628-53, Rev. E Controlled Document

Ulysses

Reference Trajectory Characteristics

J. L. Pojman

National Aeronautics and
Space Administration

JPL

Jet Propulsion Laboratory
California Institute of Technology

JPL D-243

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J. L. Pojman

Approved By:

J. L. Luthey
ULS Mission Design Manager

Approved By:

D. D. Meyer
ULS Mission Design, Operations,
and Engineering Manager

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PRINCIPAL INVESTIGATORS

Dr. Samuel J. Bame
Los Alamos National Laboratory
P. O. Box 1663 MS D438
Los Alamos, NM 87545
Phone: (505) 667-5308 or
FTS 843-6937 Mail Code: D-438
FAX: FTS 843-6937

Prof. Bruno Bertotti
Universita Delgi Studi Di Pavia
Dipartimento Di Fiscia Nucleare E Teorica
via Bassi, 6-27100 Pavia, Italy

Prof. J. Geiss
University of Bern
Physikalisches Institut
Sidlerstrasse 5- CH 3012
Bern, Switzerland
Phone: (031) 6544-10

Prof. George Gloeckler
University of Maryland
Dept. of Physics & Astronomy
College Park, MD 20742
Phone: (202) 454-3135
(FTS) 922-3311
FAX: 301-454-1572

Dr. Eberhard Gruen
Max-Planck Institut für Kernphysik
P. O. Box 103980
69 Heidelberg 1
Federal Republic of Germany
Phone: 017-982741
Telex: 461-666

Dr. Andre Balogh
The Blackett Laboratory
Imperial College of Science & Technology
Prince Consort Road
London SW7 2BZ, England
Phone: (1) 589-5111
Telex: 261-503

Dr. Kevin C. Hurley
University of California at Berkeley
Space Science Laboratory
Berkeley, CA 94708
FAX: (415) 643-7629

Dr. K-P. Wenzel (2)
Space Science Dept. of ESA, ESTEC
Postbus 299
2200 AG Noordwijk
The Netherlands

Dr. E. Keppler
Max-Planck Institut für Aeronomie
Postfach 20
D-3411 Katlenburg-Lindau 3
Federal Republic of Germany
Phone: 05556-411
Telex: 965-527

Dr. L. J. Lanzerotti
Bell Laboratories
600 Mountain Ave.
Murray Hill, NJ 07974
FAX: 201-582-2110

Dr. John A. Simpson
University of Chicago
Enrico Fermi Institute
933 East 56th Street
Chicago, IL 60637
FAX: 312-702-6645

Dr. Michael Sommer
Max Planck Institut für Astrophysik
8046 Garching B./Munchen
Federal Republic of Germany

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Goddard Space Flight Center
Laboratory for Extraterriestrial Physics
Greenbelt, MD 20771

Dr. Michael Bird
Radioastronomisches Institut
Universitat Bonn
Auf dem hugel, 71
5300 Bonn
Federal Republic of Germany

Dr. Horst Kunow
Institut für Reine und Angewandte
Kernphysik
Universitat Kiel
Olshausenstr. 40-60
D-2300 Kiel 1
Federal Republic of Germany

Dr. C. Harvey (4)
DESPA
Observatoire de Paris-Meudon
Place Jules Janssen
92195 Meudon Principal Cedex
France

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ACRONYMS

AU	Astronomical Unit (1 AU = 149597893. Km.)
B·R, B·T	B-plane target parameters at Jupiter
DLA	Declination of the launch asymptote
EMEC	Earth mean ecliptic and equinox of 1950 reference system
EMEQ	Earth mean equator and equinox of 1950 reference system
IUS	Inertial Upper Stage of Boeing Aerospace, the first and second stage of the STS upper stage
JCA	Jupiter Close Approach
MODJD	Modified Julian Date
PAM-S	Payload Assist Module of McDonnell Douglas Space System Corporation; the third stage of the STS Upper Stage
R_J	Jupiter radius: 1 R_J = 71398.0 km.
RLA	Right Ascension of the launch asymptote
S/C	Spacecraft
SMEQ	Sun mean equator and equinox of 1950 reference system
SPE	Sun-probe-Earth
STS	Space Transportation System, usually refers to the Shuttle or the Shuttle orbiter vehicle and may refer to the entire launch system (except the spacecraft) including the IUS and the Tracking and Data Relay Satellite System.
ULS	Ulysses Spacecraft/Mission
TCM	Trajectory Correction Maneuver
WRT	With respect to

SECTION 1

1.0 SUMMARY OF PERFORMANCE AND MISSION CONSTRAINTS

The 1990 launch of the ULYSSES (ULS) mission by an STS / Inertial Upper Stage (IUS) / Payload Assist Module-S (PAM-S) launch system was October 6, 1990. Launch energy capability was C_3 = 128.94 km^2/s^2, and the actual injection C3 was 128.20 km^2/s^2.

Constraints on the mission design lead to the following limitations on mission parameters:

(1) Perihelion distance (Rp) shall be > 1.28 AU.

(2) Heliocentric radius at maximum latitude shall be < 2.3 AU.

(3) The trajectory shall be designed such that the Sun-probe-Earth (SPE) angle does not exceed 60° (excludes first 30 days after launch).

(4) The trajectory shall be designed to maximize total trajectory time at heliographic latitudes greater than 70° during the two polar passes, with a minimum of 150 days total time above 70° on the two passes.

(5) Jupiter flyby radius shall be greater than 6.0 Jupiter radii (R_J) to avoid science instrument radiation damage.

(6) Jupiter arrival time at such a longitude (time) to minimize radiation fluence.

A Sun-Probe-Earth (SPE) angle constraint was defined for the first 30 days after launch, specifically, the SPE angle was less than 90° at launch plus ten days, the time of the first trajectory correction maneuver (TCM1). The spacecraft maintained Earth pointing during TCM1. This maneuver was constrained to occur prior to day 14 because of range limitations of the omni antenna. SPE angles greater than 90° would have resulted in heating the rear of the spacecraft, and were, therefore, unacceptable at the time of the maneuver. This constraint resulted in the elimination of launch dates prior to October 5, 1990. The launch period closed on October 23, 1990 because of Shuttle/upper stage performance limitations. The actual launch on October 6 gave good mission performance within the above constraints.

Figure 1-1 shows the SPE angles over the first 18 days after launch for October 5, 1990, to October 19, 1990, launches. For increasing C_3's, the SPE angle grew higher sooner. Table 1-1 lists the intended ULS Launch Vehicle Target Parameters for the October 6 launch, and following launch, the TCM Jupiter B-plane target. Figure 1-2 shows performance versus launch date based on rev 5 data. The intended mission performance before injection and after the first TCMs, are in Table 1-2.

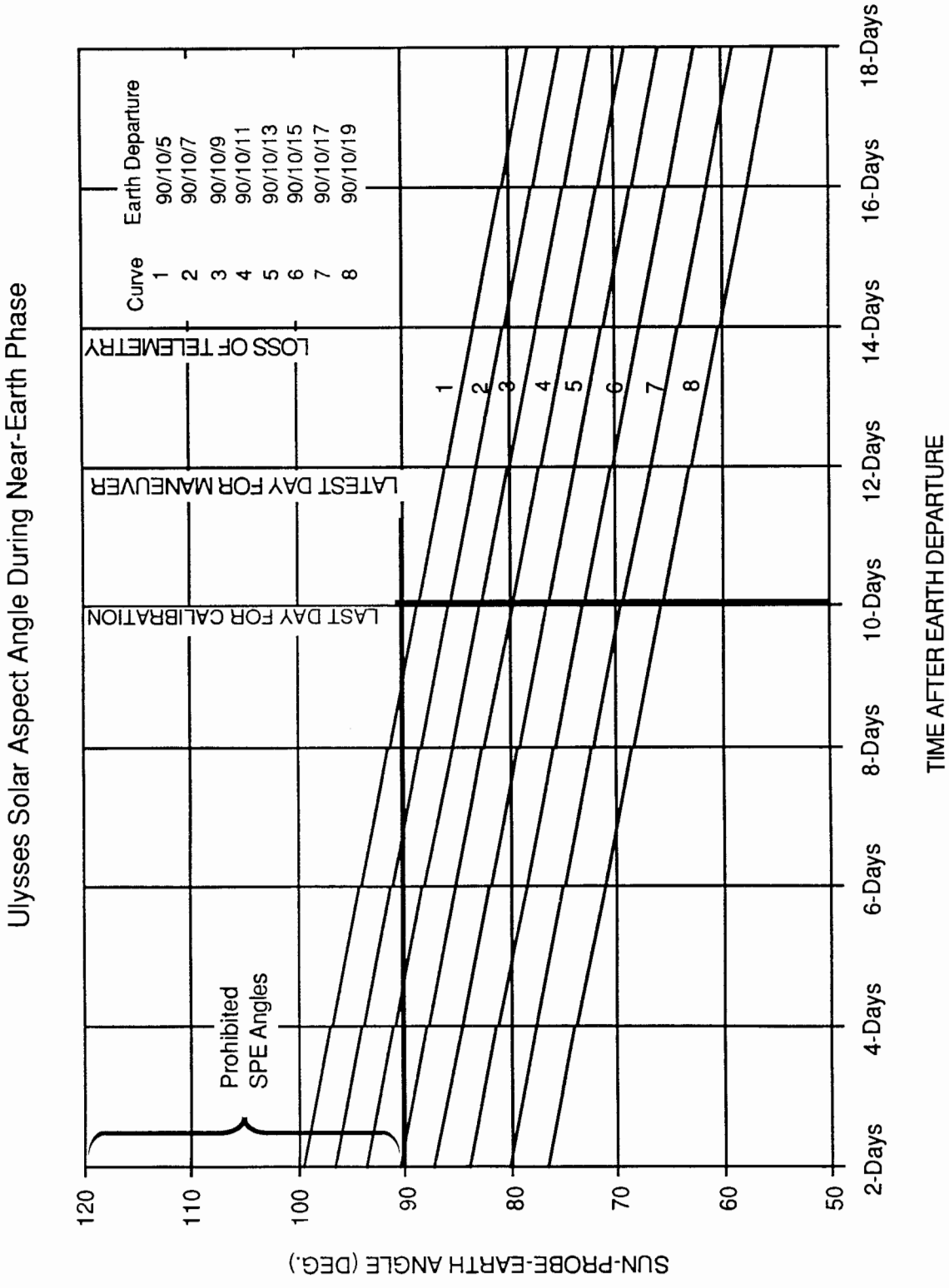


Figure 1-1. ULS SPE Angle During Near-Earth Phase (C3 = 130 km^2/s^2)

Table 1-1. Ulysses Target Parameters

	Launch Vehicle Target Parameters (EMEQ 1950.0)			Mission Target Parameters (EMEC 1950.0)		
Injection Date Time (ET)	C3 (km^2/s^2)	DLA (deg)	RLA (deg)	Arrival Date (YYYYMMDD.HHMMSS)	B.T (km)	B.R (km)
06 Oct. 90 19:38:18	127.888	28.528	116.891	19920210.233707	-690865.	-542744.
TCM Target				19920208.120409	-712069.	-552408

Table 1-2. Mission Performance

	Days > 70 deg.	Max Latitude (deg)
Before TCM	228.3	78.6
Injection After TCM	234.3	80.1

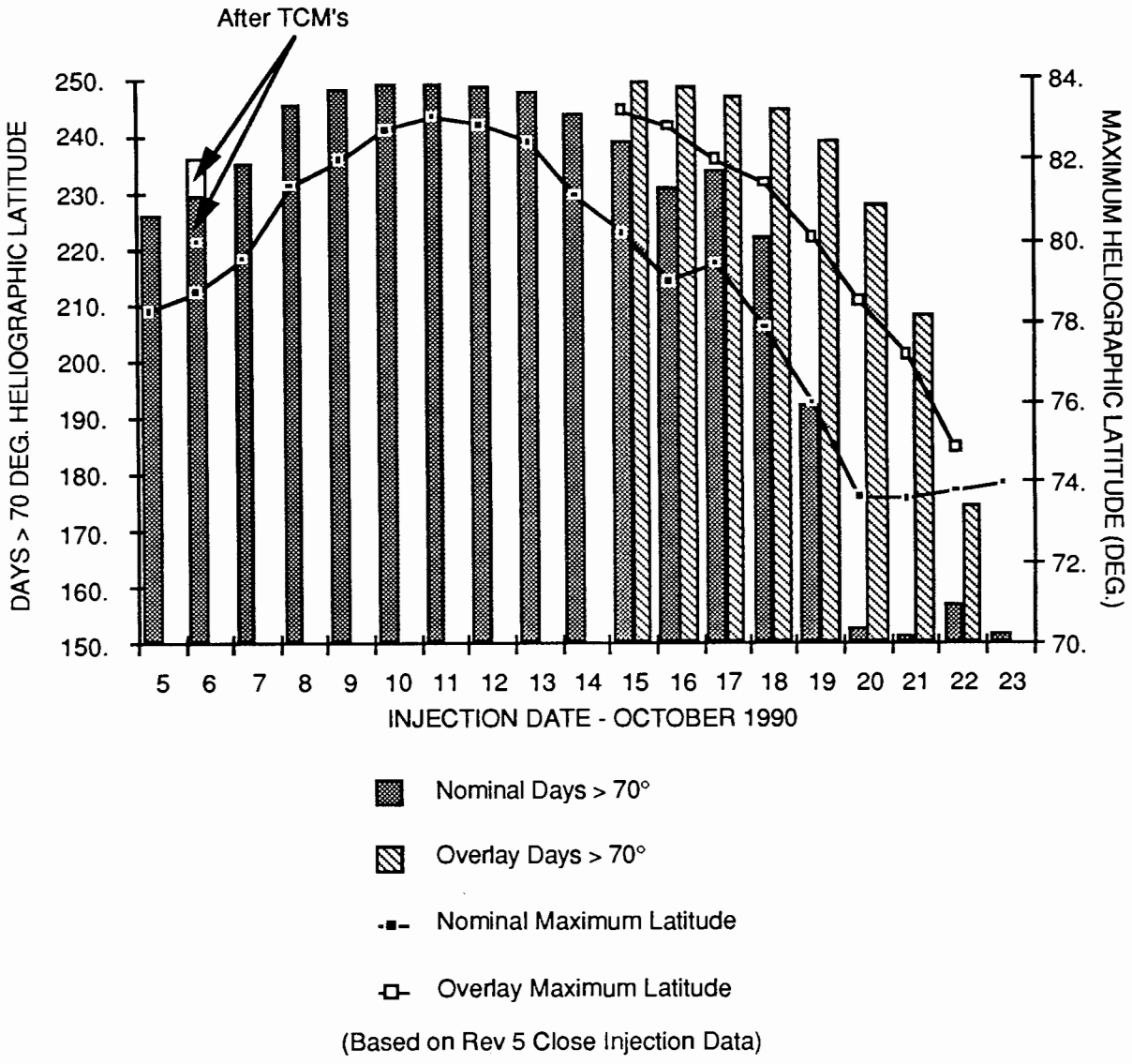


Figure 1-2. Injection Date Versus Days Above 70° and Maximum Latitude

SECTION 2

2.0 REFERENCE TRAJECTORY: 6 October 1990

The reference trajectory for the ULS mission, launched on 6 October 1990, is described in this section. The trajectory corresponds to the actual trajectory after the first two trajectory correction maneuvers (TCM). The first TCM was executed on 15-19 October 1990, and the second TCM was executed on 2 November 1990. Included are both mission plots and tabular data for geocentric, sun-related, and jovicentric data.

All quantities plotted are based on data points with 10-day granularity; hence, minima and maxima are only approximated by values tabulated within 5 days of the true value. Figures 2-1 to 2-8 are plots of geocentric quantities (see Table 2-3 for definitions). Figures 2-9 to 2-19 provide angles related to the Sun-spacecraft geometry and heliocentric data (see Table 2-4 for definitions). Tables 2-7 and 2-8 contain the same quantities in tabular form.

Jupiter flyby characteristics are represented in both graphic and tabular forms. Tables 2-9 and 2-10 show jovicentric parameters during the Jupiter flyby at frequencies of ±24 hours and ±90 days. Figures 2-20 and 2-21 present the Jupiter flyby trajectory viewed in the trajectory plane and in the Jupiter equatorial plane, respectively. Radial distance (in Jupiter radii) versus Jupiter System III (1965) longitude is shown in Figure 2-22, and the Jupiter magnetic field penetration view (magnetic latitude versus radial distance) is presented in Figure 2-23. Table 2-11, *Jovicentric Latitudes, Longitudes, and Magnetic Coordinates*, includes the data used in Figure 2-23.

The high latitude coverage for one solar pass is shown in Figure 2-24. This corresponds to the first solar pass for the reference trajectory (see Table 2-5). Higher performance missions attain higher heliographic latitudes and have more repeat observations which could discern between transient and perpetual phenomena.

Table 2-1. Definitions for Classical Elements

Symbol	Definition	Units
a	Semi-major axis of ellipse or hyperbola	km
e	Eccentricity	
i	Inclination to Earth ecliptic of 1950	deg
Ω	Longitude of ascending node in Earth ecliptic	deg
ω	Argument of Periapsis (from node)	deg
TA	True anomaly: angle from periapsis to S/C	deg

Table 2-2. ULS Mission Classical Orbital Elements: Injection Oct. 6, 1990

(Earth Mean Ecliptic of 1950)

EPOCH (GMT)	CENTRAL BODY	a (KM)	e	i (DEG)	Ω (DEG)	ω (DEG)	TA (DEG)	VALID DATES
Oct. 16, 1990 19:38:18.6687 (Inj. + 10 days)	Sun	1345106000.	.88916576	1.9907188	12.859090	7.7259532	5.7685403	Oct. 16, 1990 to Dec. 30, 1991
Feb. 8, 1992 12:04:08.8696 (Jup. Close App.)	Jupiter	--676299.74	1.6661091	142.19459	-43.055518	127.68470	0.	Dec. 30, 1991 to Mar. 19, 1992
Mar.13, 1995 16:24:36.0399 (Perihelion)	Sun	504852620.	.60261730	79.109898	-22.517214	-1.0860070	0.	Mar. 19, 1992 to Sept. 30 1995

Table 2-3. Geocentric Data (Quantities Plotted)

Quantity	Unit
Geocentric Right Ascension (EMEQ)[a]	deg
Geocentric Declination (EMEQ)	deg
Geocentric Range	AU
Range Rate with Respect to Earth	km/s
Range Acceleration with Respect to Earth	km/s^2
Declination Rate of S/C with Respect to Earth	deg/day
Right Ascension Rate of S/C with Respect to Earth	deg/day
Earth Vector Rate of S/C with Respect to Earth	deg/day

[a]EMEQ - Earth mean equator and equinox of 1950 reference system

Table 2-4. Sun-Related Data (Quantities Plotted)

Quantity	Unit
Earth - Sun - S/C Angle	deg
Sun - S/C - Earth Angle	deg
Sun - Earth - S/C Angle	deg
Heliocentric Range of S/C	Au
Heliocentric Range Rate	km/s
Heliocentric Velocity Magnitude	km/s
Heliographic Latitude of S/C (SMEQ)[a]	deg
Heliocentric Sun Equator Right Ascension[b] (SMEQ)	deg
Ecliptic Latitude of S/C Relative to Sun (EMEC)[c]	deg
Solar Longitude With Respect to Earth[d]	deg

[a]SMEQ - Sun mean equator and equinox of 1950

[b]The right ascension of the S/C in the Sun's equatorial plane measured from the ascending node of Earth's orbit plane of 1950.

[c]Earth mean ecliptic and equinox of 1950.

[d]The Earth-Sun-S/C angle projected on the sun's equatorial plane where the current Earth-Sun line is always longitude = 0.0°

Table 2-5 contains a mission summary for the reference ULS mission.

