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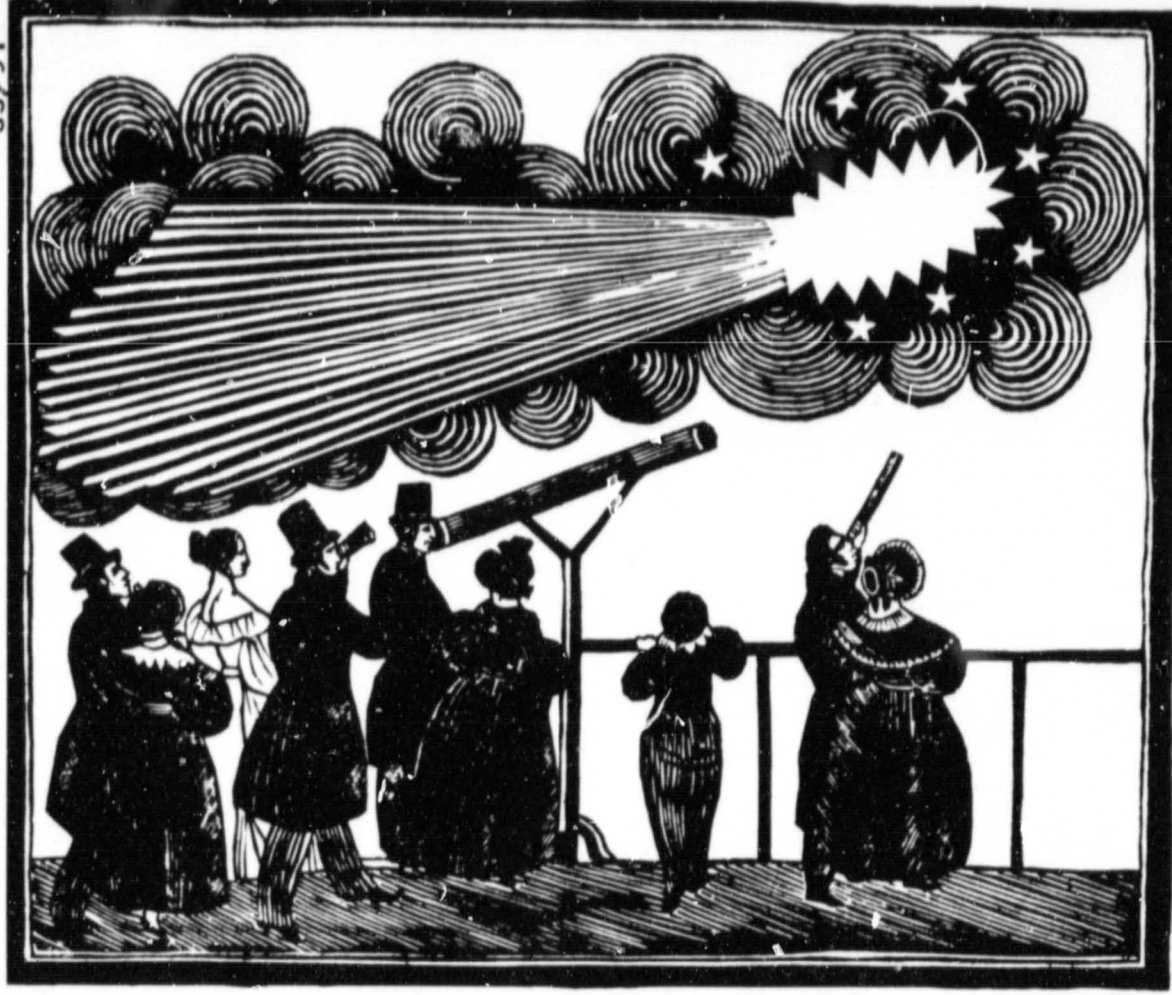
THE COMET HALLEY HANDBOOK

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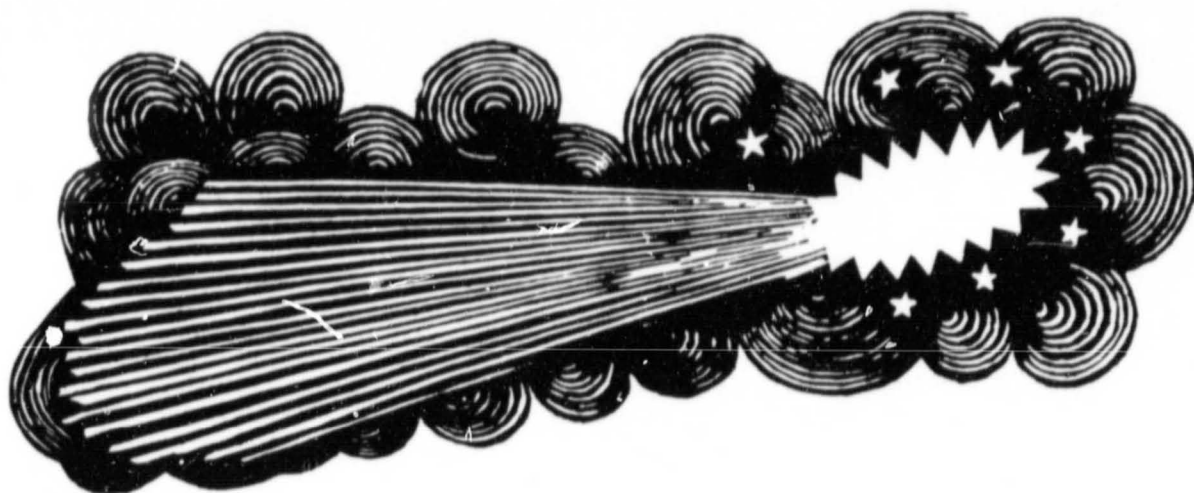
AN OBSERVER'S GUIDE



