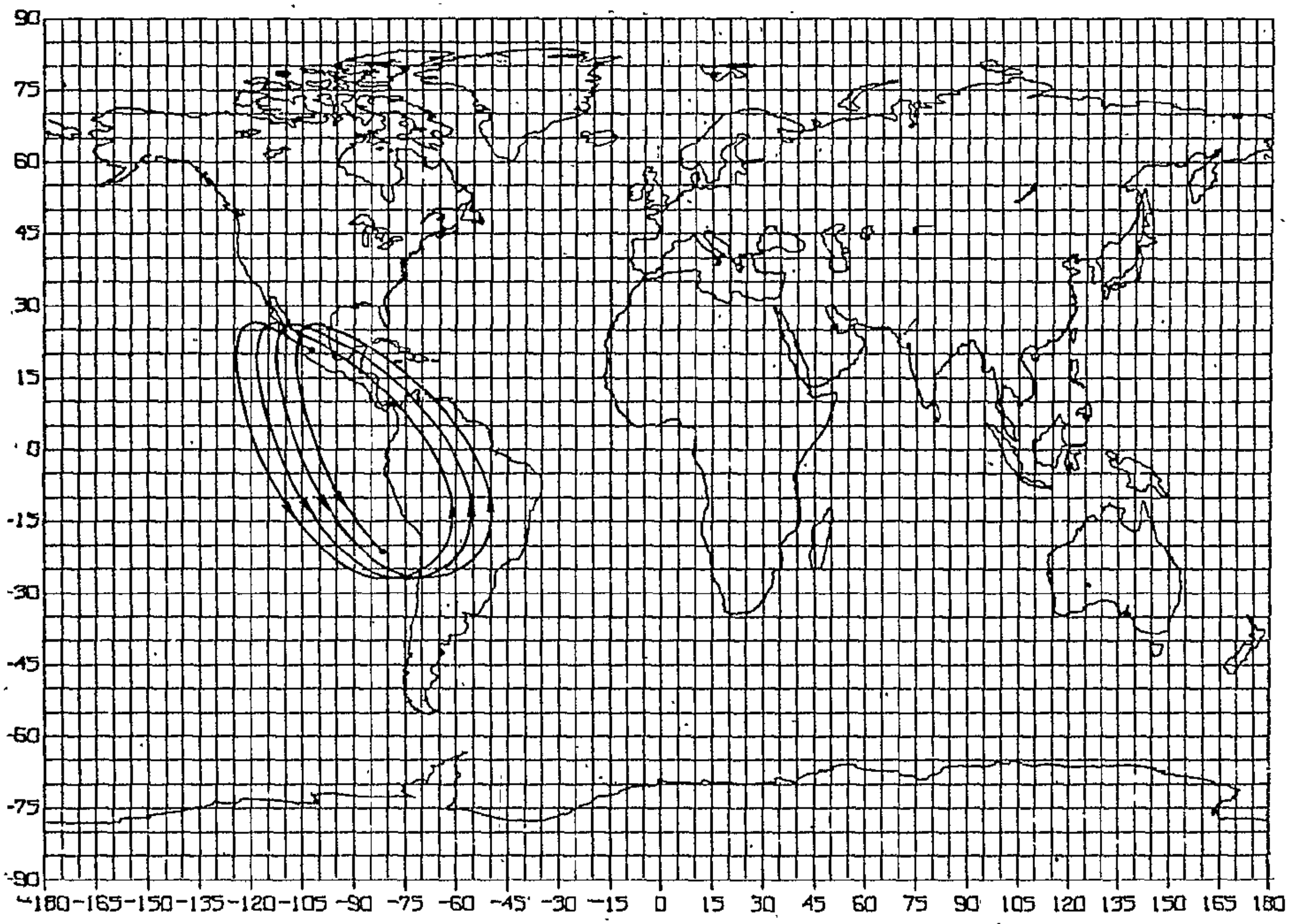


Figure 4-14. Groundtrack for Drift Orbit Phase 1

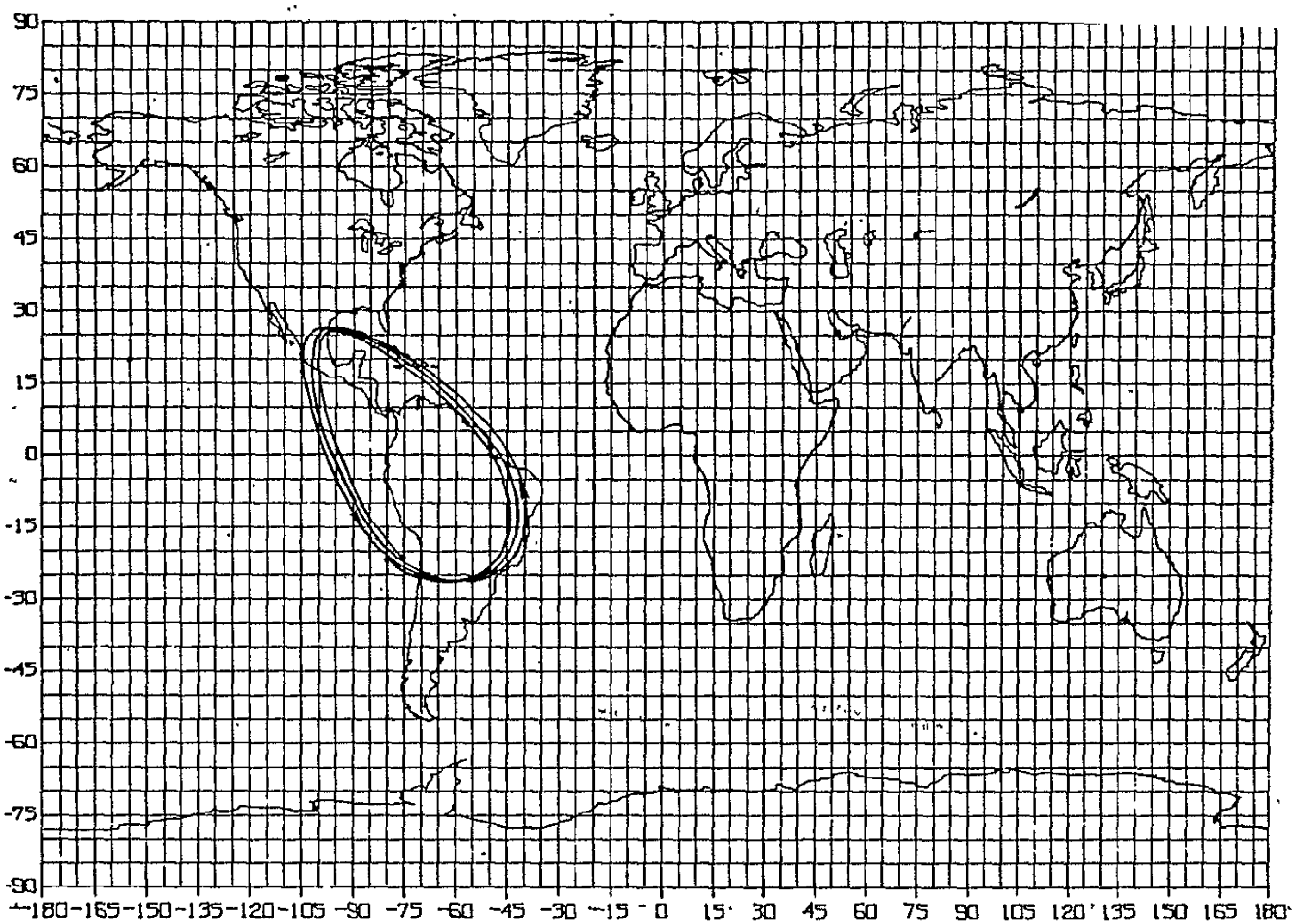


Figure 4-15. Groundtrack for Drift Orbit Phase 2

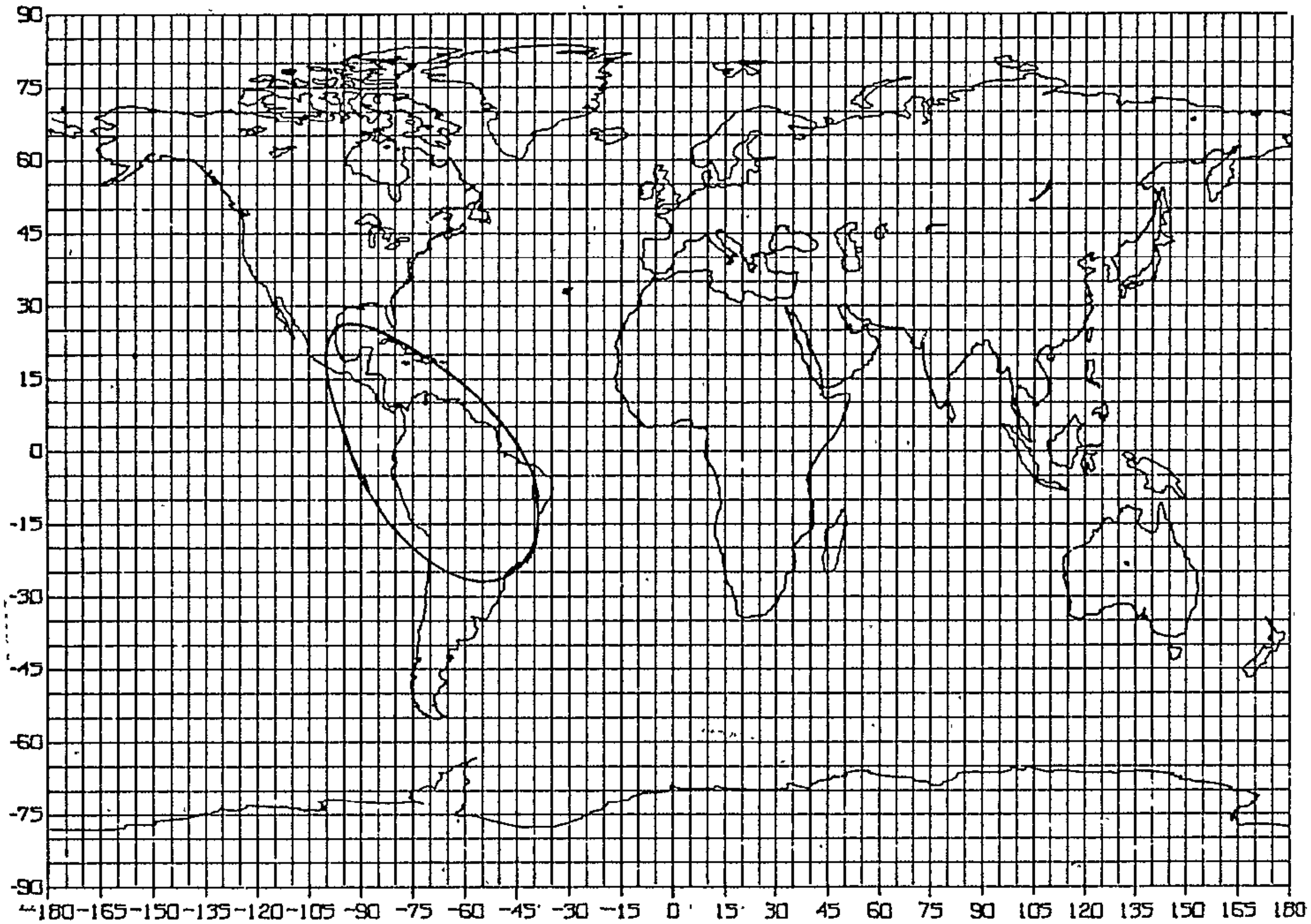


Figure 4-16. Groundtrack for Drift Orbit Phase 3

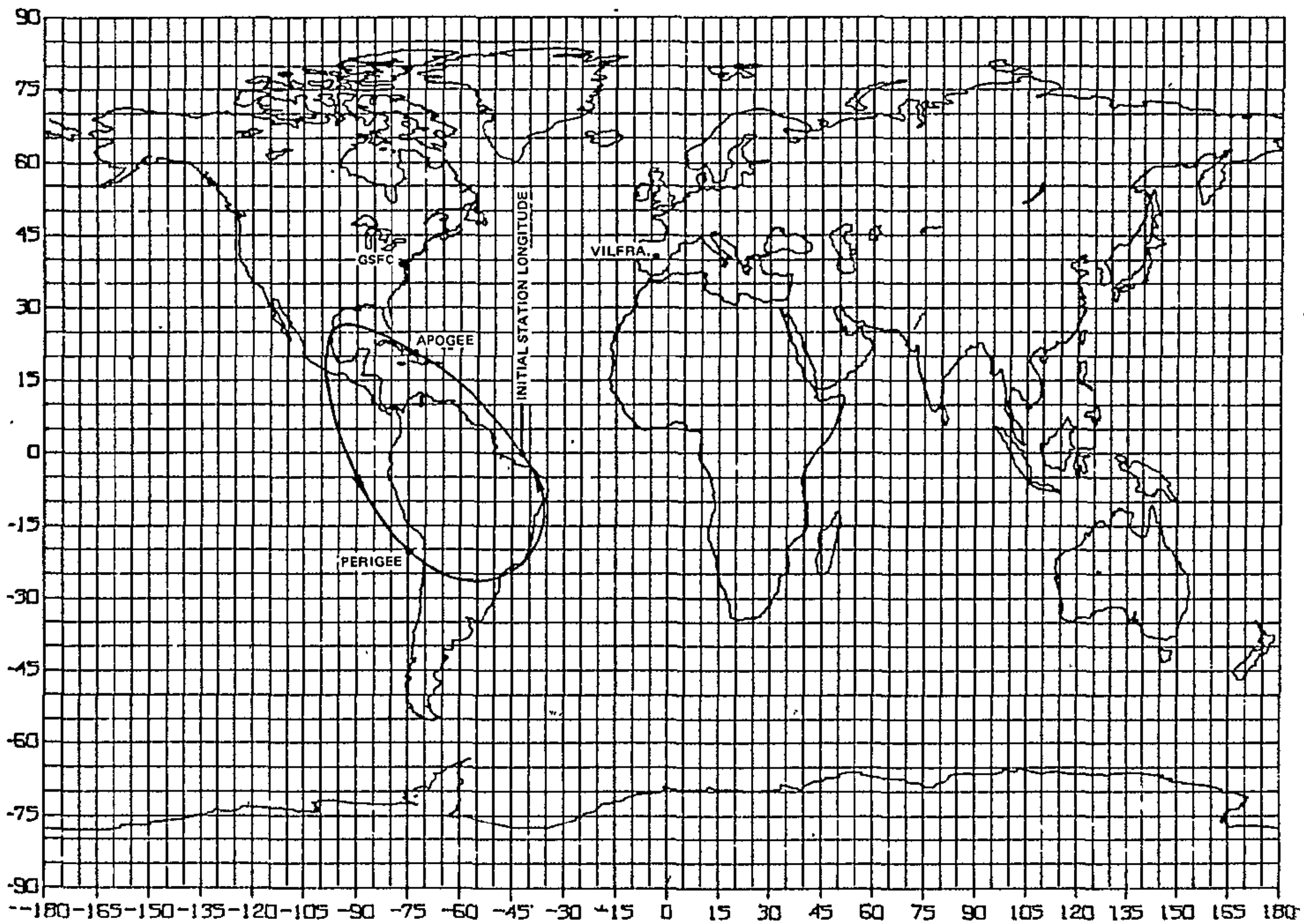


Figure 4-17. Groundtrack for Synchronous Orbit

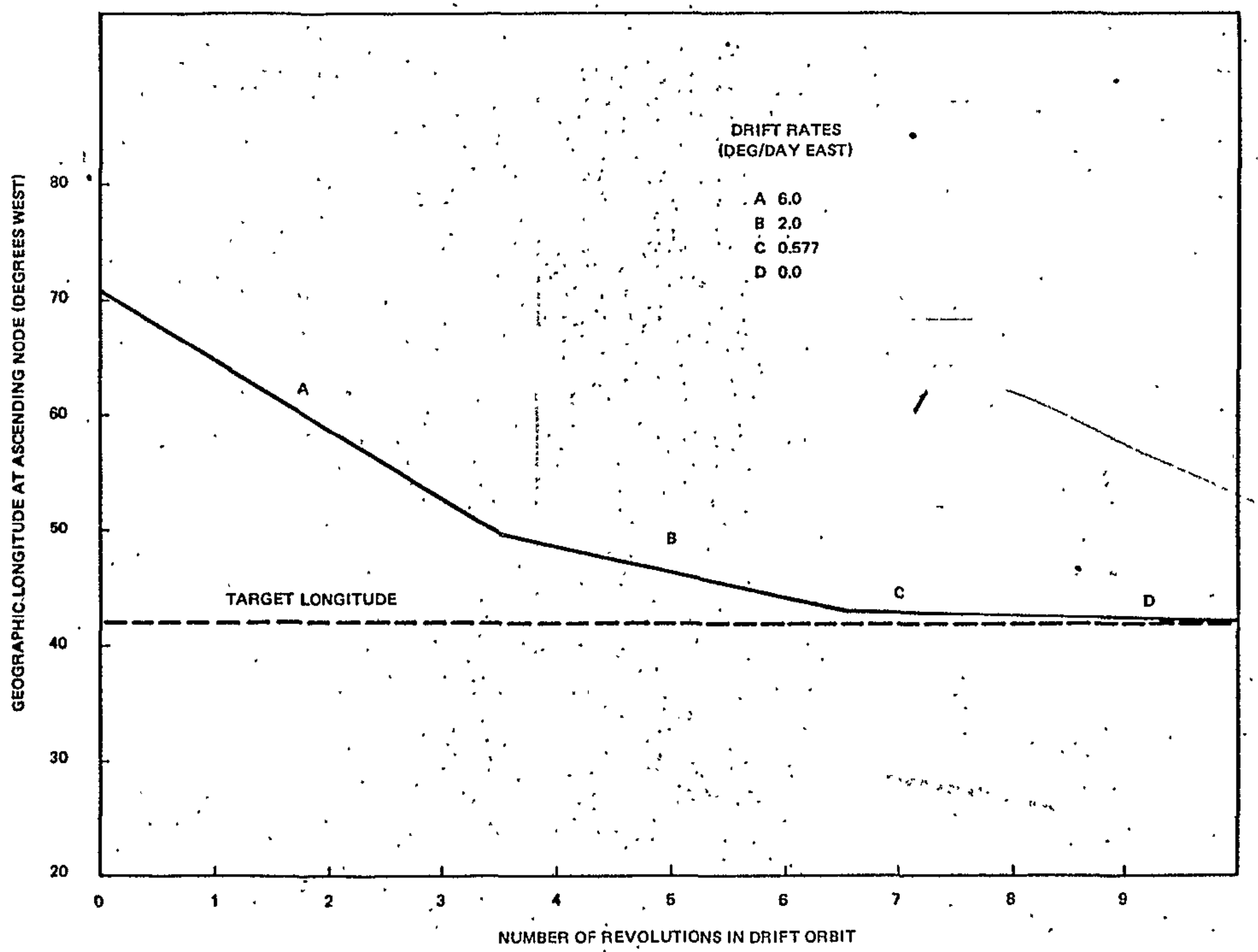


Figure 4-18. Station Acquisition

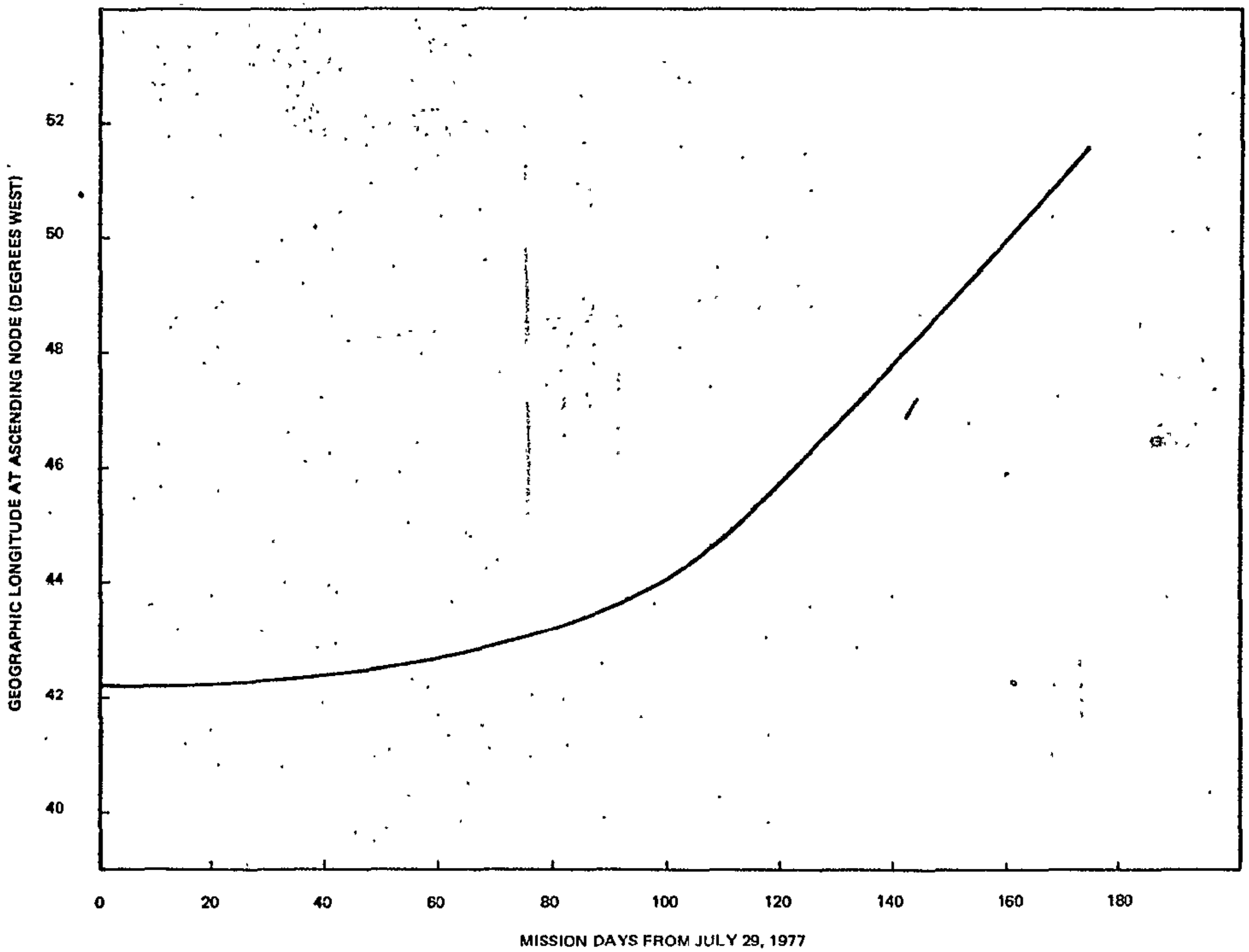


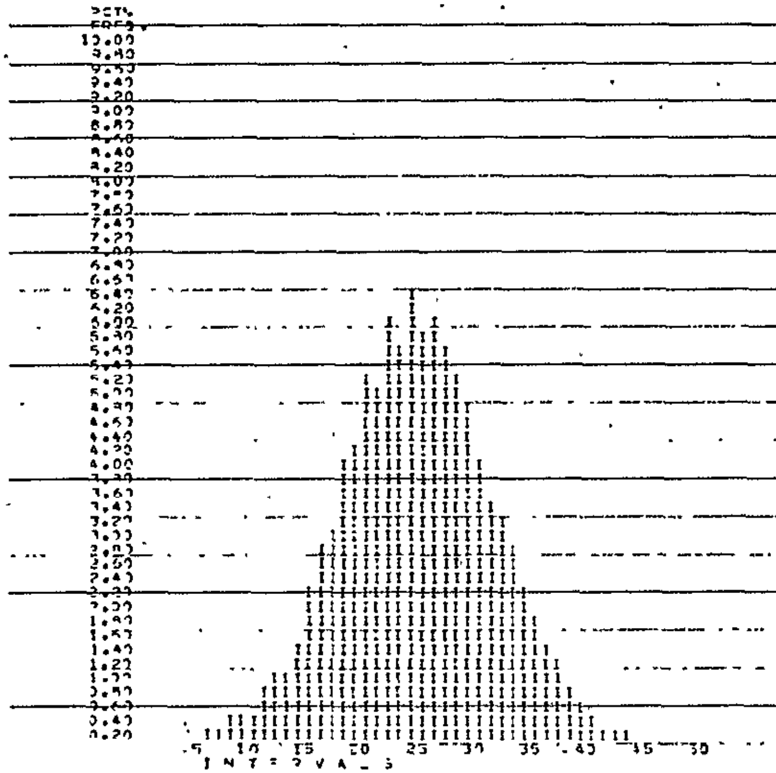
Figure 4-19. Evolution of Longitude at Ascending Node

APPENDIX A - PARAMETER HISTOGRAMS

This appendix presents the histograms generated using the Monte Carlo option in the TBERR Program. The parameters for which histograms are provided are

1. Drift orbit semimajor axis
2. Drift orbit eccentricity
3. Drift orbit inclination
4. Drift orbit node
5. Drift orbit argument of perigee
6. Drift orbit true anomaly
7. Drift orbit perigee radius
8. Drift orbit apogee radius
9. Post-AMF velocity to acquire station
10. Drift rate
11. On station weight
12. Hydrazine used to acquire station
13. Velocity required to correct semimajor axis and eccentricity
14. Hydrazine used to correct semimajor axis and eccentricity
15. Velocity required to correct drift rate errors
16. Hydrazine used to correct drift rate errors
17. Synchronous orbit eccentricity