The following definitions are to clarify the quantities whose titles are not self-explanatory:

C_3	The squared value of the hyperbolic excess velocity ($C_3 = v_\infty^2$) (Km^2/S^2)
Dla, Rla	Declination and right ascension of departure $\underline{V}\infty$, EMEQ 1950. (Degrees)
Maximum latitude	Maximum heliographic latitude achieved by ULS S/C (Degrees)
Radius at Max Lat 1, 2	Distance from Sun's center when reaching maximum latitude on passes 1 and 2 near the poles (Au)
Radius at Cl. Appr. (R_j)	Distance from center of Jupiter at closest approach in Jupiter radii
B•T, B•R	Offset from center of Jupiter of the incoming V∞, with the T coordinate in the ecliptic and R south of the ecliptic (Kilometers)
Pass 1, 2: Begin	Dates of two passes above 70° heliographic latitude, YYMMDD: year, month, day digits
SPE Max	Maximum value of Sun-probe-Earth angle during prime mission (excludes near-earth SPE angle following launch) (Degrees)

Table 2-5. October 6, 1990, Post–TCM-1 Mission Summary

Parameter:	YYMMDD	HHMMSS
Injection Date	901006	193721
Jupiter Arrival Date	920208	120409
Perihelion Date	950313	162436
End of Mission Date	950930	051756
C_3 $(Km/Sec)^2$	128.20	(Note: These
Dla of V-Infinity (deg)	28.51	are Injection
Rla of V-Infinity (deg)	116.68	values)
Days Above 70°:		
Pass 1	132.61	
Pass 2	101.65	
Total	234.26	
Maximum Latitude (deg)	80.14	
Perihelion Radius (Au)	1.341	
Radius at Max Lat 1 (Au)	2.3*	
Radius at Max Lat 2 (Au)	2.1*	
Radius at Jupiter Close Approach (R_J)	6.310	
Velocity at Infinity (JCA) (km/sec)	13.6866	
B.T at Jupiter (km)	-712110.32	
B.R at Jupiter (km)	-552423.11	
	YYMMDD	HHMMSS
Pass 1 Begin	940626	142203
Max Lat	940914	112912*
End	941106	050415
Pass 2 Begin	950620	134002
Max Lat	950801	181855*
End	950930	051756
SPE Max (deg)	30.4*	

*Note: These values taken from conic trajectory

Table 2-6. Summary of Oppositions and Conjunctions for the October 6, 1990, Mission

Injection Date (1990)	C_3 (km^2/sec^2)	Jupiter Arrival Date (1992)	Event	Date	SPE Ang. (Deg)	SEP Ang. (Deg)
October 6	128.20	Feb. 08	1st Opposition	Dec. 30, 1990	3.37	174.64
			1st Conjunction	Aug. 21, 1991	0.29	1.15
			2nd Opposition	Feb. 27, 1992	0.11	179.40
			2nd Conjunction	Sept. 2, 1992	1.48	7.78
			3rd Opposition	Feb. 29, 1993	4.62	156.32

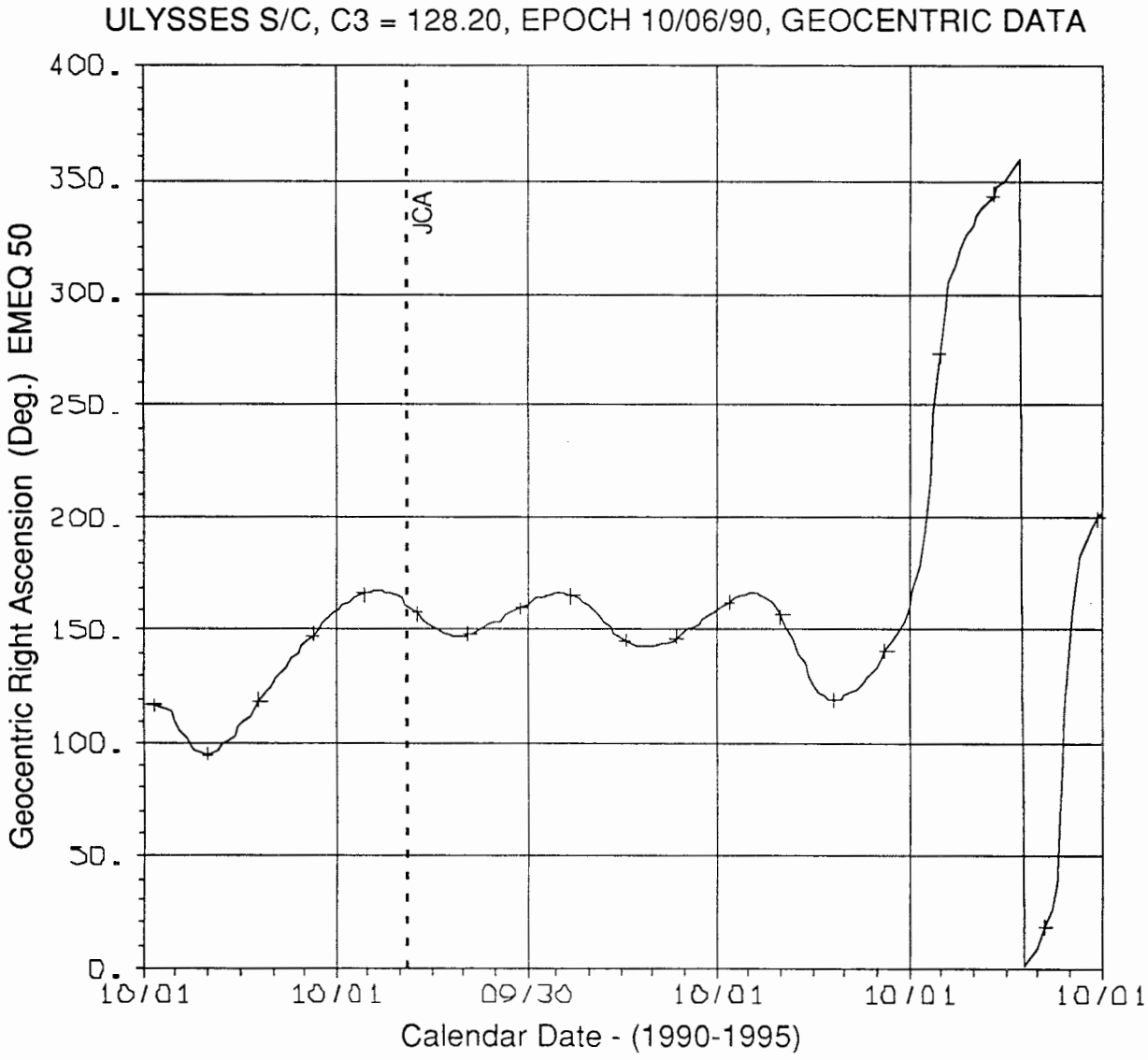


Figure 2-1. Geocentric Right Ascension (EMEQ 50)

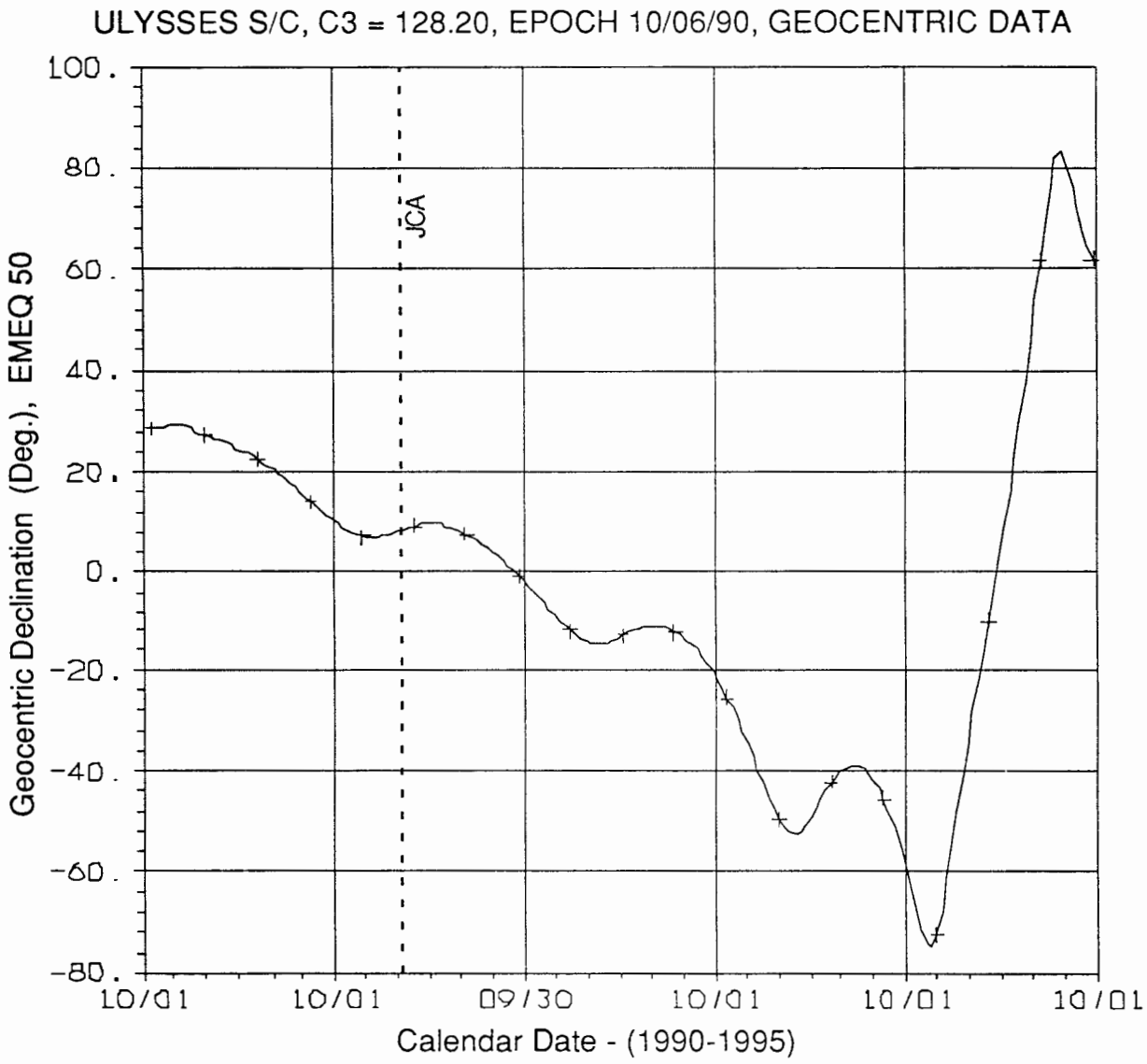


Figure 2-2. Geocentric Declination (EMEQ 50)