SMA NOMINAL= 4.1703E 04 MEAN= 4.1559E 04 SIGMA= 3.4024E 02 SAMPLE= 10000

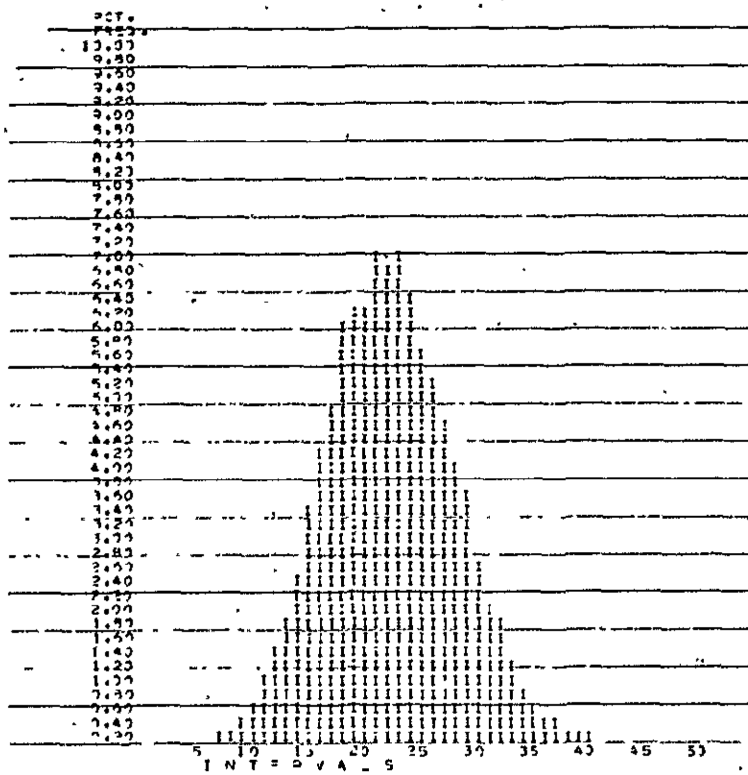


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.2162E 03	0.0100000	0.0100000
2	-1.2162E 03	-1.1645E 03	0.0400000	0.0500000
3	-1.1645E 03	-1.1127E 03	0.0200000	0.0700000
4	-1.1127E 03	-1.0610E 03	0.0600000	0.1299999
5	-1.0610E 03	-1.0092E 03	0.0500000	0.1799999
6	-1.0092E 03	-9.5751E 02	0.1000000	0.2799999
7	-9.5751E 02	-9.0577E 02	0.1400000	0.4199998
8	-9.0577E 02	-8.5403E 02	0.3200000	0.7399998
9	-8.5403E 02	-8.0230E 02	0.3400000	1.0799990
10	-8.0230E 02	-7.5056E 02	0.3900000	1.4599984
11	-7.5056E 02	-6.9882E 02	0.7300000	2.1999979
12	-6.9882E 02	-6.4709E 02	0.9500000	3.1499977
13	-6.4709E 02	-5.9535E 02	1.0799999	4.2299976
14	-5.9535E 02	-5.4361E 02	1.4400000	5.6699974
15	-5.4361E 02	-4.9187E 02	2.1099997	7.7899971
16	-4.9187E 02	-4.4014E 02	2.7299995	10.5199966
17	-4.4014E 02	-3.8840E 02	2.8999998	13.4199963
18	-3.8840E 02	-3.3666E 02	4.0599995	17.4799957
19	-3.3666E 02	-2.8493E 02	4.2500000	21.7299957
20	-2.8493E 02	-2.3319E 02	5.2900000	27.3199993
21	-2.3319E 02	-1.8145E 02	4.8999995	31.9199829
22	-1.8145E 02	-1.2972E 02	5.9099998	37.8299713
23	-1.2972E 02	-7.7979E 01	5.6599998	43.4399597
24	-7.7979E 01	-2.6242E 01	6.4599991	49.9499512
25	-2.6242E 01	2.5495E 01	5.8099995	55.7599487
26	2.5495E 01	7.7232E 01	6.0000000	61.7599487
27	7.7232E 01	1.2897E 02	5.5599995	67.3199463
28	1.2897E 02	1.8071E 02	5.1599998	72.4799347
29	1.8071E 02	2.3244E 02	4.7599993	77.2399292
30	2.3244E 02	2.8418E 02	4.0199995	81.2599182
31	2.8418E 02	3.3592E 02	3.4899998	84.7499084
32	3.3592E 02	3.8765E 02	3.2399998	87.9898787
33	3.8765E 02	4.3939E 02	2.7500000	90.7398987
34	4.3939E 02	4.9113E 02	2.2500000	92.9898987
35	4.9113E 02	5.4286E 02	1.8099995	94.7998962
35	5.4286E 02	5.9460E 02	1.3199997	96.1198883
37	5.9460E 02	6.4634E 02	1.2099991	97.3298798
38	6.4634E 02	6.9807E 02	0.8600000	98.1898651
39	6.9807E 02	7.4981E 02	0.6500000	98.8398590
40	7.4981E 02	8.0155E 02	0.3900000	99.2298584
41	8.0155E 02	8.5329E 02	0.2500000	99.4798584
42	8.5329E 02	9.0502E 02	0.1500000	99.6298523
43	9.0502E 02	9.5676E 02	0.1100000	99.7398376
44	9.5676E 02	1.0085E 03	0.0900000	99.8298340
45	1.0085E 03	1.0602E 03	0.0600000	99.8898315
46	1.0602E 03	1.1120E 03	0.0300000	99.9198303
47	1.1120E 03	1.1637E 03	0.0600000	99.9798279
48	1.1637E 03	1.2154E 03	0.0	99.9798279
49	1.2154E 03	1.2672E 03	0.0100000	99.9898224
50	1.2672E 03	PLUS INF.	0.0100000	99.9998169

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VAL.	0.408890 05	0.411360 05	0.412530 05	0.415020 05	0.416790 05	0.418590 05	0.421290 05	0.422540 05	0.424740 05

Figure A-1. Drift Orbit Semimajor Axis Histogram (Kilometers)

ECC NOMINAL = 2.6417E-01 MEAN= 2.6606E-01 SIGMA= 2.3966E-03 SAMPLE= 10000

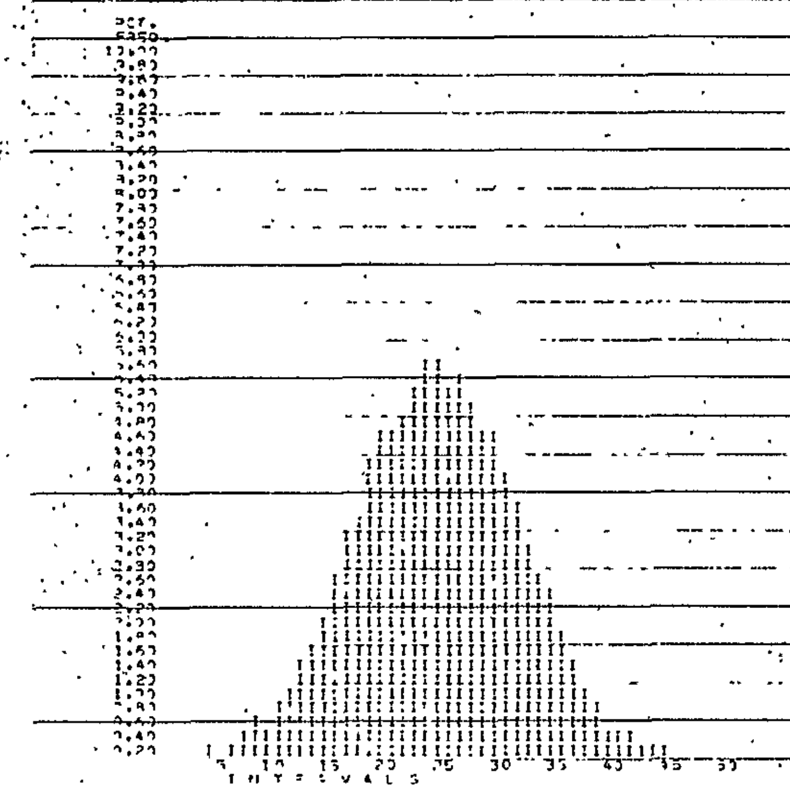


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-7.6305E-03	0.0100000	0.0100000
2	-7.6305E-03	-7.2224E-03	0.0	0.0100000
3	-7.2224E-03	-6.8142E-03	0.0300000	0.0400000
4	-6.8142E-03	-6.4061E-03	0.0200000	0.0600000
5	-6.4061E-03	-5.9980E-03	0.0300000	0.0900000
6	-5.9980E-03	-5.5899E-03	0.0800000	0.1700000
7	-5.5898E-03	-5.1817E-03	0.1500000	0.3199999
8	-5.1817E-03	-4.7736E-03	0.1400000	0.4599999
9	-4.7736E-03	-4.3654E-03	0.3800000	0.8399999
10	-4.3654E-03	-3.9573E-03	0.5600000	1.4999990
11	-3.9573E-03	-3.5492E-03	1.0299997	2.5299988
12	-3.5492E-03	-3.1410E-03	1.3399992	3.8699990
13	-3.1410E-03	-2.7329E-03	1.7299995	5.5999975
14	-2.7329E-03	-2.3248E-03	2.3899994	7.9899969
15	-2.3248E-03	-1.9166E-03	3.4099998	11.3999968
16	-1.9166E-03	-1.5085E-03	4.2199993	15.6199961
17	-1.5085E-03	-1.1004E-03	4.8799992	20.4999847
18	-1.1004E-03	-6.9223E-04	6.0999992	26.5999811
19	-6.9223E-04	-2.8410E-04	6.2599993	32.8599756
20	-2.8410E-04	1.2403E-04	6.1999998	39.0599725
21	1.2403E-04	5.3217E-04	6.8999996	45.9599664
22	5.3217E-04	9.4030E-04	6.8199997	52.7599585
23	9.4030E-04	1.3484E-03	6.8999996	59.6599524
24	1.3484E-03	1.7566E-03	6.4599991	66.1299435
25	1.7566E-03	2.1647E-03	5.5499992	71.5799315
26	2.1647E-03	2.5728E-03	5.2199993	76.8999176
27	2.5728E-03	2.9810E-03	4.5400000	81.4399109
28	2.9810E-03	3.3891E-03	4.0699997	85.5099030
29	3.3891E-03	3.7972E-03	3.5000000	89.0099030
30	3.7972E-03	4.2054E-03	2.5199995	91.5299720
31	4.2054E-03	4.6135E-03	2.0000000	93.5299920
32	4.6135E-03	5.0216E-03	1.7299995	95.2598877
33	5.0216E-03	5.4297E-03	1.2900000	96.5499910
34	5.4297E-03	5.8379E-03	0.8800000	97.4299706
35	5.8379E-03	6.2460E-03	0.6700000	98.0999699
36	6.2460E-03	6.6541E-03	0.4600000	98.5599632
37	6.6541E-03	7.0623E-03	0.4800000	99.0399560
38	7.0623E-03	7.4704E-03	0.2600000	99.2999505
39	7.4704E-03	7.8785E-03	0.1900000	99.4898376
40	7.8785E-03	8.2867E-03	0.1799999	99.6698303
41	8.2867E-03	8.6948E-03	0.0800000	99.7498169
42	8.6948E-03	9.1029E-03	0.0800000	99.8298035
43	9.1029E-03	9.5111E-03	0.0600000	99.8898010
44	9.5111E-03	9.9192E-03	0.0200000	99.9097930
45	9.9192E-03	1.0327E-02	0.0100000	99.9197845
46	1.0327E-02	1.0735E-02	0.0300000	99.9497833
47	1.0735E-02	1.1144E-02	0.0200000	99.9697723
48	1.1144E-02	1.1552E-02	0.0100000	99.9797668
49	1.1552E-02	1.1960E-02	0.0200000	99.9997559
50	1.1960E-02	PLUS INF.	0.0	99.9997559

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	-0.476990-02	-0.323744-02	-0.203420-02	-0.459910-03	0.774330-03	0.254120-02	0.395760-02	0.495330-02	0.702510-02
VAL.	0.259910 00	0.261300 00	0.262030 00	0.263700 00	0.264930 00	0.266220 00	0.268130 00	0.269130 00	0.271303 00

Figure A-2. Drift Orbit Eccentricity Histogram

INC NOMINAL= 2.6434E 01 MEAN= 2.6433E 01 SIGMA= 4.5201E-01 SAMPLE= 10000

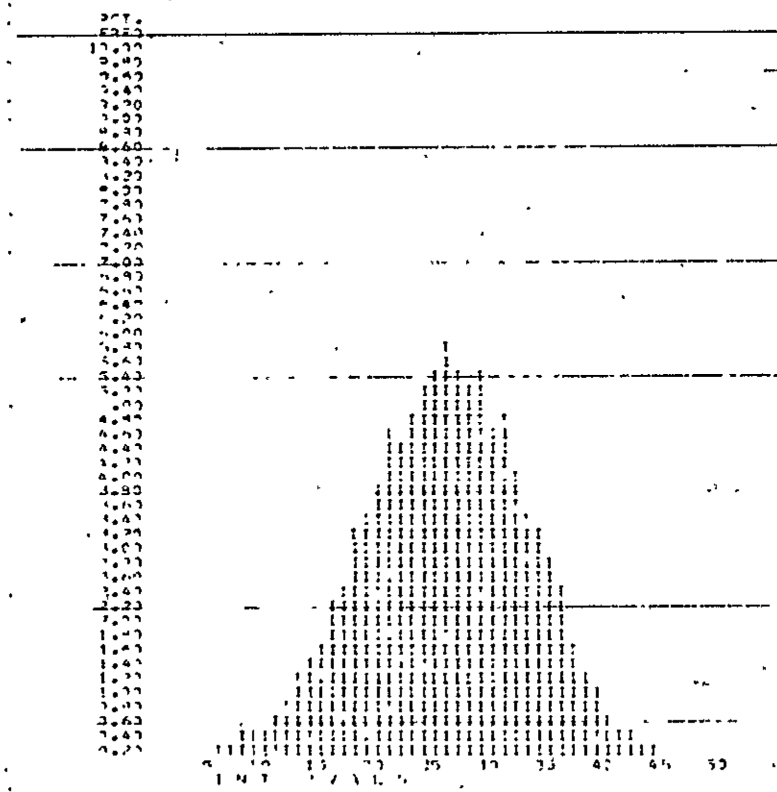


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.4413E 00	0.0100000	0.0100000
2	-1.4413E 00	-1.3775E 00	0.0200000	0.0300000
3	-1.3775E 00	-1.3137E 00	0.0400000	0.0700000
4	-1.3137E 00	-1.2499E 00	0.1199999	0.1399999
5	-1.2499E 00	-1.1861E 00	0.0900000	0.2799999
6	-1.1361E 00	-1.1223E 00	0.2000000	0.4799999
7	-1.1223E 00	-1.0585E 00	0.3800000	0.8599999
8	-1.0585E 00	-9.9469E-01	0.5000000	1.3599997
9	-9.9469E-01	-9.3089E-01	0.4100000	1.7599995
10	-9.3089E-01	-8.6708E-01	0.8099999	2.5799990
11	-8.6708E-01	-8.0328E-01	0.9700000	3.5499983
12	-8.0328E-01	-7.3947E-01	1.3999996	4.9499979
13	-7.3947E-01	-6.7567E-01	1.6399994	6.5899973
14	-6.7567E-01	-6.1186E-01	1.9799995	8.5599968
15	-6.1186E-01	-5.4806E-01	2.6499996	11.2199965
16	-5.4806E-01	-4.8425E-01	3.1799994	14.3999958
17	-4.8425E-01	-4.2045E-01	3.4799995	17.5799590
18	-4.2045E-01	-3.5664E-01	4.2099991	22.0599811
19	-3.5664E-01	-2.9284E-01	4.6399994	26.7299505
20	-2.9284E-01	-2.2903E-01	4.6399994	31.3699799
21	-2.2903E-01	-1.6523E-01	4.8199997	36.1899719
22	-1.6523E-01	-1.0142E-01	5.1999998	41.3899689
23	-1.0142E-01	-3.7618E-02	5.5199995	46.9099579
24	-3.7618E-02	2.6187E-02	5.5999994	52.5099487
25	2.6187E-02	8.9992E-02	5.2699995	57.7799377
26	8.9992E-02	1.5380E-01	5.3899994	63.1699371
27	1.5380E-01	2.1760E-01	5.0699997	68.2399292
28	2.1760E-01	2.8141E-01	4.6099997	72.8499146
29	2.8141E-01	3.4521E-01	4.5999994	77.4499054
30	3.4521E-01	4.0902E-01	3.8999996	81.3498993
31	4.0902E-01	4.7282E-01	3.5299997	84.8799981
32	4.7282E-01	5.3663E-01	3.0099993	87.8899925
33	5.3663E-01	6.0043E-01	2.6599998	90.5498810
34	6.0043E-01	6.6424E-01	2.3499994	92.8998718
35	6.6424E-01	7.2804E-01	1.8799992	94.7798615
36	7.2804E-01	7.9185E-01	1.3499994	96.1298523
37	7.9185E-01	8.5565E-01	1.0099993	97.1398468
38	8.5565E-01	9.1946E-01	0.8699999	98.0098419
39	9.1946E-01	9.8326E-01	0.4899999	98.4998322
40	9.8326E-01	1.0471E 00	0.4200000	98.9198303
41	1.0471E 00	1.1109E 00	0.3300000	99.2498169
42	1.1109E 00	1.1747E 00	0.1900000	99.4398041
43	1.1747E 00	1.2385E 00	0.1900000	99.6297913
44	1.2385E 00	1.3023E 00	0.1500000	99.7797852
45	1.3023E 00	1.3661E 00	0.0500000	99.8297729
46	1.3661E 00	1.4299E 00	0.0500000	99.8797607
47	1.4299E 00	1.4937E 00	0.0600000	99.9397583
48	1.4937E 00	1.5575E 00	0.0100000	99.9497528
49	1.5575E 00	1.6213E 00	0.0400000	99.9897461
50	1.6213E 00	PLUS INF.	0.0100000	99.9997406

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INC.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.241760 00	0.587240 00	0.733450 00	0.105260 01
VAL.	0.254570 02	0.257600 02	0.252600 02	0.252500 02	0.254950 02	0.267400 02	0.270850 02	0.272360 02	0.275590 02

Figure A-3. Drift Orbit Inclination Histogram (Degrees)

OMEGA , NOMINAL= 2.1[illegible] 02 MEAN= 2.1993E 02 SIGMA= 1.3353E 00 SAMP_E= 10000

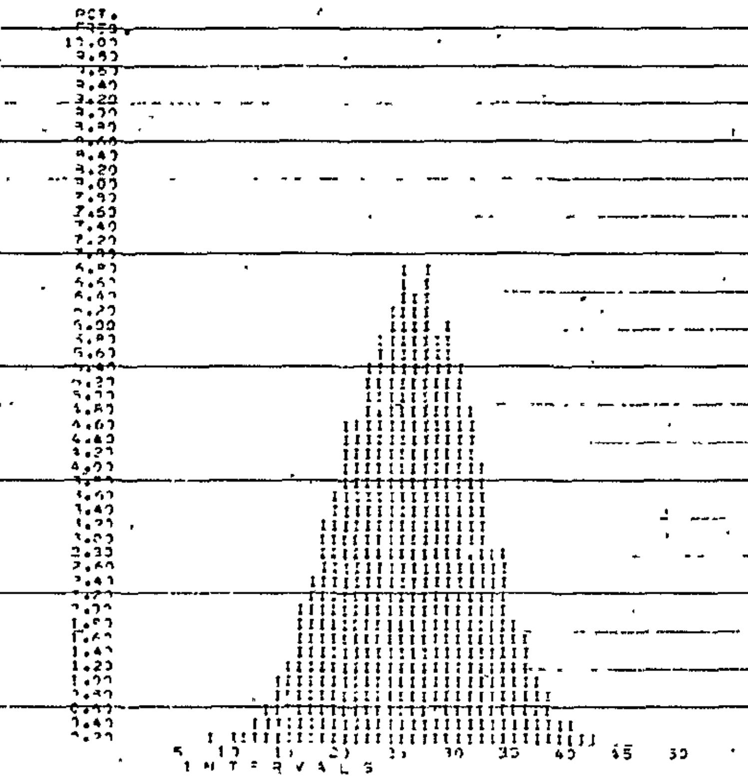


	INTERVAL_ WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-4.8284E 00	0.0100000	0.0100000
2	-4.8284E 00	-4.6321E 00	0.0400000	0.0500000
3	-4.6321E 00	-4.4358E 00	0.0300000	0.0800000
4	-4.4358E 00	-4.2394E 00	0.0800000	0.1500000
5	-4.2394E 00	-4.0431E 00	0.0900000	0.2499999
6	-4.0431E 00	-3.8468E 00	0.1100000	0.3599999
7	-3.8468E 00	-3.6504E 00	0.2700000	0.6299999
8	-3.6504E 00	-3.4541E 00	0.3600000	0.9899998
9	-3.4541E 00	-3.2578E 00	0.3699999	1.3599997
10	-3.2578E 00	-3.0614E 00	0.4500000	1.8099995
11	-3.0614E 00	-2.8651E 00	0.6700000	2.4799986
12	-2.8651E 00	-2.6688E 00	0.8500000	3.3299980
13	-2.6688E 00	-2.4725E 00	1.0999994	4.4299974
14	-2.4725E 00	-2.2761E 00	1.3999996	5.8299971
15	-2.2761E 00	-2.0798E 00	1.5799999	7.4099970
16	-2.0798E 00	-1.8835E 00	2.2099991	9.6199961
17	-1.8835E 00	-1.6871E 00	2.4599991	12.0799952
18	-1.6871E 00	-1.4908E 00	3.1499996	15.2299948
19	-1.4908E 00	-1.2945E 00	3.3899994	18.6199799
20	-1.2945E 00	-1.0981E 00	3.8599997	22.4799652
21	-1.0981E 00	-9.0182E-01	4.6899996	27.1699524
22	-9.0182E-01	-7.0549E-01	4.4499998	31.6199493
23	-7.0549E-01	-5.0916E-01	4.7199993	36.3399353
24	-5.0916E-01	-3.1283E-01	5.0999994	41.4399261
25	-3.1283E-01	-1.1650E-01	5.3999996	46.8399200
26	-1.1650E-01	7.9831E-02	5.6999998	52.5399170
27	7.9831E-02	2.7616E-01	5.4399996	57.9799042
28	2.7616E-01	4.7249E-01	5.2299995	63.2098999
29	4.7249E-01	6.6882E-01	5.3199997	68.5298920
30	6.6882E-01	8.6515E-01	4.5799999	73.1098785
31	8.6515E-01	1.0615E 00	4.8099995	77.9198761
32	1.0615E 00	1.2578E 00	4.0299997	81.9498749
33	1.2578E 00	1.4541E 00	3.4899998	85.4398651
34	1.4541E 00	1.6505E 00	3.2500000	88.6898651
35	1.6505E 00	1.8468E 00	2.8699999	91.5599602
36	1.8468E 00	2.0431E 00	2.3799992	93.9399499
37	2.0431E 00	2.2395E 00	1.6199999	95.5598450
38	2.2395E 00	2.4358E 00	1.1999998	96.7598419
39	2.4358E 00	2.6321E 00	1.0599995	97.8195395
40	2.6321E 00	2.8284E 00	0.5300000	98.4499291
41	2.8284E 00	3.0248E 00	0.4900000	98.9299245
42	3.0248E 00	3.2211E 00	0.3600000	99.2899132
43	3.2211E 00	3.4174E 00	0.1900000	99.4797974
44	3.4174E 00	3.6138E 00	0.2600000	99.7397919
45	3.6138E 00	3.8101E 00	0.0900000	99.8297892
46	3.8101E 00	4.0064E 00	0.0700000	99.8997803
47	4.0064E 00	4.2027E 00	0.0400000	99.9397736
48	4.2027E 00	4.3991E 00	0.0300000	99.9597723
49	4.3991E 00	4.5954E 00	0.0300000	99.9997711
50	4.5954E 00	PLUS INF.	0.0	99.9997711

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.174010 01	0.217150 01	0.333333 01
VAL.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.220700 03	0.221710 03	0.222140 03	0.223030 03

Figure A-4. Drift Orbit Node Histogram (Degrees)

ARGP [illegible] NOMINAL = 2.3364E 02 MEAN= 2.3327E 02 SIGMA= 2.4422E 00 SAMPLE= 10000

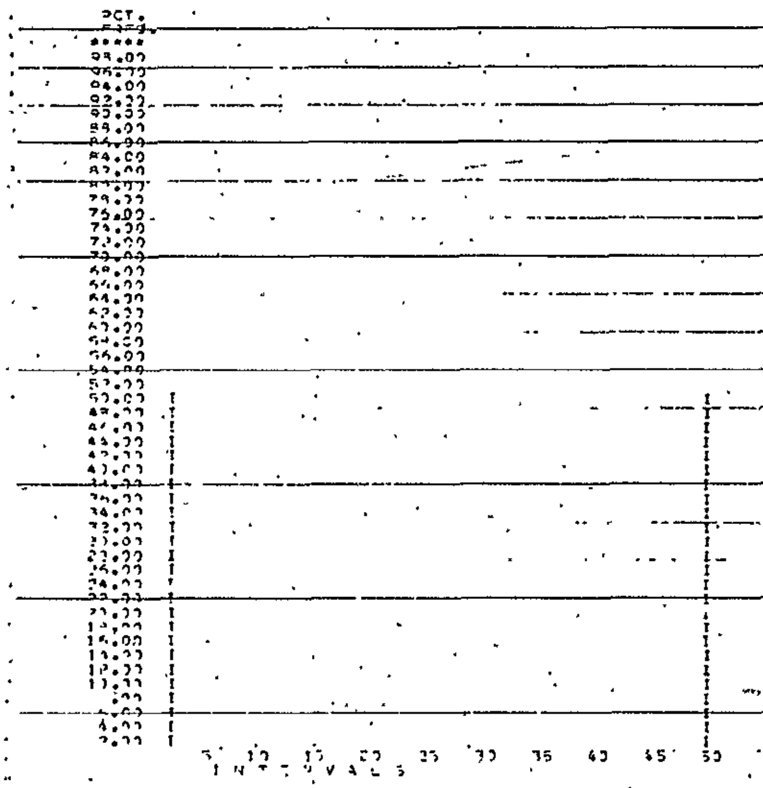


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.0036E 01	0.0	0.0
2	-1.0036E 01	-9.6226E 00	0.0100000	0.0100000
3	-9.6226E 00	-9.2075E 00	0.0	0.0100000
4	-9.2075E 00	-8.7923E 00	0.0	0.0100000
5	-8.7923E 00	-8.3772E 00	0.0200000	0.0300000
6	-8.3772E 00	-7.9620E 00	0.0500000	0.0800000
7	-7.9620E 00	-7.5468E 00	0.0600000	0.1399999
8	-7.5468E 00	-7.1317E 00	0.1000000	0.2399999
9	-7.1317E 00	-6.7165E 00	0.0600000	0.2999999
10	-6.7165E 00	-6.3014E 00	0.1600000	0.4599998
11	-6.3014E 00	-5.8862E 00	0.2200000	0.6799998
12	-5.8862E 00	-5.4710E 00	0.4600000	1.1399994
13	-5.4710E 00	-5.0559E 00	0.5900000	1.7299996
14	-5.0559E 00	-4.6407E 00	0.9400000	2.6699982
15	-4.6407E 00	-4.2256E 00	1.2199993	3.8899975
16	-4.2256E 00	-3.8104E 00	1.8999996	5.7099971
17	-3.8104E 00	-3.3953E 00	2.3999996	8.1899957
18	-3.3953E 00	-2.9801E 00	3.1499996	11.3399963
19	-2.9801E 00	-2.5649E 00	3.6799994	15.0199957
20	-2.5649E 00	-2.1498E 00	4.5499992	19.5699921
21	-2.1498E 00	-1.7346E 00	4.5400000	24.1099854
22	-1.7346E 00	-1.3195E 00	5.4299994	29.5399780
23	-1.3195E 00	-9.0430E-01	5.8699999	35.4099731
24	-9.0430E-01	-4.6914E-01	6.2599993	41.6699677
25	-4.6914E-01	-7.3986E-02	6.7999992	48.4699554
26	-7.3986E-02	3.4117E-01	6.4199991	54.8899536
27	3.4117E-01	7.5633E-01	6.8799992	61.7699432
28	7.5633E-01	1.1715E 00	5.8599997	67.6299286
29	1.1715E 00	1.5866E 00	6.0199995	73.6499176
30	1.5866E 00	2.0018E 00	6.4299994	79.9799103
31	2.0018E 00	2.4170E 00	4.7900000	83.8699036
32	2.4170E 00	2.8321E 00	3.8999996	87.7698975
33	2.8321E 00	3.2473E 00	2.7699995	90.5398865
34	3.2473E 00	3.6624E 00	2.7299995	93.2698822
35	3.6624E 00	4.0776E 00	1.8099995	95.0798798
36	4.0776E 00	4.4928E 00	1.6799994	96.7598724
37	4.4928E 00	4.9079E 00	1.0499992	97.8098502
38	4.9079E 00	5.3231E 00	0.8699999	98.6798553
39	5.3231E 00	5.7382E 00	0.4400000	99.1198425
40	5.7382E 00	6.1534E 00	0.3400000	99.4598389
41	6.1534E 00	6.5685E 00	0.2600000	99.7198334
42	6.5685E 00	6.9837E 00	0.1700000	99.8898315
43	6.9837E 00	7.3989E 00	0.0600000	99.9498291
44	7.3989E 00	7.8140E 00	0.0200000	99.9698181
45	7.8140E 00	8.2292E 00	0.0100000	99.9798126
46	8.2292E 00	8.6443E 00	0.0	99.9798126
47	8.6443E 00	9.0595E 00	0.0	99.9798126
48	9.0595E 00	9.4747E 00	0.0100000	99.9898071
49	9.4747E 00	9.8898E 00	0.0	99.9898071
50	9.8898E 00	PLUS INF.	0.0100000	99.9998016

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.133490 01	0.315643 01	0.405933 01	0.552510 01
VAL.	0.228760 03	0.2312[illegible] 03	0.2300[illegible] 03	0.232572 03	0.233392 03	0.235302 03	0.237132 03	0.238023 03	0.239530 03