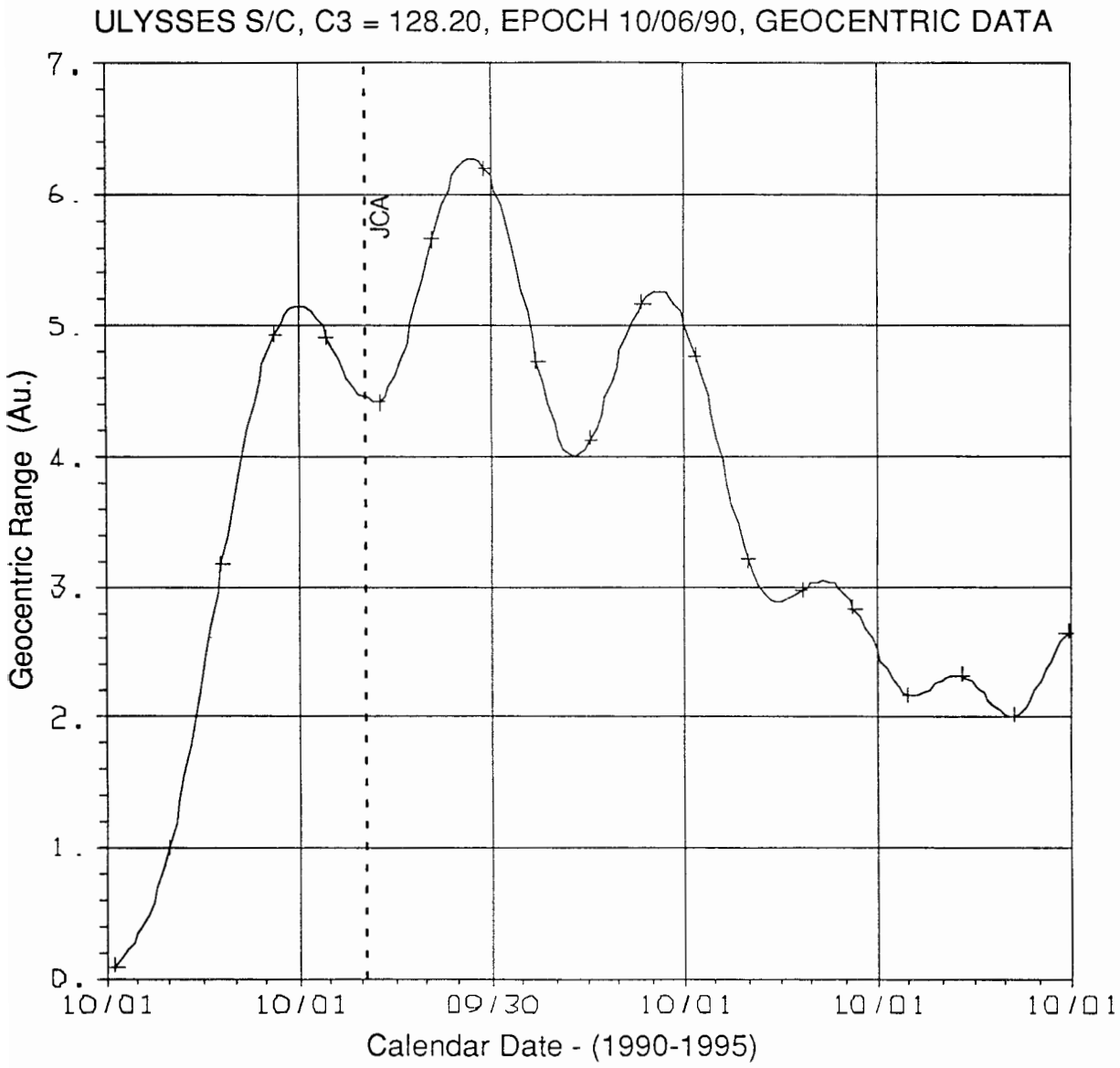


Figure 2-3. Geocentric Range

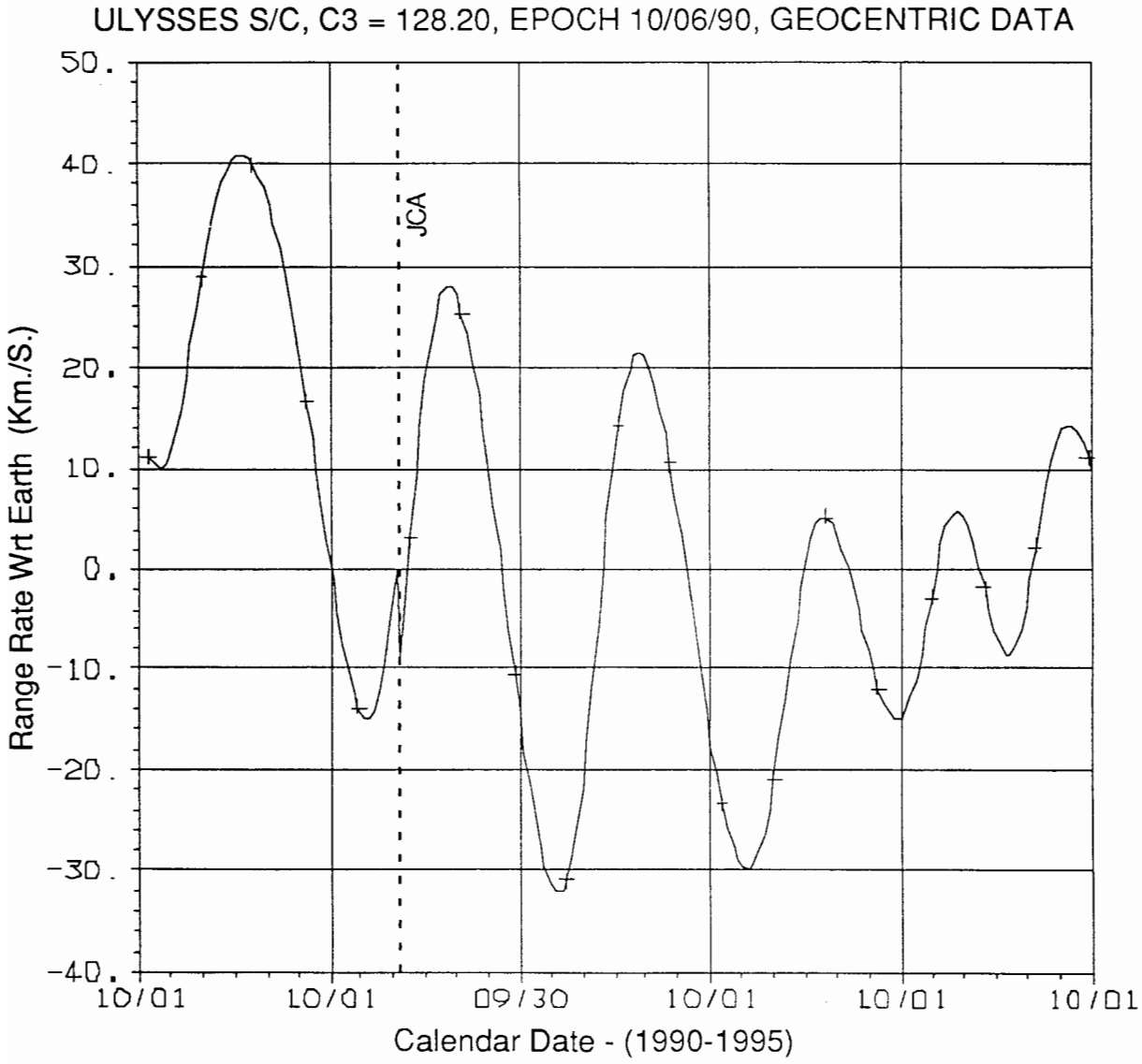


Figure 2-4. Range Rate With Respect to Earth

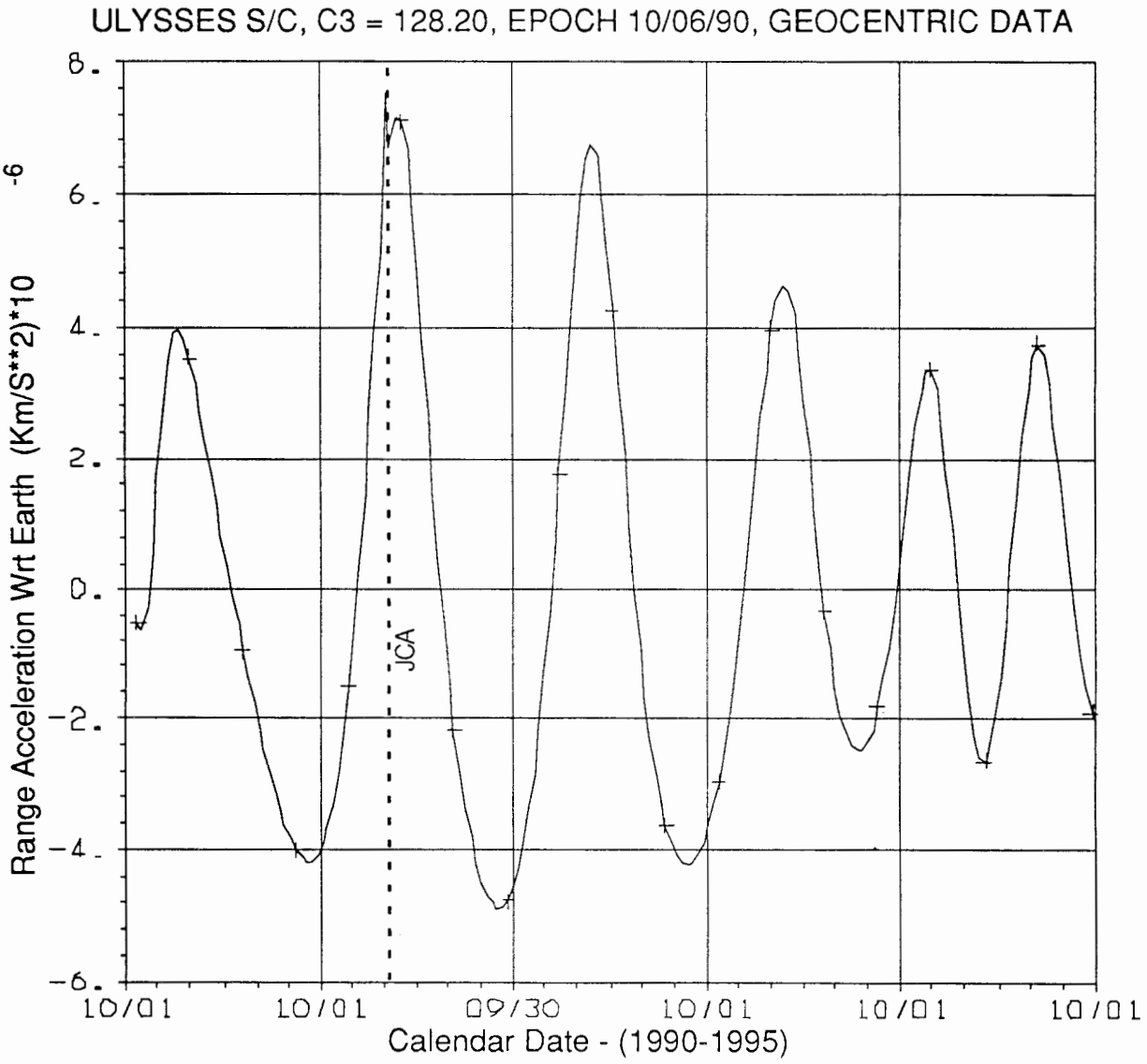


Figure 2-5. Range Acceleration With Respect to Earth

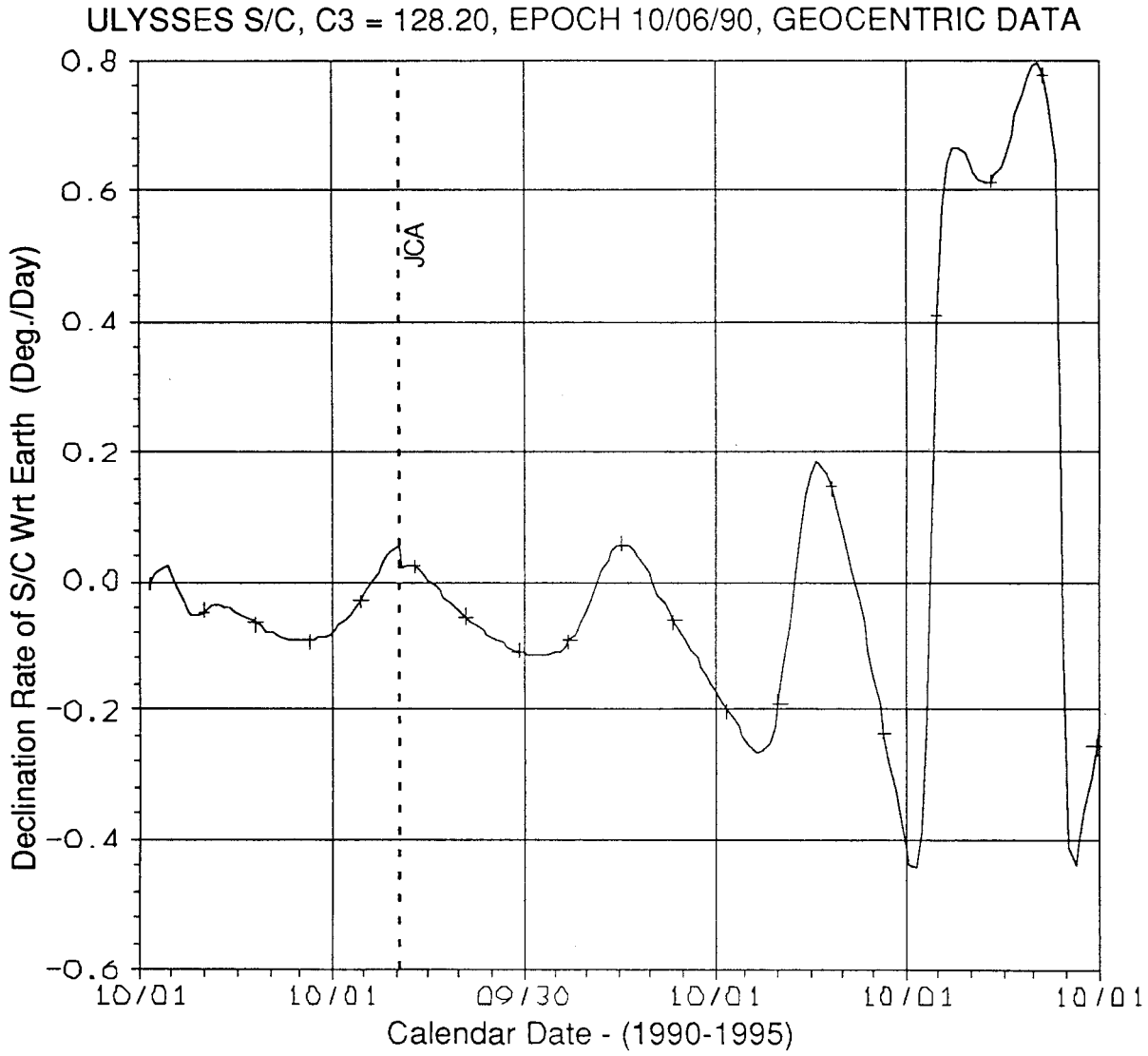


Figure 2-6. Declination Rate of S/C With Respect to Earth

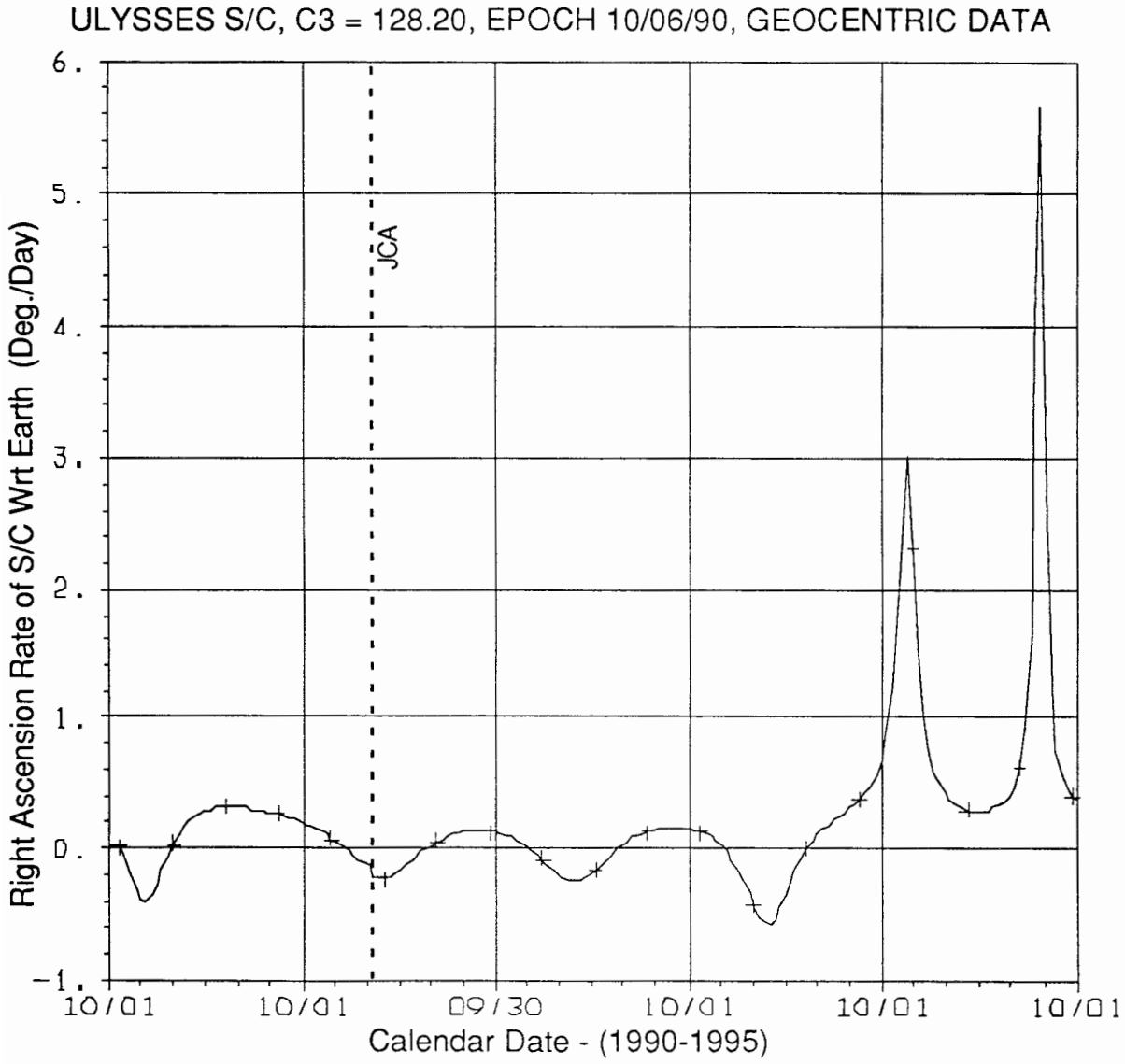


Figure 2-7. Right Ascension Rate of S/C With Respect to Earth

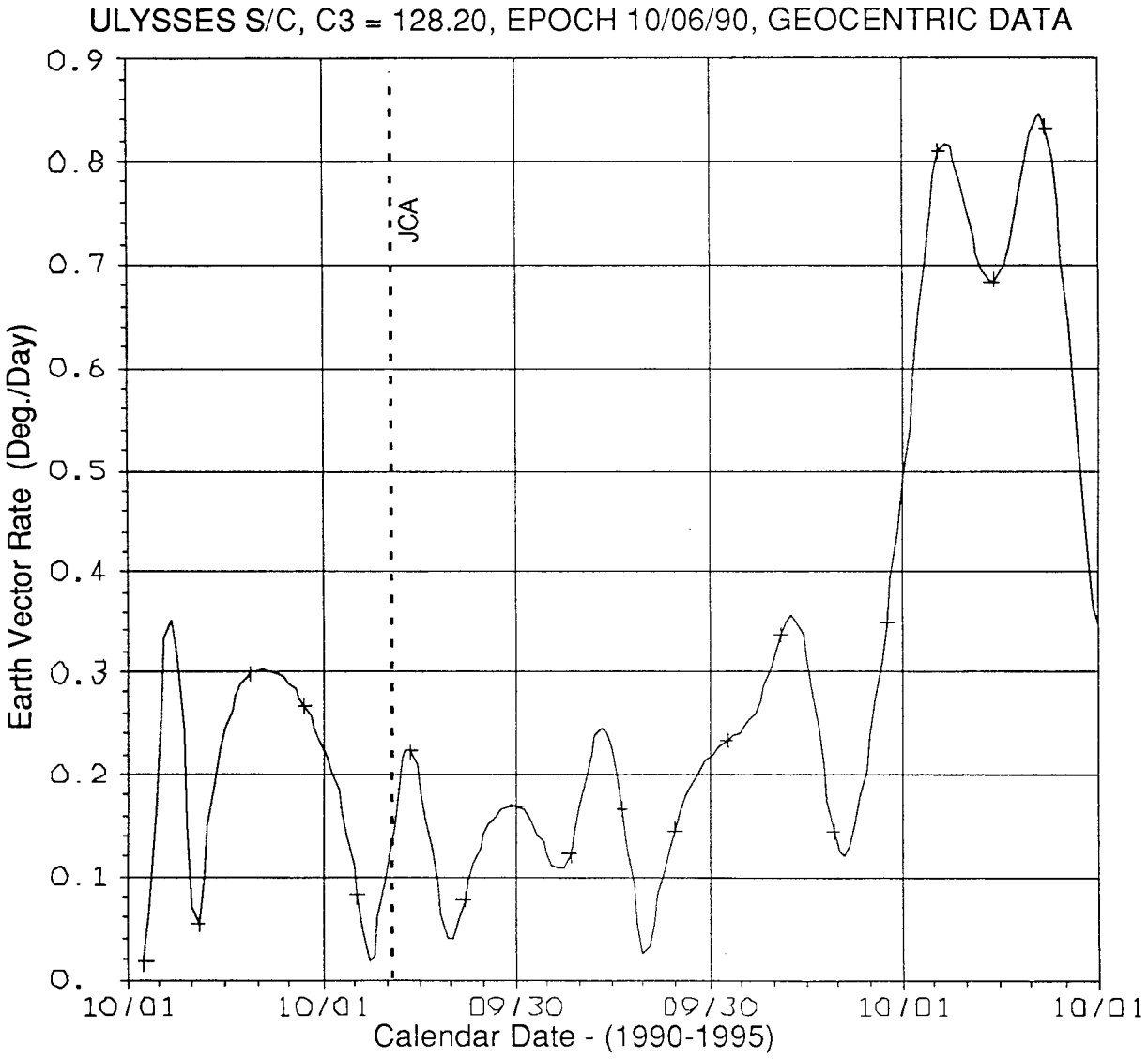


Figure 2-8. Earth Vector Rate of S/C

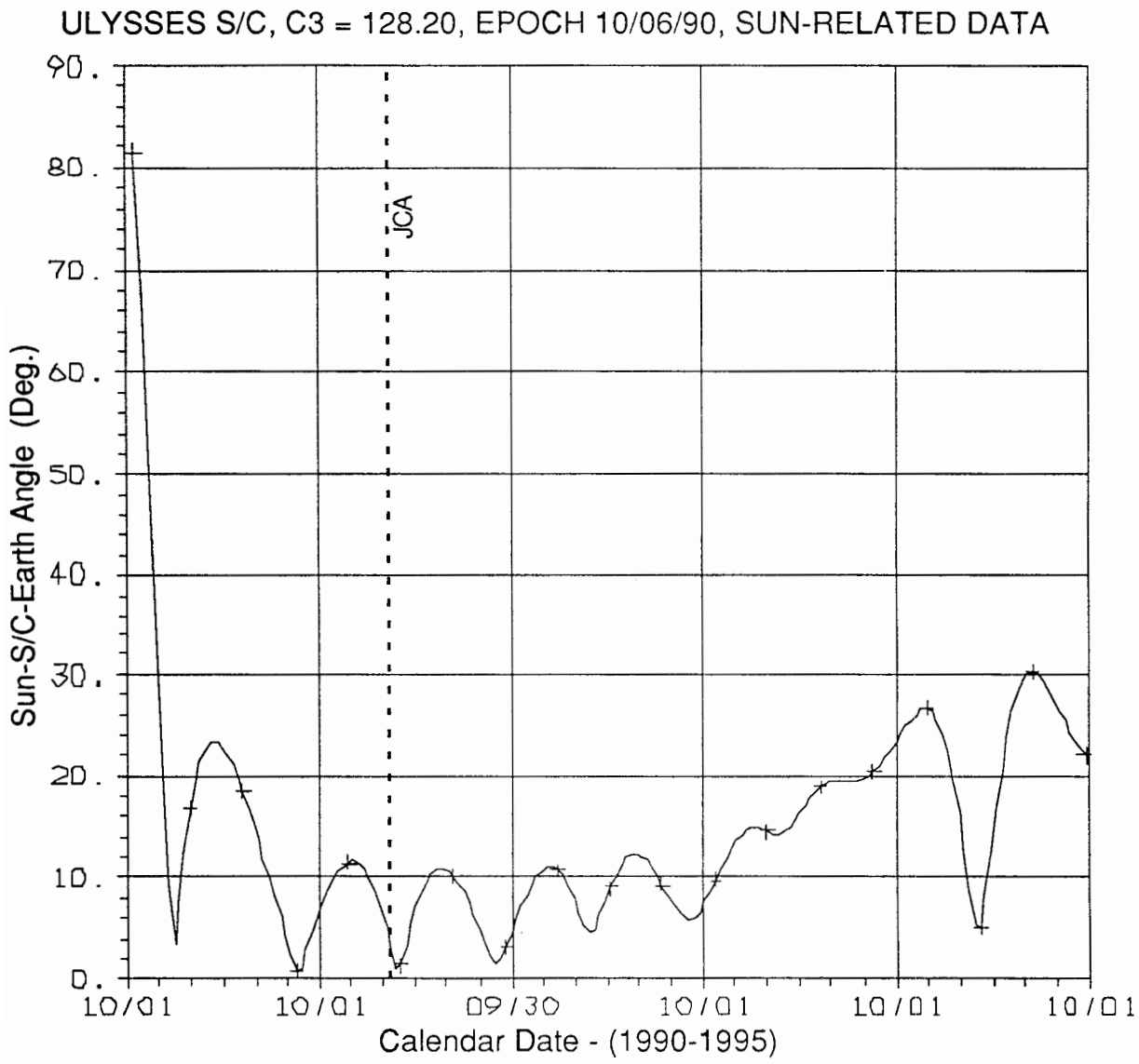


Figure 2-9. Sun-S/C-Earth Angle