Figure A-5. Drift Orbit Argument of Perigee Histogram (Degrees)

THETA NOMINAL = 1.4000E 02 MEAN= -1.3529E 03 SIGMA= 1.7335E 02 SAMPLE= 10000

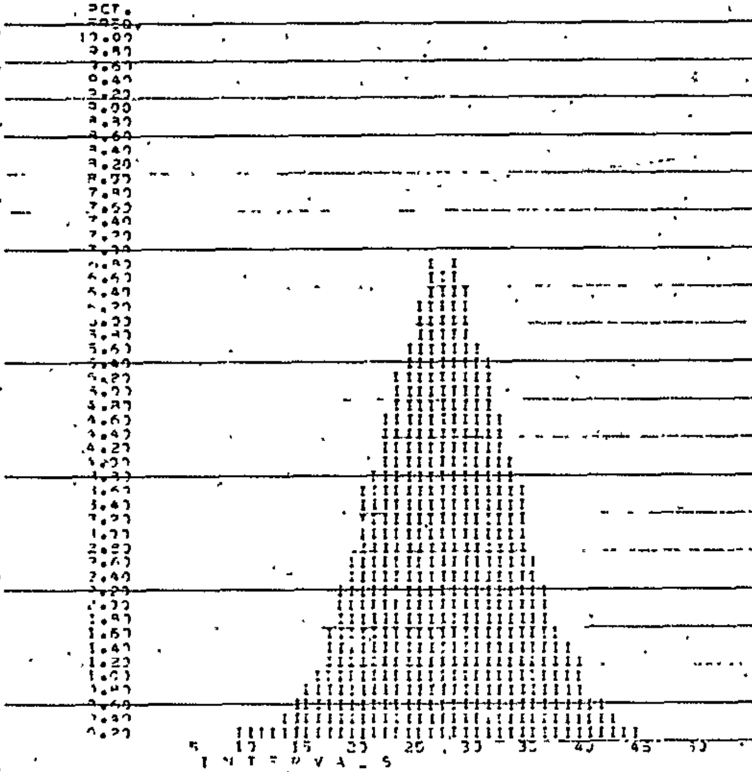


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-3.6000E 02	0.0100000	0.0100000
2	-3.6000E 02	-3.5250E 02	50.5099945	50.5199890
3	-3.5250E 02	-3.4500E 02	0.0300000	50.5499878
4	-3.4500E 02	-3.3750E 02	0.0	50.5499878
5	-3.3750E 02	-3.3000E 02	0.0	50.5499878
6	-3.3000E 02	-3.2250E 02	0.0	50.5499878
7	-3.2250E 02	-3.1500E 02	0.0	50.5499878
8	-3.1500E 02	-3.0750E 02	0.0	50.5499878
9	-3.0750E 02	-3.0000E 02	0.0	50.5499878
10	-3.0000E 02	-2.9250E 02	0.0	50.5499878
11	-2.9250E 02	-2.8500E 02	0.0	50.5499878
12	-2.8500E 02	-2.7750E 02	0.0	50.5499878
13	-2.7750E 02	-2.7000E 02	0.0	50.5499878
14	-2.7000E 02	-2.6250E 02	0.0	50.5499878
15	-2.6250E 02	-2.5500E 02	0.0	50.5499878
16	-2.5500E 02	-2.4750E 02	0.0	50.5499878
17	-2.4750E 02	-2.4000E 02	0.0	50.5499878
18	-2.4000E 02	-2.3250E 02	0.0	50.5499878
19	-2.3250E 02	-2.2500E 02	0.0	50.5499878
20	-2.2500E 02	-2.1750E 02	0.0	50.5499878
21	-2.1750E 02	-2.1000E 02	0.0	50.5499878
22	-2.1000E 02	-2.0250E 02	0.0	50.5499878
23	-2.0250E 02	-1.9500E 02	0.0	50.5499878
24	-1.9500E 02	-1.8750E 02	0.0	50.5499878
25	-1.8750E 02	-1.8000E 02	0.0	50.5499878
26	-1.8000E 02	-1.7250E 02	0.0	50.5499878
27	-1.7250E 02	-1.6500E 02	0.0	50.5499878
28	-1.6500E 02	-1.5750E 02	0.0	50.5499878
29	-1.5750E 02	-1.5000E 02	0.0	50.5499878
30	-1.5000E 02	-1.4250E 02	0.0	50.5499878
31	-1.4250E 02	-1.3500E 02	0.0	50.5499878
32	-1.3500E 02	-1.2750E 02	0.0	50.5499878
33	-1.2750E 02	-1.2000E 02	0.0	50.5499878
34	-1.2000E 02	-1.1250E 02	0.0	50.5499878
35	-1.1250E 02	-1.0500E 02	0.0	50.5499878
36	-1.0500E 02	-9.7500E 01	0.0	50.5499878
37	-9.7500E 01	-9.0000E 01	0.0	50.5499878
38	-9.0000E 01	-8.2500E 01	0.0	50.5499878
39	-8.2500E 01	-7.5000E 01	0.0	50.5499878
40	-7.5000E 01	-6.7500E 01	0.0	50.5499878
41	-6.7500E 01	-6.0000E 01	0.0	50.5499878
42	-6.0000E 01	-5.2500E 01	0.0	50.5499878
43	-5.2500E 01	-4.5000E 01	0.0	50.5499878
44	-4.5000E 01	-3.7500E 01	0.0	50.5499878
45	-3.7500E 01	-3.0000E 01	0.0	50.5499878
46	-3.0000E 01	-2.2500E 01	0.0	50.5499878
47	-2.2500E 01	-1.5000E 01	0.0	50.5499878
48	-1.5000E 01	-7.5001E 00	0.0	50.5499878
49	-7.5001E 00	-9.2506E-05	49.4499969	99.9999847
50	-9.2506E-05	PLUS INF.	0.0	99.9999847

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INF.	[illegible]	[illegible]	[illegible]	-0.355350 03	-0.352530 03	-0.459310 01	-0.151690 01	-0.758430 00	-0.131760 03
VAL.	-0.172[illegible] 03	-0.17[illegible]62 03	-0.178520 03	-0.175350 03	-0.172530 03	0.175450 03	0.178480 03	0.179240 03	0.179850 03

Figure A-6. Drift Orbit True Anomaly Histogram (Degrees)

PER NOMINAL= 3.0606E 04 MEAN= 3.0536E 04 SIGMA= 2.3016E 02 SAMPLE= 10000



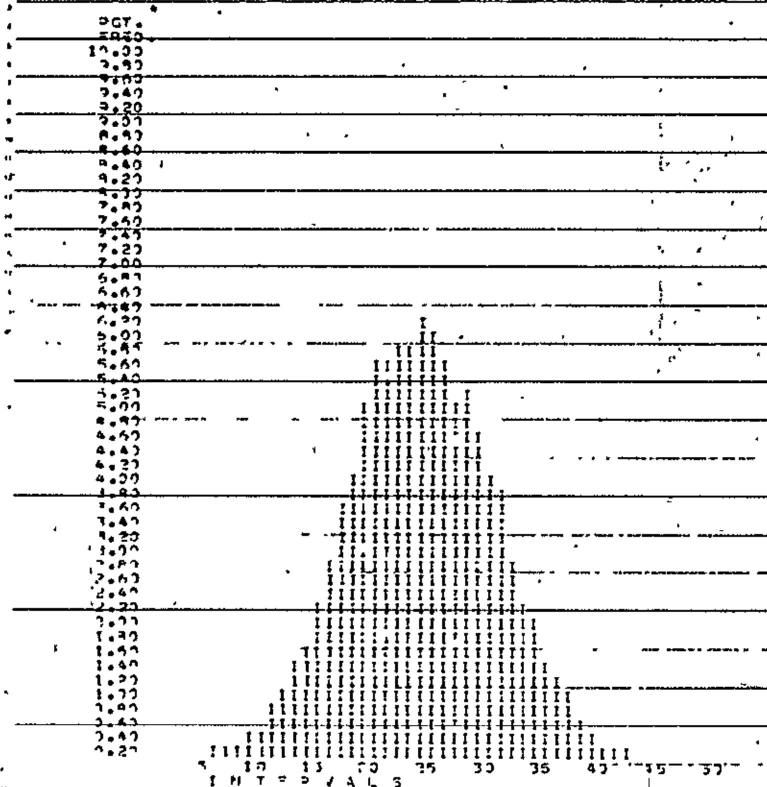
	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.2315E 03	0.0100000	0.0100000
2	-1.2315E 03	-1.1855E 03	0.0	0.0100000
3	-1.1855E 03	-1.1395E 03	0.0	0.0100000
4	-1.1395E 03	-1.0935E 03	0.0100000	0.0200000
5	-1.0935E 03	-1.0475E 03	0.0200000	0.0400000
6	-1.0475E 03	-1.0015E 03	0.0100000	0.0500000
7	-1.0015E 03	-9.5545E 02	0.0200000	0.0700000
8	-9.5545E 02	-9.0945E 02	0.0700000	0.1400000
9	-9.0945E 02	-8.6344E 02	0.1000000	0.2399999
10	-8.6344E 02	-8.1743E 02	0.1100000	0.3499999
11	-8.1743E 02	-7.7142E 02	0.1400000	0.4899999
12	-7.7142E 02	-7.2541E 02	0.2500000	0.7399999
13	-7.2541E 02	-6.7941E 02	0.4100000	1.1499996
14	-6.7941E 02	-6.3340E 02	0.6700000	1.8[illegible]
15	-6.3340E 02	-5.8739E 02	0.8699999	2.5999989
16	-5.8739E 02	-5.4139E 02	1.0400000	3.7399988
17	-5.4139E 02	-4.9537E 02	1.6199999	5.3599987
18	-4.9537E 02	-4.4937E 02	2.1799994	7.5399981
19	-4.4937E 02	-4.0336E 02	2.6899996	10.2299976
20	-4.0336E 02	-3.5735E 02	3.5199995	13.7499971
21	-3.5735E 02	-3.1134E 02	3.7399998	17.4899902
22	-3.1134E 02	-2.6533E 02	4.5400000	22.0299835
23	-2.6533E 02	-2.1933E 02	5.1499996	27.1799774
24	-2.1933E 02	-1.7332E 02	5.6599998	32.5399659
25	-1.7332E 02	-1.2731E 02	[illegible]	38.[illegible]
26	-1.2731E 02	-8.1302E 01	6.8199997	45.5099518
27	-8.1302E 01	-3.5295E 01	6.5599995	52.3699493
28	-3.5295E 01	1.0713E 01	6.7900000	59.1599426
29	1.0713E 01	5.6721E 01	6.4099998	65.5599310
30	5.6721E 01	1.0273E 02	5.5299997	71.0[illegible]
31	1.0273E 02	1.4874E 02	5.3599997	76.4599152
32	1.4874E 02	1.9474E 02	4.6199999	81.0799103
33	1.9474E 02	2.4075E 02	4.0799999	85.15[illegible]
34	2.4075E 02	2.8676E 02	3.5599995	88.7198944
35	2.8676E 02	3.3277E 02	2.5499992	91.2598922
36	3.3277E 02	3.7878E 02	2.2900000	93.5598755
37	3.7878E 02	4.2478E 02	1.6099997	95.1698608
38	4.2478E 02	4.7079E 02	1.4099998	96.5798492
39	4.7079E 02	5.1680E 02	1.1799994	97.7598419
40	5.1680E 02	5.6281E 02	0.6700000	98.4298401
41	5.6281E 02	6.0581E 02	0.6400000	99.06[illegible]
42	6.0881E 02	6.5482E 02	0.3000000	99.3698273
43	6.5482E 02	7.0083E 02	0.2100000	99.5798187
44	7.0083E 02	7.4684E 02	0.1700000	99.7498169
45	7.4684E 02	7.9285E 02	0.0800000	99.8298035
46	7.9285E 02	8.3885E 02	0.0600000	99.8898010
47	8.3885E 02	8.8486E 02	0.0500000	99.9397399
48	8.8486E 02	9.3087E 02	0.0300000	99.9697876
49	9.3087E 02	9.7686E 02	0.0300000	99.9997354
50	9.7688E 02	PLUS INF.	0.0	99.9997564

PCT. 1.0 5.0 10.0 30.0 50.0 70.0 90.0 95.0 99.0

VAL. [illegible] 0.324930D 05 0.330615D 05 0.307800D 05 0.309960 05 0.311060 05 0.312900 05

Figure A-7. Drift Orbit Perigee Radius Histogram (Kilometers)

APOG NOMINAL= 5.2722E 04 MEAN= 5.2733E 04 SIGMA= 4.3003E 02 SAMP.E= 10000

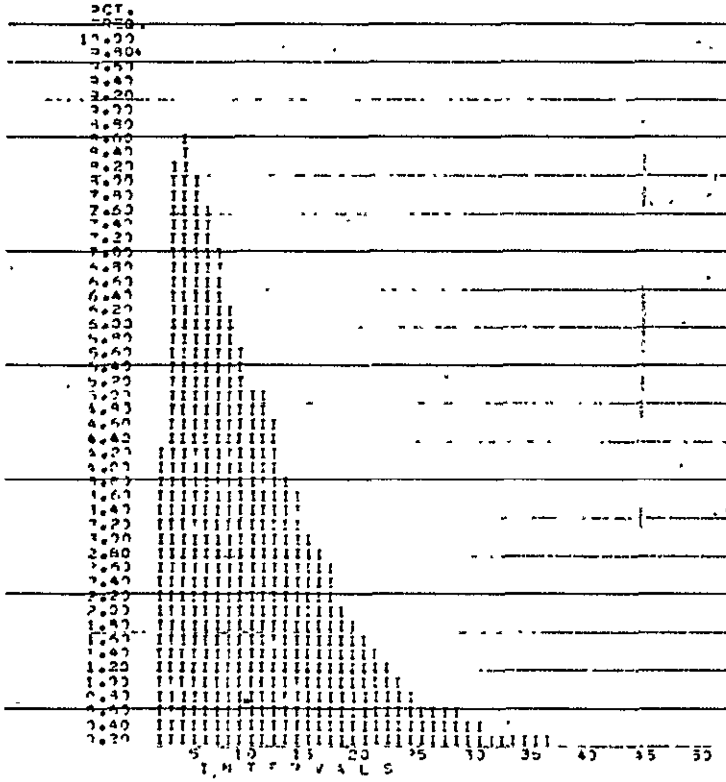


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.4837E 03	0.0100000	0.0100000
2	-1.4837E 03	-1.4176E 03	0.0	0.0100000
3	-1.4176E 03	-1.3515E 03	0.0500000	0.0600000
4	-1.3515E 03	-1.2853E 03	0.0300000	0.0900000
5	-1.2853E 03	-1.2192E 03	0.0600000	0.1499999
6	-1.2192E 03	-1.1531E 03	0.2100000	0.3599999
7	-1.1531E 03	-1.0869E 03	0.1700000	0.5299999
8	-1.0869E 03	-1.0208E 03	0.2900000	0.8199998
9	-1.0208E 03	-9.5466E 02	0.4299999	1.2499990
10	-9.5466E 02	-8.8853E 02	0.4700000	1.7199984
11	-8.8853E 02	-8.2239E 02	0.8400000	2.5599976
12	-8.2239E 02	-7.5626E 02	1.0199995	3.5799971
13	-7.5626E 02	-6.9013E 02	1.3899994	4.9699965
14	-6.9013E 02	-6.2399E 02	1.6399994	6.6099958
15	-6.2399E 02	-5.5786E 02	2.1899996	8.7999954
16	-5.5786E 02	-4.9172E 02	2.7599993	11.5599947
17	-4.9172E 02	-4.2559E 02	3.5699997	15.1299944
18	-4.2559E 02	-3.5946E 02	4.0499992	19.1799927
19	-3.5946E 02	-2.9332E 02	4.9099998	24.0899811
20	-2.9332E 02	-2.2719E 02	5.5400000	29.6299744
21	-2.2719E 02	-1.6105E 02	5.5999994	35.2299652
22	-1.6105E 02	-9.4919E 01	5.7399998	40.9699554
23	-9.4919E 01	-2.8785E 01	5.7699995	46.7399445
24	-2.8785E 01	3.7349E 01	6.1599998	52.8999329
25	3.7349E 01	1.0348E 02	6.0299997	58.9299316
26	1.0348E 02	1.6962E 02	5.5000000	64.4299316
27	1.6962E 02	2.3575E 02	5.0699997	69.4999237
28	2.3575E 02	3.0188E 02	5.2099991	74.7099152
29	3.0188E 02	3.6802E 02	4.6899996	79.3999023
30	3.6802E 02	4.3415E 02	4.0899992	83.4898987
31	4.3415E 02	5.0029E 02	3.7999992	87.2898865
32	5.0029E 02	5.6642E 02	2.8299999	90.1198730
33	5.6642E 02	6.3255E 02	2.1799994	92.2998657
34	6.3255E 02	6.9869E 02	2.0499992	94.3498535
35	6.9869E 02	7.6482E 02	1.3899994	95.7398529
36	7.6482E 02	8.3095E 02	1.2599993	96.9998474
37	8.3095E 02	8.9709E 02	0.9400000	97.9398346
38	8.9709E 02	9.6322E 02	0.5700000	98.6098328
39	9.6322E 02	1.0294E 03	0.4800000	99.0898285
40	1.0294E 03	1.0955E 03	0.2800000	99.3698273
41	1.0955E 03	1.1616E 03	0.2200000	99.5898132
42	1.1616E 03	1.2278E 03	0.1799999	99.7698059
43	1.2278E 03	1.2939E 03	0.0500000	99.8197937
44	1.2939E 03	1.3600E 03	0.0700000	99.8897858
45	1.3600E 03	1.4262E 03	0.0600000	99.9497833
46	1.4262E 03	1.4923E 03	0.0200000	99.9697723
47	1.4923E 03	1.5584E 03	0.0	99.9697723
48	1.5584E 03	1.6246E 03	0.0200000	99.9897614
49	1.6246E 03	1.6907E 03	0.0	99.9897614
50	1.6907E 03	PLUS INF.	0.0100000	99.9997559

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INF.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.242100 03	0.553620 03	0.729820 03	0.101700 04
VAL.	0.517770 05	0.520310 05	0.521310 05	0.524940 05	0.527270 05	0.529620 05	0.532840 05	0.534500 05	0.537370 05

Figure A-8. Drift Orbit Apogee Radius Histogram (Kilometers)

DE-V NOMINAL= 1.2862E-02 MEAN= 2.3630E-02 SIGMA= 9.7453E-03 SAMPLE= 10000

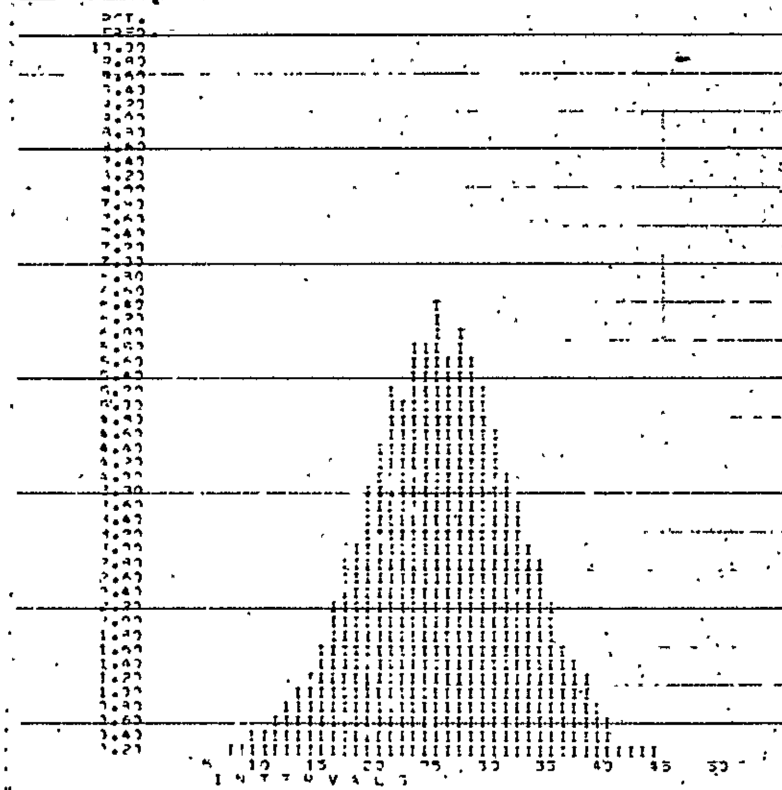


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.9791E-04	0.0100000	0.0100000
2	-1.9791E-04	1.0644E-03	4.1699991	4.1799984
3	1.0644E-03	2.3167E-03	8.2699995	12.4499979
4	2.3167E-03	3.5690E-03	8.6899996	21.1399841
5	3.5690E-03	4.8212E-03	8.0699997	29.2099762
6	4.8212E-03	6.0735E-03	7.5699997	36.7799683
7	6.0735E-03	7.3258E-03	6.9299994	43.7099609
8	7.3259E-03	8.5781E-03	6.1199999	49.8299561
9	8.5781E-03	9.8304E-03	5.5299997	55.3599548
10	9.8304E-03	1.1083E-02	5.0599995	60.4199524
11	1.1083E-02	1.2335E-02	4.9399996	65.3599396
12	1.2335E-02	1.3587E-02	4.6799994	70.0399323
13	1.3587E-02	1.4840E-02	3.7999992	73.8399200
14	1.4840E-02	1.6092E-02	3.5899992	77.4299164
15	1.6092E-02	1.7344E-02	3.0199995	80.4499054
16	1.7344E-02	1.8596E-02	2.8599997	83.3099907
17	1.8596E-02	1.9849E-02	2.5099993	85.8198853
18	1.9849E-02	2.1101E-02	1.9099998	87.7298737
19	2.1101E-02	2.2353E-02	1.7900000	89.5198663
20	2.2353E-02	2.3606E-02	1.5999994	91.1199578
21	2.3606E-02	2.4858E-02	1.3099995	92.4299553
22	2.4858E-02	2.6110E-02	1.1199999	93.5498505
23	2.6110E-02	2.7362E-02	1.0199995	94.5698395
24	2.7362E-02	2.8615E-02	0.8000000	95.3698273
25	2.8615E-02	2.9867E-02	0.5599999	95.9298249
26	2.9867E-02	3.1119E-02	0.5599999	96.4898224
27	3.1119E-02	3.2372E-02	0.6400000	97.1298218
28	3.2372E-02	3.3624E-02	0.4100000	97.5398163
29	3.3624E-02	3.4876E-02	0.4099999	97.9498138
30	3.4876E-02	3.6128E-02	0.4100000	98.3598022
31	3.6129E-02	3.7381E-02	0.2399999	98.5997925
32	3.7381E-02	3.8633E-02	0.1900000	98.7897797
33	3.8633E-02	3.9885E-02	0.2100000	98.9997711
34	3.9885E-02	4.1138E-02	0.1700000	99.1697693
35	4.1138E-02	4.2390E-02	0.2000000	99.3697662
36	4.2390E-02	4.3642E-02	0.1300000	99.4997559
37	4.3642E-02	4.4895E-02	0.0900000	99.5897522
38	4.4895E-02	4.6147E-02	0.0700000	99.6597443
39	4.6147E-02	4.7399E-02	0.0900000	99.7497405
40	4.7399E-02	4.8651E-02	0.0400000	99.7897339
41	4.8651E-02	4.9904E-02	0.0400000	99.8297272
42	4.9904E-02	5.1156E-02	0.0300000	99.8597260
43	5.1156E-02	5.2408E-02	0.0100000	99.8697205
44	5.2408E-02	5.3661E-02	0.0400000	99.9097137
45	5.3661E-02	5.4913E-02	0.0200000	99.9297028
46	5.4913E-02	5.6165E-02	0.0100000	99.9396973
47	5.6165E-02	5.7417E-02	0.0100000	99.9496918
48	5.7417E-02	5.8670E-02	0.0200000	99.9696808
49	5.8670E-02	5.9922E-02	0.0200000	99.9896698
50	5.9922E-02	PLUS INF.	0.0100000	99.9995643

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	0.113862D-02	0.174570D-02	0.495190D-02	0.851350D-02	0.135770D-01	0.227290D-01	0.280350D-01	0.393370D-01
VAL.	0.129710D-01	0.140030D-01	0.146072D-01	0.178140D-01	0.213730D-01	0.264380D-01	0.355910D-01	0.408980D-01	0.527430D-01

Figure A-9. Post-AMF Velocity To Acquire Station Histogram (Kilometers/Second)

DRIFT NOMINAL=-9.0000E 00 MEAN= -6.2977E 00 SIGMA= 4.4356E 00 SAMPLE= 10000



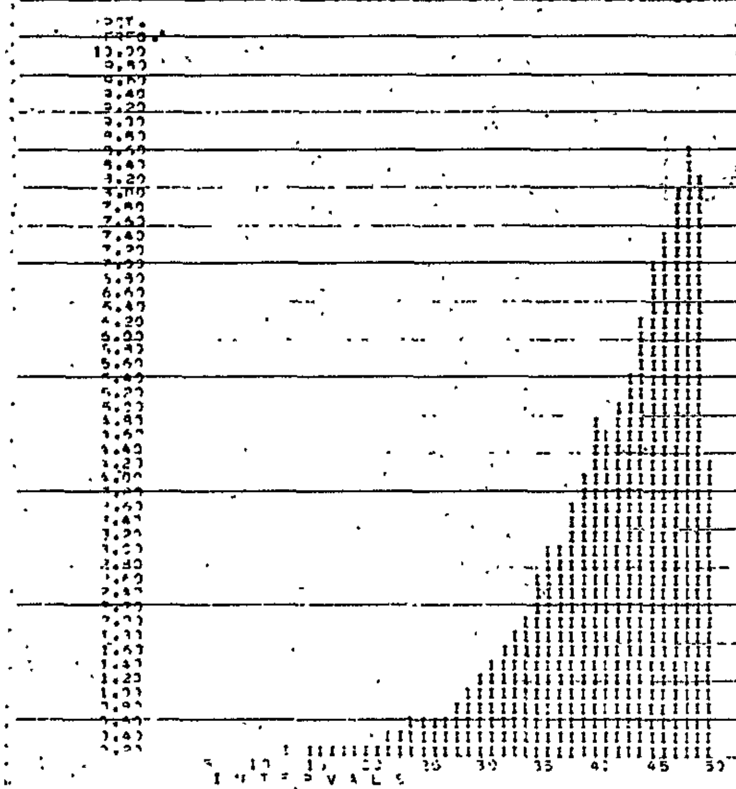
	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.6659E 01	0.0100000	0.0100000
2	-1.6659E 01	-1.5977E 01	0.0400000	0.0500000
3	-1.5977E 01	-1.5294E 01	0.0200000	0.0700000
4	-1.5294E 01	-1.4611E 01	0.0300000	0.1000000
5	-1.4611E 01	-1.3928E 01	0.0600000	0.1599999
6	-1.3928E 01	-1.3246E 01	0.0700000	0.2299999
7	-1.3246E 01	-1.2563E 01	0.1500000	0.3799999
8	-1.2563E 01	-1.1880E 01	0.2000000	0.5799999
9	-1.1880E 01	-1.1197E 01	0.3300000	0.9099998
10	-1.1197E 01	-1.0515E 01	0.3400000	1.2499990
11	-1.0515E 01	-9.8318E 00	0.5000000	1.7499990
12	-9.8318E 00	-9.1490E 00	0.7399999	2.4899988
13	-9.1490E 00	-8.4662E 00	0.9899999	3.4799986
14	-8.4662E 00	-7.7835E 00	1.1299992	4.6099977
15	-7.7835E 00	-7.1007E 00	1.5799999	6.1899977
16	-7.1007E 00	-6.4180E 00	2.1899996	8.3799973
17	-6.4180E 00	-5.7352E 00	2.7299995	11.1099968
18	-5.7352E 00	-5.0524E 00	3.0899992	14.1999960
19	-5.0524E 00	-4.3697E 00	3.8799992	18.0799956
20	-4.3697E 00	-3.6869E 00	4.4099998	22.4899950
21	-3.6869E 00	-3.0042E 00	5.1499996	27.6399689
22	-3.0042E 00	-2.3214E 00	5.0599995	32.6399664
23	-2.3214E 00	-1.6386E 00	5.8399992	38.5399628
24	-1.6386E 00	-9.5589E-01	5.7500000	44.2899628
25	-9.5589E-01	-2.7313E-01	6.3699999	50.6599579
26	-2.7313E-01	4.0963E-01	5.6599998	56.3199463
27	4.0963E-01	1.0924E 00	6.0000000	62.3199463
28	1.0924E 00	1.7751E 00	5.6477996	67.9599432
29	1.7751E 00	2.4579E 00	5.2299995	73.1999359
30	2.4579E 00	3.1407E 00	4.6299992	77.8299255
31	3.1407E 00	3.8234E 00	4.0599995	81.8899231
32	3.8234E 00	4.5062E 00	3.5400000	85.4299164
33	4.5062E 00	5.1889E 00	3.0699997	88.4999084
34	5.1889E 00	5.8717E 00	2.7900000	91.2899017
35	5.8717E 00	6.5545E 00	2.2299995	93.5198975
36	6.5545E 00	7.2372E 00	1.6399994	95.1598969
37	7.2372E 00	7.9200E 00	1.3599997	96.5198822
38	7.9200E 00	8.6027E 00	1.1899996	97.7098594
39	8.6027E 00	9.2855E 00	0.7800000	98.4998682
40	9.2855E 00	9.9682E 00	0.5599999	99.0498657
41	9.9682E 00	1.0651E 01	0.2800000	99.3298645
42	1.0651E 01	1.1334E 01	0.2300000	99.5598602
43	1.1334E 01	1.2017E 01	0.1500000	99.7096541
44	1.2017E 01	1.2699E 01	0.1000000	99.8098450
45	1.2699E 01	1.3382E 01	0.0600000	99.8698425
46	1.3382E 01	1.4065E 01	0.0400000	99.9098359
47	1.4065E 01	1.4748E 01	0.0500000	99.9598236
48	1.4748E 01	1.5430E 01	0.0200000	99.9798126
49	1.5430E 01	1.6113E 01	0.0200000	99.9998016
50	1.6113E 01	PLUS INF.	0.0	99.9998016

PCT. 1.0 5.0 10.0 30.0 50.0 70.0 90.0 95.0 99.0

VAL. -0.177170 02 -0.111110 02 -0.126130 02 -0.268570 01 -0.634390 01 -0.395380 01 -0.443960 00 0.117060 01 0.390750 01

Figure A-10. Initial Longitudinal Drift Rate Histogram (Degrees/Day)

WTSA NOMINAL= 2.4863E 02 MEAN= 2.4394E 02 SIGMA= 3.9163E 00 SAMPLE= 10000

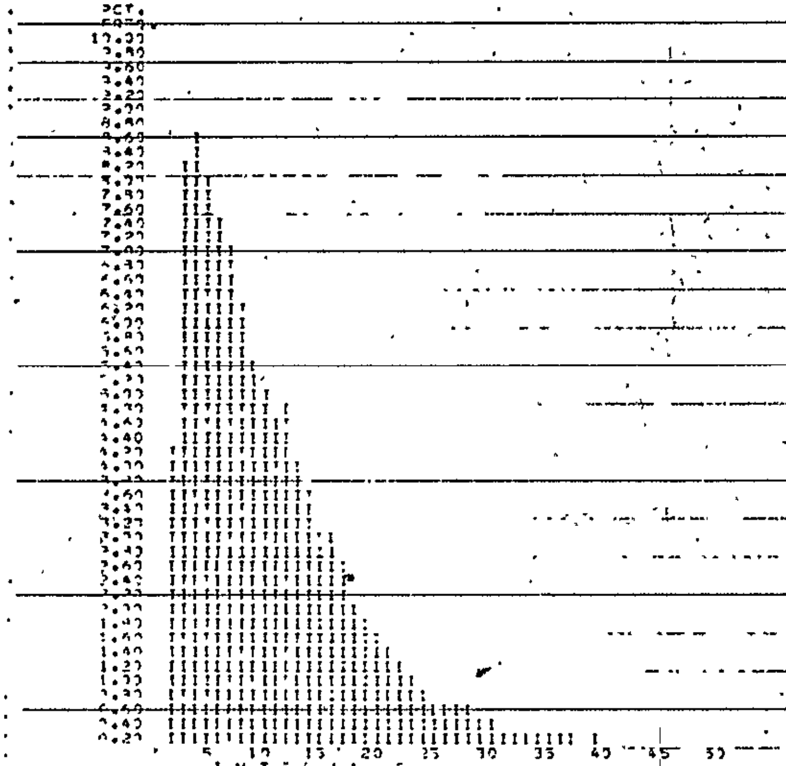


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-2.5987E 01	0.0100000	0.0100000
2	-2.5987E 01	-2.5443E 01	0.0200000	0.0300000
3	-2.5443E 01	-2.4900E 01	0.0200000	0.0500000
4	-2.4900E 01	-2.4357E 01	0.0100000	0.0500000
5	-2.4357E 01	-2.3814E 01	0.0100000	0.0700000
6	-2.3814E 01	-2.3271E 01	0.0200000	0.0900000
7	-2.3271E 01	-2.2728E 01	0.0400000	0.1299999
8	-2.2728E 01	-2.2185E 01	0.0100000	0.1399999
9	-2.2185E 01	-2.1642E 01	0.0300000	0.1699999
10	-2.1642E 01	-2.1098E 01	0.0400000	0.2099999
11	-2.1098E 01	-2.0555E 01	0.0500000	0.2599998
12	-2.0555E 01	-2.0012E 01	0.1000000	0.3599998
13	-2.0012E 01	-1.9469E 01	0.0500000	0.4099997
14	-1.9469E 01	-1.8926E 01	0.1000000	0.5099997
15	-1.8926E 01	-1.8383E 01	0.1799999	0.6899996
15	-1.8383E 01	-1.7840E 01	0.1500000	0.8399996
17	-1.7840E 01	-1.7297E 01	0.2000000	1.0399990
15	-1.7297E 01	-1.6753E 01	0.1700000	1.2099981
19	-1.6753E 01	-1.6210E 01	0.2000000	1.4099979
20	-1.6210E 01	-1.5667E 01	0.2900000	1.5999979
21	-1.5667E 01	-1.5124E 01	0.3800000	2.0799971
22	-1.5124E 01	-1.4581E 01	0.3699999	2.4499969
23	-1.4581E 01	-1.4038E 01	0.5300000	2.9799967
24	-1.4038E 01	-1.3495E 01	0.5900000	3.5699959
25	-1.3495E 01	-1.2952E 01	0.5800000	4.1499958
25	-1.2752E 01	-1.2409E 01	0.6400000	4.7999952
27	-1.2409E 01	-1.1865E 01	0.8200000	5.6099943
28	-1.1865E 01	-1.1322E 01	1.0099993	6.6199942
29	-1.1322E 01	-1.0779E 01	1.1099997	7.7299938
30	-1.0779E 01	-1.0236E 01	1.4899998	9.2199936
31	-1.0236E 01	-9.6930E 00	1.5400000	10.7599936
32	-9.6930E 00	-9.1499E 00	1.7900000	12.5499935
33	-9.1499E 00	-8.6068E 00	1.9399996	14.4899931
34	-8.6069E 00	-8.0637E 00	2.5099993	16.9999847
35	-8.0637E 00	-7.5206E 00	2.8999996	19.8999786
35	-7.5206E 00	-6.9775E 00	3.0599995	22.9599762
37	-6.9775E 00	-6.4344E 00	3.5299997	26.4899750
38	-6.4344E 00	-5.8913E 00	3.9899998	30.4799652
39	-5.8913E 00	-5.3482E 00	4.8899994	35.3699646
40	-5.3482E 00	-4.8051E 00	4.6699991	40.0399628
41	-4.8051E 00	-4.2620E 00	5.0899992	45.1299591
42	-4.2620E 00	-3.7189E 00	5.4599991	50.5899506
43	-3.7189E 00	-3.1758E 00	6.2199993	56.8099365
44	-3.1758E 00	-2.6326E 00	6.9199991	63.7299347
43	-2.6326E 00	-2.0895E 00	7.4099999	71.1399231
46	-2.0895E 00	-1.5464E 00	8.0599995	79.1999207
47	-1.5464E 00	-1.0033E 00	8.5599995	87.7599182
48	-1.0033E 00	-4.6021E-01	8.1399994	95.8999176
49	-4.6021E-01	8.2895E-02	4.0999994	99.9999084
50	8.2895E-02	PLUS INF.	0.0	99.9999084

PCT. 1.0 5.0 10.0 30.0 50.0 70.0 90.0 95.0 99.0

Figure A-11. On-Station Weight Histogram (Pounds)

HYDIIII NOMINAL= 5.4223E 00 MEAN= 1.0A17E 01 SIGMA= 3.8163E 00 SAMPLE= 10000

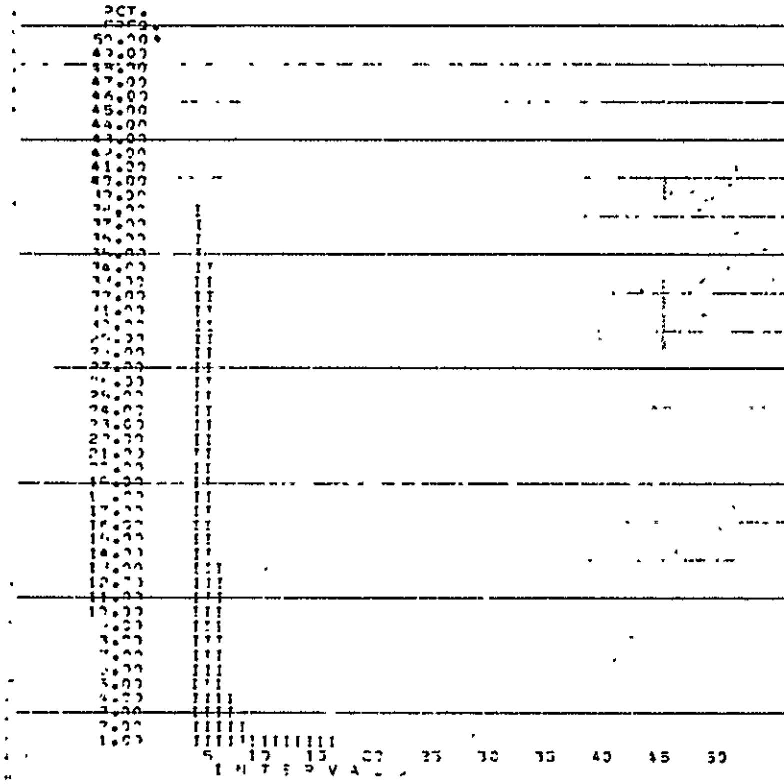


	INTERVAL WRT	NOMINAL	PCT. FREQ.	SUM
1	MINUS INF.	-8.2634E-02	0.0	0.0
2	-8.2634E-02	4.6047E-01	4.1099997	4.1099997
3	4.6047E-01	1.0036E 00	8.1299992	12.2399988
4	1.0036E 00	1.5467E 00	8.5599995	20.7999878
5	1.5467E 00	2.0898E 00	8.0699997	28.8699799
6	2.0898E 00	2.6329E 00	7.4099998	36.2799683
7	2.6329E 00	3.1760E 00	6.9099998	43.1899567
8	3.1760E 00	3.7191E 00	6.2199993	49.4099425
9	3.7191E 00	4.2622E 00	5.4599991	54.8599341
10	4.2622E 00	4.8053E 00	5.0899992	59.9599304
11	4.8053E 00	5.3484E 00	4.6699991	64.6299286
12	5.3484E 00	5.8915E 00	4.8899994	69.5199230
13	5.8915E 00	6.4347E 00	4.0000000	73.5199280
14	6.4347E 00	6.9778E 00	3.5299997	77.0499268
15	6.9778E 00	7.5209E 00	3.0499992	80.0999146
16	7.5209E 00	8.0640E 00	2.9099998	83.0099030
17	8.0640E 00	8.6071E 00	2.5000000	85.5099030
18	8.6071E 00	9.1502E 00	1.9499998	87.4599999
19	9.1502E 00	9.6933E 00	1.7799997	89.2398987
20	9.6933E 00	1.0236E 01	1.5400000	90.7798920
21	1.0236E 01	1.0780E 01	1.4899998	92.2698822
22	1.0780E 01	1.1323E 01	1.1099997	93.3798676
23	1.1323E 01	1.1866E 01	1.0099993	94.3898621
24	1.1866E 01	1.2409E 01	0.8200000	95.2098541
25	1.2409E 01	1.2952E 01	0.6400000	95.8495535
26	1.2952E 01	1.3495E 01	0.5800000	96.4298401
27	1.3495E 01	1.4038E 01	0.5900000	97.0198364
28	1.4038E 01	1.4581E 01	0.5300000	97.5498352
29	1.4581E 01	1.5124E 01	0.3699999	97.9198303
30	1.5124E 01	1.5667E 01	0.3800000	98.2998199
31	1.5667E 01	1.6211E 01	0.2900000	98.5398132
32	1.6211E 01	1.6754E 01	0.2000000	98.7398102
33	1.6754E 01	1.7297E 01	0.1700000	98.9598083
34	1.7297E 01	1.7840E 01	0.2000000	99.1598053
35	1.7840E 01	1.8383E 01	0.1500000	99.3097992
36	1.8383E 01	1.8926E 01	0.1799999	99.4897919
37	1.8926E 01	1.9469E 01	0.1000000	99.5897927
38	1.9469E 01	2.0012E 01	0.0500000	99.6397705
39	2.0012E 01	2.0555E 01	0.1000000	99.7397614
40	2.0555E 01	2.1099E 01	0.0500000	99.7897491
41	2.1099E 01	2.1642E 01	0.0400000	99.8297424
42	2.1642E 01	2.2185E 01	0.0300000	99.8597412
43	2.2185E 01	2.2728E 01	0.0100000	99.8597357
44	2.2728E 01	2.3271E 01	0.0400000	99.9097290
45	2.3271E 01	2.3814E 01	0.0200000	99.9297190
46	2.3814E 01	2.4357E 01	0.0100000	99.9397125
47	2.4357E 01	2.4900E 01	0.0100000	99.9497070
48	2.4900E 01	2.5443E 01	0.0200000	99.9695960
49	2.5443E 01	2.5986E 01	0.0200000	99.9896831
50	2.5986E 01	PLUS INF.	0.0100000	99.9996796

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INF.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.996140 01	0.122730 02	0.174060 02
VAL.	[illegible]	[illegible]	[illegible]	0.734510 01	[illegible]	0.116290 02	0.156340 02	0.179420 02	0.230780 02

Figure A-12. Hydrazine Fuel Used To Acquire Station Histogram (Pounds)

(DV1AE) NOMINAL= 1.2362E-02 MEAN= 1.3048E-02 SIGMA= 3.2823E-04 SAMPLE= 10000

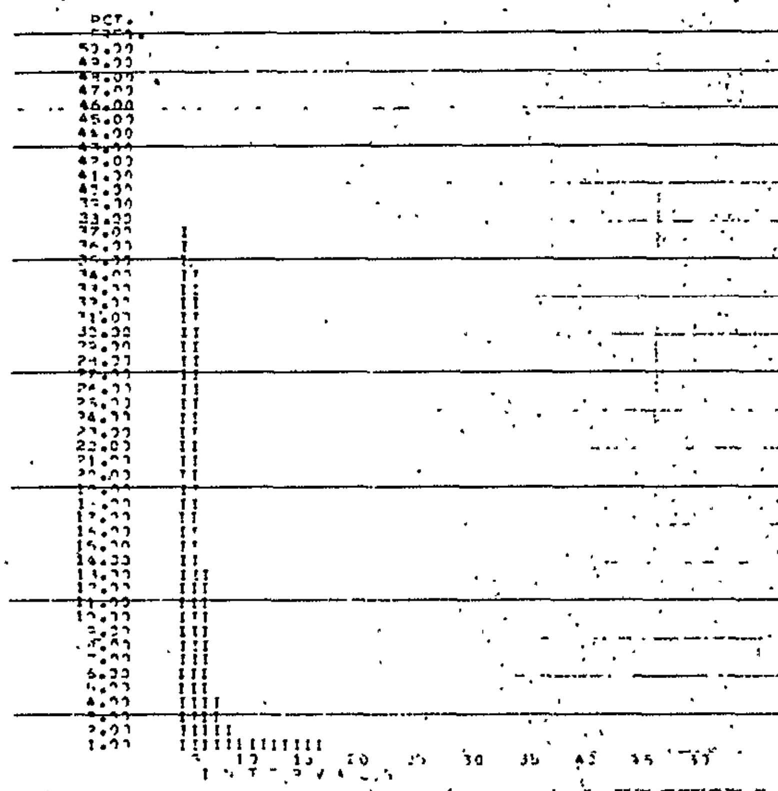


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-1.8791E-04	0.0100000	0.0100000
2	-1.8791E-04	-1.0253E-04	0.1199999	0.1299999
3	-1.0253E-04	-1.7147E-05	0.1100000	0.2399999
4	-1.7147E-05	6.8236E-05	37.5999908	37.8399811
5	6.8236E-05	1.5362E-04	33.7399902	71.5799713
6	1.5362E-04	2.3900E-04	13.1799994	84.7599640
7	2.3900E-04	3.2439E-04	4.4699993	89.2299500
8	3.2439E-04	4.0977E-04	2.0400000	91.2599432
9	4.0977E-04	4.9515E-04	0.8900000	92.1599426
10	4.9515E-04	5.8054E-04	0.8300000	92.9899292
11	5.8054E-04	6.6592E-04	0.6199999	93.6099243
12	6.6592E-04	7.5131E-04	0.6400000	94.2499237
13	7.5131E-04	8.3669E-04	0.5700000	94.8199158
14	8.3669E-04	9.2207E-04	0.6900000	95.5099030
15	9.2207E-04	1.0075E-03	0.7000000	96.2099999
16	1.0075E-03	1.0928E-03	0.5599999	96.7699975
17	1.0928E-03	1.1782E-03	0.4800000	97.2499732
18	1.1782E-03	1.2636E-03	0.3699999	97.6198883
19	1.2636E-03	1.3490E-03	0.3800000	97.9998779
20	1.3490E-03	1.4344E-03	0.2300000	98.2298737
21	1.4344E-03	1.5198E-03	0.1700000	98.3998718
22	1.5198E-03	1.6051E-03	0.1900000	98.5898590
23	1.6051E-03	1.6905E-03	0.1900000	98.7798452
24	1.6905E-03	1.7759E-03	0.1500000	98.9298401
25	1.7759E-03	1.8613E-03	0.1600000	99.0898253
26	1.8613E-03	1.9467E-03	0.1300000	99.2198131
27	1.9467E-03	2.0321E-03	0.1300000	99.3498077
28	2.0321E-03	2.1174E-03	0.1500000	99.4998015
29	2.1174E-03	2.2028E-03	0.1100000	99.6097870
30	2.2028E-03	2.2882E-03	0.0400000	99.6497803
31	2.2882E-03	2.3736E-03	0.0800000	99.7297653
32	2.3736E-03	2.4590E-03	0.0300000	99.7597655
33	2.4590E-03	2.5444E-03	0.0400000	99.7997599
34	2.5444E-03	2.6297E-03	0.0500000	99.8497467
35	2.6297E-03	2.7151E-03	0.0400000	99.8897400
36	2.7151E-03	2.8005E-03	0.0100000	99.8997345
37	2.8005E-03	2.8859E-03	0.0100000	99.9097290
38	2.8859E-03	2.9713E-03	0.0100000	99.9197235
39	2.9713E-03	3.0567E-03	0.0100000	99.9297180
40	3.0567E-03	3.1420E-03	0.0100000	99.9397125
41	3.1420E-03	3.2274E-03	0.0100000	99.9497070
42	3.2274E-03	3.3128E-03	0.0200000	99.9696960
43	3.3128E-03	3.3982E-03	0.0	99.9696960
44	3.3982E-03	3.4836E-03	0.0100000	99.9796906
45	3.4836E-03	3.5690E-03	0.0	99.9796906
46	3.5690E-03	3.6543E-03	0.0100000	99.9896851
47	3.6543E-03	3.7397E-03	0.0	99.9896851
48	3.7397E-03	3.8251E-03	0.0	99.9896851
49	3.8251E-03	3.9105E-03	0.0	99.9896851
50	3.9105E-03	PLUS INF.	0.0100000	99.9996796

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INF.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VAL.	0.129840D-01	0.128??0D-01	0.128670D-01	0.129120D-01	0.129510D-01	0.130110D-01	0.132180D-01	0.137210D-01	0.145750D-01

Figure A-13. Velocity Change Required To Correct Semimajor Axis and Eccentricity Histogram (Kilometers/Second)

HYDAZ NOMINAL= 5.672 E 00 MEAN= 5.7543E 00 SIGMA= 1.4423E-01 SAMPLE= 10000

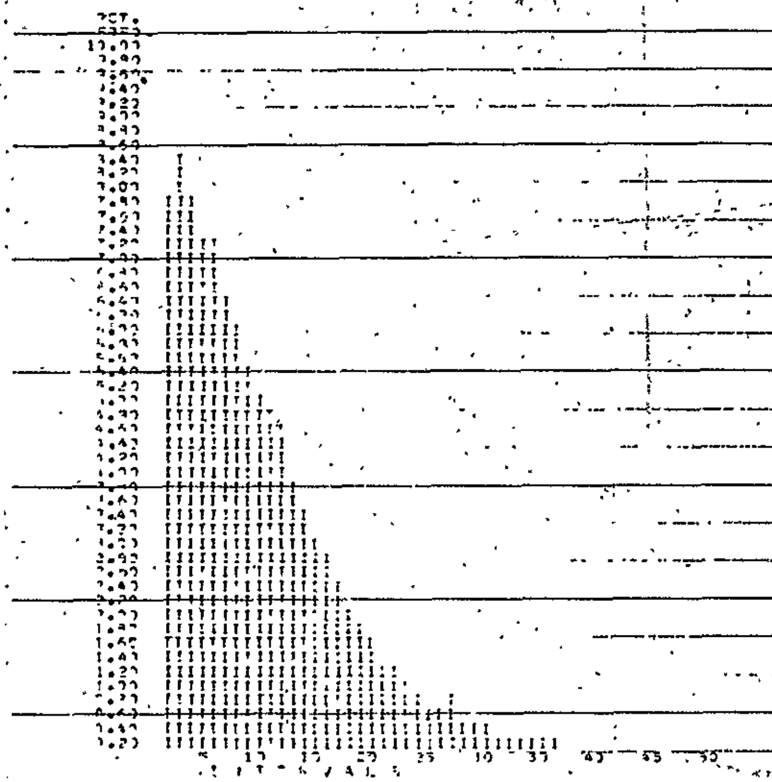


	INTERVAL	#RT NOMINAL	PCT. FREQ.	SUM
1	MINUS INF.	-8.2634E-02	0.0100000	0.0100000
2	-8.2634E-02	-4.5121E-02	0.1199999	0.1299999
3	-4.5121E-02	-7.6083E-03	0.1100000	0.2399999
4	-7.6083E-03	2.9905E-02	37.4499969	37.6899872
5	2.9905E-02	6.7417E-02	33.8199921	71.5099792
6	6.7417E-02	1.0493E-01	13.2199993	84.7299652
7	1.0493E-01	1.4244E-01	4.4899998	89.2199554
8	1.4244E-01	1.7996E-01	2.0400000	91.2599487
9	1.7996E-01	2.1747E-01	0.8900000	92.1499481
10	2.1747E-01	2.5498E-01	0.8400000	92.9899445
11	2.5498E-01	2.9249E-01	0.6000000	93.5899353
12	2.9249E-01	3.3001E-01	0.5600000	94.2499237
13	3.3001E-01	3.6752E-01	0.5700000	94.8199158
14	3.6752E-01	4.0503E-01	0.6799999	95.4999084
15	4.0503E-01	4.4255E-01	0.6900000	96.1898956
16	4.4255E-01	4.8006E-01	0.5800000	96.7598922
17	4.8006E-01	5.1757E-01	0.4500000	97.2498779
18	5.1757E-01	5.5508E-01	0.3500000	97.5998638
19	5.5508E-01	5.9260E-01	0.3900000	97.9898682
20	5.9260E-01	6.3011E-01	0.2399999	98.2298584
21	6.3011E-01	6.6762E-01	0.1700000	98.3998556
22	6.6762E-01	7.0514E-01	0.1900000	98.5898438
23	7.0514E-01	7.4265E-01	0.1900000	98.7798339
24	7.4265E-01	7.8016E-01	0.1500000	98.9299249
25	7.8016E-01	8.1767E-01	0.1600000	99.0898132
26	8.1767E-01	8.5519E-01	0.1300000	99.2198029
27	8.5519E-01	8.9270E-01	0.1300000	99.3497925
28	8.9270E-01	9.3021E-01	0.1500000	99.4997864
29	9.3021E-01	9.6773E-01	0.1100000	99.6097717
30	9.6773E-01	1.0052E 00	0.0400000	99.6497650
31	1.0052E 00	1.0428E 00	0.0800000	99.7297516
32	1.0428E 00	1.0803E 00	0.0300000	99.7597504
33	1.0803E 00	1.1178E 00	0.0400000	99.7997437
34	1.1178E 00	1.1553E 00	0.0500000	99.8497314
35	1.1553E 00	1.1928E 00	0.0400000	99.8897247
36	1.1928E 00	1.2303E 00	0.0100000	99.8997192
37	1.2303E 00	1.2678E 00	0.0100000	99.9097137
38	1.2678E 00	1.3053E 00	0.0100000	99.9197083
39	1.3053E 00	1.3429E 00	0.0100000	99.9297028
40	1.3429E 00	1.3804E 00	0.0100000	99.9396973
41	1.3804E 00	1.4179E 00	0.0100000	99.9496918
42	1.4179E 00	1.4554E 00	0.0200000	99.9696808
43	1.4554E 00	1.4929E 00	0.0	99.9696808
44	1.4929E 00	1.5304E 00	0.0100000	99.9796753
45	1.5304E 00	1.5679E 00	0.0	99.9796753
46	1.5679E 00	1.6054E 00	0.0100000	99.9896698
47	1.6054E 00	1.6430E 00	0.0	99.9896698
48	1.6430E 00	1.6805E 00	0.0	99.9896698
49	1.6805E 00	1.7180E 00	0.0	99.9896698
50	1.7180E 00	PLUS INF.	0.0100000	99.9996643

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	[illegible]	[illegible]	[illegible]	0.435590-01	0.557430-01	0.156790 00	0.377450 00	0.795520 00
X4.	0.566570 01	0.569270 01	0.567470 01	0.569420 01	0.571610 01	0.573830 01	0.582930 01	0.605000 01	0.645910 01

Figure A-14. Hydrazine Fuel Used To Correct Semimajor Axis and Eccentricity Histogram (Pounds)