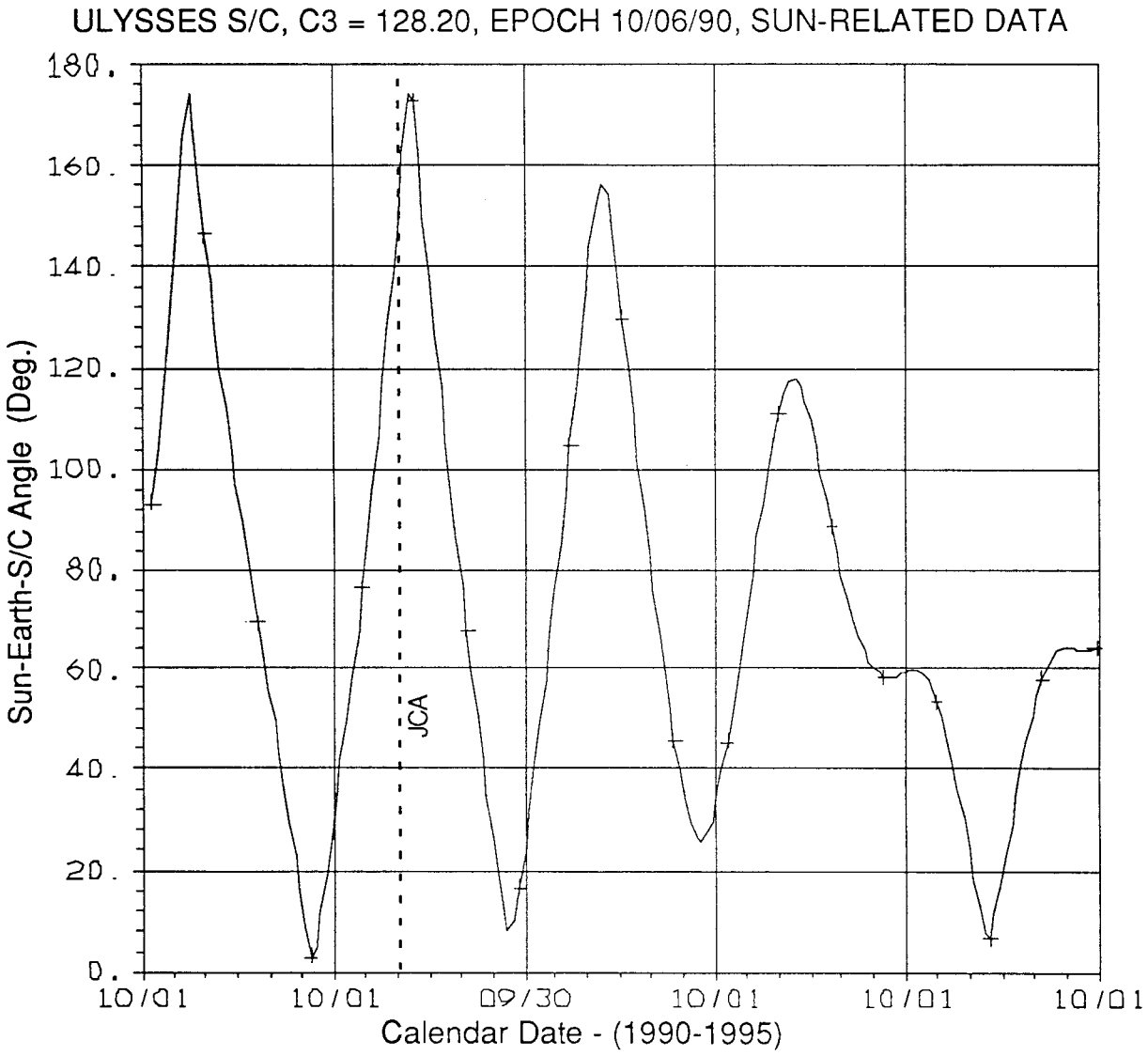


Figure 2-10. Sun-Earth-S/C Angle

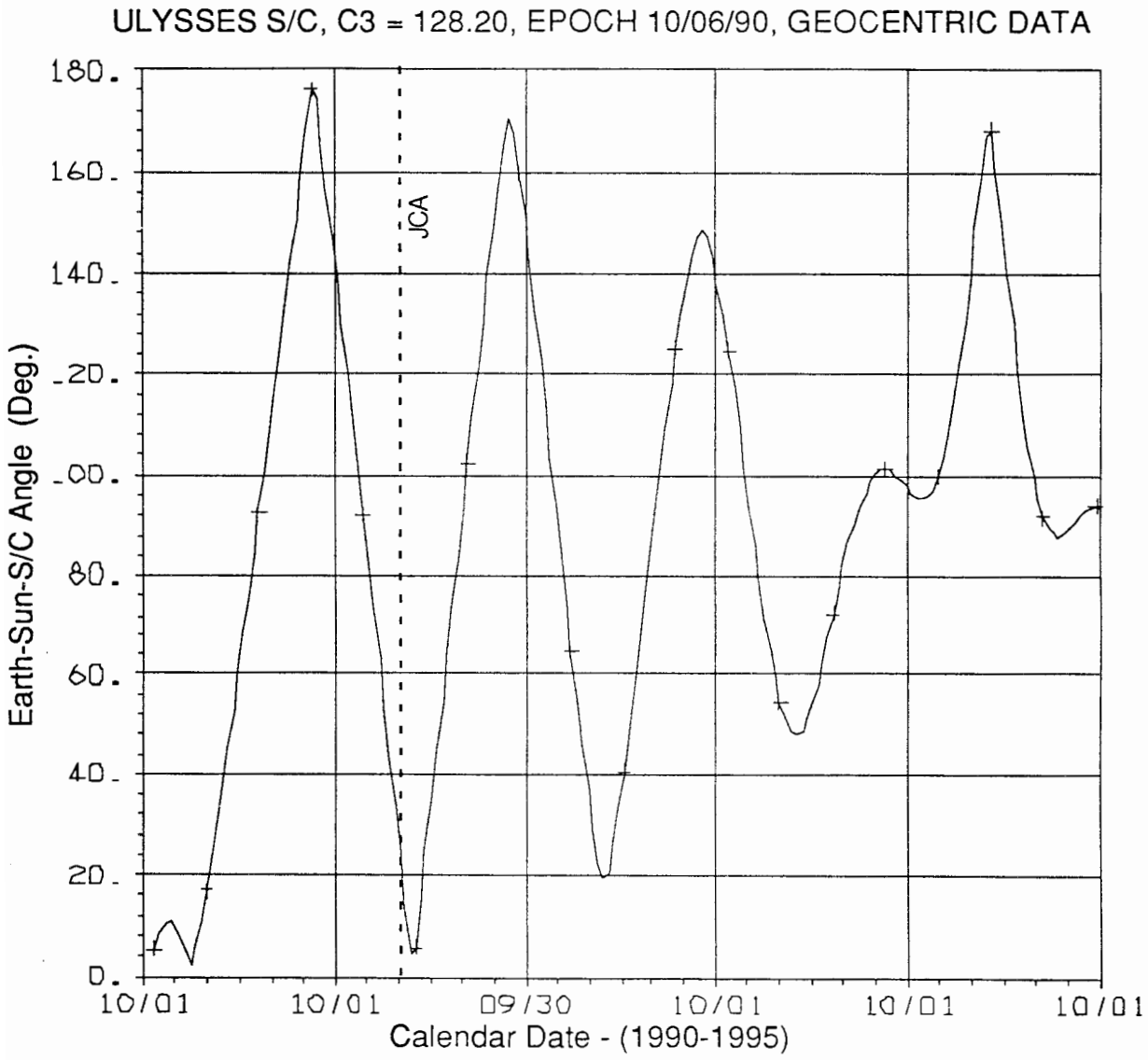


Figure 2-11. Earth-Sun-S/C Angle

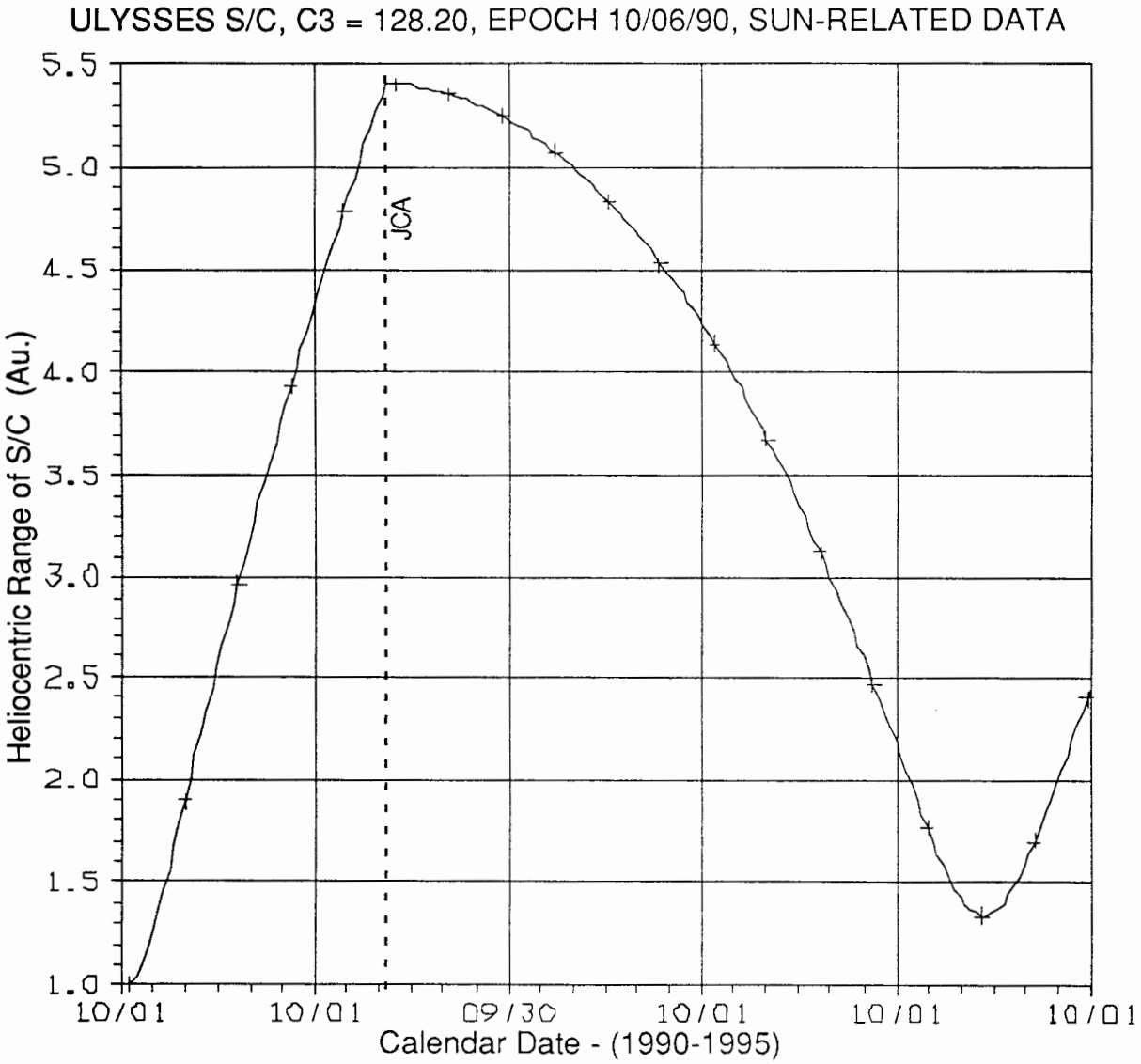


Figure 2-12. Heliocentric Range of Spacecraft

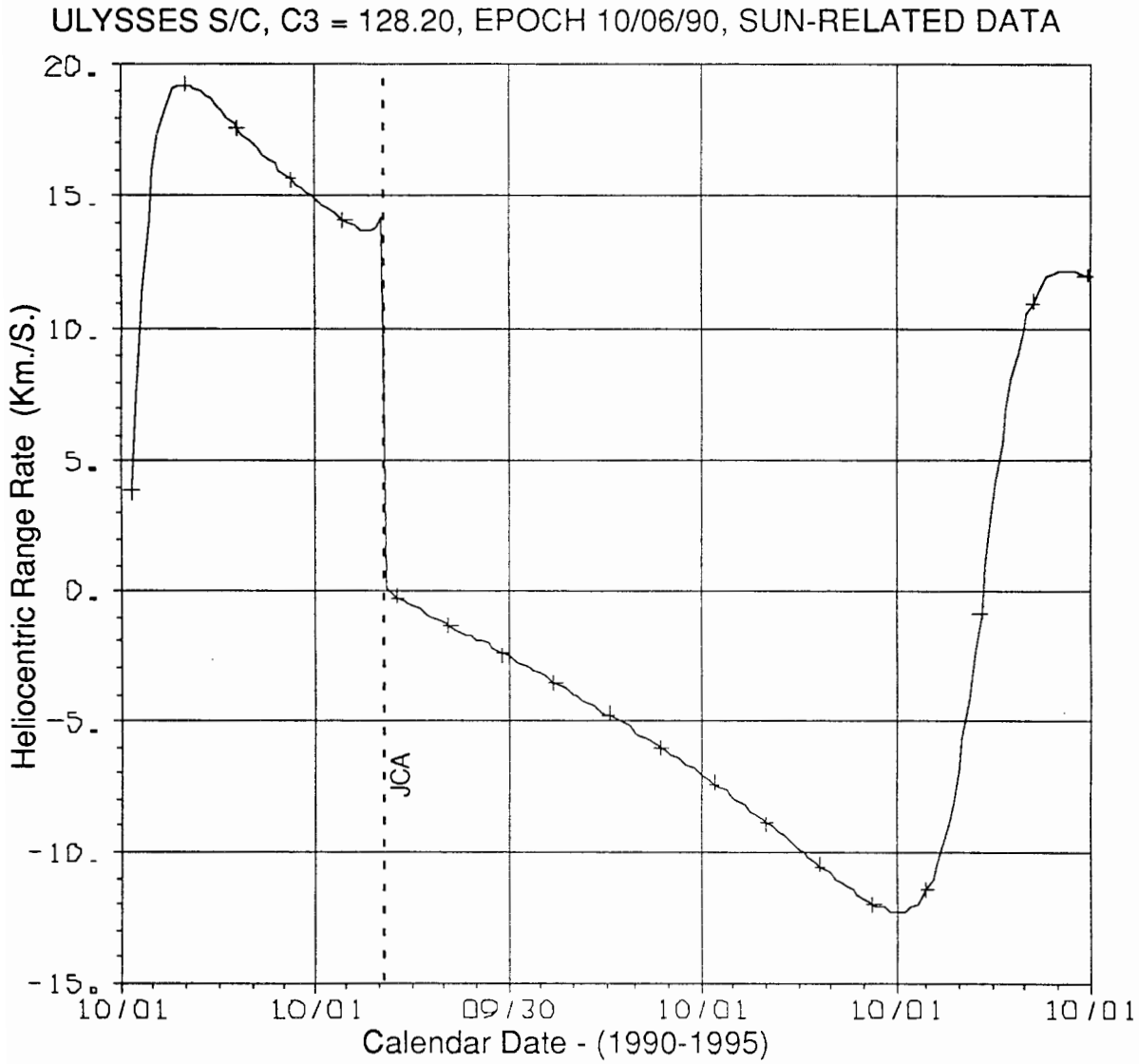


Figure 2-13. Heliocentric Range Rate

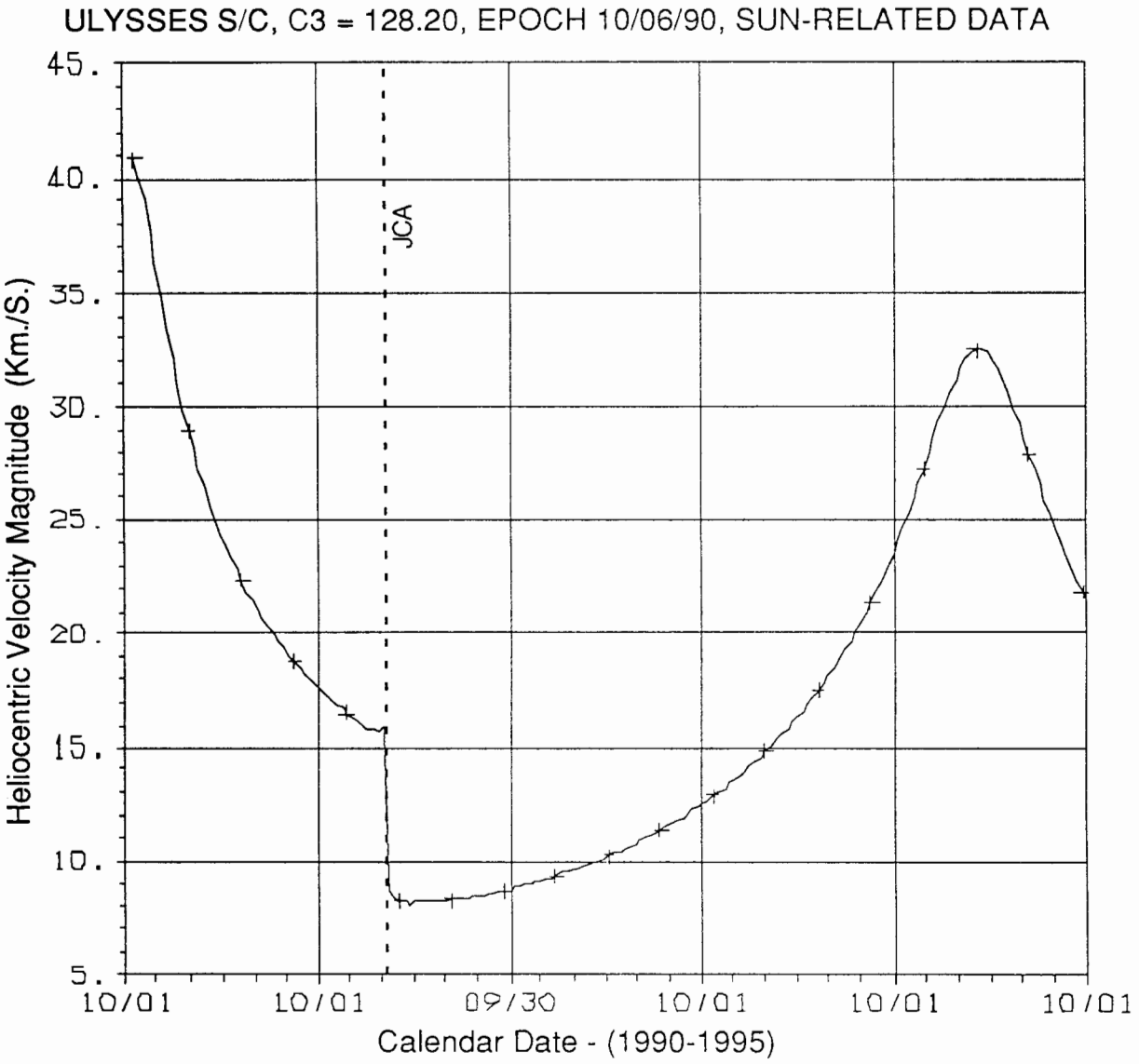
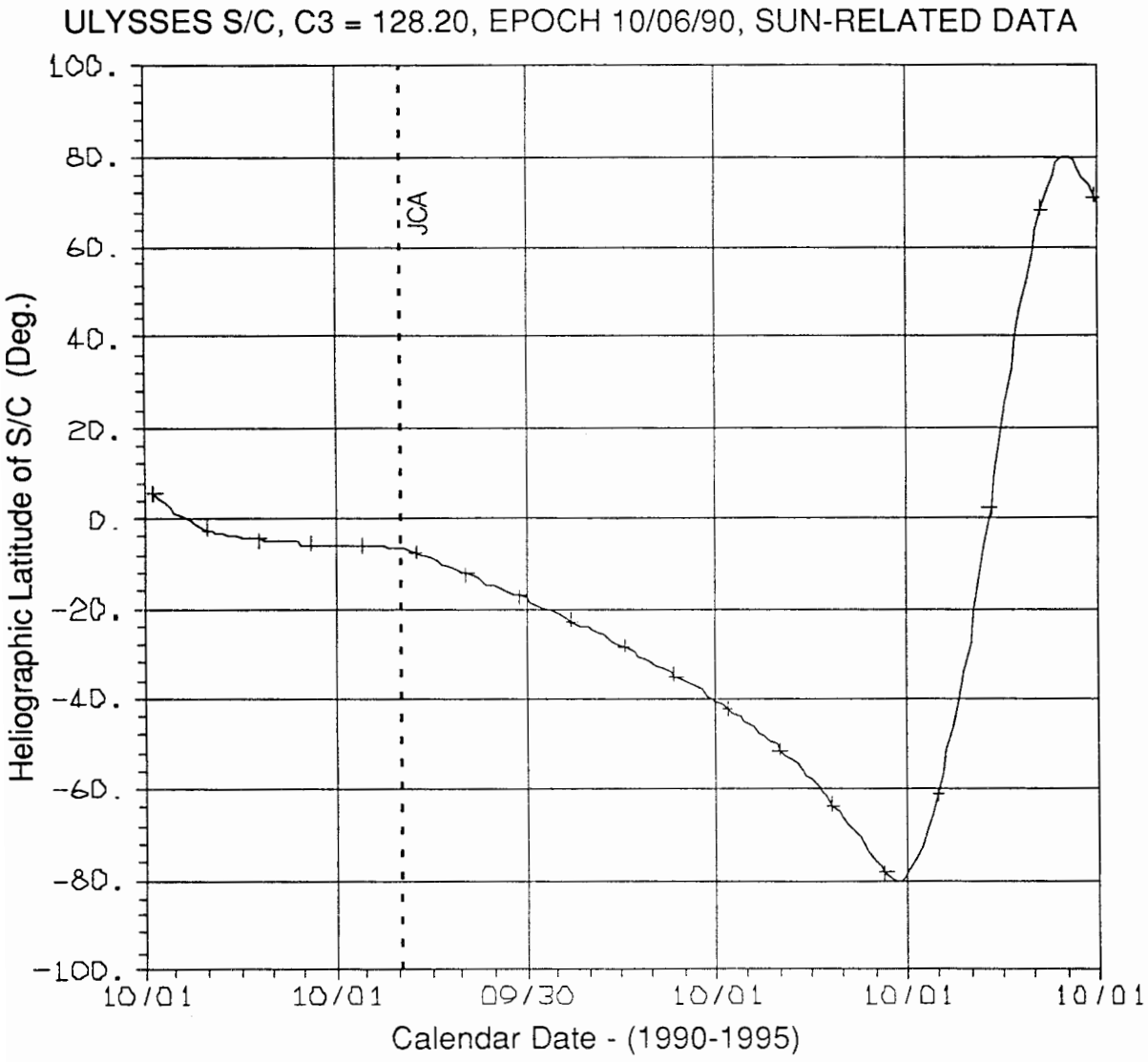


Figure 2-14. Heliocentric Velocity Magnitude



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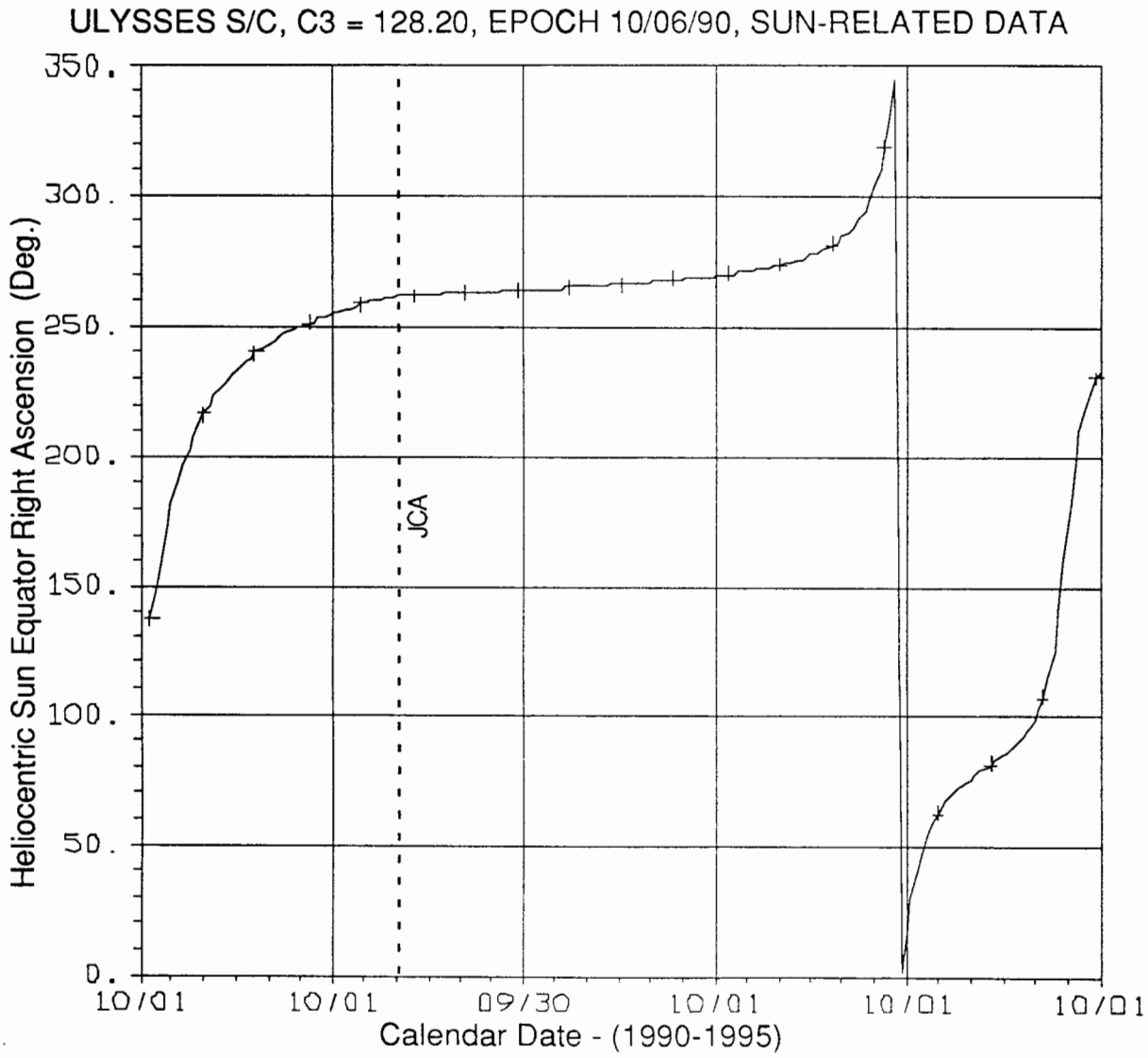

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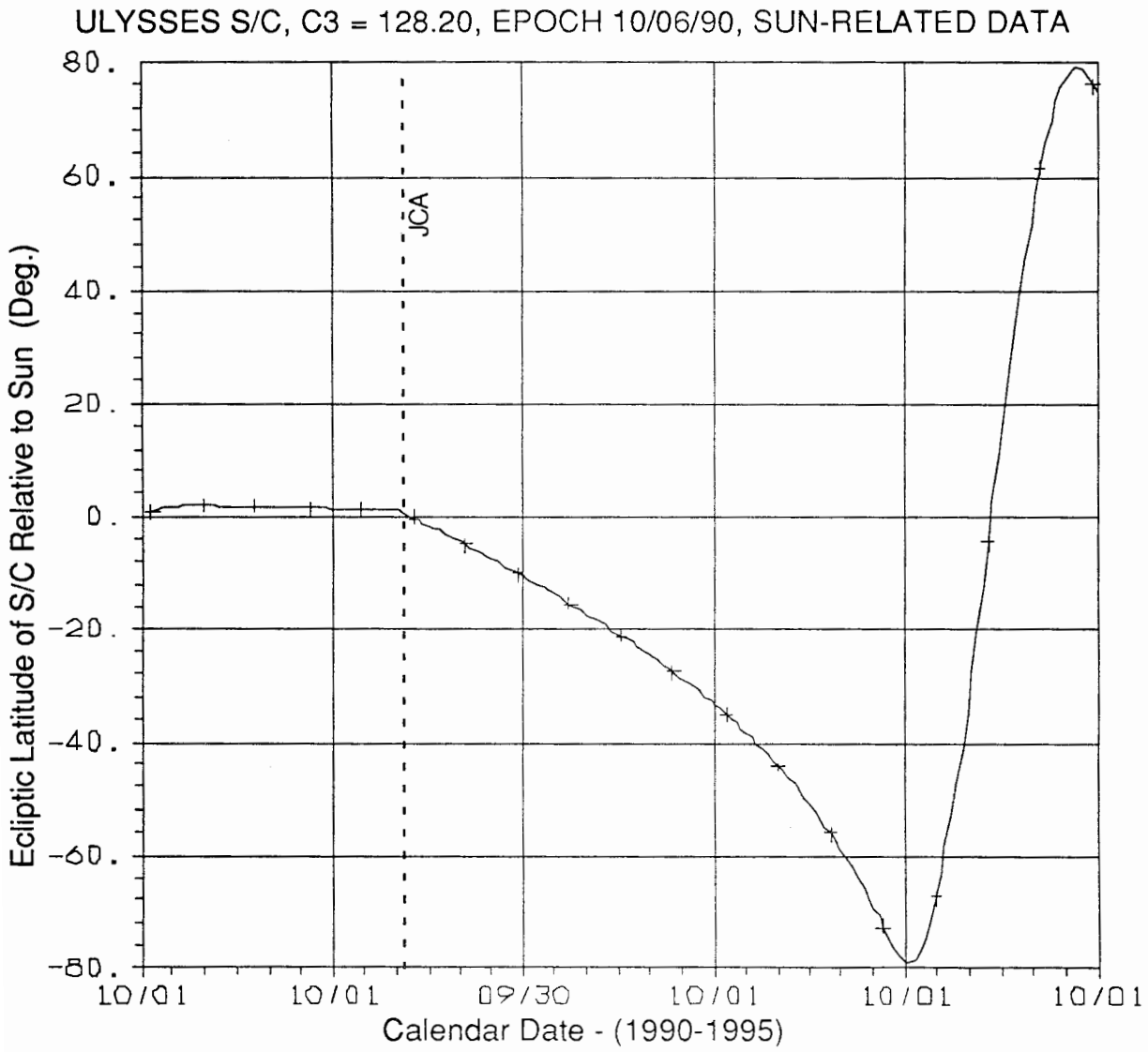