DVDRFT NOMINAL= 0.0 MEAN= 1.0548E-02 SIGMA= 3.7575E-03 SAMPLE= 10000

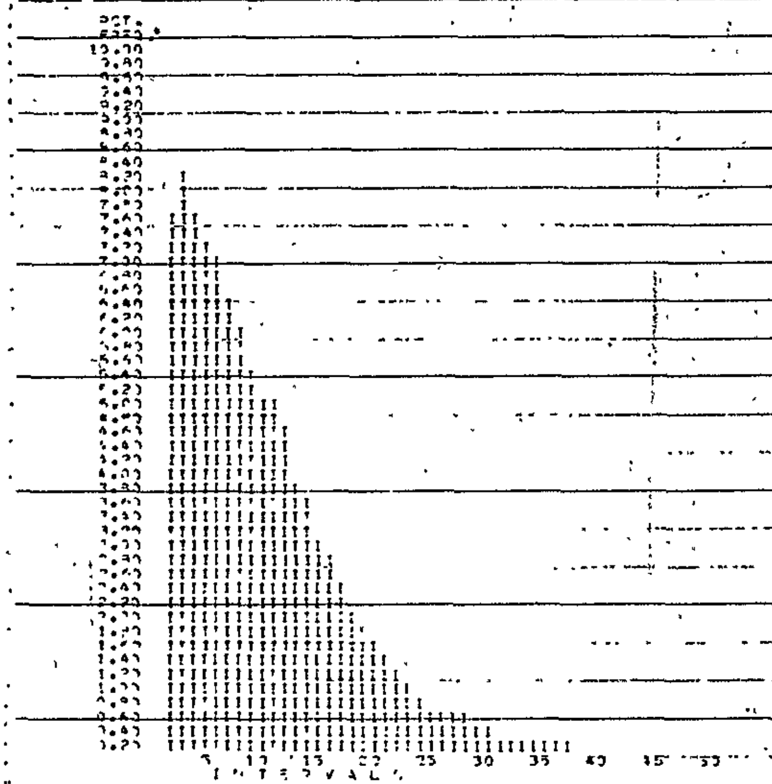


	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	0.0	0.0	0.0
2	0.0	1.2387E-03	7.7799997	7.7799997
3	1.2387E-03	2.4774E-03	8.2999992	16.0799856
4	2.4774E-03	3.7161E-03	7.8399992	23.9199829
5	3.7161E-03	4.9548E-03	7.1399994	31.0599823
6	4.9548E-03	6.1935E-03	7.1099997	38.1699677
7	6.1935E-03	7.4322E-03	6.4399996	44.5099548
8	7.4322E-03	8.6709E-03	6.0299997	50.6399536
9	8.6709E-03	9.9095E-03	5.4499998	56.0899506
10	9.9095E-03	1.1148E-02	4.9899998	61.0799408
11	1.1148E-02	1.2387E-02	4.7799997	65.8599396
12	1.2387E-02	1.3626E-02	4.6699991	70.5299377
13	1.3626E-02	1.4864E-02	3.8099995	74.3399353
14	1.4864E-02	1.6103E-02	3.3699999	77.7099304
15	1.6103E-02	1.7342E-02	3.0400000	80.7499237
16	1.7342E-02	1.8580E-02	2.8599997	83.5099091
17	1.8580E-02	1.9819E-02	2.3999996	86.0099037
18	1.9819E-02	2.1058E-02	1.8999996	87.9098969
19	2.1058E-02	2.2296E-02	1.7999992	89.7098846
20	2.2296E-02	2.3535E-02	1.5299997	91.2398834
21	2.3535E-02	2.4774E-02	1.2699995	92.5098724
22	2.4774E-02	2.6013E-02	1.1699991	93.6798706
23	2.6013E-02	2.7251E-02	0.9299999	94.6098633
24	2.7251E-02	2.8490E-02	0.6200000	95.4298553
25	2.8490E-02	2.9729E-02	0.5700000	95.9998474
26	2.9729E-02	3.0967E-02	0.5200000	96.5198354
27	3.0967E-02	3.2206E-02	0.7000000	97.2198334
28	3.2206E-02	3.3445E-02	0.4299999	97.5498260
29	3.3445E-02	3.4683E-02	0.3300000	97.9798126
30	3.4683E-02	3.5922E-02	0.4100000	98.3898010
31	3.5922E-02	3.7161E-02	0.2300000	98.5197959
32	3.7161E-02	3.8399E-02	0.1900000	98.8097839
33	3.8399E-02	3.9639E-02	0.2200000	99.0297699
34	3.9639E-02	4.0877E-02	0.1400000	99.1697693
35	4.0877E-02	4.2116E-02	0.2100000	99.3797607
36	4.2116E-02	4.3354E-02	0.1300000	99.5097504
37	4.3354E-02	4.4593E-02	0.0900000	99.5897369
38	4.4593E-02	4.5832E-02	0.0900000	99.6797333
39	4.5832E-02	4.7070E-02	0.0700000	99.7497253
40	4.7070E-02	4.8309E-02	0.0400000	99.7897156
41	4.8309E-02	4.9548E-02	0.0400000	99.8297119
42	4.9548E-02	5.0786E-02	0.0300000	99.8597107
43	5.0786E-02	5.2025E-02	0.0100000	99.8697052
44	5.2025E-02	5.3264E-02	0.0400000	99.9096985
45	5.3264E-02	5.4502E-02	0.0200000	99.9295975
46	5.4502E-02	5.5741E-02	0.0100000	99.9396820
47	5.5741E-02	5.6980E-02	0.0100000	99.9496765
48	5.6980E-02	5.8219E-02	0.0200000	99.9695655
49	5.8219E-02	5.9457E-02	0.0200000	99.9896545
50	5.9457E-02	PLUS INF.	0.0100000	99.9996490

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
VAL.	0.151220D-03	0.7[illegible]D-03	0.157030D-02	0.477330D-02	0.853340D-02	0.134850D-01	0.225312D-01	0.279810D-01	0.394710D-01

Figure A-15. Velocity Change Required to Correct Drift Rate Errors Histogram (Kilometers/Second)

HYDRFT NOMINAL= 0.0 MEAN= 4.5303E 00 SIGMA= 3.8433E 00 SAMP.E= 10000



	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	0.0	0.0	0.0
2	0.0	5.4046E-01	7.6299992	7.6299992
3	5.4046E-01	1.0809E 00	8.2500000	15.8799992
4	1.0809E 00	1.6214E 00	7.6899996	23.5699921
5	1.6214E 00	2.1618E 00	7.1399994	30.7099915
6	2.1618E 00	2.7023E 00	7.0400000	37.7499847
7	2.7023E 00	3.2427E 00	6.4399996	44.1899719
8	3.2427E 00	3.7832E 00	5.9599991	50.1499634
9	3.7832E 00	4.3237E 00	5.4699993	55.6199493
10	4.3237E 00	4.8641E 00	4.9199991	60.5399475
11	4.8641E 00	5.4046E 00	4.9099998	65.4499359
12	5.4046E 00	5.9450E 00	4.6299992	70.0799255
13	5.9450E 00	6.4855E 00	3.7199993	73.7999115
14	6.4855E 00	7.0260E 00	3.5799999	77.3798981
15	7.0260E 00	7.5664E 00	3.0099993	80.3898926
16	7.5664E 00	8.1069E 00	2.8799992	83.2698822
17	8.1069E 00	8.6473E 00	2.4799995	85.7498779
18	8.6473E 00	9.1878E 00	1.9099998	87.6598663
19	9.1878E 00	9.7282E 00	1.7599993	89.4198608
20	9.7282E 00	1.0269E 01	1.5499992	90.9698486
21	1.0269E 01	1.0809E 01	1.4199991	92.3898468
22	1.0809E 01	1.1350E 01	1.0999994	93.4898376
23	1.1350E 01	1.1890E 01	0.9899999	94.4798279
24	1.1890E 01	1.2431E 01	0.8099999	95.2898254
25	1.2431E 01	1.2971E 01	0.5900000	95.8798218
26	1.2971E 01	1.3511E 01	0.6000000	96.4798126
27	1.3511E 01	1.4052E 01	0.5700000	97.0498047
28	1.4052E 01	1.4592E 01	0.5400000	97.5897980
29	1.4592E 01	1.5133E 01	0.3400000	97.9297943
30	1.5133E 01	1.5673E 01	0.3800000	98.3097839
31	1.5673E 01	1.6214E 01	0.2900000	98.5997772
32	1.6214E 01	1.6754E 01	0.1900000	98.7897644
33	1.6754E 01	1.7295E 01	0.1900000	98.9797516
34	1.7295E 01	1.7835E 01	0.1799999	99.1597443
35	1.7835E 01	1.8376E 01	0.1700000	99.3297424
36	1.8376E 01	1.8916E 01	0.1600000	99.4897308
37	1.8916E 01	1.9456E 01	0.1000000	99.5897217
38	1.9456E 01	1.9997E 01	0.0700000	99.6597137
39	1.9997E 01	2.0537E 01	0.0800000	99.7397033
40	2.0537E 01	2.1078E 01	0.0500000	99.7895881
41	2.1078E 01	2.1618E 01	0.0400000	99.8296814
42	2.1618E 01	2.2159E 01	0.0300000	99.8596802
43	2.2159E 01	2.2699E 01	0.0100000	99.8696747
44	2.2699E 01	2.3240E 01	0.0400000	99.9096680
45	2.3240E 01	2.3780E 01	0.0200000	99.9296570
46	2.3780E 01	2.4320E 01	0.0100000	99.9396515
47	2.4320E 01	2.4861E 01	0.0100000	99.9496450
48	2.4861E 01	2.5401E 01	0.0200000	99.9696350
49	2.5401E 01	2.5942E 01	0.0200000	99.9896240
50	2.5942E 01	PLUS INF.	0.0100000	99.9996185

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INF.	0.739333E-01	0.311177 00	0.629720 00	0.213810 01	0.375950 01	0.593570 01	0.993050 01	0.122370 02	0.173550 02
VAL.	0.739333E-01	0.311177 00	0.629720 00	0.213810 01	0.375950 01	0.593570 01	0.993050 01	0.122370 02	0.173550 02

Figure A-16. Hydrazine Fuel Used To Correct Drift Rate Errors Histogram (Pounds)

ECCSYN NOMINAL= 2.7221E-01 MEAN= 2.7013E-01 SIGMA= 3.5334E-03 SAMPLE= 10000

	INTERVAL WRT NOMINAL		PCT. FREQ.	SUM
1	MINUS INF.	-2.3168E-02	0.0100000	0.0100000
2	-2.3168E-02	-2.2686E-02	0.0100000	0.0200000
3	-2.2686E-02	-2.2203E-02	0.0100000	0.0300000
4	-2.2203E-02	-2.1720E-02	0.0100000	0.0400000
5	-2.1720E-02	-2.1237E-02	0.0	0.0400000
6	-2.1237E-02	-2.0754E-02	0.0300000	0.0699999
7	-2.0754E-02	-2.0271E-02	0.0300000	0.0999999
8	-2.0271E-02	-1.9788E-02	0.0100000	0.1099999
9	-1.9788E-02	-1.9306E-02	0.0200000	0.1299999
10	-1.9306E-02	-1.8823E-02	0.0300000	0.1599998
11	-1.8823E-02	-1.8340E-02	0.0400000	0.1999998
12	-1.8340E-02	-1.7857E-02	0.0400000	0.2399998
13	-1.7857E-02	-1.7374E-02	0.0400000	0.2799997
14	-1.7374E-02	-1.6891E-02	0.1000000	0.3799997
15	-1.6891E-02	-1.6409E-02	0.0600000	0.4399996
16	-1.6409E-02	-1.5926E-02	0.0900000	0.5299996
17	-1.5926E-02	-1.5443E-02	0.1199999	0.6499996
18	-1.5443E-02	-1.4960E-02	0.0900000	0.7399995
19	-1.4960E-02	-1.4477E-02	0.1900000	0.9299995
20	-1.4477E-02	-1.3994E-02	0.2200000	1.1499987
21	-1.3994E-02	-1.3511E-02	0.3200000	1.4599994
22	-1.3511E-02	-1.3029E-02	0.3200000	1.7399981
23	-1.3029E-02	-1.2546E-02	0.2500000	2.0399931
24	-1.2546E-02	-1.2063E-02	0.3699999	2.4399979
25	-1.2063E-02	-1.1580E-02	0.5400000	2.9499979
26	-1.1580E-02	-1.1097E-02	0.5100000	3.4599972
27	-1.1097E-02	-1.0614E-02	0.6400000	4.0999966
28	-1.0614E-02	-1.0131E-02	0.5600000	4.7599964
29	-1.0131E-02	-9.6486E-03	0.7100000	5.4699955
30	-9.6486E-03	-9.1658E-03	0.6799999	6.1499949
31	-9.1658E-03	-8.6829E-03	0.9400000	7.0899944
32	-8.6829E-03	-8.2001E-03	0.9700000	8.0599937
33	-8.2001E-03	-7.7172E-03	1.0499992	9.1099930
34	-7.7172E-03	-7.2344E-03	1.0899992	10.1999922
35	-7.2344E-03	-6.7515E-03	1.2599993	11.4599915
36	-6.7515E-03	-6.2687E-03	1.5799999	13.0399914
37	-6.2687E-03	-5.7958E-03	1.5000000	14.5399914
38	-5.7858E-03	-5.3030E-03	1.6699991	16.2099762
39	-5.3030E-03	-4.8201E-03	1.8899994	18.0999756
40	-4.8201E-03	-4.3373E-03	1.9599991	20.0599670
41	-4.3373E-03	-3.8544E-03	1.9299994	21.9999597
42	-3.8544E-03	-3.3716E-03	2.1699991	24.1599579
43	-3.3716E-03	-2.8887E-03	2.4399996	26.5999451
44	-2.8887E-03	-2.4059E-03	2.4599991	29.0599365
45	-2.4059E-03	-1.9230E-03	2.1399994	31.1999359
46	-1.9230E-03	-1.4402E-03	2.7699995	33.9699249
47	-1.4402E-03	-9.5733E-04	2.7699995	36.7399139
48	-9.5733E-04	-4.7448E-04	2.9099998	39.6499023
49	-4.7448E-04	9.3656E-06	60.3499908	99.9998932
50	9.3656E-06	PLUS INF.	0.0	99.9998932

PCT. 99.99 ... 94.00 ... 88.00 ... 63.00 ... 4.00

I N T E R V A L S 5 10 15 20 25 30 35 40 45 50

PCT.	1.0	5.0	10.0	30.0	50.0	70.0	90.0	95.0	99.0
INT.	[illegible]	[illegible]	[illegible]	[illegible]	-0.391570-03	-0.231960-03	-0.715420-04	-0.315330-04	0.355540-05
VAL.	0.257??E 00	0.262??? 00	0.264??? 00	0.270220 00	0.271420 00	0.271980 00	0.272140 00	0.272190 00	0.272210 00

Figure A-17. Synchronous Orbit Eccentricity Histogram

APPENDIX B - SHADOW HISTORY CURVES

This appendix presents several plots of synchronous orbit shadow over a 5-year mission. For the node values used here, the 72-minute constraint is violated by both the umbra and penumbra shadow durations. Each figure is listed below:

1. Shadow History for 99th Percentile Low Argument of Perigee and a Node Angle 40 Degrees Below Nominal
2. Shadow History for 99th Percentile Low Argument of Perigee and a Node Angle 50 Degrees Above Nominal
3. Shadow History for 99th Percentile High Argument of Perigee and a Node Angle 40 Degrees Below Nominal
4. Shadow History for 99th Percentile High Argument of Perigee and a Node Angle 50 Degrees Above Nominal

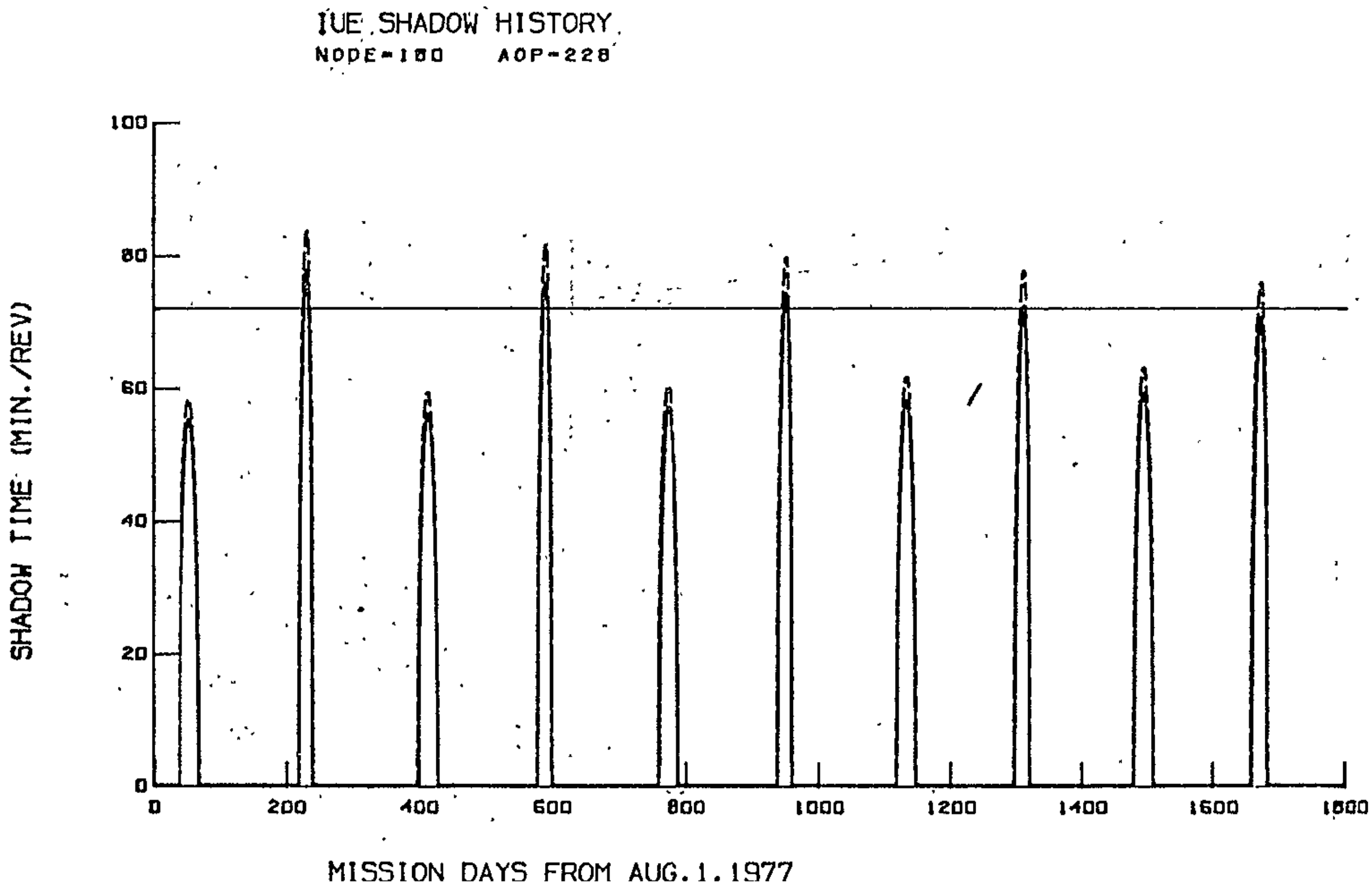


Figure B-1. Shadow History for 99th Percentile Low Argument of Perigee and a Node Angle 40 Degrees Below Nominal

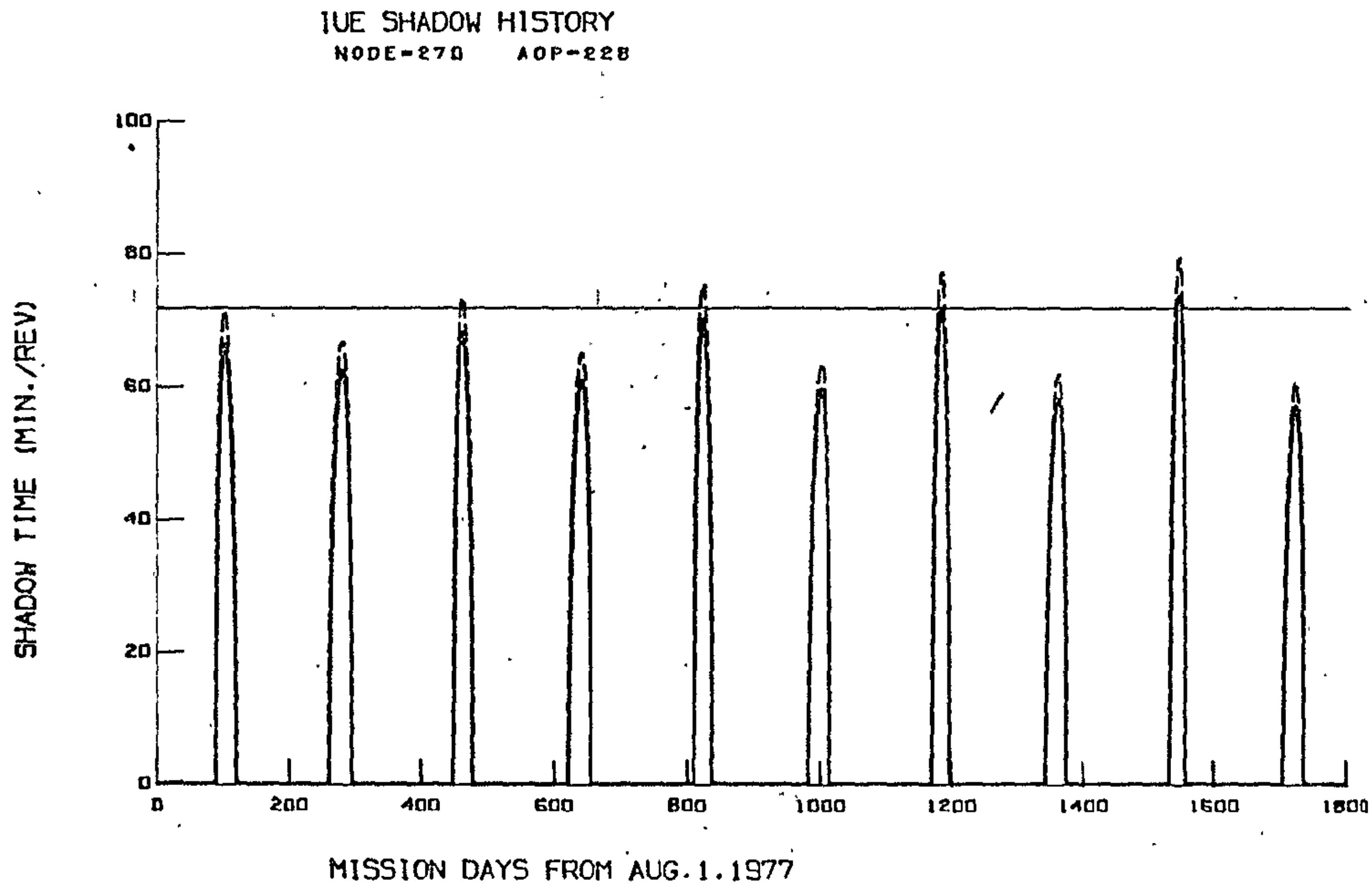


Figure B-2. Shadow History for 99th Percentile Low Argument of Perigee and a Node Angle 50 Degrees Above Nominal

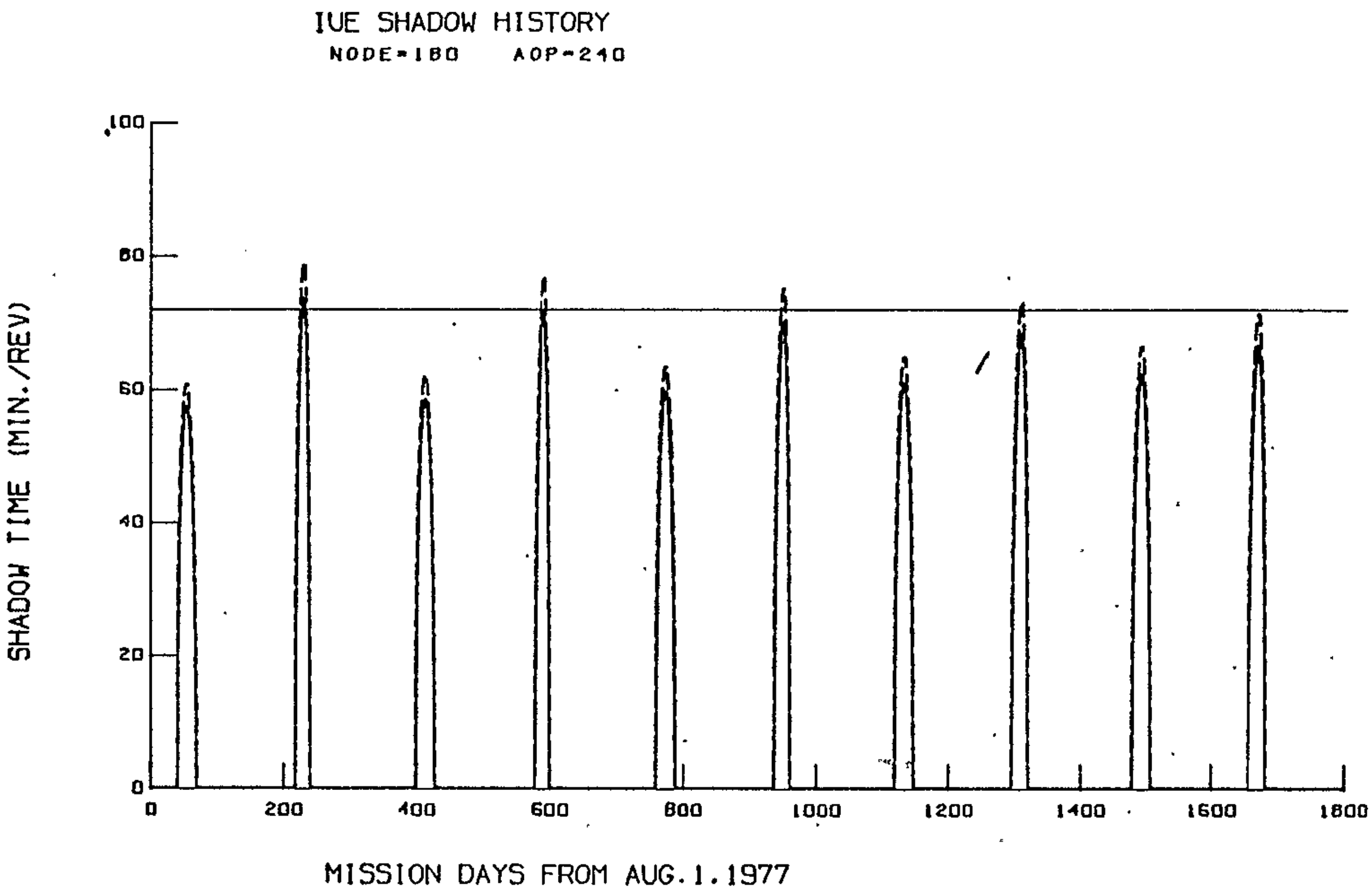


Figure B-3. Shadow History for 99th Percentile High Argument of Perigee and a Node Angle 40 Degrees Below Nominal