Figure 2-17. Ecliptic Latitude of Spacecraft Relative to Sun

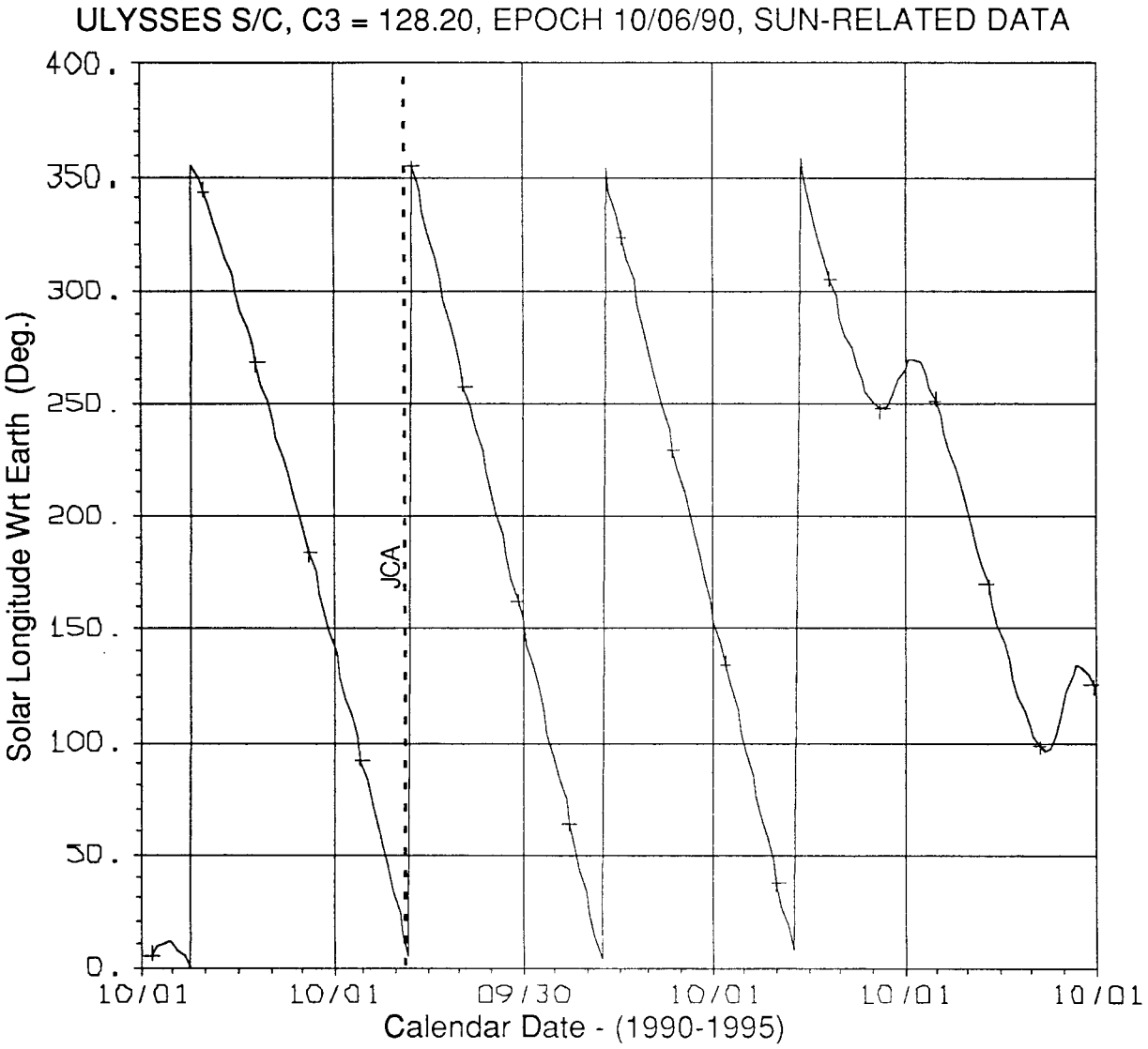


Figure 2-18. Solar Longitude of Spacecraft Relative to Earth

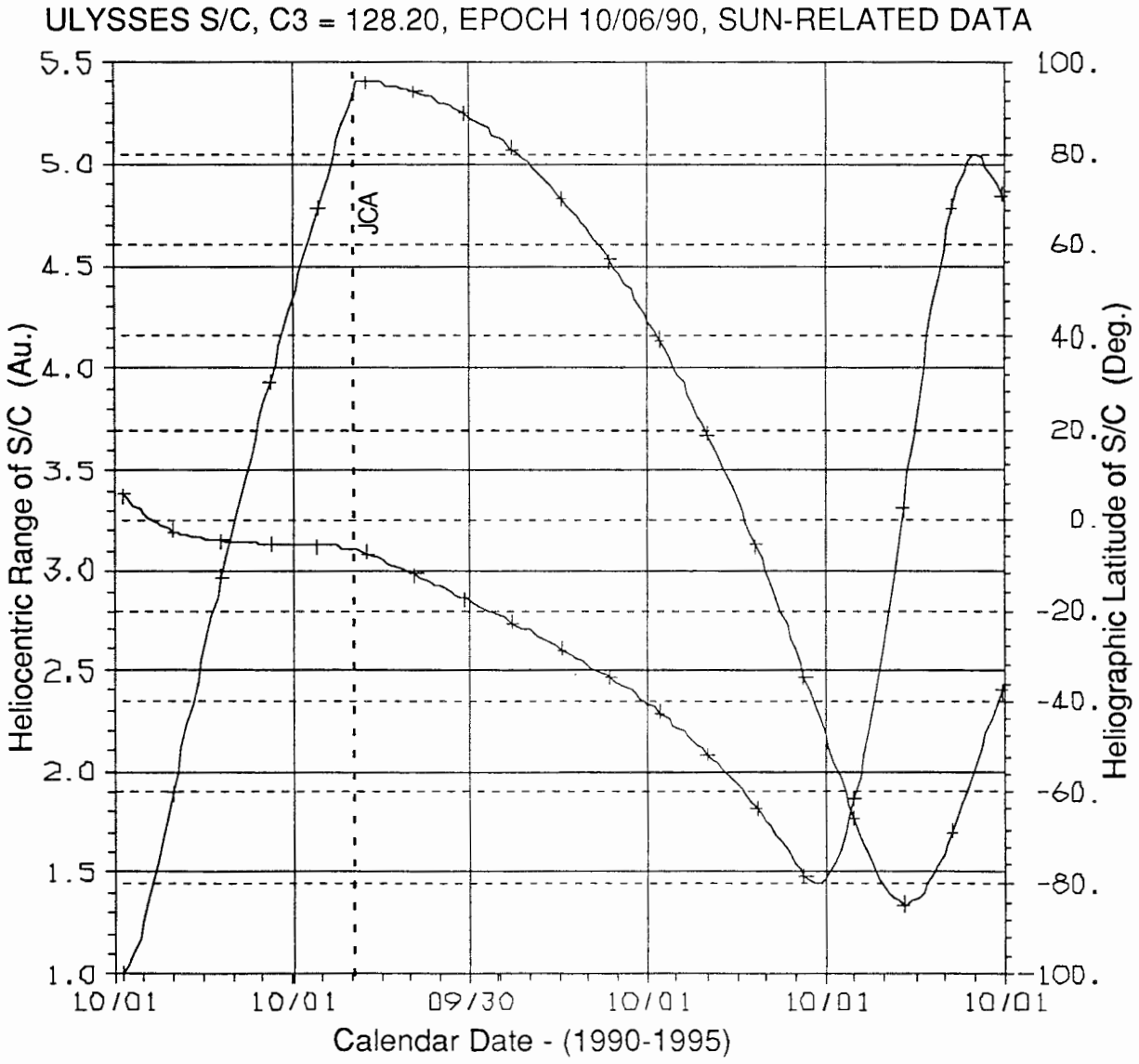
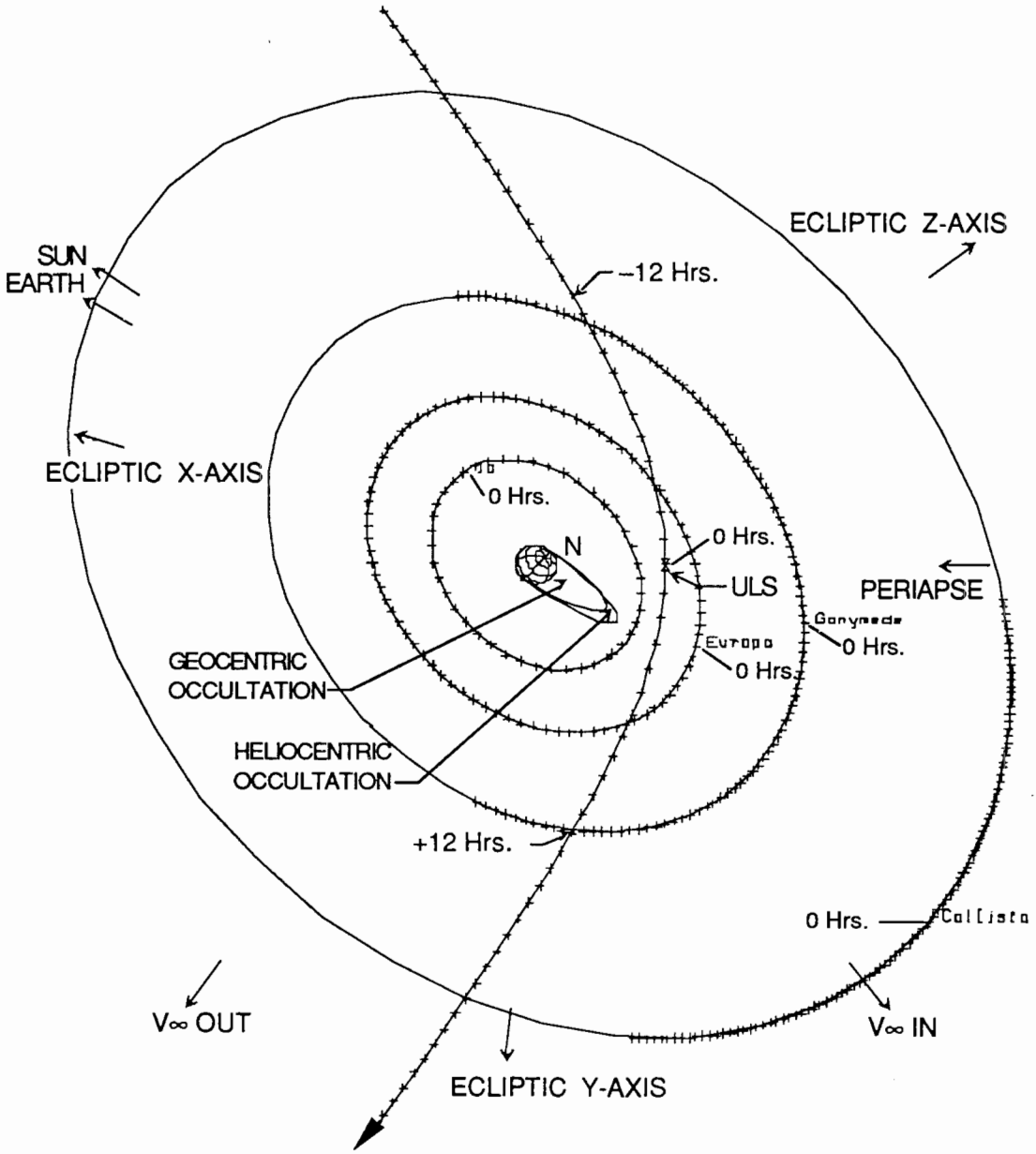
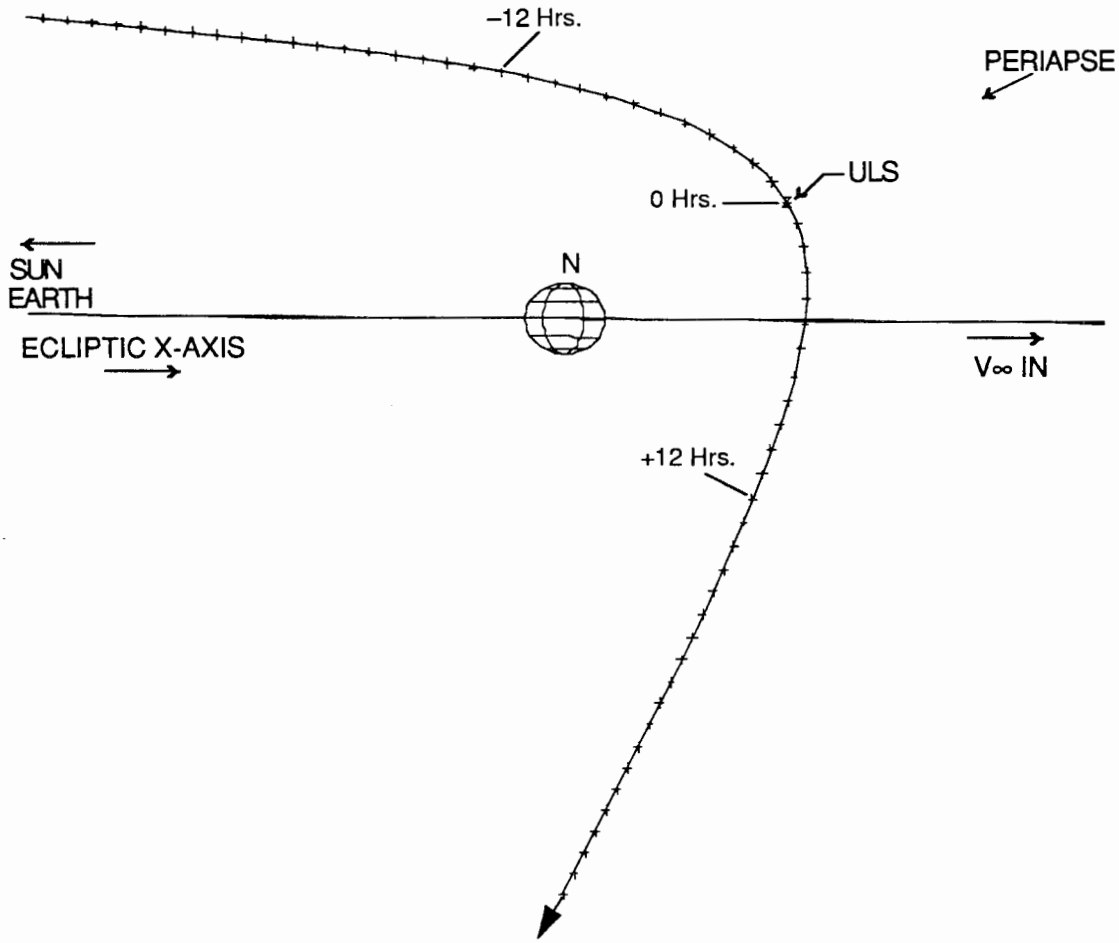


Figure 2-19. Heliocentric Range and Heliographic Latitude of S/C



ULS Jupiter Flyby Presented in the Trajectory Plane.
Satellites Shown at Time of Perijove (0 Hrs. = February 8, 1992 12:04:09 GMT).
Injection Date: October 6, 1990, C_3 = 128.20 Km^2/Sec^2. Radius at Perijove: 6.310 R_J.
All Tic Marks Represent One-Hour Increments.

Figure 2-20. Trajectory Plane View at Jupiter



ULS Jupiter Flyby (Viewed From Jupiter's Equatorial Plane at a Right Angle to the Periapse Vector).
at Time of Perijove (0 Hrs. = February 8, 1992 12:04:09 GMT).
Injection Date: October 6, 1990, C_3 = 128.20 Km^2/Sec^2. Radius at Perijove: 6.310 R_J.
All Tic Marks Represent One-Hour Increments.

Figure 2-21. Trajectory Equatorial View at Jupiter

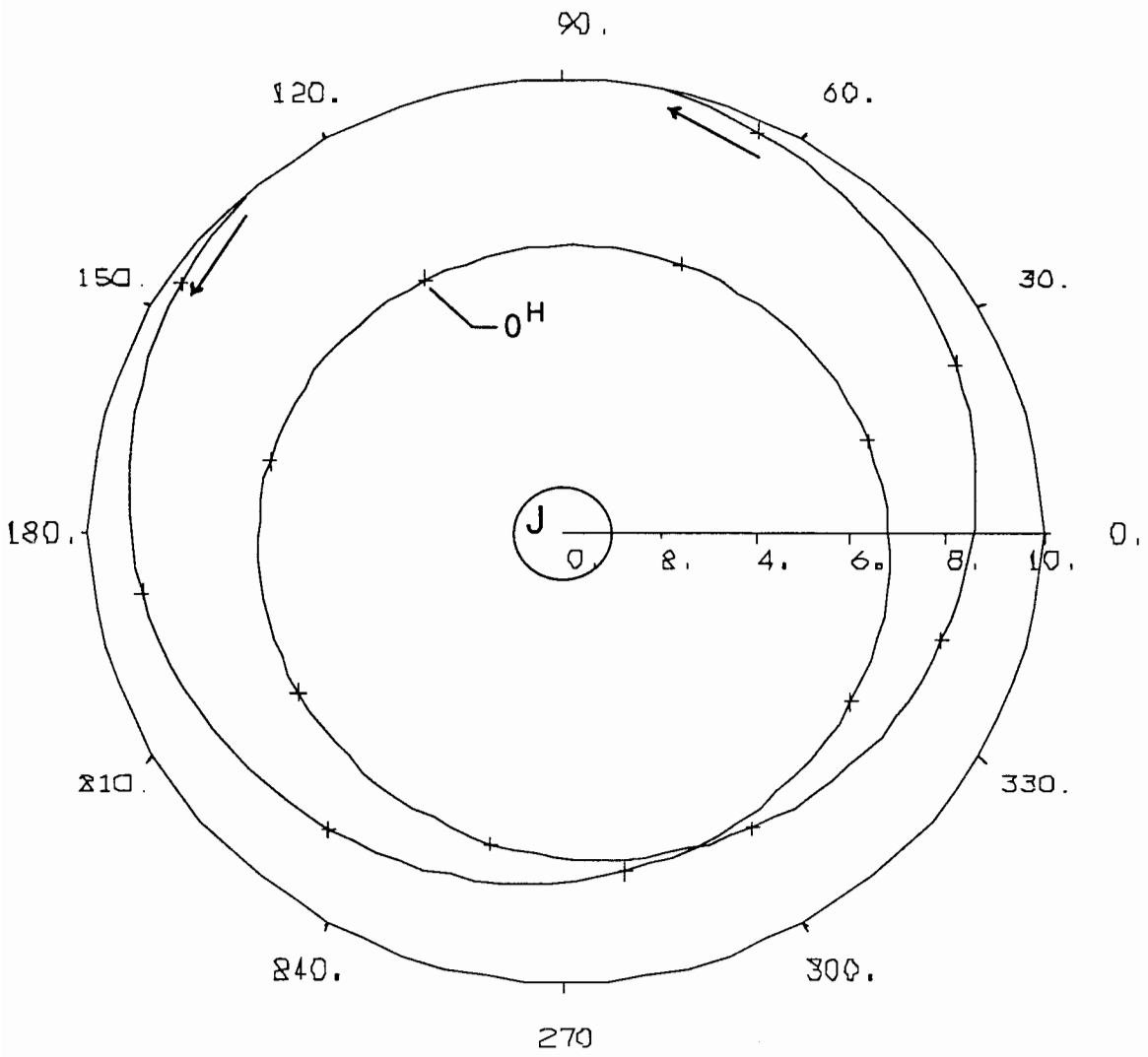
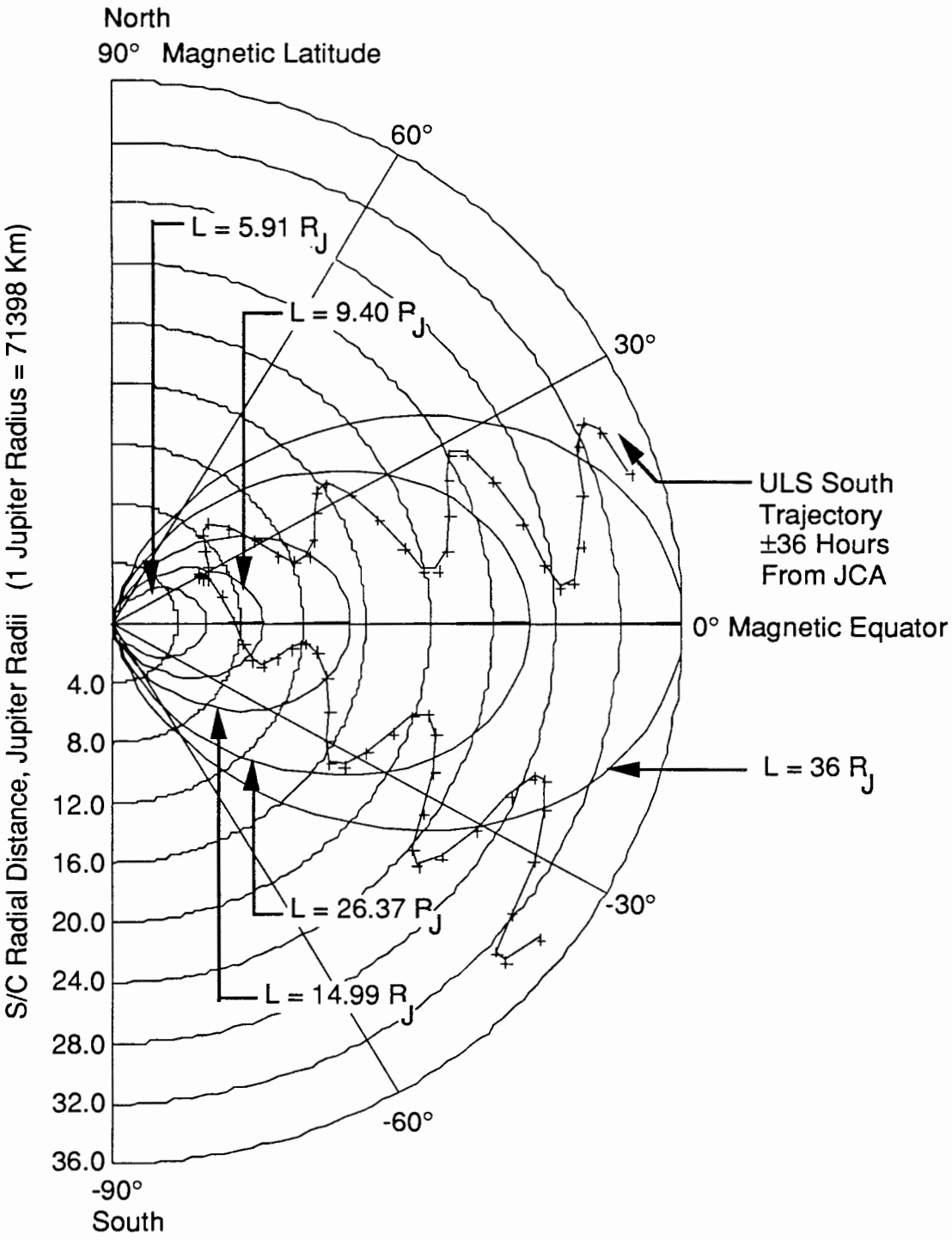
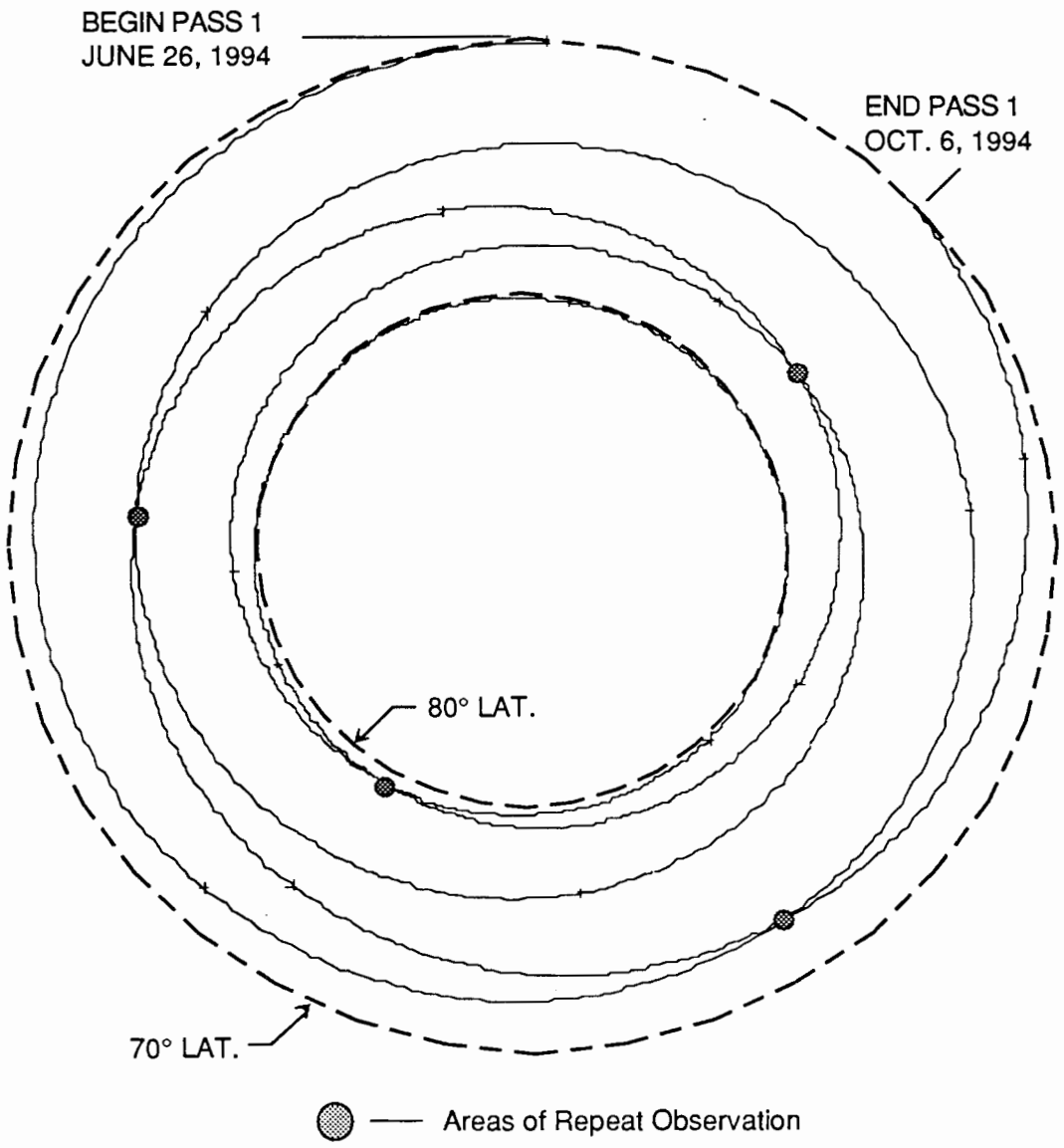


Figure 2-22. System III Longitude Versus Radial Distance at Jupiter



Jupiter Arrival: February 8, 1992 12:04:09 GMT
Tic Marks Represent 1-Hour Increments
L = L-Shells

Figure 2-23. Jupiter Magnetic Field Penetration View



ULS Injection on October 6, 1990, C_3 = 128.20 Km^2/Sec^2
Solar Ground Track for South Polar Pass
Tic Marks Represent 10-Day Increments

Figure 2-24. Solar Ground Track for One Polar Pass

Table 2-7. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, GEOCENTRIC DATA

Date	Modjd	Rt. Asc Wrt Earth	Geocentric Rt. Asc Rate	Declination Wrt Earth	Range Earth Au	Range Rate Wrt Earth	Range Accel. Wrt Earth	Geocentric Declination Rate	Earth Vector Rate
901021.	16.	116.813	0.0177	28.494	0.0921	10.9981	-0.00000053	-0.0031	0.0159
901031.	26.	116.569	-0.0703	28.526	0.1541	10.4671	-0.00000063	0.0097	0.0625
901110.	36.	115.315	-0.1830	28.684	0.2132	10.0383	-0.00000028	0.0209	0.1619
901120.	46.	112.896	-0.2989	28.917	0.2711	10.1244	0.00000054	0.0238	0.2627
901130.	56.	109.446	-0.3823	29.114	0.3318	11.0535	0.00000163	0.0132	0.3343
901210.	66.	105.459	-0.4047	29.146	0.4006	12.9318	0.00000269	-0.0078	0.3535
901220.	76.	101.577	-0.3613	28.955	0.4827	15.6250	0.00000348	-0.0297	0.3175
901230.	86.	98.385	-0.2719	28.576	0.5821	18.8380	0.00000389	-0.0444	0.2429
910109.	96.	96.195	-0.1644	28.098	0.7007	22.2601	0.00000398	-0.0500	0.1534
910119.	106.	95.084	-0.0599	27.599	0.8391	25.6412	0.00000382	-0.0490	0.0722
910129.	116.	94.954	0.0310	27.126	0.9965	28.8200	0.00000352	-0.0454	0.0531
910208.	126.	95.649	0.1055	26.691	1.1714	31.6996	0.00000313	-0.0417	0.1031
910218.	136.	97.010	0.1641	26.287	1.3620	34.2218	0.00000270	-0.0394	0.1523
910228.	146.	98.888	0.2093	25.898	1.5660	36.3580	0.00000224	-0.0388	0.1922
910310.	156.	101.160	0.2436	25.505	1.7812	38.0920	0.00000177	-0.0400	0.2235
910320.	166.	103.731	0.2691	25.094	2.0052	39.4170	0.00000130	-0.0426	0.2474
910330.	176.	106.520	0.2876	24.650	2.2357	40.3327	0.00000082	-0.0463	0.2655
910409.	186.	109.465	0.3006	24.165	2.4703	40.8431	0.00000036	-0.0508	0.2789
910419.	196.	112.516	0.3091	23.633	2.7067	40.9555	-0.00000010	-0.0557	0.2886
910429.	206.	115.635	0.3141	23.050	2.9426	40.6796	-0.00000054	-0.0609	0.2954
910509.	216.	118.790	0.3163	22.415	3.1759	40.0278	-0.00000097	-0.0660	0.2998
910519.	226.	121.955	0.3163	21.730	3.4043	39.0135	-0.00000138	-0.0710	0.3023
910529.	236.	125.109	0.3143	20.996	3.6258	37.6518	-0.00000177	-0.0756	0.3030
910608.	246.	128.237	0.3109	20.219	3.8386	35.9597	-0.00000214	-0.0798	0.3025
910618.	256.	131.323	0.3063	19.401	4.0406	33.9556	-0.00000249	-0.0836	0.3008
910628.	266.	134.359	0.3006	18.549	4.2302	31.6579	-0.00000282	-0.0867	0.2979
910708.	276.	137.332	0.2940	17.669	4.4058	29.0894	-0.00000312	-0.0892	0.2940
910718.	286.	140.235	0.2865	16.768	4.5657	26.2728	-0.00000339	-0.0910	0.2890
910728.	296.	143.060	0.2783	15.851	4.7088	23.2351	-0.00000363	-0.0921	0.2831
910807.	306.	145.798	0.2692	14.928	4.8338	20.0055	-0.00000384	-0.0925	0.2761
910817.	316.	148.441	0.2593	14.004	4.9396	16.6182	-0.00000400	-0.0920	0.2679
910827.	326.	150.980	0.2484	13.090	5.0255	13.1115	-0.00000411	-0.0907	0.2584
910906.	336.	153.405	0.2364	12.195	5.0909	9.5321	-0.00000417	-0.0884	0.2474
910916.	346.	155.704	0.2232	11.326	5.1356	5.9287	-0.00000416	-0.0851	0.2348
910926.	356.	157.864	0.2086	10.495	5.1595	2.3614	-0.00000408	-0.0808	0.2205
911006.	366.	159.870	0.1922	9.713	5.1630	-1.1024	-0.00000392	-0.0754	0.2039
911016.	376.	161.703	0.1740	8.991	5.1471	-4.3841	-0.00000366	-0.0688	0.1851

Table 2-7. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, GEOCENTRIC DATA

Date	Modjd	Rt. Asc Wrt Earth	Geocentric Rt. Asc Rate	Declination Wrt Earth	Range Earth Au	Range Rate Wrt Earth	Range Accel. Wrt Earth	Geocentric Declination Rate	Earth Vector Rate
911026.	386.	163.343	0.1537	8.341	5.1129	-7.3997	-0.00000330	-0.0610	0.1639
911105.	396.	164.768	0.1309	7.776	5.0623	-10.0520	-0.00000282	-0.0518	0.1397
911115.	406.	165.953	0.1057	7.309	4.9977	-12.2359	-0.00000221	-0.0414	0.1127
911125.	416.	166.873	0.0778	6.952	4.9221	-13.8409	-0.00000148	-0.0297	0.0827
911205.	426.	167.501	0.0475	6.718	4.8391	-14.7529	-0.00000061	-0.0169	0.0501
911215.	436.	167.816	0.0151	6.616	4.7532	-14.8623	0.00000038	-0.0033	0.0154
911225.	446.	167.799	-0.0186	6.653	4.6692	-14.0737	0.00000146	0.0108	0.0214
920104.	456.	167.189	-0.0535	6.932	4.5971	-12.1302	0.00000271	0.0250	0.0587
920114.	466.	166.491	-0.0859	7.247	4.5347	-9.2758	0.00000389	0.0378	0.0932
920124.	476.	165.484	-0.1148	7.682	4.4919	-5.3947	0.00000511	0.0488	0.1238
920203.	486.	164.210	-0.1398	8.215	4.4748	-0.2188	0.00000753	0.0574	0.1498
920213.	496.	162.299	-0.2209	8.619	4.4577	-9.3392	0.00000673	0.0208	0.2194
920223.	506.	160.069	-0.2256	8.847	4.4211	-3.2586	0.00000718	0.0238	0.2242
920304.	516.	157.812	-0.2241	9.081	4.4203	2.9468	0.00000711	0.0225	0.2224
920314.	526.	155.622	-0.2122	9.286	4.4547	8.9242	0.00000667	0.0181	0.2102
920324.	536.	153.754	-0.1896	9.269	4.5204	14.2145	0.00000590	0.0122	0.1875
920403.	546.	151.995	-0.1612	9.352	4.6164	18.8907	0.00000490	0.0041	0.1591
920413.	556.	150.546	-0.1281	9.348	4.7369	22.6433	0.00000377	-0.0049	0.1265
920423.	566.	149.439	-0.0931	9.254	4.8761	25.3996	0.00000261	-0.0141	0.0930
920503.	576.	148.683	-0.0583	9.067	5.0283	27.1570	0.00000147	-0.0232	0.0621
920513.	586.	148.267	-0.0253	8.791	5.1879	27.9610	0.00000041	-0.0320	0.0406
920523.	596.	148.168	0.0051	8.430	5.3496	27.8864	-0.00000056	-0.0403	0.0406
920602.	606.	148.357	0.0321	7.987	5.5085	27.0232	-0.00000142	-0.0482	0.0577
920612.	616.	148.800	0.0558	7.468	5.6604	25.4649	-0.00000217	-0.0556	0.0784
920622.	626.	149.462	0.0760	6.877	5.8015	23.3043	-0.00000282	-0.0625	0.0980
920702.	636.	150.309	0.0930	6.219	5.9286	20.6287	-0.00000336	-0.0690	0.1154
920712.	646.	151.312	0.1069	5.498	6.0390	17.5199	-0.00000382	-0.0752	0.1303
920722.	656.	152.438	0.1179	4.717	6.1303	14.0550	-0.00000419	-0.0809	0.1427
920801.	666.	153.662	0.1263	3.881	6.2008	10.3047	-0.00000448	-0.0863	0.1527
920811.	676.	154.956	0.1321	2.993	6.2489	6.3387	-0.00000469	-0.0912	0.1604
920821.	686.	156.295	0.1355	2.058	6.2737	2.2241	-0.00000482	-0.0958	0.1659
920831.	696.	157.657	0.1365	1.078	6.2745	-1.9743	-0.00000488	-0.1000	0.1692
920910.	706.	159.017	0.1351	0.059	6.2509	-6.1897	-0.00000486	-0.1038	0.1704
920920.	716.	160.351	0.1313	-0.996	6.2031	-10.3508	-0.00000476	-0.1071	0.1694
920930.	726.	161.634	0.1249	-2.081	6.1316	-14.3866	-0.00000457	-0.1099	0.1663
921010.	736.	162.840	0.1158	-3.193	6.0373	-18.2209	-0.00000429	-0.1122	0.1611
921020.	746.	163.940	0.1037	-4.323	5.9216	-21.7713	-0.00000391	-0.1138	0.1538

Table 2-7. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, GEOCENTRIC DATA

Date	Modjd	Rt. Asc Wrt Earth	Geocentric Rt. Asc Rate	Declination Wrt Earth	Range Earth Au	Range Rate Wrt Earth	Range Accel. Wrt Earth	Geocentric Declination Rate	Earth Vector Rate
921030.	756.	164.903	0.0884	-5.467	5.7865	-24.9513	-0.00000343	-0.1147	0.1446
921109.	766.	165.697	0.0696	-6.615	5.6343	-27.6700	-0.00000284	-0.1147	0.1339
921119.	776.	166.283	0.0470	-7.757	5.4679	-29.8311	-0.00000214	-0.1136	0.1228
921129.	786.	166.624	0.0204	-8.883	5.2910	-31.3355	-0.00000132	-0.1112	0.1130
921209.	796.	166.678	-0.0102	-9.976	5.1075	-32.0852	-0.00000039	-0.1071	0.1076
921219.	806.	166.407	-0.0447	-11.018	4.9220	-31.9868	0.00000064	-0.1009	0.1100
921229.	816.	165.774	-0.0823	-11.986	4.7398	-30.9607	0.00000175	-0.0923	0.1225
930108.	826.	164.755	-0.1217	-12.854	4.5663	-28.9521	0.00000290	-0.0807	0.1435
930118.	836.	163.341	-0.1609	-13.590	4.4073	-25.9476	0.00000404	-0.0660	0.1698
930128.	846.	161.547	-0.1970	-14.163	4.2684	-21.9898	0.00000509	-0.0481	0.1970
930207.	856.	159.422	-0.2266	-14.544	4.1549	-17.1992	0.00000596	-0.0278	0.2211
930217.	866.	157.048	-0.2462	-14.715	4.0709	-11.7780	0.00000654	-0.0064	0.2382
930227.	876.	154.540	-0.2533	-14.673	4.0195	-6.0025	0.00000677	0.0145	0.2455
930309.	886.	152.028	-0.2467	-14.435	4.0017	-0.1963	0.00000661	0.0326	0.2411
930319.	896.	149.647	-0.2274	-14.035	4.0167	5.3122	0.00000609	0.0464	0.2254
930329.	906.	147.515	-0.1977	-13.526	4.0619	10.2347	0.00000527	0.0545	0.1998
930408.	916.	145.718	-0.1609	-12.964	4.1333	14.3577	0.00000425	0.0570	0.1668
930418.	926.	144.308	-0.1206	-12.404	4.2259	17.5562	0.00000314	0.0542	0.1297
930428.	936.	143.307	-0.0797	-11.894	4.3342	19.7849	0.00000202	0.0472	0.0912
930508.	946.	142.708	-0.0403	-11.471	4.4527	21.0639	0.00000095	0.0369	0.0541
930518.	956.	142.490	-0.0039	-11.162	4.5758	21.4561	-0.00000003	0.0246	0.0249
930528.	966.	142.618	0.0289	-10.984	4.6990	21.0487	-0.00000090	0.0108	0.0304
930607.	976.	143.054	0.0577	-10.948	4.8176	19.9391	-0.00000165	-0.0036	0.0568
930617.	986.	143.759	0.0826	-11.058	4.9281	18.2260	-0.00000230	-0.0184	0.0831
930627.	996.	144.694	0.1038	-11.316	5.0272	16.0039	-0.00000283	-0.0332	0.1071
930707.	1006.	145.823	0.1215	-11.722	5.1121	13.3605	-0.00000327	-0.0479	0.1282
930717.	1016.	147.114	0.1361	-12.273	5.1808	10.3777	-0.00000362	-0.0623	0.1469
930727.	1026.	148.535	0.1477	-12.967	5.2315	7.1311	-0.00000388	-0.0765	0.1630
930806.	1036.	150.059	0.1567	-13.802	5.2628	3.6895	-0.00000407	-0.0905	0.1771
930816.	1046.	151.660	0.1631	-14.775	5.2739	0.1183	-0.00000418	-0.1042	0.1890
930826.	1056.	153.312	0.1670	-15.886	5.2641	-3.5179	-0.00000422	-0.1178	0.1992
930905.	1066.	154.992	0.1686	-17.132	5.2332	-7.1580	-0.00000419	-0.1314	0.2079
930915.	1076.	156.676	0.1677	-18.513	5.1815	-10.7426	-0.00000409	-0.1449	0.2151
930925.	1086.	158.338	0.1642	-20.030	5.1094	-14.2091	-0.00000392	-0.1584	0.2211
931005.	1096.	159.951	0.1578	-21.682	5.0177	-17.4959	-0.00000368	-0.1720	0.2260
931015.	1106.	161.484	0.1482	-23.470	4.9078	-20.5384	-0.00000336	-0.1857	0.2301
931025.	1116.	162.902	0.1348	-25.397	4.7811	-23.2724	-0.00000296	-0.1995	0.2337

Table 2-7. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, GEOCENTRIC DATA

Date	Modjd	Rt. Asc Wrt Earth	Geocentric Rt. Asc Rate	Declination Wrt Earth	Range Earth Au	Range Rate Wrt Earth	Range Accel. Wrt Earth	Geocentric Declination Rate	Earth Vector Rate
931104.	1126.	164.165	0.1169	-27.461	4.6396	-25.6314	-0.00000249	-0.2132	0.2371
931114.	1136.	165.223	0.0936	-29.660	4.4859	-27.5473	-0.00000194	-0.2267	0.2408
931124.	1146.	166.016	0.0638	-31.992	4.3224	-28.9541	-0.00000131	-0.2395	0.2455
931204.	1156.	166.471	0.0259	-34.446	4.1525	-29.7879	-0.00000061	-0.2510	0.2519
931214.	1166.	166.501	-0.0218	-37.003	3.9796	-29.9908	0.00000015	-0.2600	0.2606
931224.	1176.	165.998	-0.0809	-39.632	3.8074	-29.5153	0.00000096	-0.2648	0.2720
940103.	1186.	164.841	-0.1528	-42.279	3.6400	-28.3319	0.00000178	-0.2633	0.2865
940113.	1196.	162.898	-0.2377	-44.866	3.4815	-26.4361	0.00000260	-0.2522	0.3033
940123.	1206.	160.052	-0.3327	-47.281	3.3359	-23.8611	0.00000335	-0.2283	0.3210
940202.	1216.	156.237	-0.4297	-49.379	3.2070	-20.6869	0.00000397	-0.1885	0.3373
940212.	1226.	151.501	-0.5141	-50.996	3.0979	-17.0470	0.00000442	-0.1323	0.3496
940222.	1236.	146.061	-0.5671	-51.981	3.0107	-13.1250	0.00000462	-0.0630	0.3549
940304.	1246.	140.316	-0.5732	-52.238	2.9464	-9.1457	0.00000455	0.0115	0.3512
940314.	1256.	134.763	-0.5297	-51.769	2.9047	-5.3464	0.00000420	0.0804	0.3375
940324.	1266.	129.851	-0.4481	-50.679	2.8839	-1.9473	0.00000363	0.1346	0.3142
940403.	1276.	125.865	-0.3473	-49.143	2.8811	0.8790	0.00000289	0.1693	0.2833
940413.	1286.	122.912	-0.2439	-47.359	2.8927	3.0201	0.00000206	0.1843	0.2475
940423.	1296.	120.961	-0.1482	-45.514	2.9146	4.4291	0.00000121	0.1825	0.2100
940503.	1306.	119.908	-0.0645	-43.751	2.9425	5.1166	0.00000039	0.1681	0.1744
940513.	1316.	119.629	0.0065	-42.181	2.9724	5.1336	-0.00000034	0.1447	0.1448
940523.	1326.	120.000	0.0659	-40.876	3.0006	4.5579	-0.00000097	0.1155	0.1258
940602.	1336.	120.914	0.1155	-39.884	3.0241	3.4817	-0.00000150	0.0826	0.1212
940612.	1346.	122.284	0.1574	-39.232	3.0401	2.0022	-0.00000191	0.0473	0.1308
940622.	1356.	124.043	0.1934	-38.941	3.0466	0.2168	-0.00000221	0.0106	0.1508
940702.	1366.	126.137	0.2249	-39.023	3.0422	-1.7796	-0.00000240	-0.0271	0.1768
940712.	1376.	128.531	0.2537	-39.487	3.0258	-3.8951	-0.00000248	-0.0658	0.2066
940722.	1386.	131.206	0.2810	-40.343	2.9971	-6.0419	-0.00000247	-0.1056	0.2388
940801.	1396.	134.153	0.3086	-41.602	2.9561	-8.1325	-0.00000235	-0.1465	0.2733
940811.	1406.	137.385	0.3383	-43.278	2.9035	-10.0819	-0.00000214	-0.1889	0.3104
940821.	1416.	140.933	0.3725	-45.385	2.8401	-11.8036	-0.00000183	-0.2328	0.3502
940831.	1426.	144.861	0.4149	-47.938	2.7677	-13.2126	-0.00000142	-0.2781	0.3932
940910.	1436.	149.277	0.4713	-50.949	2.6883	-14.2236	-0.00000091	-0.3242	0.4396
940920.	1446.	154.366	0.5517	-54.420	2.6043	-14.7548	-0.00000031	-0.3697	0.4896
940930.	1456.	160.450	0.6745	-58.330	2.5189	-14.7334	0.00000037	-0.4112	0.5427
941010.	1466.	168.112	0.8752	-62.608	2.4353	-14.1045	0.00000109	-0.4418	0.5978
941020.	1476.	178.441	1.2236	-67.081	2.3572	-12.8435	0.00000182	-0.4463	0.6529
941030.	1486.	193.463	1.8342	-71.340	2.2881	-10.9733	0.00000249	-0.3910	0.7052

Table 2-7. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, GEOCENTRIC DATA

Date	Modjd	Rt. Asc Wrt Earth	Geocentric Rt. Asc Rate	Declination Wrt Earth	Range Earth Au	Range Rate Wrt Earth	Range Accel. Wrt Earth	Geocentric Declination Rate	Earth Vector Rate
941109.	1496.	216.054	2.6942	-74.490	2.2315	-8.5788	0.00000302	-0.2125	0.7511
941119.	1506.	245.614	3.0272	-75.080	2.1898	-5.8153	0.00000333	0.1093	0.7870
941129.	1516.	272.826	2.3134	-72.393	2.1646	-2.9020	0.00000336	0.4080	0.8100
941209.	1526.	291.764	1.5213	-67.385	2.1560	-0.0966	0.00000308	0.5730	0.8189
941219.	1536.	304.310	1.0338	-61.241	2.1628	2.3431	0.00000252	0.6450	0.8145
941229.	1546.	313.137	0.7567	-54.642	2.1820	4.2008	0.00000175	0.6692	0.7997
950108.	1556.	319.816	0.5927	-47.936	2.2099	5.3299	0.00000085	0.6692	0.7781
950118.	1566.	325.190	0.4896	-41.295	2.2420	5.6655	-0.00000007	0.6579	0.7538
950128.	1576.	329.724	0.4214	-34.791	2.2738	5.2217	-0.00000094	0.6427	0.7300
950207.	1586.	333.689	0.3745	-28.438	2.3010	4.0805	-0.00000168	0.6284	0.7095
950217.	1596.	337.261	0.3417	-22.210	2.3199	2.3779	-0.00000223	0.6179	0.6942
950227.	1606.	340.555	0.3187	-16.061	2.3277	0.2929	-0.00000256	0.6129	0.6852
950309.	1616.	343.660	0.3034	-9.929	2.3229	-1.9688	-0.00000263	0.6145	0.6833
950319.	1626.	346.644	0.2943	-3.748	2.3051	-4.1848	-0.00000245	0.6230	0.6887
950329.	1636.	349.564	0.2906	2.554	2.2751	-6.1352	-0.00000202	0.6385	0.7014
950408.	1646.	352.472	0.2919	9.044	2.2351	-7.6149	-0.00000137	0.6605	0.7207
950418.	1656.	355.418	0.2983	15.783	2.1883	-8.4516	-0.00000054	0.6880	0.7455
950428.	1666.	358.456	0.3104	22.815	2.1390	-8.5180	0.00000040	0.7188	0.7737
950508.	1676.	1.650	0.3297	30.159	2.0916	-7.7483	0.00000138	0.7497	0.8021
950518.	1686.	5.084	0.3593	37.796	2.0511	-6.1513	0.00000230	0.7765	0.8268
950528.	1696.	8.891	0.4055	45.658	2.0219	-3.8227	0.00000306	0.7940	0.8431
950607.	1706.	13.294	0.4819	53.625	2.0080	-0.9452	0.00000356	0.7966	0.8463
950617.	1716.	18.731	0.6204	61.524	2.0116	2.2290	0.00000374	0.7794	0.8336
950627.	1726.	26.183	0.9090	69.129	2.0337	5.4141	0.00000359	0.7365	0.8046
950707.	1736.	38.324	1.6445	76.118	2.0736	8.3419	0.00000315	0.6508	0.7611
950717.	1746.	63.954	3.8800	81.742	2.1292	10.7981	0.00000251	0.4352	0.7071
950727.	1756.	117.208	5.6737	83.555	2.1972	12.6478	0.00000176	-0.1142	0.6470
950806.	1766.	157.387	2.5137	80.515	2.2740	13.8316	0.00000098	-0.4134	0.5852
950816.	1776.	174.778	1.2091	76.166	2.3557	14.3525	0.00000023	-0.4377	0.5246
950826.	1786.	184.261	0.7569	71.939	2.4386	14.2558	-0.00000044	-0.4037	0.4669
950905.	1796.	190.736	0.5617	68.133	2.5193	13.6128	-0.00000103	-0.3566	0.4134
950915.	1806.	195.803	0.4617	64.817	2.5949	12.5089	-0.00000151	-0.3066	0.3641
950925.	1816.	200.105	0.4033	62.001	2.6631	11.0359	-0.00000188	-0.2566	0.3189
951005.	1826.	203.937	0.3654	59.681	2.7219	9.2896	-0.00000214	-0.2075	0.2776

Table 2-8. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, SUN-RELATED DATA