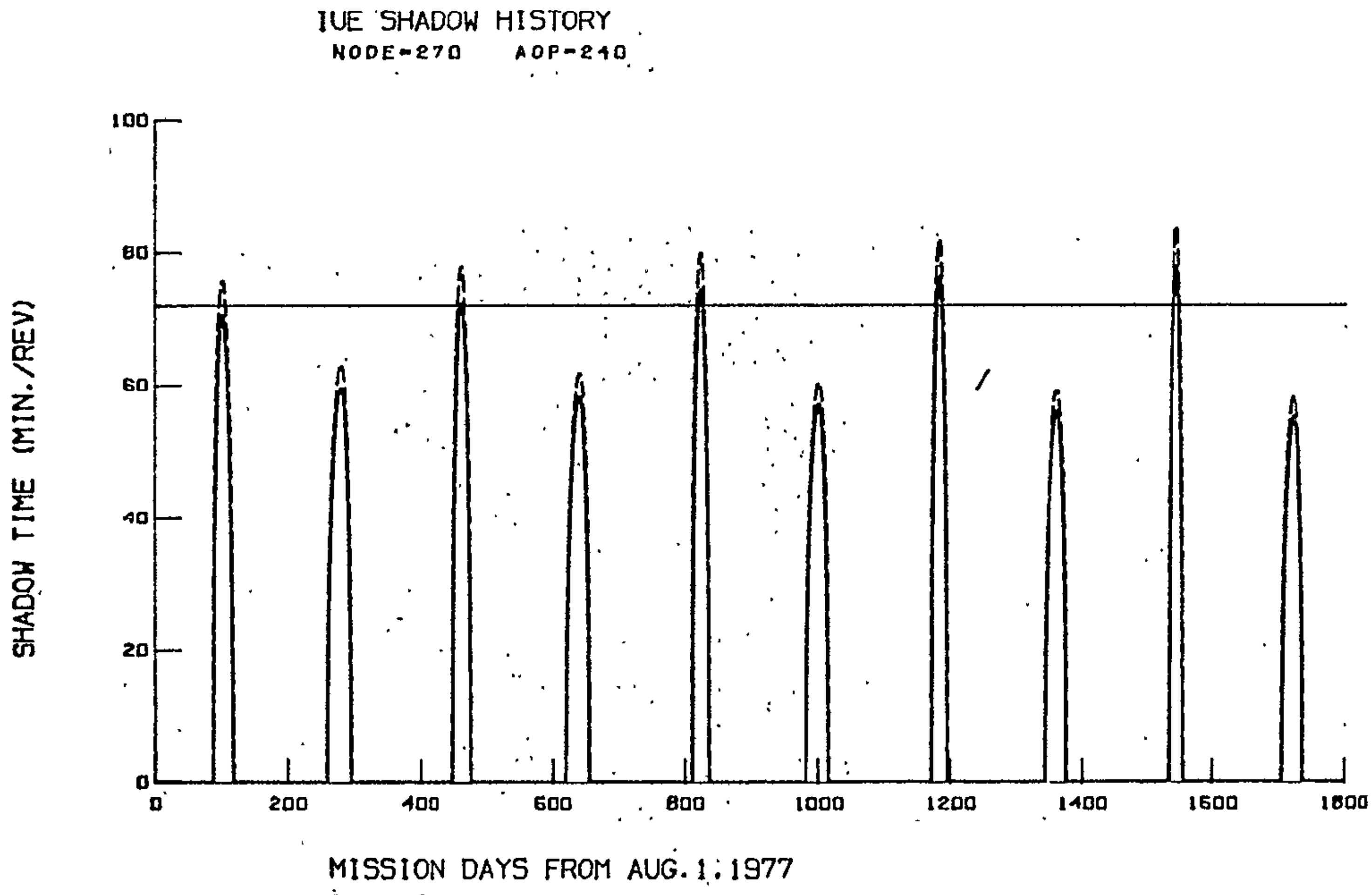


Figure B-4. Shadow History for 99th Percentile High Argument of Perigee and a Node Angle 50 Degrees Above Nominal

APPENDIX C - TRACKING COVERAGE

This appendix presents tracking coverage for five apogee passages in the transfer orbit and for each phase of the drift orbit up to station acquisition. For all tracking sites, except GSFC and VILFRA, a constant 5-degree elevation mask was assumed. For GSFC, the mask for the NTTF 12-meter antenna (STDN no. 705) was used. Two masks were used for the VILFRA tracking site. In the following figures, the label VILFRA means the physical mask was used; the label VIL+10 means the physical mask plus 10 degrees was used. The list of figures follows:

1. Tracking Coverage for First Apogee in Transfer Orbit
2. Tracking Coverage for Second Apogee in Transfer Orbit
3. Tracking Coverage for Third Apogee in Transfer Orbit
4. Tracking Coverage for Fourth Apogee in Transfer Orbit
5. Tracking Coverage for Fifth Apogee in Transfer Orbit
6. Tracking Coverage for Drift Orbit Phase 1
7. Tracking Coverage for Drift Orbit Phase 2
8. Tracking Coverage for Drift Orbit Phase 3
9. Tracking Coverage for First Day of Synchronous Orbit

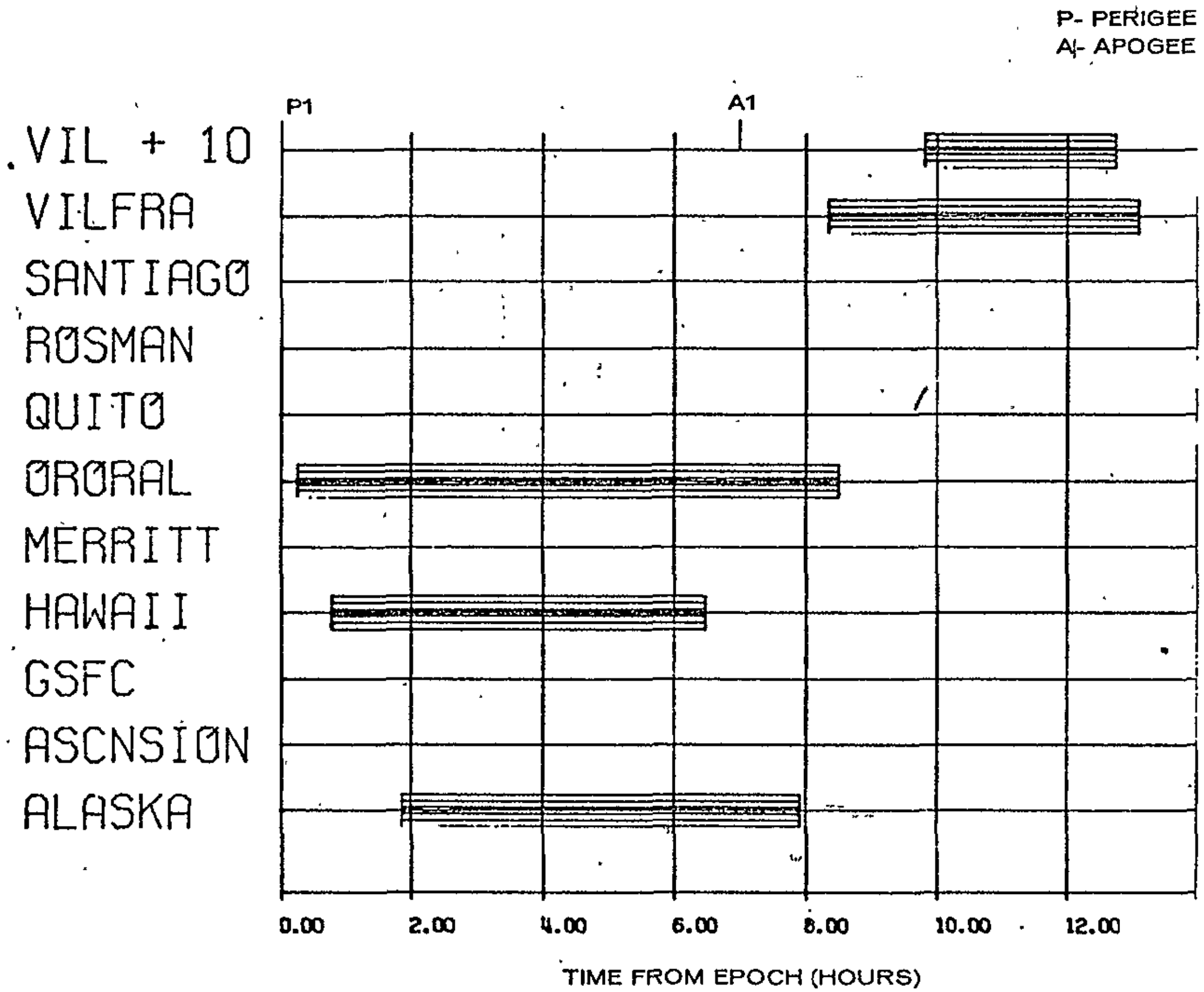


Figure C-1. Tracking Coverage for First Apogee in Transfer Orbit

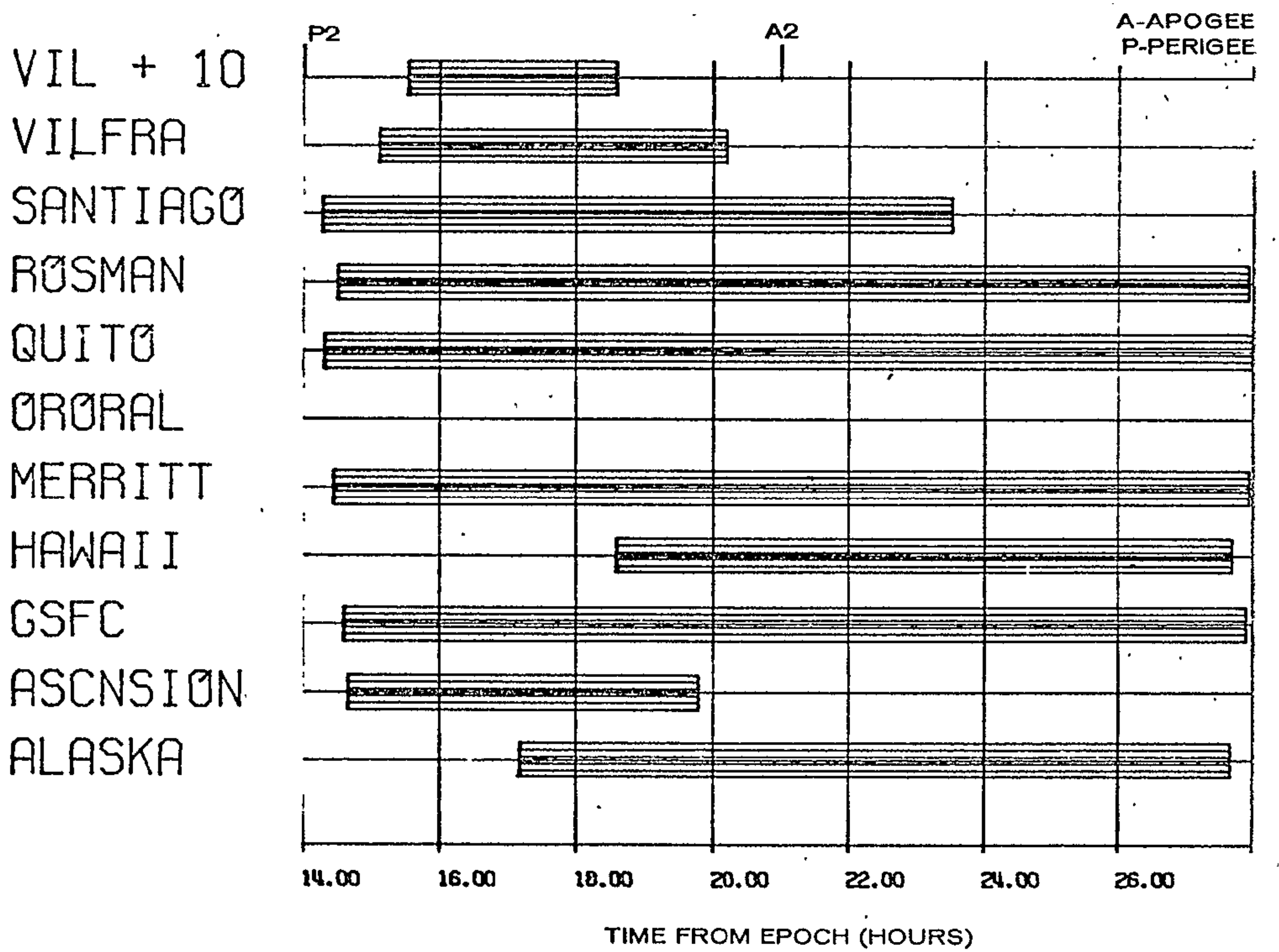


Figure C-2. Tracking Coverage for Second Apogee in Transfer Orbit

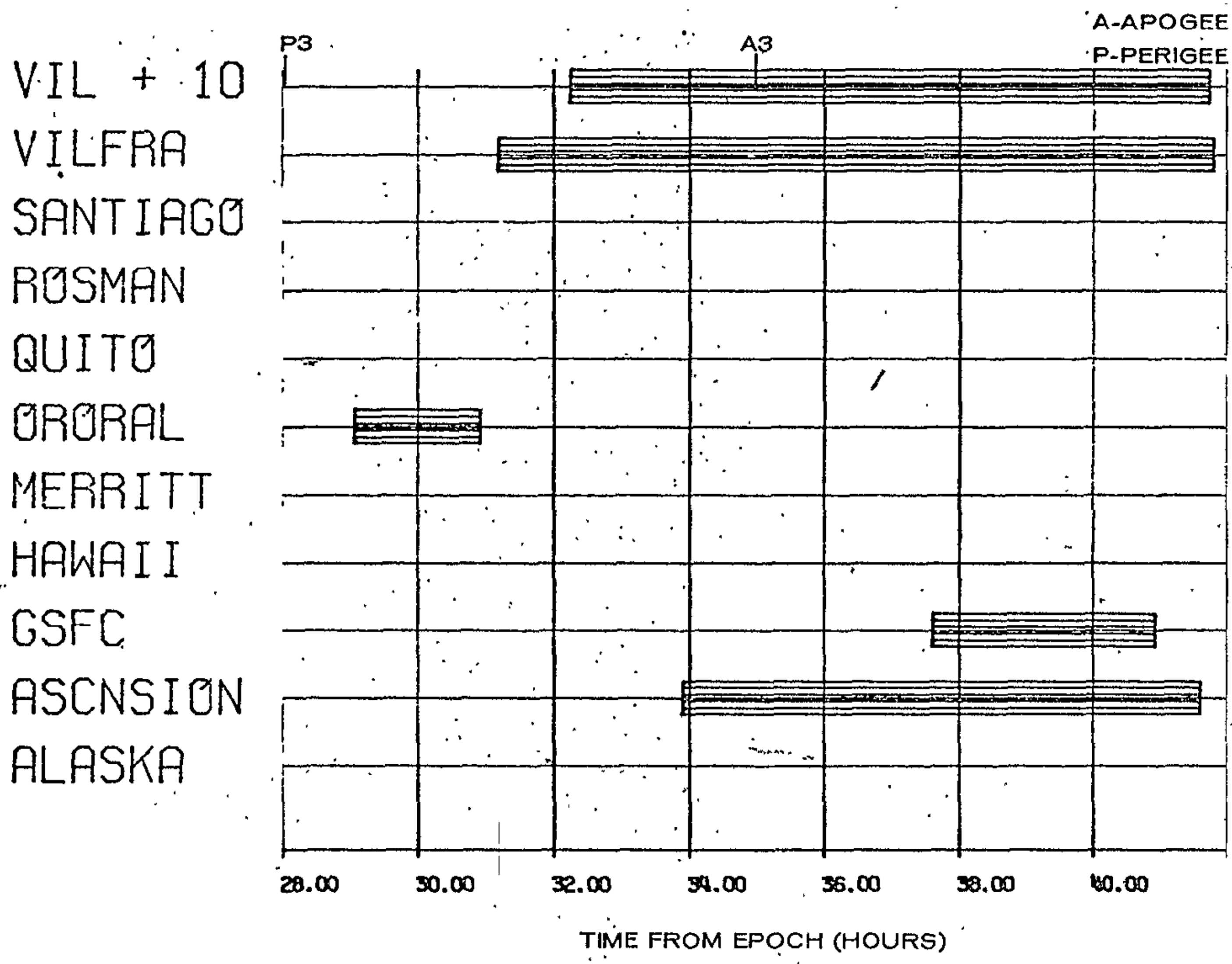


Figure C-3. Tracking Coverage for Third Apogee in Transfer Orbit

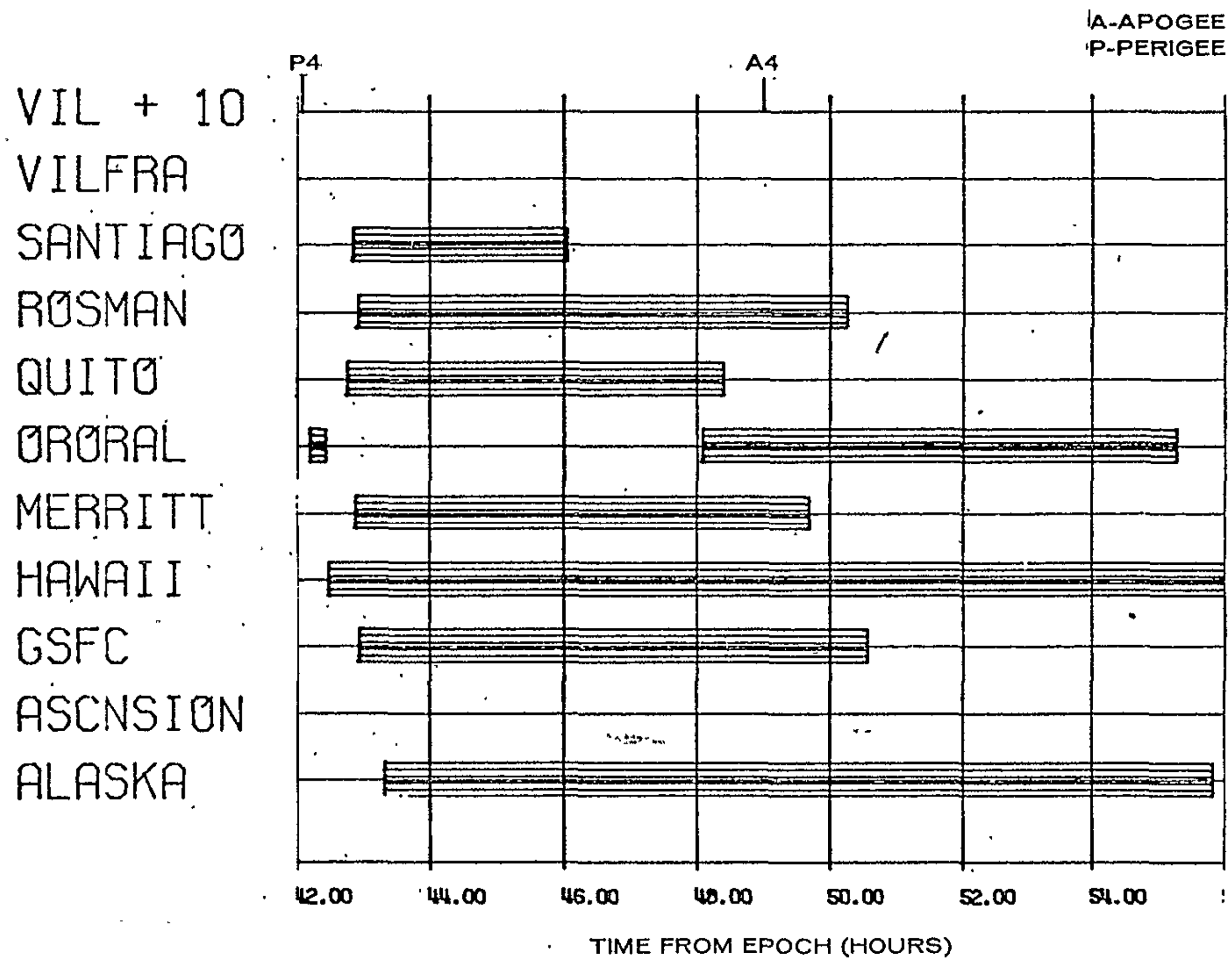


Figure C-4. Tracking Coverage for Fourth Apogee in Transfer Orbit

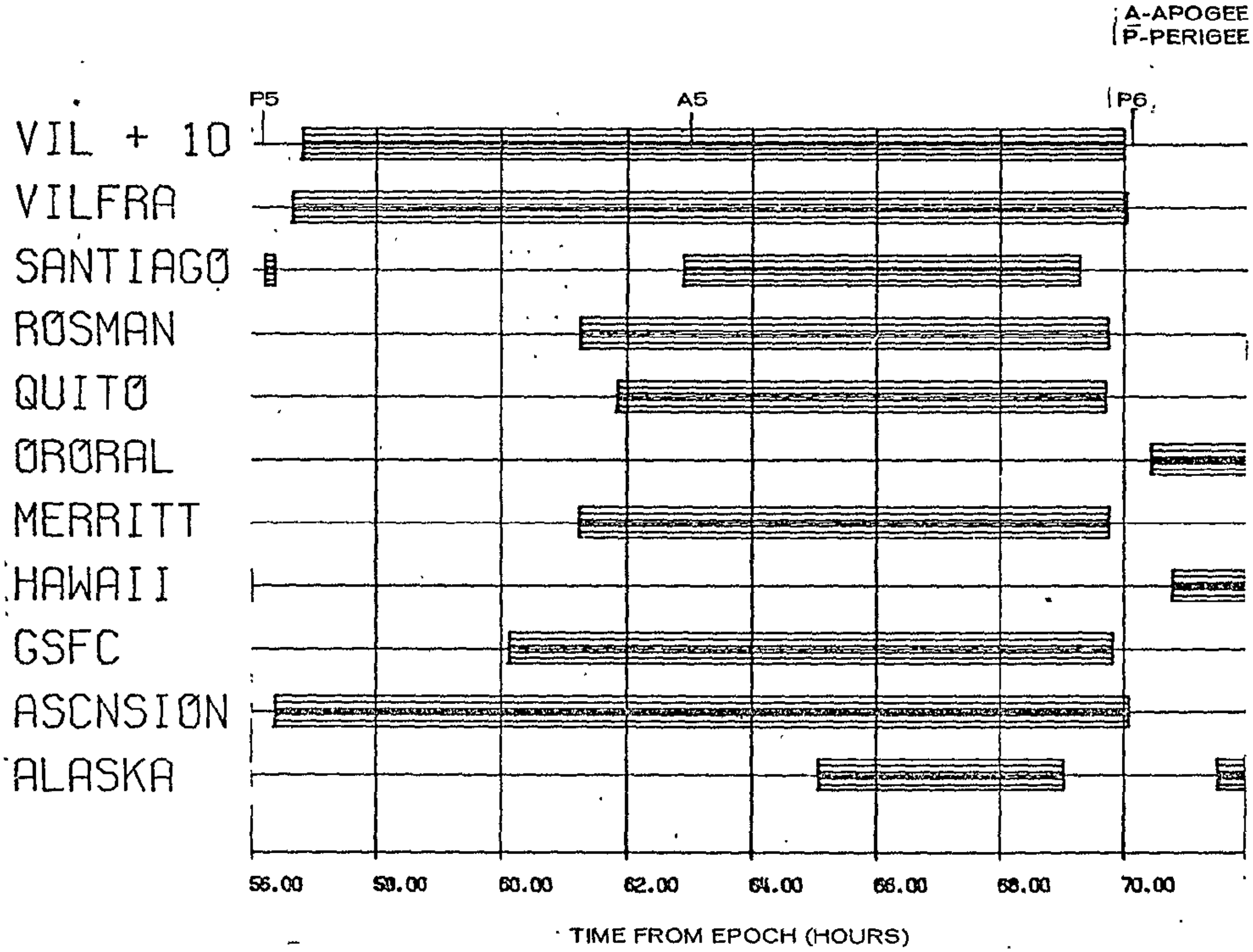


Figure C-5. Tracking Coverage for Fifth Apogee in Transfer Orbit

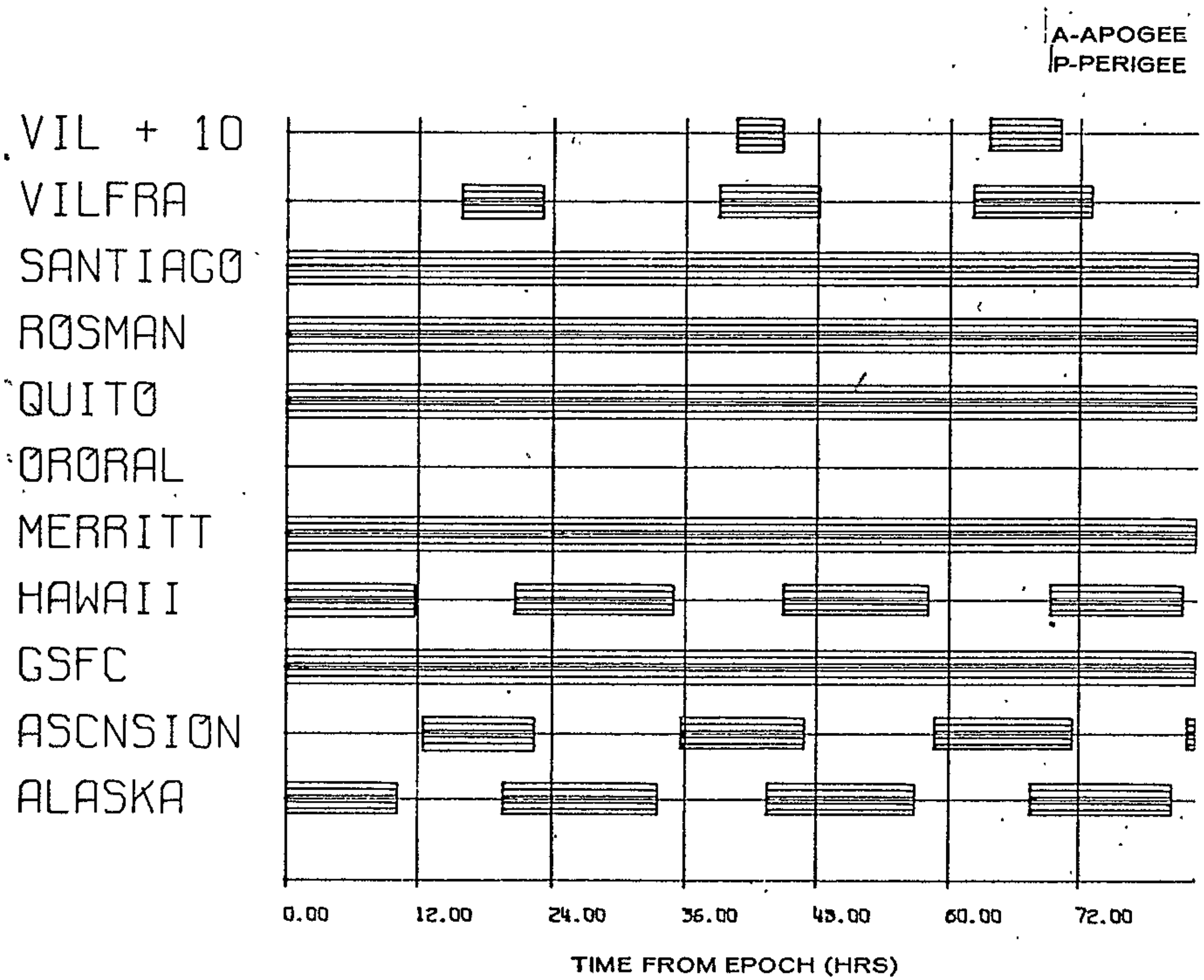


Figure C-6. Tracking Coverage for Drift Orbit Phase 1

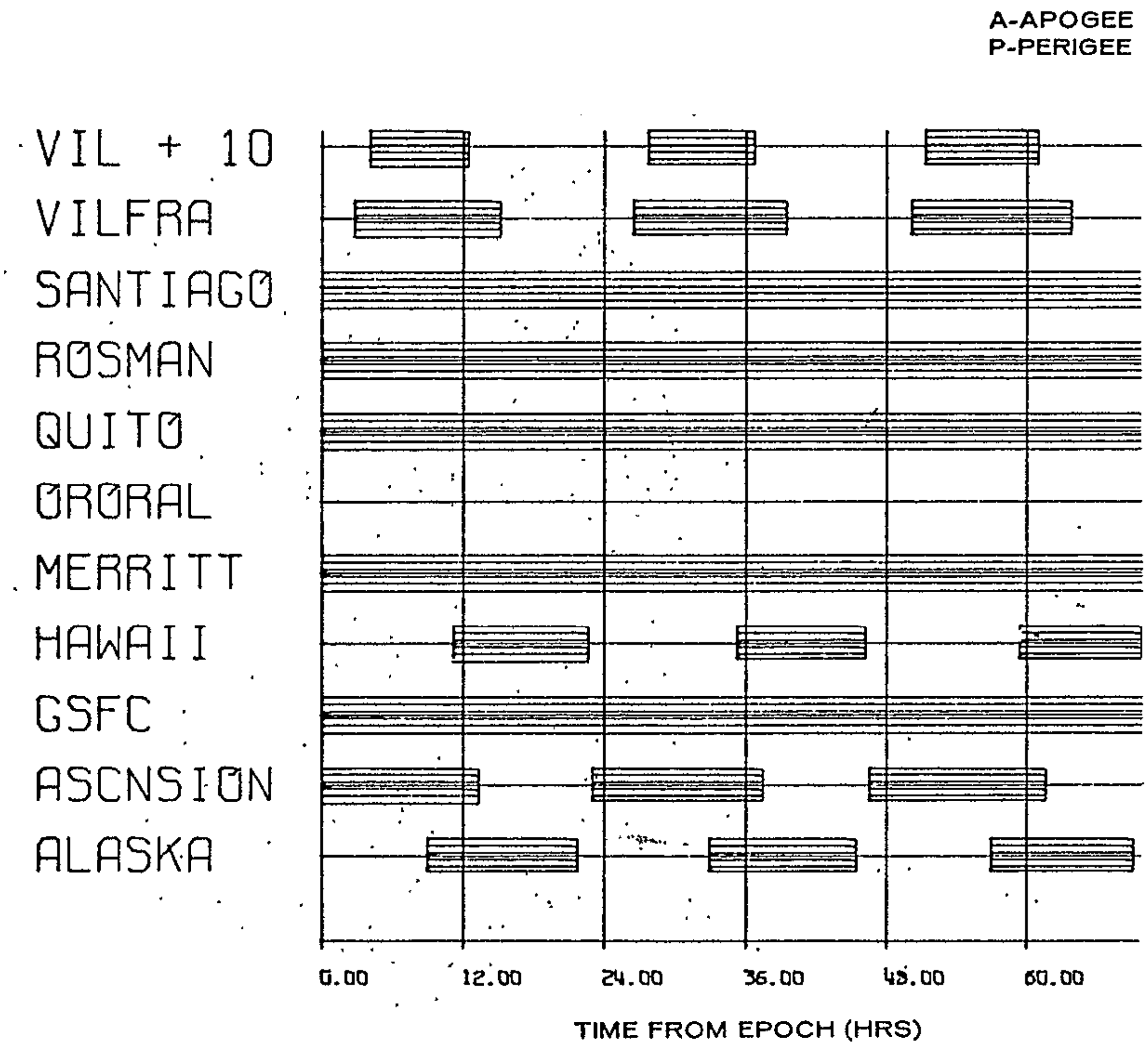


Figure C-7. Tracking Coverage for Drift Orbit Phase 2

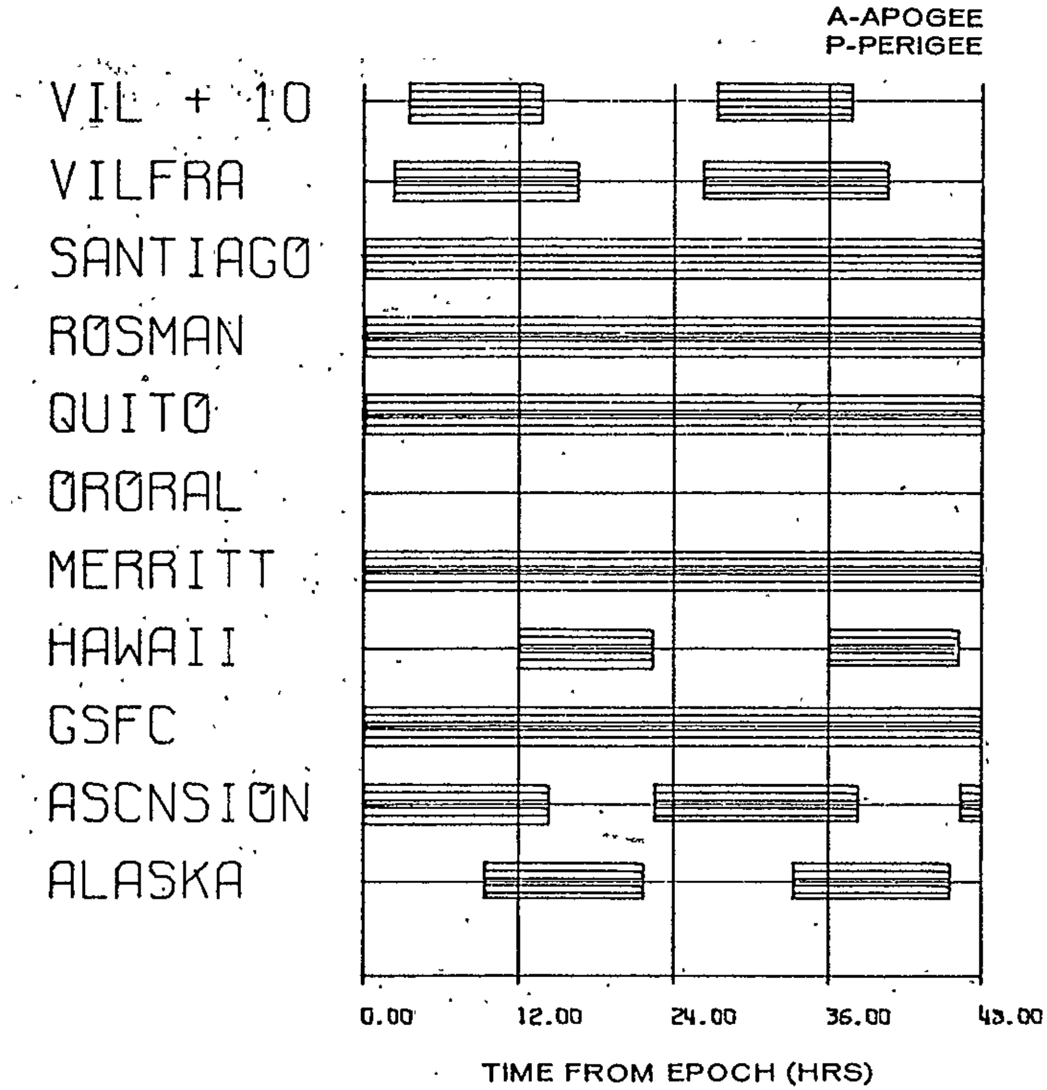


Figure C-8. Tracking Coverage for Drift Orbit Phase 3

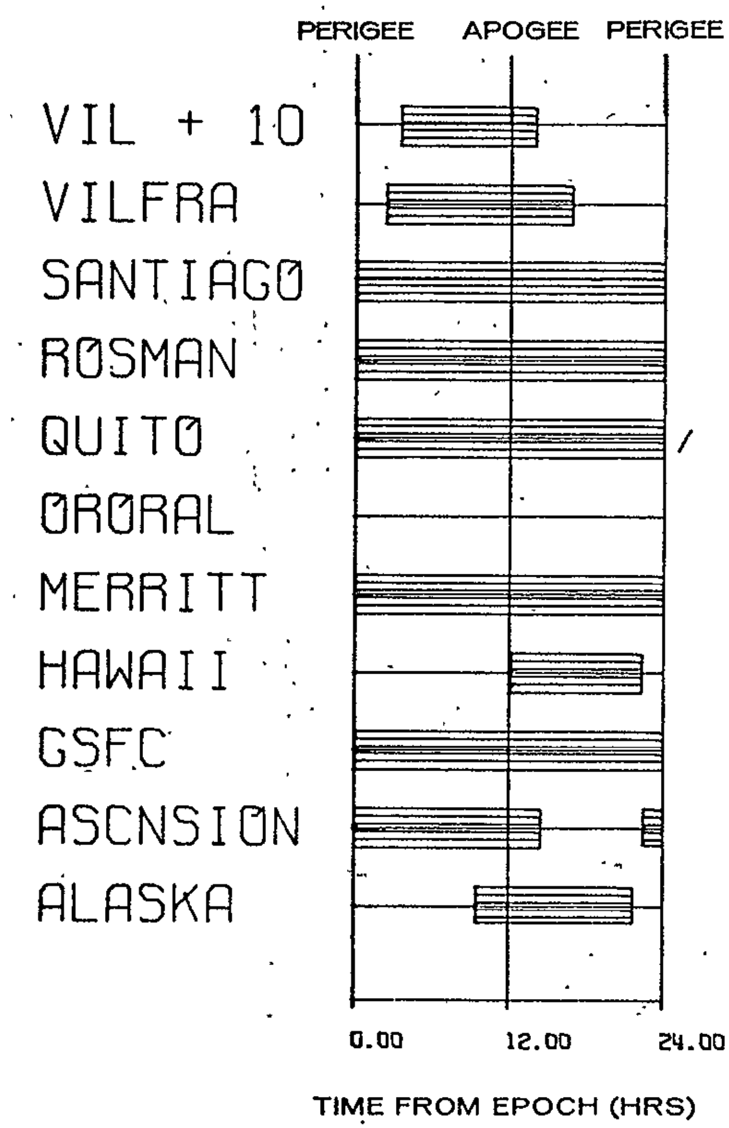


Figure C-9. Tracking Coverage for First Day of Synchronous Orbit

APPENDIX D - LAUNCH WINDOW CONSTRAINT PARAMETER CONTOUR PLOTS

This appendix presents contour plots of the individual constraint parameters used in defining the launch window. Each figure is plotted in terms of parking orbit node and launch date. Contour angles are in degrees. The figures are

1. Transfer Shadow Contours
2. Contours of Solar Aspect Angle at Third-Stage Ignition (Transfer Orbit Injection)
3. Contours of Solar Aspect Angle at Fourth-Stage Ignition (Apogee Boost Motor)
4. Contours of Minimum Separation Angle During 3 Hours Prior to Apogee
5. Contours of Maximum Separation Angle During 3 Hours Prior to Apogee

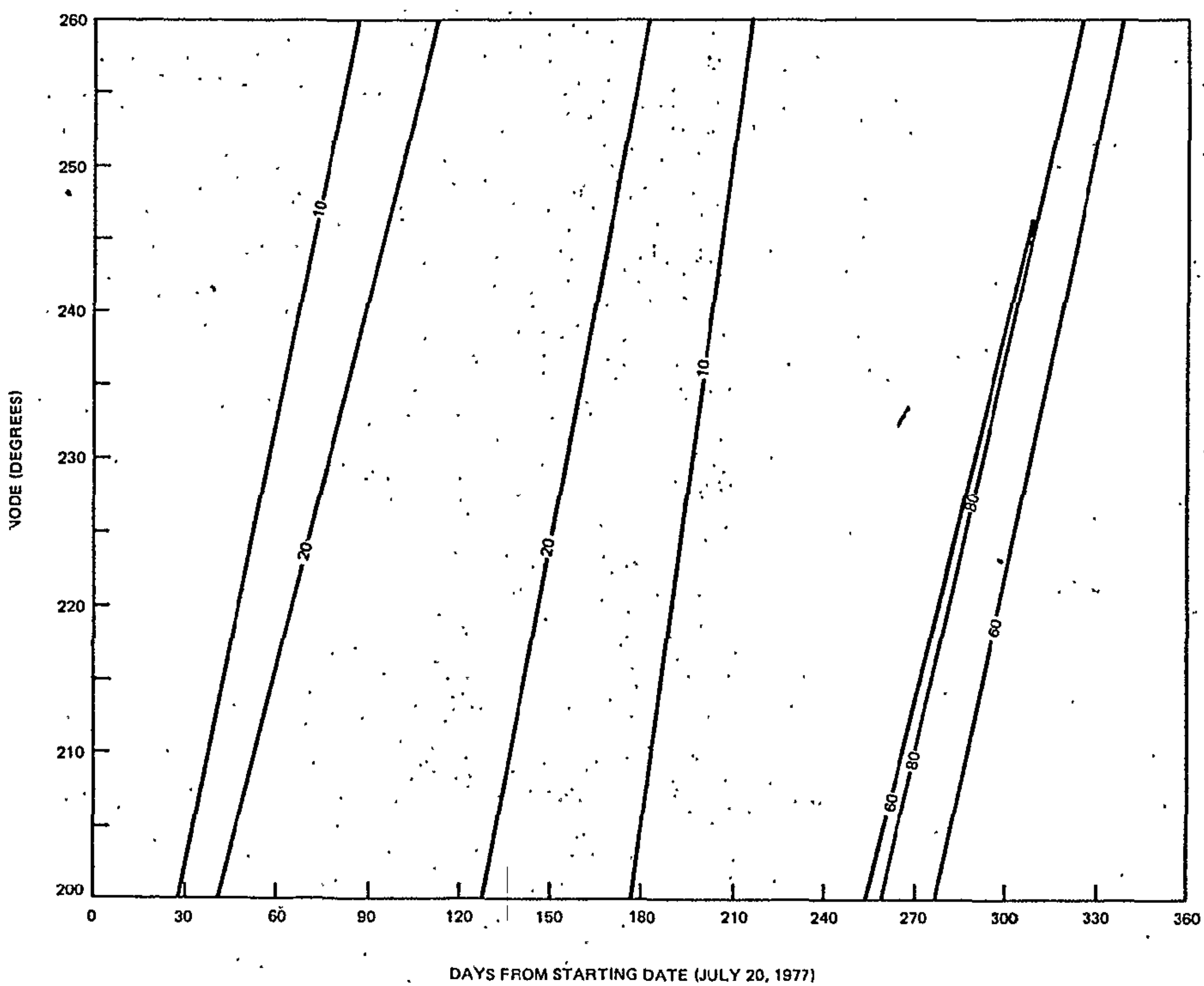


Figure D-1. Transfer Shadow Contours (Minutes)

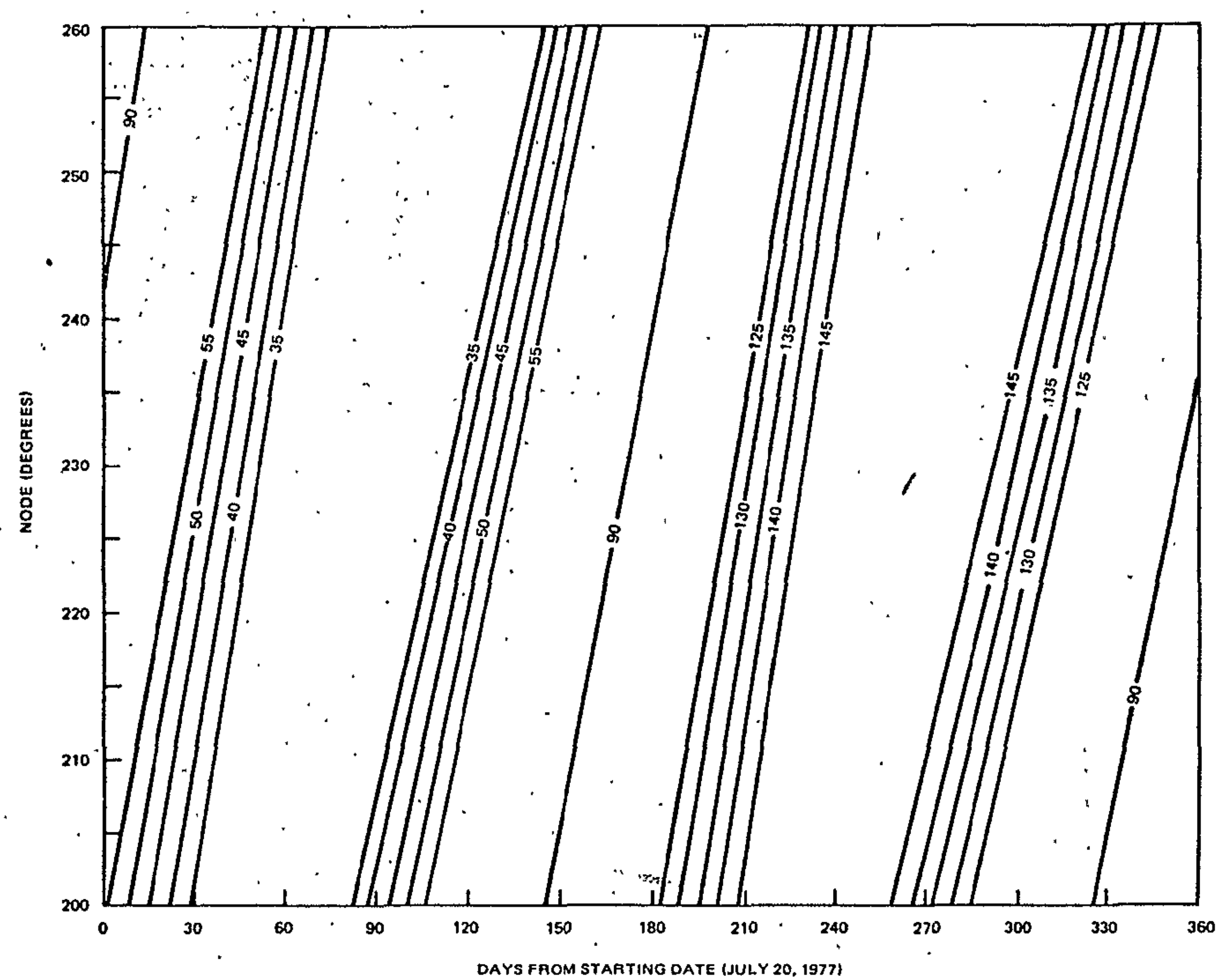


Figure D-2. Contours of Solar Aspect Angle at Third-Stage Ignition (Transfer Orbit Injection)

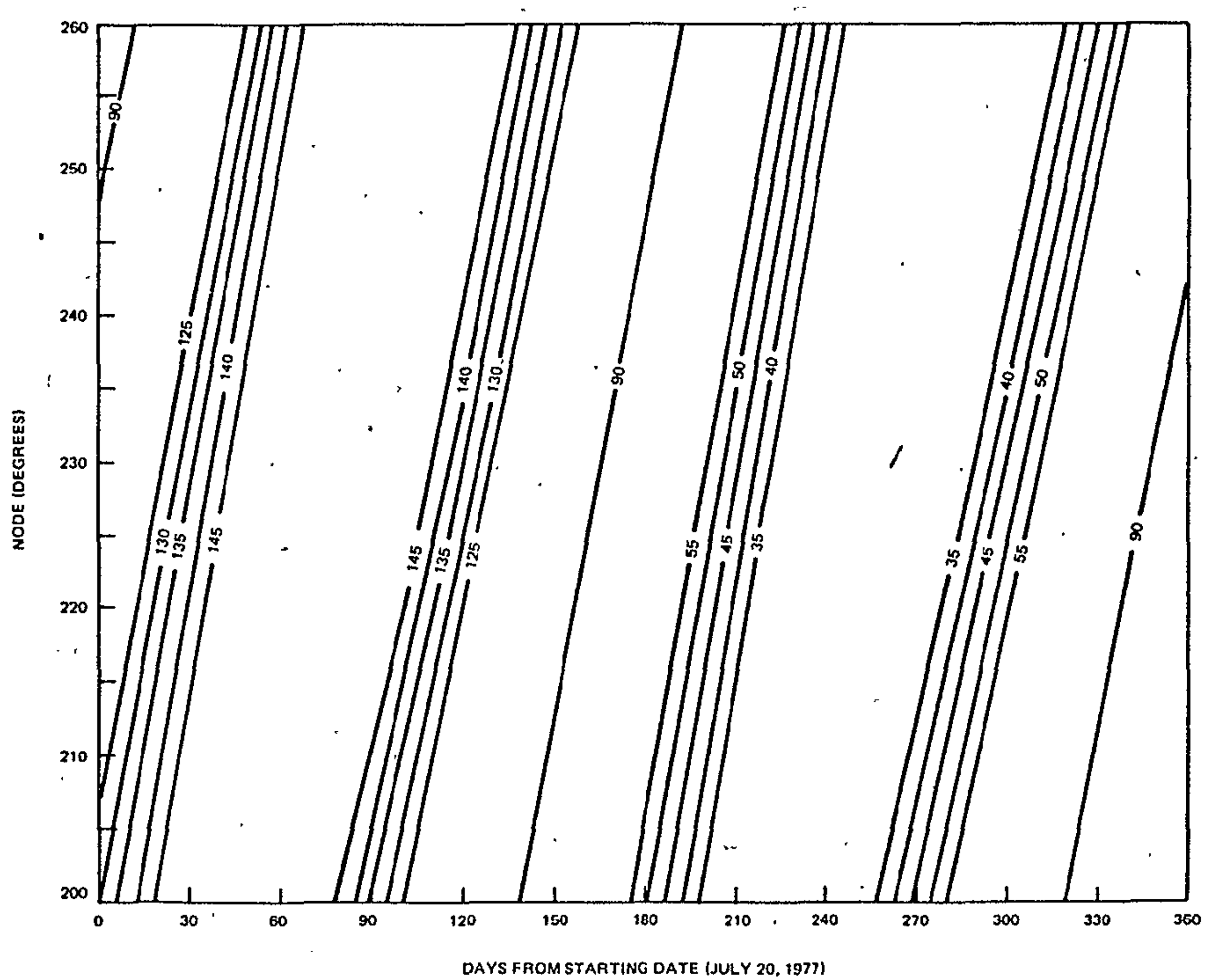


Figure D-3. Contours of Solar Aspect Angle at Fourth-Stage Ignition (Apogee Boost Motor)

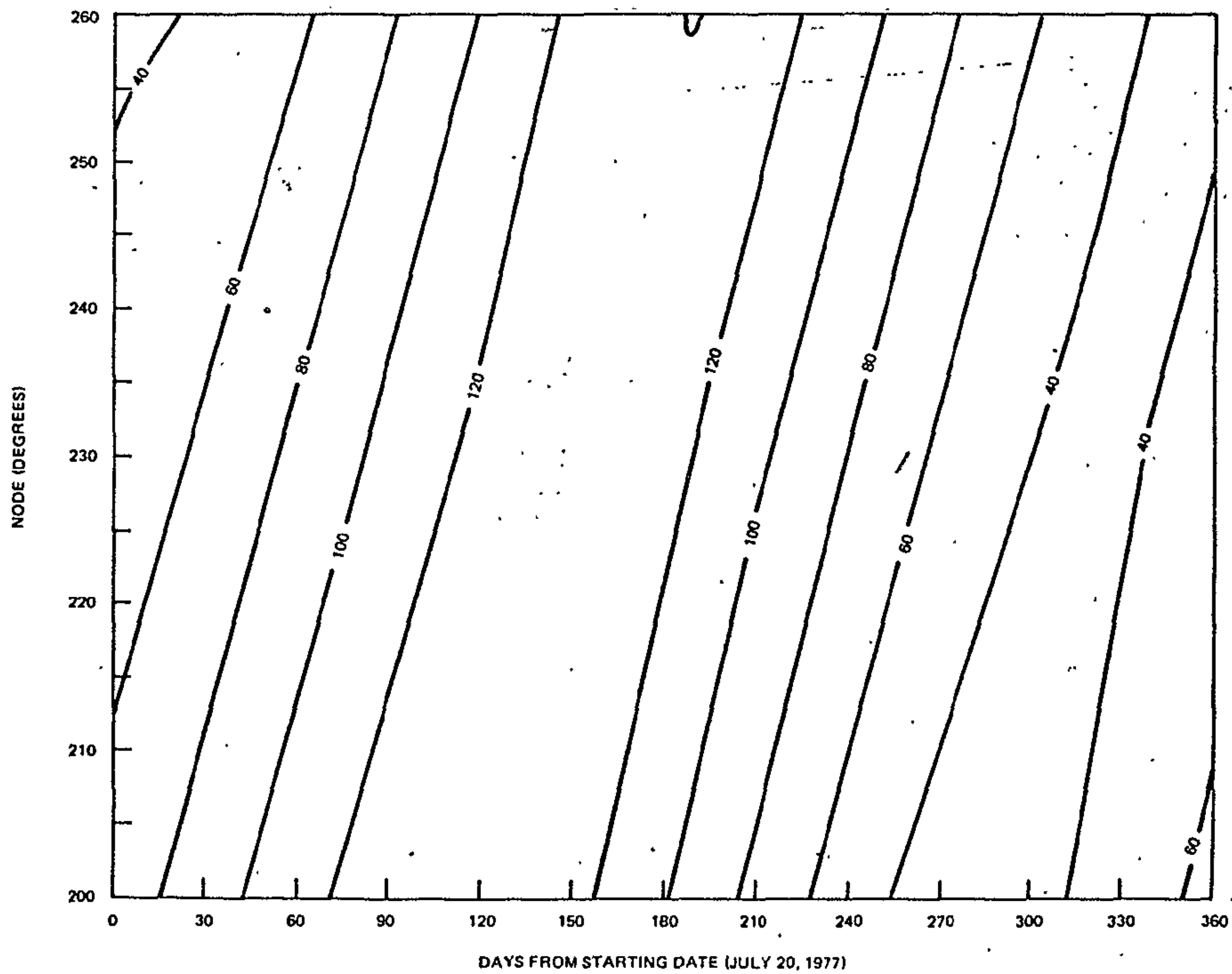
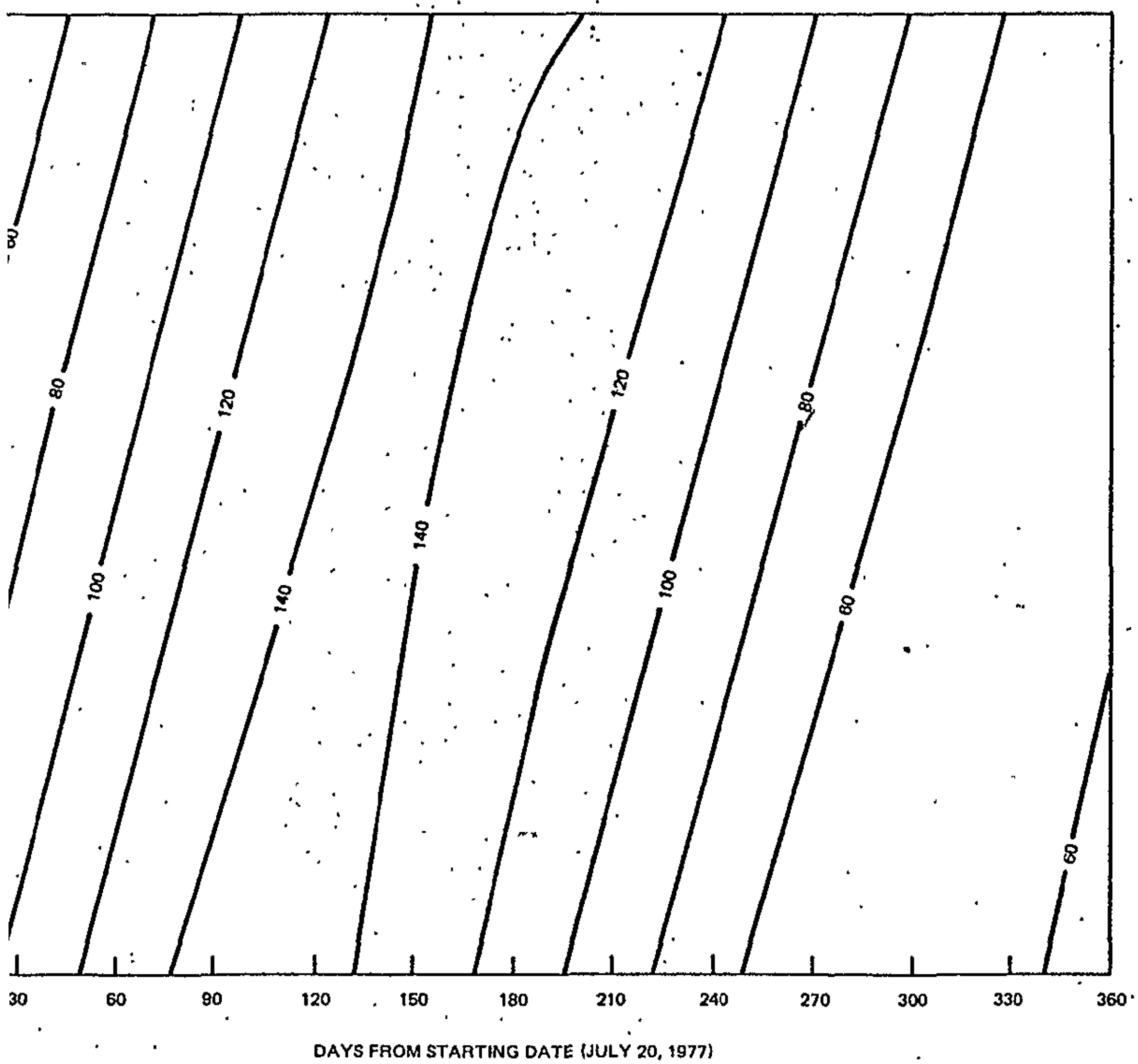