Date	Earth Sun S/C	Sun S/C Earth	Sun Earth S/C	Helioc. Range Au	Helioc. Range Rate	Helioc. Velocity Magnitude	Heliographic Latitude S/C	Helioc. Rt. Asc S/C	Helioc. Ecliptic Lat	Solar Longitude Wrt Earth
901021.	5.25	81.56	93.19	1.0049	3.8056	40.8337	5.60	137.19	0.66	5.271
901031.	8.30	68.41	103.29	1.0392	7.9682	40.1142	4.69	150.21	1.06	8.324
901110.	10.21	55.45	114.34	1.0956	11.4296	39.0033	3.64	162.10	1.39	10.229
901120.	10.75	42.82	126.44	1.1696	14.0939	37.6654	2.58	172.64	1.63	10.751
901130.	9.88	30.68	139.43	1.2569	16.0273	36.2397	1.58	181.80	1.79	9.871
901210.	7.77	19.41	152.82	1.3536	17.3659	34.8209	0.68	189.71	1.89	7.711
901220.	4.66	9.52	165.82	1.4567	18.2530	33.4630	-0.10	196.52	1.95	4.432
901230.	1.99	3.36	174.65	1.5638	18.8100	32.1918	-0.78	202.42	1.98	0.211
910109.	5.43	7.63	166.95	1.6735	19.1307	31.0156	-1.36	207.56	1.99	355.198
910119.	10.88	12.79	156.33	1.7845	19.2840	29.9335	-1.86	212.06	1.99	349.535
910129.	16.98	16.78	146.23	1.8960	19.3194	28.9402	-2.29	216.03	1.97	343.333
910208.	23.54	19.65	136.80	2.0075	19.2719	28.0280	-2.67	219.57	1.95	336.686
910218.	30.45	21.57	127.98	2.1185	19.1667	27.1892	-3.00	222.73	1.92	329.684
910228.	37.64	22.72	119.64	2.2288	19.0214	26.4160	-3.29	225.59	1.89	322.395
910310.	45.05	23.24	111.71	2.3382	18.8487	25.7016	-3.54	228.17	1.86	314.880
910320.	52.65	23.25	104.10	2.4465	18.6578	25.0395	-3.77	230.53	1.83	307.194
910330.	60.39	22.85	96.76	2.5537	18.4551	24.4241	-3.97	232.69	1.80	299.379
910409.	68.25	22.12	89.64	2.6596	18.2454	23.8506	-4.15	234.68	1.77	291.468
910419.	76.20	21.12	82.68	2.7644	18.0322	23.3146	-4.31	236.51	1.74	283.486
910429.	84.24	19.90	75.86	2.8679	17.8178	22.8123	-4.45	238.22	1.71	275.451
910509.	92.34	18.52	69.14	2.9702	17.6042	22.3405	-4.58	239.80	1.69	267.377
910519.	100.51	16.99	62.51	3.0713	17.3924	21.8961	-4.70	241.28	1.66	259.262
910529.	108.73	15.35	55.92	3.1711	17.1835	21.4768	-4.81	242.67	1.63	251.107
910608.	117.00	13.63	49.37	3.2698	16.9782	21.0801	-4.91	243.98	1.60	242.907
910618.	125.32	11.84	42.84	3.3672	16.7767	20.7042	-5.01	245.21	1.58	234.656
910628.	133.70	10.01	36.30	3.4636	16.5794	20.3472	-5.09	246.37	1.55	226.340
910708.	142.13	8.14	29.73	3.5588	16.3866	20.0077	-5.17	247.47	1.53	217.955
910718.	150.62	6.27	23.11	3.6529	16.1981	19.6841	-5.24	248.51	1.51	209.488
910728.	159.16	4.40	16.44	3.7459	16.0141	19.3753	-5.31	249.50	1.48	200.933
910807.	167.75	2.55	9.70	3.8378	15.8346	19.0802	-5.37	250.44	1.46	192.285
910817.	176.25	0.77	2.98	3.9288	15.6595	18.7976	-5.43	251.34	1.44	183.543
910827.	174.50	1.10	4.40	4.0187	15.4886	18.5268	-5.49	252.20	1.42	174.705
910906.	165.77	2.79	11.44	4.1077	15.3220	18.2669	-5.54	253.02	1.40	165.780
910916.	156.86	4.41	18.73	4.1957	15.1594	18.0172	-5.58	253.80	1.38	156.766
910926.	147.85	5.94	26.22	4.2828	15.0009	17.7770	-5.63	254.56	1.36	147.675
911006.	138.75	7.34	33.92	4.3690	14.8462	17.5456	-5.67	255.28	1.34	138.512
911016.	129.57	8.59	41.85	4.4543	14.6952	17.3225	-5.71	255.98	1.32	129.291

Table 2-8. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, SUN-RELATED DATA

Date	Earth Sun S/C	Sun S/C Earth	Sun Earth S/C	Helioc. Range Au	Helioc. Range Rate	Helioc. Velocity Magnitude	Heliographic Latitude S/C	Helioc. Rt. Asc S/C	Helioc. Ecliptic Lat	Solar Longitude Wrt Earth
911026.	120.30	9.67	50.04	4.5388	14.5478	17.1073	-5.75	256.65	1.31	120.010
911105.	110.95	10.54	58.51	4.6224	14.4039	16.8994	-5.78	257.30	1.29	110.678
911115.	101.53	11.18	67.29	4.7051	14.2634	16.6984	-5.82	257.92	1.27	101.301
911125.	92.04	11.56	76.40	4.7871	14.1261	16.5039	-5.85	258.52	1.26	91.875
911205.	82.49	11.65	85.86	4.8683	13.9919	16.3155	-5.88	259.11	1.24	82.403
911215.	72.89	11.42	95.69	4.9488	13.8608	16.1330	-5.91	259.67	1.23	72.888
911225.	63.26	10.84	105.90	5.0284	13.7325	15.9560	-5.93	260.22	1.21	63.328
920104.	53.36	9.88	116.75	5.1156	13.7422	15.8877	-5.96	260.51	1.19	53.491
920114.	43.68	8.62	127.70	5.1949	13.7077	15.7852	-5.99	261.02	1.18	43.843
920124.	34.00	7.04	138.97	5.2741	13.7543	15.7387	-6.01	261.51	1.16	34.163
920203.	24.31	5.20	150.48	5.3545	14.2750	16.0126	-6.03	261.98	1.14	24.454
920213.	14.34	3.14	162.52	5.4074	0.0232	8.7311	-6.34	262.13	0.84	14.429
920223.	4.29	0.96	174.75	5.4070	-0.1354	8.2905	-6.85	262.18	0.33	4.317
920304.	5.70	1.28	173.03	5.4059	-0.2418	8.2114	-7.35	262.25	-0.17	354.259
920314.	15.62	3.45	160.94	5.4042	-0.3461	8.1845	-7.85	262.32	-0.66	344.259
920324.	25.32	5.41	149.26	5.4015	-0.5020	8.0994	-8.43	262.57	-1.24	334.490
920403.	35.12	7.16	137.72	5.3983	-0.6077	8.1114	-8.92	262.65	-1.73	324.637
920413.	44.86	8.59	126.55	5.3945	-0.7136	8.1257	-9.41	262.74	-2.21	314.864
920423.	54.54	9.67	115.78	5.3901	-0.8196	8.1423	-9.90	262.83	-2.70	305.172
920503.	64.17	10.40	105.43	5.3850	-0.9257	8.1612	-10.39	262.91	-3.19	295.559
920513.	73.74	10.78	95.48	5.3794	-1.0319	8.1824	-10.88	263.00	-3.68	286.016
920523.	83.26	10.83	85.91	5.3731	-1.1383	8.2059	-11.37	263.09	-4.17	276.536
920602.	92.73	10.60	76.67	5.3662	-1.2449	8.2316	-11.86	263.18	-4.66	267.104
920612.	102.16	10.10	67.74	5.3587	-1.3517	8.2597	-12.36	263.27	-5.16	257.702
920622.	111.55	9.38	59.07	5.3506	-1.4586	8.2900	-12.85	263.36	-5.65	248.316
920702.	120.91	8.46	50.63	5.3419	-1.5658	8.3227	-13.35	263.45	-6.15	238.929
920712.	130.21	7.39	42.40	5.3325	-1.6733	8.3576	-13.85	263.54	-6.65	229.526
920722.	139.46	6.18	34.36	5.3226	-1.7809	8.3948	-14.35	263.64	-7.15	220.094
920801.	148.59	4.89	26.51	5.3120	-1.8889	8.4343	-14.86	263.73	-7.65	210.621
920811.	157.47	3.56	18.97	5.3007	-1.9972	8.4762	-15.36	263.82	-8.15	201.101
920821.	165.59	2.30	12.11	5.2889	-2.1058	8.5203	-15.87	263.92	-8.66	191.531
920831.	170.62	1.50	7.88	5.2764	-2.2147	8.5667	-16.38	264.02	-9.17	181.907
920910.	167.73	1.96	10.31	5.2633	-2.3239	8.6154	-16.89	264.11	-9.68	172.229
920920.	160.07	3.16	16.77	5.2496	-2.4335	8.6665	-17.40	264.21	-10.19	162.506
920930.	151.18	4.52	24.31	5.2352	-2.5435	8.7198	-17.92	264.31	-10.71	152.741
921010.	141.88	5.86	32.26	5.2202	-2.6539	8.7755	-18.44	264.41	-11.22	142.937
921020.	132.39	7.13	40.48	5.2045	-2.7647	8.8336	-18.96	264.51	-11.75	133.102

Table 2-8. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, SUN-RELATED DATA

Date	Earth Sun S/C	Sun S/C Earth	Sun Earth S/C	Helioc. Range Au	Helioc. Range Rate	Helioc. Velocity Magnitude	Heliographic Latitude S/C	Helioc. Rt. Asc S/C	Helioc. Ecliptic Lat	Solar Longitude Wrt Earth
921030.	122.79	8.29	48.92	5.1882	-2.8760	8.8939	-19.49	264.61	-12.27	123.241
921109.	113.12	9.30	57.58	5.1713	-2.9877	8.9567	-20.02	264.72	-12.80	113.355
921119.	103.40	10.13	66.47	5.1537	-3.0999	9.0218	-20.55	264.82	-13.33	103.445
921129.	93.67	10.72	75.61	5.1355	-3.2127	9.0892	-21.09	264.93	-13.87	93.513
921209.	83.94	11.06	85.00	5.1166	-3.3259	9.1591	-21.63	265.04	-14.41	83.556
921219.	74.25	11.09	94.66	5.0971	-3.4397	9.2314	-22.18	265.15	-14.95	73.574
921229.	64.64	10.81	104.55	5.0769	-3.5540	9.3061	-22.72	265.26	-15.50	63.566
930108.	55.17	10.18	114.65	5.0560	-3.6689	9.3832	-23.28	265.37	-16.05	53.536
930118.	45.93	9.23	124.84	5.0345	-3.7845	9.4628	-23.83	265.49	-16.61	43.488
930128.	37.10	8.00	134.90	5.0123	-3.9006	9.5449	-24.40	265.61	-17.17	33.427
930207.	29.04	6.62	144.34	4.9895	-4.0175	9.6295	-24.96	265.73	-17.73	23.365
930217.	22.54	5.34	152.12	4.9659	-4.1350	9.7166	-25.54	265.85	-18.30	13.318
930227.	19.18	4.64	156.18	4.9417	-4.2532	9.8063	-26.12	265.97	-18.88	3.299
930309.	20.46	4.98	154.56	4.9168	-4.3721	9.8987	-26.70	266.10	-19.46	353.323
930319.	25.62	6.15	148.22	4.8912	-4.4918	9.9936	-27.29	266.23	-20.05	343.405
930329.	32.80	7.65	139.54	4.8649	-4.6122	10.0912	-27.88	266.36	-20.65	333.558
930408.	40.89	9.12	129.98	4.8379	-4.7335	10.1915	-28.49	266.49	-21.25	323.792
930418.	49.39	10.39	120.22	4.8102	-4.8556	10.2945	-29.10	266.63	-21.86	314.108
930428.	58.06	11.37	110.57	4.7818	-4.9785	10.4004	-29.71	266.77	-22.47	304.507
930508.	66.79	12.02	101.18	4.7527	-5.1023	10.5091	-30.33	266.92	-23.09	294.986
930518.	75.51	12.36	92.13	4.7229	-5.2270	10.6207	-30.97	267.07	-23.72	285.536
930528.	84.18	12.39	83.43	4.6923	-5.3526	10.7352	-31.60	267.22	-24.36	276.143
930607.	92.75	12.15	75.10	4.6611	-5.4792	10.8527	-32.25	267.38	-25.01	266.793
930617.	101.19	11.67	67.14	4.6290	-5.6068	10.9733	-32.91	267.54	-25.66	257.473
930627.	109.46	10.99	59.55	4.5963	-5.7354	11.0971	-33.57	267.70	-26.33	248.165
930707.	117.48	10.16	52.36	4.5628	-5.8651	11.2241	-34.25	267.88	-27.00	238.851
930717.	125.16	9.23	45.61	4.5285	-5.9958	11.3543	-34.93	268.05	-27.68	229.520
930727.	132.33	8.25	39.42	4.4935	-6.1276	11.4880	-35.62	268.23	-28.38	220.161
930806.	138.73	7.30	33.96	4.4578	-6.2606	11.6250	-36.33	268.42	-29.08	210.762
930816.	143.97	6.48	29.54	4.4212	-6.3947	11.7657	-37.05	268.62	-29.80	201.317
930826.	147.47	5.92	26.60	4.3839	-6.5300	11.9100	-37.77	268.82	-30.52	191.826
930905.	148.66	5.75	25.59	4.3458	-6.6665	12.0581	-38.51	269.03	-31.26	182.292
930915.	147.27	6.02	26.70	4.3069	-6.8042	12.2100	-39.27	269.25	-32.02	172.712
930925.	143.62	6.69	29.69	4.2672	-6.9433	12.3660	-40.03	269.47	-32.78	163.096
931005.	138.31	7.62	34.07	4.2267	-7.0836	12.5260	-40.81	269.71	-33.56	153.447
931015.	131.90	8.70	39.40	4.1854	-7.2252	12.6904	-41.61	269.96	-34.36	143.776
931025.	124.81	9.83	45.36	4.1432	-7.3682	12.8591	-42.42	270.21	-35.17	134.084

Table 2-8. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, SUN-RELATED DATA

Date	Earth Sun S/C	Sun S/C Earth	Sun Earth S/C	Helioc. Range Au	Helioc. Range Rate	Helioc. Velocity Magnitude	Heliographic Latitude S/C	Helioc. Rt. Asc S/C	Helioc. Ecliptic Lat	Solar Longitude Wrt Earth
931104.	117.30	10.95	51.75	4.1002	-7.5125	13.0325	-43.25	270.49	-36.00	124.377
931114.	109.58	11.99	58.43	4.0564	-7.6582	13.2106	-44.09	270.77	-36.84	114.659
931124.	101.76	12.92	65.32	4.0118	-7.8053	13.3935	-44.95	271.07	-37.70	104.932
931204.	93.97	13.70	72.34	3.9663	-7.9538	13.5817	-45.83	271.38	-38.59	95.196
931214.	86.30	14.29	79.41	3.9199	-8.1037	13.7751	-46.74	271.72	-39.49	85.451
931224.	78.88	14.68	86.43	3.8727	-8.2550	13.9741	-47.66	272.07	-40.41	75.698
940103.	71.84	14.87	93.29	3.8246	-8.4078	14.1788	-48.60	272.44	-41.35	65.943
940113.	65.32	14.87	99.81	3.7755	-8.5619	14.3896	-49.57	272.84	-42.32	56.186
940123.	59.51	14.73	105.76	3.7256	-8.7174	14.6066	-50.56	273.27	-43.31	46.439
940202.	54.65	14.51	110.84	3.6749	-8.8743	14.8303	-51.57	273.72	-44.33	36.715
940212.	50.97	14.33	114.70	3.6231	-9.0324	15.0608	-52.61	274.22	-45.38	27.032
940222.	48.69	14.29	117.02	3.5705	-9.1918	15.2985	-53.68	274.75	-46.45	17.402
940304.	47.95	14.47	117.57	3.5170	-9.3524	15.5438	-54.78	275.32	-47.56	7.851
940314.	48.74	14.91	116.35	3.4625	-9.5140	15.7971	-55.92	275.95	-48.70	358.401
940324.	50.89	15.56	113.55	3.4071	-9.6765	16.0588	-57.08	276.64	-49.87	349.074
940403.	54.13	16.33	109.54	3.3507	-9.8398	16.3292	-58.28	277.39	-51.08	339.887
940413.	58.16	17.12	104.72	3.2934	-10.0037	16.6089	-59.51	278.23	-52.33	330.860
940423.	62.71	17.85	99.43	3.2352	-10.1680	16.8984	-60.79	279.17	-53.61	322.014
940503.	67.55	18.46	93.99	3.1760	-10.3323	17.1982	-62.10	280.22	-54.94	313.362
940513.	72.49	18.92	88.59	3.1158	-10.4963	17.5089	-63.46	281.42	-56.32	304.921
940523.	77.37	19.22	83.41	3.0547	-10.6595	17.8312	-64.85	282.78	-57.74	296.716
940602.	82.05	19.40	78.55	2.9927	-10.8216	18.1656	-66.29	284.36	-59.22	288.774
940612.	86.41	19.47	74.11	2.9297	-10.9818	18.5130	-67.77	286.22	-60.74	281.132
940622.	90.35	19.49	70.16	2.8658	-11.1394	18.8741	-69.29	288.42	-62.32	273.854
940702.	93.78	19.48	66.74	2.8011	-11.2935	19.2497	-70.85	291.07	-63.96	267.030
940712.	96.60	19.50	63.90	2.7354	-11.4429	19.6406	-72.43	294.33	-65.65	260.797
940722.	98.78	19.57	61.65	2.6689	-11.5865	20.0479	-74.03	298.40	-67.39	255.348
940801.	100.26	19.75	60.00	2.6016	-11.7225	20.4724	-75.60	303.60	-69.18	250.990
940811.	101.05	20.04	58.92	2.5335	-11.8490	20.9151	-77.11	310.37	-71.00	248.144
940821.	101.19	20.45	58.36	2.4647	-11.9638	21.3772	-78.46	319.26	-72.83	247.374
940831.	100.77	21.00	58.24	2.3953	-12.0639	21.8595	-79.52	330.84	-74.64	249.229
940910.	99.90	21.66	58.45	2.3254	-12.1460	22.3631	-80.11	345.17	-76.33	253.792
940920.	98.74	22.41	58.85	2.2551	-12.2060	22.8890	-80.01	1.17	-77.79	259.968
940930.	97.48	23.22	59.30	2.1845	-12.2388	23.4379	-79.11	16.65	-78.80	265.586
941010.	96.33	24.05	59.62	2.1138	-12.2385	24.0105	-77.46	29.80	-79.10	268.843
941020.	95.50	24.87	59.63	2.0432	-12.1978	24.6070	-75.17	40.15	-78.46	269.253
941030.	95.22	25.61	59.17	1.9730	-12.1080	25.2271	-72.34	48.06	-76.84	267.203

Table 2-8. (Continued) ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, SUN-RELATED DATA

Date	Earth Sun S/C	Sun S/C Earth	Sun Earth S/C	Helioc. Range Au	Helioc. Range Rate	Helioc. Velocity Magnitude	Heliographic Latitude S/C	Helioc. Rt. Asc S/C	Helioc. Ecliptic Lat	Solar Longitude Wrt Earth
941109.	95.71	26.21	58.08	1.9034	-11.9589	25.8700	-69.06	54.14	-74.37	263.288
941119.	97.14	26.61	56.25	1.8350	-11.7385	26.5337	-65.35	58.88	-71.20	258.020
941129.	99.68	26.69	53.63	1.7680	-11.4328	27.2150	-61.23	62.67	-67.44	251.774
941209.	103.41	26.38	50.21	1.7031	-11.0262	27.9088	-56.70	65.78	-63.16	244.812
941219.	108.36	25.58	46.06	1.6409	-10.5016	28.6079	-51.76	68.37	-58.40	237.322
941229.	114.52	24.21	41.28	1.5821	-9.8413	29.3020	-46.38	70.60	-53.16	229.430
950108.	121.81	22.22	35.97	1.5275	-9.0287	29.9778	-40.57	72.55	-47.44	221.235
950118.	130.12	19.61	30.28	1.4781	-8.0501	30.6185	-34.32	74.29	-41.27	212.814
950128.	139.27	16.41	24.31	1.4348	-6.8980	31.2038	-27.64	75.88	-34.65	204.225
950207.	149.02	12.74	18.23	1.3987	-5.5748	31.7110	-20.56	77.36	-27.62	195.527
950217.	158.87	8.83	12.30	1.3708	-4.0955	32.1169	-13.13	78.77	-20.24	186.766
950227.	167.21	5.40	7.38	1.3517	-2.4902	32.3999	-5.45	80.14	-12.59	177.994
950309.	168.25	4.99	6.75	1.3421	-0.8031	32.5435	2.41	81.51	-4.76	169.254
950319.	160.55	8.27	11.18	1.3425	0.9112	32.5388	10.32	82.90	3.12	160.597
950329.	150.48	12.49	17.04	1.3526	2.5946	32.3860	18.16	84.36	10.95	152.066
950408.	140.18	16.67	23.15	1.3723	4.1932	32.0946	25.82	85.91	18.59	143.713
950418.	130.29	20.49	29.23	1.4008	5.6633	31.6817	33.20	87.61	25.95	135.588
950428.	121.12	23.76	35.12	1.4374	6.9761	31.1688	40.22	89.53	32.97	127.760
950508.	112.89	26.39	40.72	1.4810	8.1171	30.5794	46.82	91.75	39.57	120.307
950518.	105.75	28.33	45.92	1.5308	9.0849	29.9359	52.96	94.39	45.73	113.345
950528.	99.80	29.59	50.60	1.5857	9.8875	29.2585	58.63	97.63	51.44	107.041
950607.	95.10	30.22	54.67	1.6447	10.5386	28.5637	63.81	101.75	56.68	101.656
950617.	91.65	30.32	58.03	1.7071	11.0552	27.8647	68.47	107.19	61.47	97.607
950627.	89.40	29.99	60.62	1.7722	11.4550	27.1715	72.56	114.63	65.79	95.573
950707.	88.21	29.34	62.44	1.8393	11.7548	26.4911	75.98	125.12	69.63	96.577
950717.	87.94	28.49	63.57	1.9078	11.9703	25.8287	78.53	139.89	72.94	101.842
950727.	88.37	27.52	64.11	1.9774	12.1153	25.1872	79.94	159.09	75.67	111.502
950806.	89.30	26.49	64.21	2.0476	12.2017	24.5685	80.05	179.73	77.67	122.557
950816.	90.49	25.46	64.05	2.1182	12.2396	23.9736	79.05	197.34	78.84	130.535
950826.	91.73	24.47	63.80	2.1889	12.2377	23.4025	77.38	210.28	79.09	133.788
950905.	92.82	23.56	63.61	2.2595	12.2030	22.8551	75.39	219.38	78.55	133.140
950915.	93.59	22.76	63.65	2.3299	12.1415	22.3306	73.27	225.85	77.43	129.817
950925.	93.90	22.07	64.03	2.3997	12.0581	21.8284	71.13	230.59	75.98	124.722
951005.	93.62	21.51	64.87	2.4691	11.9569	21.3474	69.02	234.19	74.34	118.439