Figure D-4. Contours of Minimum Separation Angle During 3 Hours Prior to Apogee



'. Contours of Maximum Separation Angle During 3 Hours Prior to Apogee

APPENDIX E - EVOLUTION OF ORBITAL ELEMENTS

The Rapid Orbit Prediction (ROP) program was used to compute the orbital evolution, assuming that no stationkeeping maneuvers were performed during the mission. The gravitational potential included the fields due to the Earth, Moon, and Sun. A 6 × 6 field was assumed for the Earth. The figures are listed below:

1. Evolution of Semimajor Axis
2. Evolution of Eccentricity
3. Evolution of Inclination
4. Evolution of Node
5. Evolution of Argument of Perigee
6. Evolution of Groundtrack

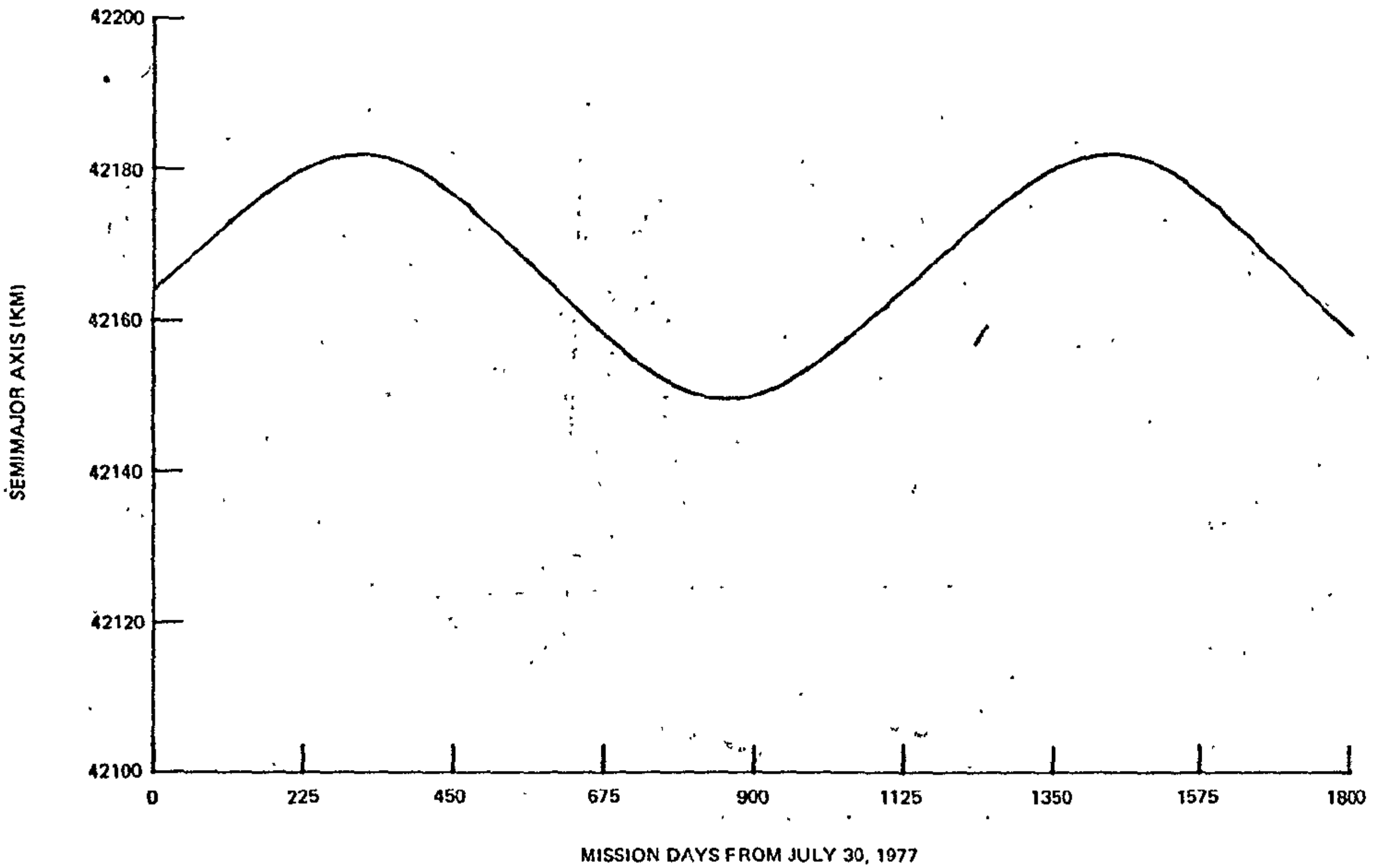


Figure E-1. Evolution of Semimajor Axis

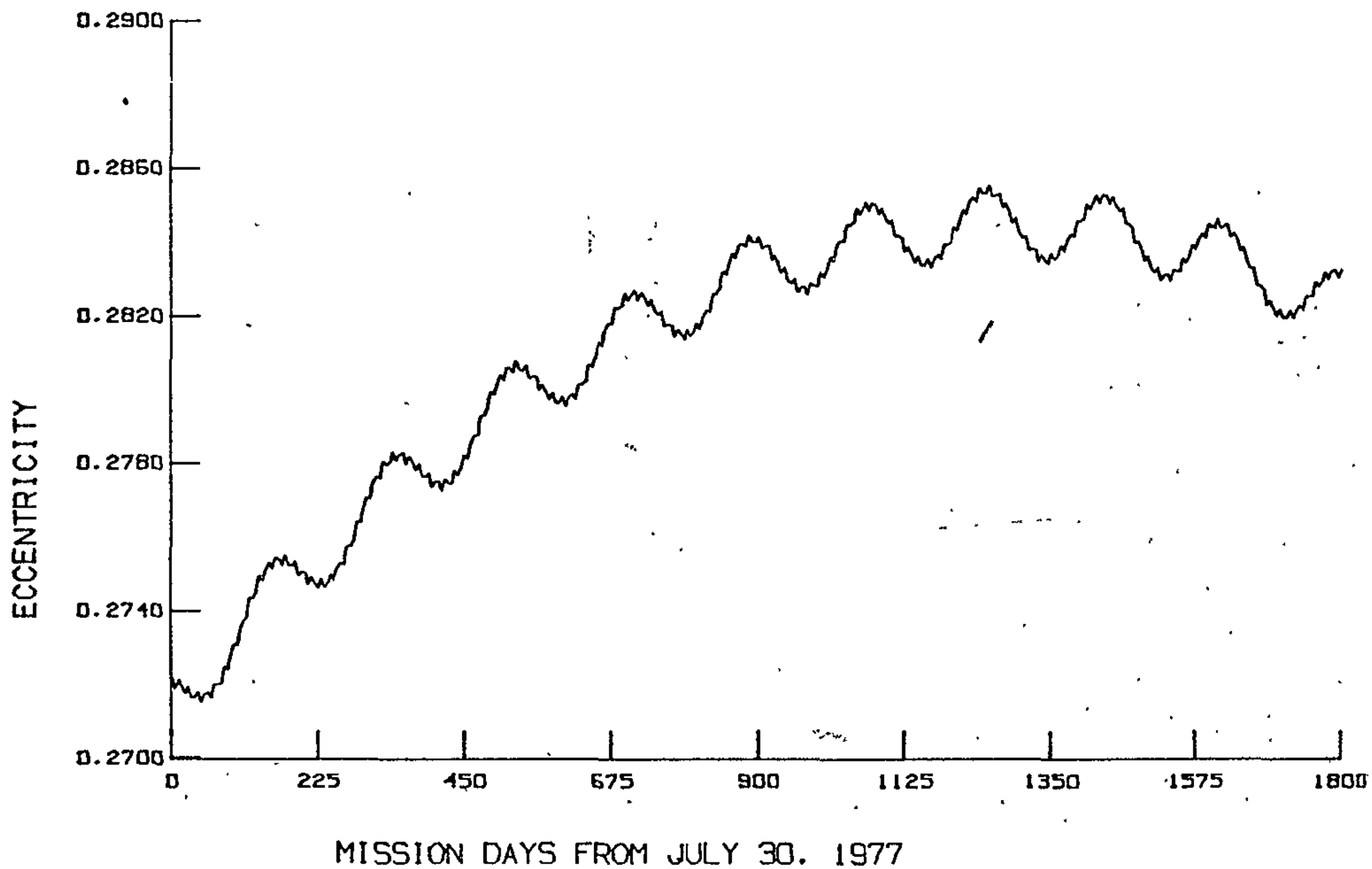


Figure E-2. Evolution of Eccentricity

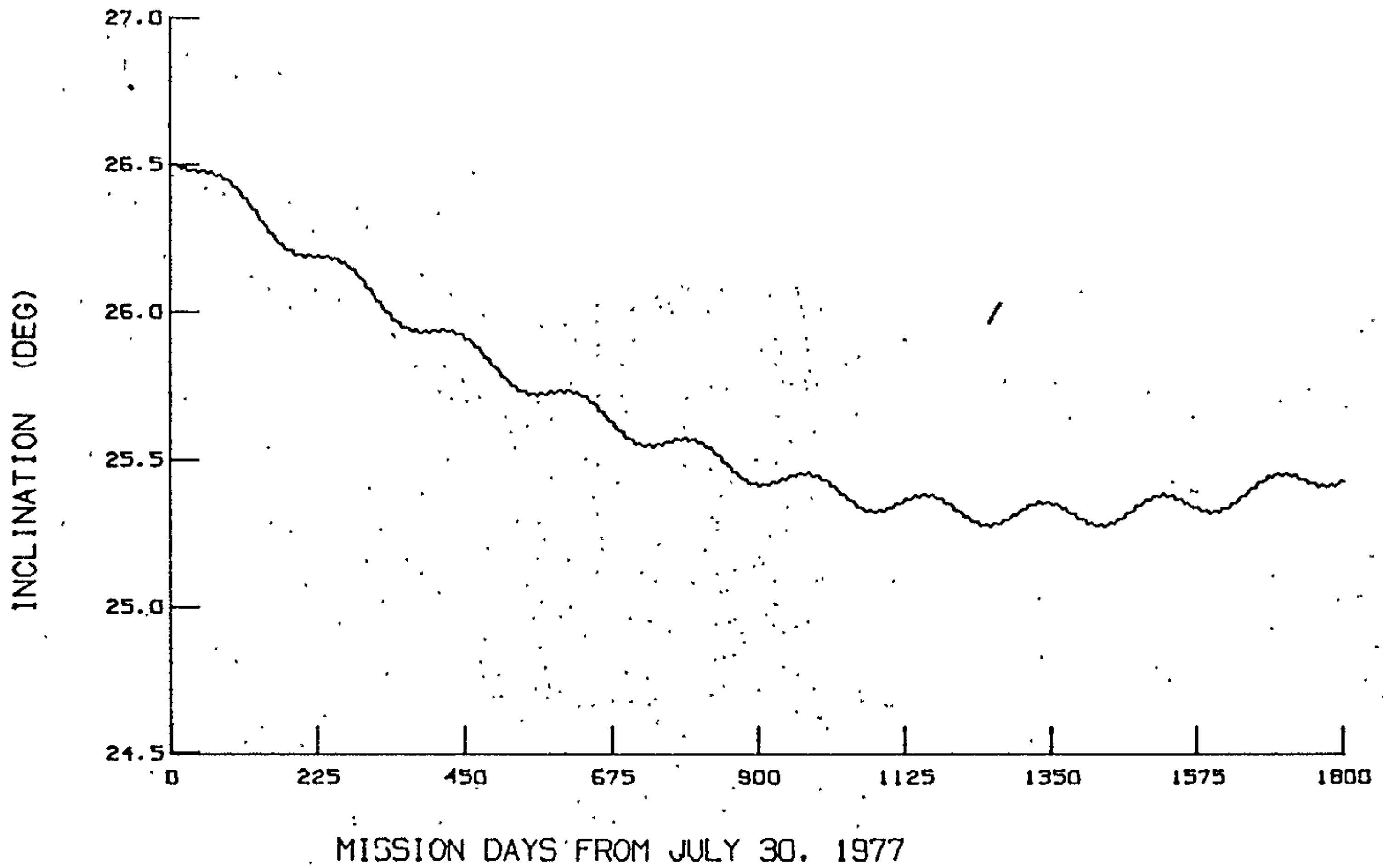


Figure E-3. Evolution of Inclination

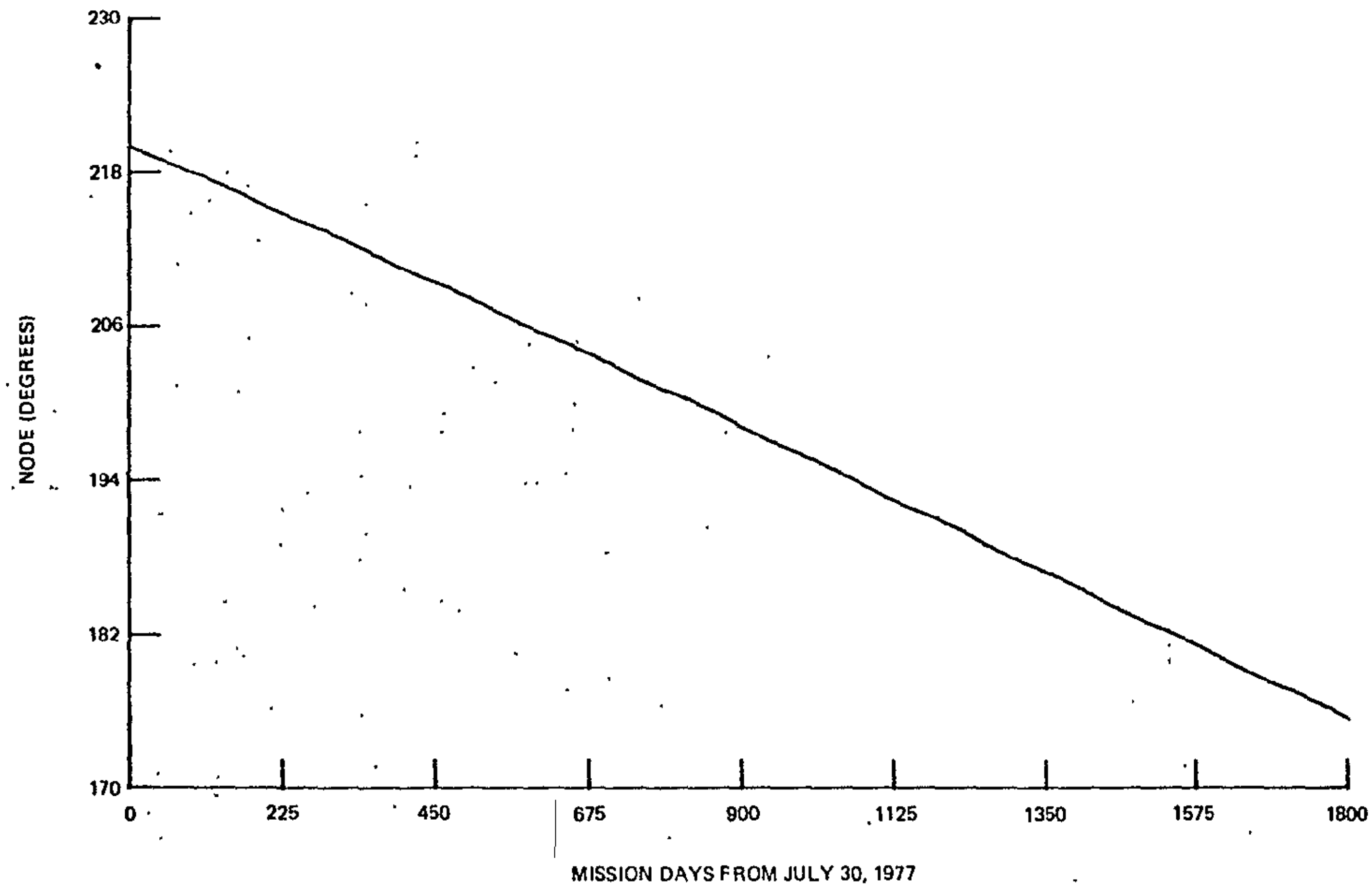


Figure E-4. Evolution of Node

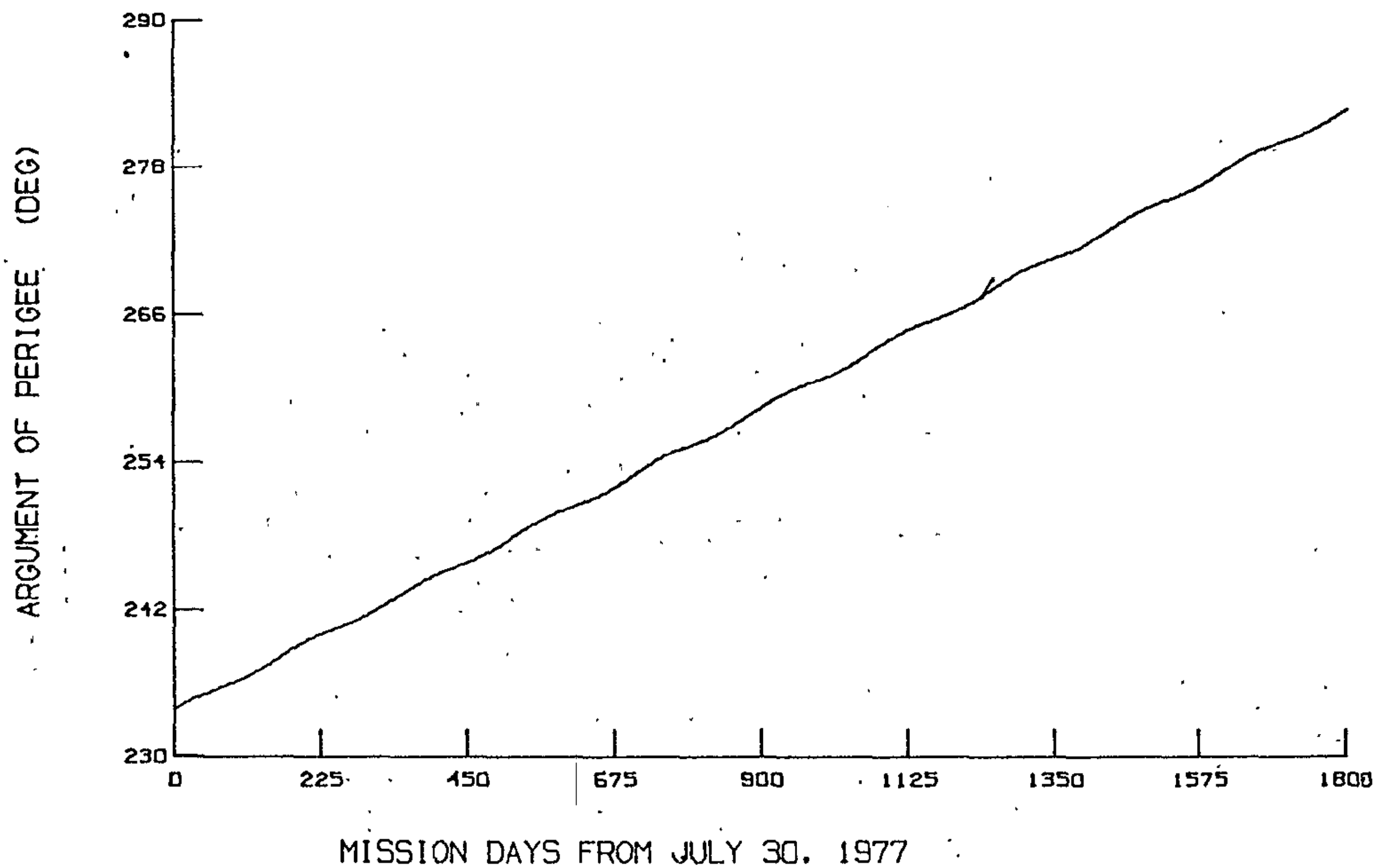


Figure E-5. Evolution of Argument of Perigee

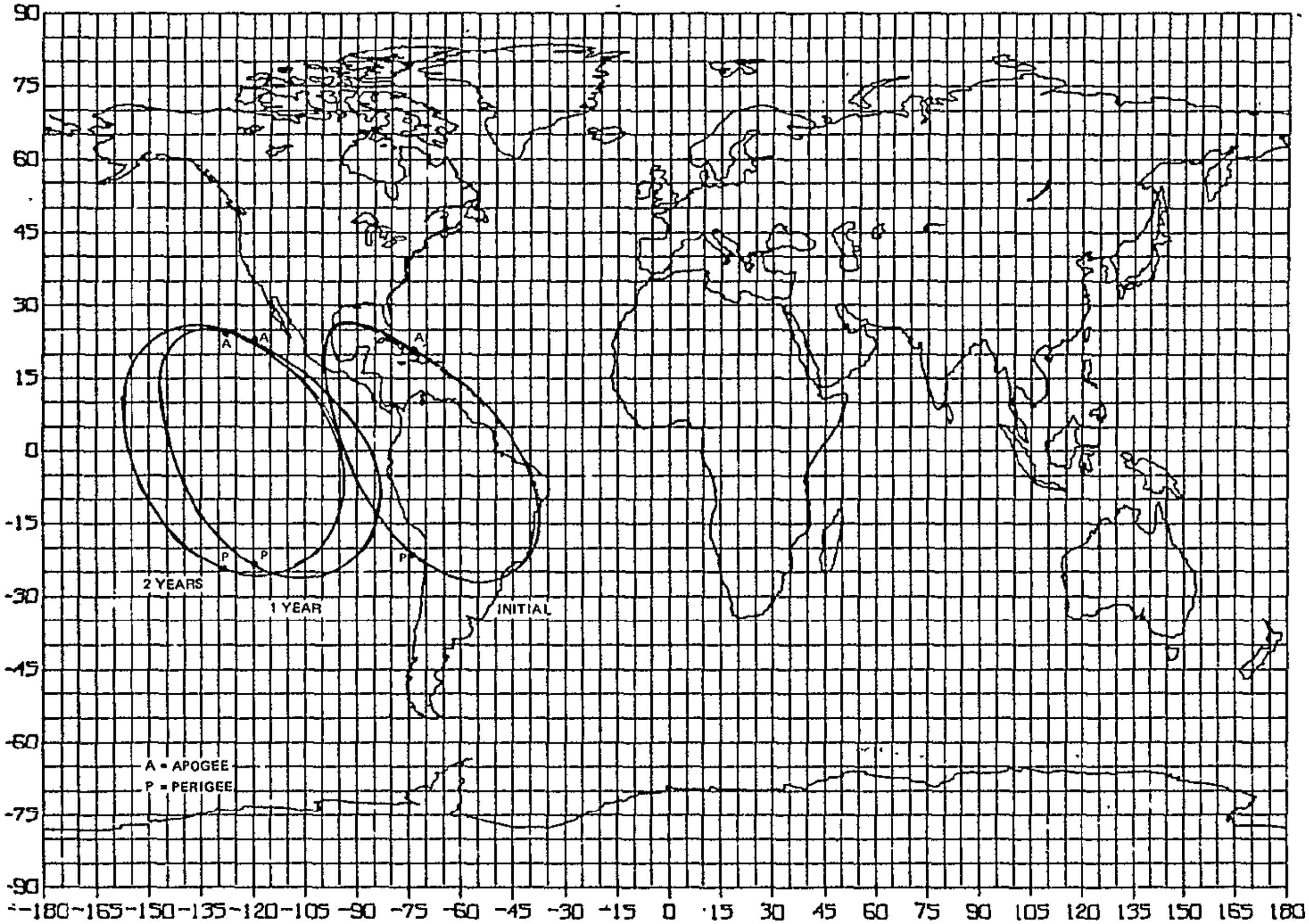


Figure E-6. Evolution of Groundtrack (1 of 2)

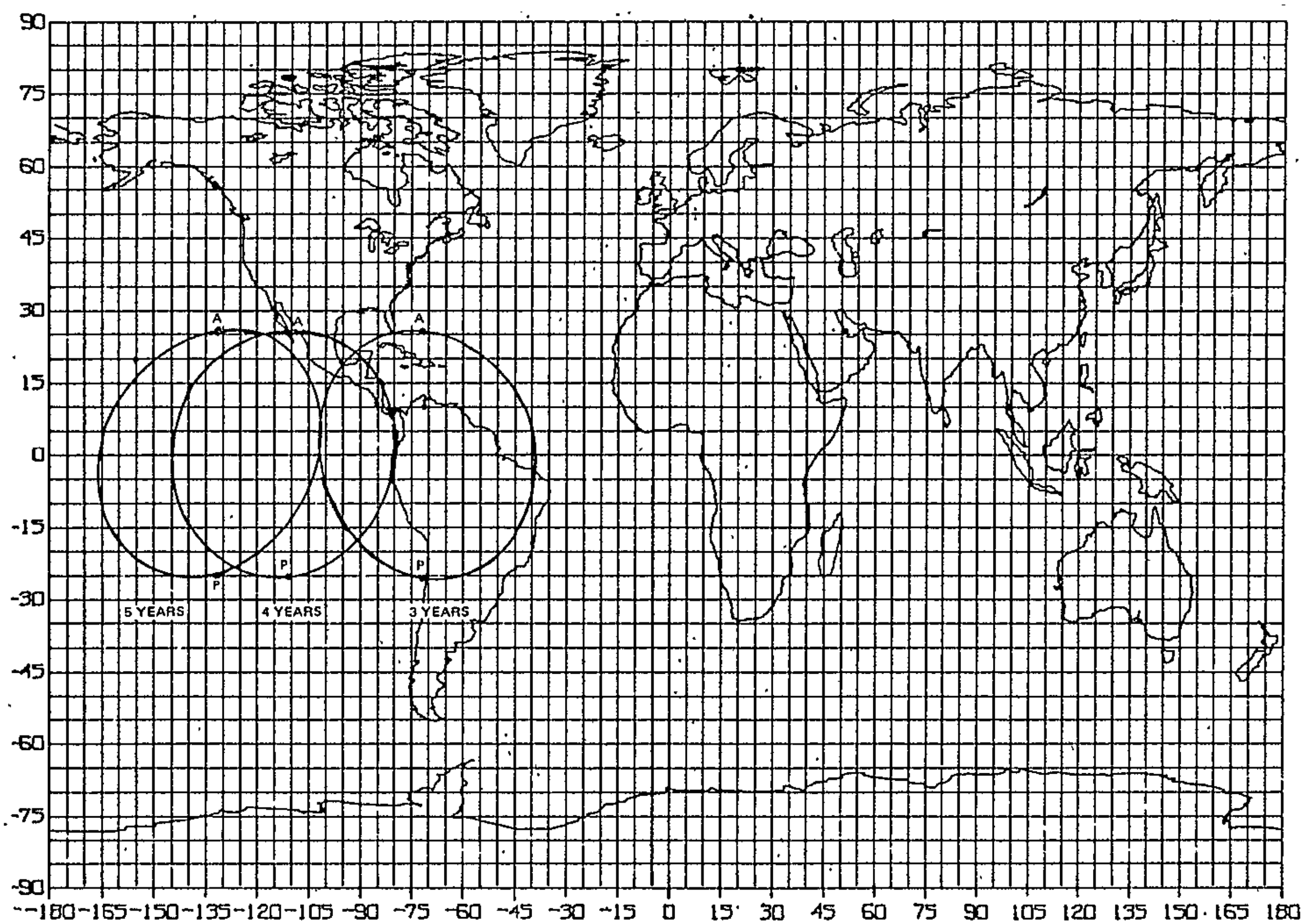


Figure E-6. Evolution of Groundtrack (2 of 2)