Table 2-9. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, PERIJOVE DETAILED DATA

Hours From JCA	Range Jupiter R_J	Vel Mag Wrt Jupiter	Range Earth Au	Rdot Wrt Earth	Range Sun Au	Sun Jupiter S/C	Earth Jupiter S/C	Rt. Asc. Wrt Jup. Eq.	Declination Wrt Jup. Eq.	Jupiter Cone E-Ref.
-24.	24.19	18.28	4.479	4.80	5.394	45.2	49.2	158.9	17.7	130.7
-22.	22.49	18.58	4.479	5.06	5.394	47.0	51.0	157.3	18.8	128.9
-20.	20.78	18.92	4.480	5.34	5.395	49.1	53.0	155.5	20.0	126.9
-18.	19.06	19.33	4.480	5.64	5.396	51.5	55.4	153.2	21.5	124.5
-16.	17.34	19.80	4.480	5.98	5.397	54.4	58.3	150.5	23.2	121.6
-14.	15.61	20.36	4.481	6.36	5.398	58.0	61.8	147.1	25.2	118.1
-12.	13.89	21.04	4.481	6.77	5.399	62.5	66.3	142.7	27.5	113.7
-10.	12.20	21.87	4.481	7.19	5.400	68.3	72.0	136.8	30.4	108.0
-8.	10.55	22.89	4.482	7.58	5.401	75.9	79.5	128.5	33.7	100.5
-6.	9.00	24.12	4.482	7.80	5.402	86.2	89.7	116.3	37.2	90.2
-4.	7.65	25.52	4.482	7.54	5.403	100.5	103.9	97.9	39.7	76.1
-2.	6.67	26.81	4.483	6.18	5.404	119.9	123.0	72.4	38.3	57.0
0.	6.31	27.38	4.483	3.22	5.404	143.1	145.7	44.9	30.0	34.3
2.	6.67	26.81	4.483	-0.66	5.405	164.1	164.4	22.7	16.9	15.6
4.	7.65	25.52	4.483	-4.03	5.406	165.7	161.9	6.9	4.6	18.1
6.	9.00	24.12	4.483	-6.37	5.406	154.3	150.3	355.7	-4.7	29.7
8.	10.55	22.89	4.482	-7.87	5.406	144.6	140.7	347.4	-11.4	39.3
10.	12.20	21.87	4.482	-8.84	5.406	137.2	133.4	341.1	-16.2	46.5
12.	13.89	21.04	4.481	-9.47	5.407	131.5	127.8	336.1	-19.6	52.1
14.	15.61	20.36	4.481	-9.90	5.407	127.1	123.4	332.0	-22.3	56.5
16.	17.34	19.80	4.480	-10.20	5.407	123.5	119.9	328.7	-24.3	60.0
18.	19.06	19.33	4.480	-10.41	5.407	120.5	117.0	325.8	-25.9	62.9
20.	20.78	18.92	4.479	-10.55	5.407	118.1	114.5	323.4	-27.2	65.3
22.	22.49	18.58	4.479	-10.65	5.407	116.0	112.5	321.3	-28.3	67.4
24.	24.19	18.28	4.478	-10.73	5.407	114.2	110.7	319.5	-29.1	69.1

Table 2-10. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, JOVICENTRIC DETAILED DATA

Days From JCA	Range Jupiter Rj	Vel Mag Wrt Jupiter	Range Earth Au	Rdot Wrt Earth	Range Sun Au	Sun Jupiter S/C	Earth Jupiter S/C	Rt. Asc. Wrt Jup. Eq.	Declination Wrt Jup. Eq.	Jupiter Cone E-Ref.
-90.	1560.71	13.90	5.028	-11.32	4.668	15.6	25.3	178.3	1.6	151.0
-88.	1527.10	13.89	5.015	-11.74	4.685	15.8	25.7	178.3	1.6	150.7
-86.	1493.52	13.88	5.001	-12.14	4.701	16.0	26.0	178.2	1.6	150.5
-84.	1459.97	13.87	4.987	-12.52	4.718	16.2	26.3	178.2	1.6	150.2
-82.	1426.43	13.86	4.972	-12.87	4.734	16.4	26.6	178.1	1.6	149.9
-80.	1392.93	13.85	4.957	-13.20	4.750	16.6	26.9	178.1	1.7	149.7
-78.	1359.45	13.84	4.942	-13.50	4.767	16.9	27.1	178.0	1.7	149.4
-76.	1325.99	13.83	4.926	-13.78	4.783	17.1	27.4	178.0	1.7	149.2
-74.	1292.55	13.82	4.910	-14.02	4.799	17.3	27.7	177.9	1.7	149.0
-72.	1259.12	13.81	4.894	-14.25	4.816	17.5	27.9	177.9	1.7	148.8
-70.	1225.73	13.81	4.877	-14.44	4.832	17.7	28.2	177.8	1.7	148.6
-68.	1192.36	13.80	4.860	-14.60	4.848	17.9	28.4	177.7	1.7	148.4
-66.	1159.00	13.79	4.843	-14.73	4.864	18.1	28.7	177.7	1.7	148.2
-64.	1125.66	13.78	4.826	-14.82	4.880	18.4	28.9	177.6	1.8	148.0
-62.	1092.34	13.78	4.809	-14.89	4.897	18.6	29.1	177.5	1.8	147.9
-60.	1059.03	13.77	4.792	-14.92	4.913	18.8	29.3	177.4	1.8	147.7
-58.	1025.75	13.76	4.775	-14.92	4.929	19.1	29.5	177.4	1.8	147.6
-56.	992.49	13.76	4.757	-14.88	4.945	19.3	29.7	177.3	1.8	147.5
-54.	959.23	13.75	4.740	-14.80	4.961	19.6	29.9	177.2	1.8	147.3
-52.	926.00	13.75	4.723	-14.69	4.977	19.8	30.1	177.1	1.9	147.2
-50.	892.77	13.74	4.706	-14.54	4.993	20.1	30.3	177.0	1.9	147.1
-48.	859.57	13.74	4.690	-14.36	5.009	20.4	30.4	176.8	1.9	147.0
-46.	826.38	13.73	4.673	-14.14	5.024	20.6	30.6	176.7	1.9	146.9
-44.	793.21	13.73	4.657	-13.87	5.040	20.9	30.8	176.6	2.0	146.8
-42.	760.06	13.72	4.641	-13.57	5.056	21.2	31.0	176.4	2.0	146.7
-40.	695.77	13.87	4.630	-13.08	5.080	18.8	28.4	179.0	1.9	149.7
-38.	662.19	13.88	4.615	-12.68	5.096	19.0	28.4	179.0	2.0	149.7
-36.	628.59	13.89	4.601	-12.25	5.112	19.2	28.5	178.9	2.0	149.8
-34.	594.96	13.90	4.587	-11.77	5.128	19.4	28.5	178.9	2.0	149.8
-32.	561.30	13.92	4.573	-11.25	5.143	19.7	28.5	178.8	2.1	149.9
-30.	527.61	13.93	4.561	-10.69	5.159	19.9	28.5	178.8	2.1	150.0
-28.	493.89	13.95	4.549	-10.08	5.175	20.1	28.5	178.7	2.2	150.1
-26.	460.13	13.97	4.537	-9.44	5.191	20.4	28.5	178.6	2.3	150.1
-24.	426.31	13.99	4.527	-8.76	5.207	20.6	28.5	178.5	2.4	150.2
-22.	392.44	14.01	4.517	-8.04	5.223	20.9	28.6	178.4	2.4	150.3
-20.	358.51	14.04	4.508	-7.27	5.238	21.2	28.6	178.3	2.6	150.4

Table 2-10. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, JOVICENTRIC DETAILED DATA

Days From JCA	Range Jupiter Rj	Vel Mag Wrt Jupiter	Range Earth Au	Rdot Wrt Earth	Range Sun Au	Sun Jupiter S/C	Earth Jupiter S/C	Rt. Asc. Wrt Jup. Eq.	Declination Wrt Jup. Eq.	Jupiter Cone E-Ref.
-18.	324.50	14.08	4.500	-6.46	5.254	21.5	28.6	178.1	2.7	150.4
-16.	290.39	14.13	4.493	-5.61	5.270	21.9	28.7	177.9	2.8	150.5
-14.	256.17	14.18	4.487	-4.72	5.286	22.3	28.8	177.7	3.1	150.4
-12.	221.80	14.26	4.483	-3.78	5.302	22.8	29.0	177.4	3.3	150.3
-10.	187.24	14.36	4.479	-2.78	5.318	23.5	29.3	176.9	3.7	150.1
-8.	152.39	14.51	4.476	-1.71	5.334	24.4	29.9	176.3	4.2	149.6
-6.	117.14	14.75	4.475	-0.54	5.350	25.7	30.9	175.2	5.1	148.8
-4.	81.22	15.20	4.475	0.84	5.367	28.2	32.9	173.3	6.7	146.8
-2.	43.94	16.37	4.477	2.83	5.384	34.5	38.8	168.0	10.9	141.0
0.	6.31	27.38	4.483	3.22	5.404	143.1	145.7	44.9	30.0	34.3
2.	43.94	16.37	4.472	-10.66	5.407	103.2	99.9	307.6	-34.0	79.8
4.	81.22	15.20	4.460	-9.63	5.407	96.5	93.6	300.0	-36.3	85.9
6.	117.14	14.75	4.450	-8.45	5.407	93.9	91.4	297.0	-37.0	87.9
8.	152.39	14.51	4.441	-7.25	5.407	92.5	90.3	295.3	-37.4	88.8
10.	187.24	14.36	4.433	-6.03	5.407	91.5	89.7	294.3	-37.6	89.2
12.	221.80	14.26	4.427	-4.80	5.407	90.9	89.3	293.6	-37.7	89.3
14.	256.17	14.18	4.422	-3.57	5.407	90.3	89.1	293.1	-37.8	89.3
16.	290.39	14.13	4.419	-2.33	5.407	89.9	89.0	292.7	-37.9	89.2
18.	324.50	14.08	4.417	-1.08	5.407	89.5	89.0	292.4	-38.0	89.0
20.	358.51	14.04	4.416	0.16	5.406	89.2	89.0	292.1	-38.0	88.8
22.	392.44	14.01	4.417	1.40	5.406	88.9	89.0	291.9	-38.0	88.5
24.	426.31	13.99	4.419	2.64	5.406	88.6	89.1	291.7	-38.1	88.3
26.	460.13	13.97	4.423	3.87	5.406	88.4	89.2	291.6	-38.1	88.0
28.	493.89	13.95	4.428	5.08	5.405	88.1	89.3	291.5	-38.1	87.7
30.	527.61	13.93	4.435	6.28	5.405	87.9	89.4	291.3	-38.1	87.3
32.	561.30	13.92	4.443	7.47	5.405	87.7	89.5	291.2	-38.2	87.0
34.	594.96	13.90	4.452	8.64	5.404	87.5	89.7	291.1	-38.2	86.7
36.	628.59	13.89	4.463	9.79	5.404	87.3	89.8	291.1	-38.2	86.4
38.	662.19	13.88	4.475	10.91	5.403	87.2	89.9	291.0	-38.2	86.0
40.	695.77	13.87	4.488	12.00	5.403	87.0	90.1	290.9	-38.2	85.7
42.	713.44	13.66	4.501	12.92	5.402	86.8	90.0	290.8	-40.9	85.6
44.	746.49	13.66	4.516	13.96	5.402	86.6	90.1	290.7	-40.8	85.3
46.	779.53	13.66	4.533	14.97	5.401	86.4	90.3	290.6	-40.7	85.0
48.	812.54	13.65	4.551	15.95	5.400	86.3	90.4	290.6	-40.6	84.7
50.	845.57	13.65	4.570	16.89	5.400	86.1	90.5	290.5	-40.5	84.4
52.	878.61	13.65	4.590	17.80	5.399	85.9	90.6	290.5	-40.4	84.2

Table 2-10. ULYSSES S/C, INJECTION 10/06/90, C_3=128.20, JOVICENTRIC DETAILED DATA

Days From JCA	Range Jupiter Rj	Vel Mag Wrt Jupiter	Range Earth Au	Rdot Wrt Earth	Range Sun Au	Sun Jupiter S/C	Earth Jupiter S/C	Rt. Asc. Wrt Jup. Eq.	Declination Wrt Jup. Eq.	Jupiter Cone E-Ref.
54.	911.62	13.65	4.611	18.68	5.398	85.8	90.7	290.4	-40.4	83.9
56.	944.63	13.64	4.633	19.52	5.398	85.6	90.8	290.4	-40.3	83.6
58.	977.63	13.64	4.656	20.32	5.397	85.5	90.9	290.3	-40.2	83.3
60.	1010.63	13.64	4.680	21.08	5.396	85.3	91.0	290.3	-40.2	83.1
62.	1043.64	13.63	4.705	21.80	5.396	85.2	91.1	290.3	-40.1	82.9
64.	1076.62	13.63	4.730	22.48	5.395	85.0	91.1	290.2	-40.1	82.6
66.	1109.60	13.63	4.757	23.12	5.394	84.9	91.2	290.2	-40.0	82.4
68.	1142.58	13.62	4.784	23.72	5.393	84.7	91.3	290.2	-40.0	82.2
70.	1175.54	13.62	4.811	24.28	5.392	84.6	91.3	290.2	-39.9	82.0
72.	1208.51	13.62	4.840	24.81	5.391	84.4	91.4	290.1	-39.9	81.8
74.	1241.47	13.61	4.869	25.29	5.390	84.3	91.4	290.1	-39.8	81.6
76.	1274.39	13.61	4.898	25.73	5.389	84.2	91.4	290.1	-39.8	81.5
78.	1307.33	13.61	4.928	26.13	5.388	84.0	91.4	290.1	-39.8	81.3
80.	1340.25	13.60	4.959	26.49	5.387	83.9	91.4	290.0	-39.7	81.2
82.	1373.16	13.60	4.989	26.81	5.386	83.7	91.4	290.0	-39.7	81.0
84.	1406.07	13.59	5.021	27.09	5.385	83.6	91.4	290.0	-39.7	80.9
86.	1438.97	13.59	5.052	27.34	5.384	83.5	91.4	290.0	-39.7	80.8
88.	1471.85	13.58	5.084	27.54	5.383	83.3	91.3	290.0	-39.6	80.7
90.	1504.73	13.58	5.116	27.71	5.382	83.2	91.3	290.0	-39.6	80.6

Table 2-11. Jovicentric Latitudes, Longitudes, and Magnetic Coordinates

Data for October 6, 1990 injection; Jupiter arrival on February 08, 1992; C_3 = 128.20 km^2/s^2

THE TARGET BODY IS JUPITER

Date	Time	Radius S/C	Mag. Latitude	Mag. W. Long.	Latitude* S/C	W. Long.* S/C	Latitude† S/C	E. Long.† S/C
(YYYYMMDD)	(HHMMSS.FF)	(km.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)
19920207.	408.87	2442163.6	17.09	288.96	13.35	132.56	12.06	300.96
19920207.	10408.87	2383427.1	22.66	326.55	13.62	169.19	12.32	300.60
19920207.	20408.87	2324547.2	24.54	5.52	13.90	205.84	12.59	300.22
19920207.	30408.87	2265520.5	21.99	44.28	14.20	242.50	12.87	299.82
19920207.	40408.87	2206343.5	16.33	81.45	14.51	279.19	13.17	299.40
19920207.	50408.87	2147012.7	10.05	117.28	14.84	315.90	13.48	298.95
19920207.	60408.87	2087525.1	5.67	152.70	15.18	352.64	13.81	298.47
19920207.	70408.87	2027877.6	4.94	188.16	15.55	29.41	14.16	297.97
19920207.	80408.87	1968067.2	8.28	223.59	15.93	66.21	14.53	297.43
19920207.	90408.87	1908091.7	14.61	259.14	16.34	103.05	14.92	296.86
19920207.	100408.87	1847949.2	21.74	295.73	16.77	139.92	15.33	296.25
19920207.	110408.87	1787638.5	26.97	334.30	17.23	176.84	15.77	295.59
19920207.	120408.87	1727159.2	28.11	14.30	17.72	213.81	16.24	294.89
19920207.	130408.87	1666512.5	24.81	53.61	18.24	250.83	16.74	294.13
19920207.	140408.87	1605700.7	18.89	90.96	18.80	287.91	17.28	293.31
19920207.	150408.87	1544728.8	13.07	126.84	19.40	325.07	17.85	292.41
19920207.	160408.87	1483604.0	9.80	162.25	20.04	2.30	18.47	291.44
19920207.	170408.87	1422337.6	10.52	197.62	20.74	39.63	19.13	290.38
19920207.	180408.87	1360945.5	15.27	233.04	21.48	77.06	19.85	289.21
19920207.	190408.87	1299450.0	22.61	269.16	22.29	114.61	20.63	287.92
19920207.	200408.87	1237881.7	30.07	307.34	23.17	152.31	21.47	286.48
19920207.	210408.87	1176282.9	34.69	348.45	24.13	190.18	22.39	284.88
19920207.	220408.87	1114710.7	34.49	30.85	25.17	228.26	23.38	283.07
19920207.	230408.87	1053243.2	30.07	71.52	26.30	266.58	24.47	281.02
19920208.	408.87	991986.6	24.19	109.57	27.54	305.20	25.66	278.68
19920208.	10408.87	931086.1	19.93	146.11	28.89	344.20	26.96	275.97
19920208.	20408.87	870741.0	19.51	182.25	30.37	23.66	28.38	272.81
19920208.	30408.87	811226.0	23.78	218.64	31.96	63.71	29.92	269.07
19920208.	40408.87	752922.2	31.91	256.38	33.66	104.51	31.55	264.62
19920208.	50408.87	696359.2	41.35	298.10	35.42	146.27	33.26	259.23
19920208.	60408.87	642273.4	47.87	346.86	37.15	189.28	34.95	252.67
19920208.	70408.87	591680.3	47.27	39.89	38.68	233.82	36.47	244.62
19920208.	80408.87	545952.1	40.38	89.10	39.70	280.20	37.54	234.83
19920208.	90408.87	506864.8	32.22	133.62	39.76	328.46	37.75	223.18
19920208.	100408.87	476539.5	27.22	177.07	38.33	18.23	36.58	209.99
19920208.	110408.87	457169.6	27.35	222.13	35.04	68.56	33.66	196.09
19920208.	120408.87	450489.4	30.93	270.51	29.95	118.28	29.02	182.59
19920208.	130408.87	457169.5	32.60	322.57	23.65	166.54	23.15	170.39
19920208.	140408.87	476539.5	27.35	14.06	16.92	213.07	16.82	159.88
19920208.	150408.87	506864.8	15.84	60.08	10.44	257.94	10.68	151.02
19920208.	160408.87	545952.1	2.39	101.67	4.61	301.42	5.13	143.59
19920208.	170408.87	591680.3	-8.98	142.32	-.44	343.76	.30	137.34
19920208.	180408.87	642273.4	-15.40	184.03	-4.73	25.19	-3.80	132.03
19920208.	190408.87	696359.3	-15.92	226.12	-8.35	65.88	-7.26	127.49
19920208.	200408.87	752922.2	-12.28	267.02	-11.39	106.00	-10.18	123.56
19920208.	210408.87	811226.1	-7.91	306.43	-13.97	145.63	-12.64	120.14
19920208.	220408.87	870741.0	-6.02	344.87	-16.15	184.87	-14.74	117.12
19920208.	230408.87	931086.2	-8.28	22.43	-18.02	223.77	-16.53	114.45
19920209.	408.87	991986.7	-14.38	59.17	-19.64	262.41	-18.08	112.06
19920209.	10408.87	1053243.3	-22.47	96.02	-21.04	300.80	-19.42	109.91

Table 2-11. (Continued) Jovicentric Latitudes, Longitudes, and Magnetic Coordinates

Data for October 5, 1990 injection; Jupiter arrival on February 11, 1992; C_3 = 128.42 km^2/s^2

THE TARGET BODY IS JUPITER

Date	Time	Radius S/C	Mag. Latitude	Mag. W. Long.	Latitude* S/C	W. Long.* S/C	Latitude† S/C	E. Long.† S/C
(YYYYMMDD)	(HHMMSS.FF)	(km.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)	(Deg.)
19920209.	20408.87	1114710.8	-29.89	134.57	-22.26	339.00	-20.60	107.97
19920209.	30408.87	1176282.9	-33.90	175.54	-23.33	17.03	-21.63	106.21
19920209.	40408.87	1237881.8	-32.99	217.13	-24.29	54.90	-22.54	104.60
19920209.	50408.87	1299450.0	-28.15	256.70	-25.13	92.64	-23.35	103.13
19920209.	60408.87	1360945.6	-22.10	293.77	-25.89	130.27	-24.08	101.77
19920209.	70408.87	1422337.7	-17.64	329.36	-26.57	167.80	-24.73	100.52
19920209.	80408.87	1483604.1	-16.65	4.33	-27.19	205.23	-25.32	99.36
19920209.	90408.87	1544728.8	-19.65	39.03	-27.74	242.59	-25.86	98.28
19920209.	100408.87	1605700.7	-25.73	74.01	-28.25	279.87	-26.35	97.28
19920209.	110408.87	1666512.5	-32.88	110.53	-28.71	317.08	-26.79	96.34
19920209.	120408.87	1727159.2	-38.45	149.96	-29.14	354.24	-27.20	95.46
19920209.	130408.87	1787638.5	-39.96	191.75	-29.53	31.35	-27.58	94.63
19920209.	140408.87	1847949.3	-36.79	232.75	-29.89	68.40	-27.92	93.86
19920209.	150408.87	1908091.8	-30.76	270.73	-30.23	105.41	-28.24	93.12
19920209.	160408.87	1968067.2	-24.69	306.19	-30.54	142.38	-28.54	92.43
19920209.	170408.87	2027877.5	-20.93	340.43	-30.82	179.32	-28.82	91.78
19920209.	180408.87	2087525.2	-20.84	14.27	-31.09	216.22	-29.08	91.16
19920209.	190408.87	2147012.8	-24.51	48.14	-31.34	253.09	-29.32	90.57
19920209.	200408.87	2206343.4	-30.79	82.82	-31.58	289.92	-29.54	90.01
19920209.	210408.87	2265520.5	-37.53	119.76	-31.80	326.74	-29.76	89.48
19920209.	220408.87	2324547.3	-42.05	160.04	-32.00	3.52	-29.96	88.97
19920209.	230408.87	2383427.1	-42.16	202.17	-32.20	40.29	-30.14	88.49
19920210.	408.87	2442163.6	-37.89	242.51	-32.38	77.03	-30.32	88.02

Definitions of Parameters:

	Radius	Radius of S/C in planet frame
	Mag. Latitude	Magnetic Latitude of S/C
	Mag. W. Long.	Magnetic west longitude of S/C
*	Latitude S/C	Latitude of S/C in planet frame
*	W. Long. S/C	West longitude of S/C in planet frame
†	Latitude S/C	Latitude of S/C w.r.t. planet in Earth Mean Ecliptic of 1950 system
†	E. Long. S/C	East longitude of S/C w.r.t. planet in Earth Mean Ecliptic of 1950 system