THE

COMET HALLEY

HANDBOOK



AN OBSERVER'S GUIDE

CREATED FOR THE INTERNATIONAL HALLEY WATCH
BY
DONALD K. YEOMANS

JANUARY 15, 1981

Foreword

The continuing search for Comet Halley began in November 1977, when observers at two of the United States' largest telescopes unsuccessfully attempted to recover the comet more than eight years before it is due to pass perihelion. At that time, the estimated magnitude of the comet was fainter than 26. While observations of Comet Halley at great heliocentric distances are very important for characterizing its size and physical behavior, perhaps some of the incentive for these early recovery attempts was due to the historical importance of this most famous of all comets.

Comet Halley's fame is not due to its superior brightness alone: its periodic returns every 76 years act like a clock counting time in units of human lifetimes. Thus the ever-returning comet marks transitions from one era to the next. Our parents and grandparents have told us about the great comet's visit in 1910, and we will tell our children and grandchildren about its return in 1986. Once every 76 years, nearly everyone in recorded history has had the opportunity to view the comet.

Because of the unfavorable positions of the comet with respect to the earth and the sun, the coming apparition of Comet Halley will disappoint much of the waiting public. Comet Halley will not be an obvious naked-eye object. In fact, it will probably be invisible to the naked eye if the observer is located in a populous area with significant artificial lighting. Successful observers will have to equip themselves with binoculars, know where and when to observe, and seek an observing location free from aerial pollutants and artificial lighting.

Many will not make the effort. However, the curious will gladly go out of their way to pursue this once-in-a-lifetime experience. It is for these curious few, as well as for the small army of serious amateur and professional astronomers, that this Handbook is intended.

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The Comet Halley Handbook: An Observer's Guide

I. The Orbit of Comet Halley

Considerable portions of information in this handbook are based upon a previous work on Comet Halley's orbit,⁽¹⁾ The orbit determination technique used in that publication was a least-squares adjustment of the comet's motion to observational data. The observational data on Comet Halley began with a rather crude naked-eye observation by Johannes Kepler on September 28, 1607, continued through the 1607, 1682, 1759, 1835-36, and 1909-11 apparitions, and ended with a precise telescopic observation on May 24, 1911. A total of 885 observations were used in the orbit determination process. The required numerical integrations were run over various observational data arcs, with perturbations or accelerations from all nine planets taken into account at each half-day time step.

Forces other than gravity acting on a cometary nucleus often introduce an additional acceleration in its orbital motion. These so-called nongravitational accelerations are believed due to the outgassing rocket effect of the comet's icy nucleus.⁽²⁾ These effects have been successfully modeled by Marsden, Sekanina, and Yeomans.⁽³⁾ Yeomans included them in his computations for Comet Halley.⁽¹⁾

To provide a prediction for Comet Halley's motion in 1985-86, an orbit determined from the 1759, 1835-36, and 1909-11 observations was integrated forward in time. The complete set of osculating orbit elements for 1986 is given as follows:

Epoch	1986 Feb. 19.0 (E.T.)
T	1986 Feb. 9.6613 (E.T.)
q	0.587096 (AU)
e	0.967267
ω	111.8534
Ω	58.1531
i	162.2378

These orbital elements are strictly correct only for a given instant of time (Epoch). However, for many low-precision computations, they can be used for several months on either side of perihelion passage T . The epoch and perihelion passage time are given in ephemeris time (E.T.). The perihelion distance and eccentricity are denoted q and e respectively. The three angular elements are the longitude of the ascending node Ω , the argument of perihelion ω , and the orbital inclination i ; they are referred to the mean ecliptic and equinox of 1950.0 and are illustrated in Figure 1.

Figure 2 illustrates an ecliptic plane projection of Comet Halley's orbit within the solar system. Figure 3 illustrates the relative positions of the comet and earth in the 1985-86 time period. The pre- and post-perihelion close approaches of the comet and earth occur on November 27, 1985 and April 11, 1986 at minimum distances of 0.62 and 0.42 AU respectively. The position of the vernal equinox on Figures 1, 2, and 3 is

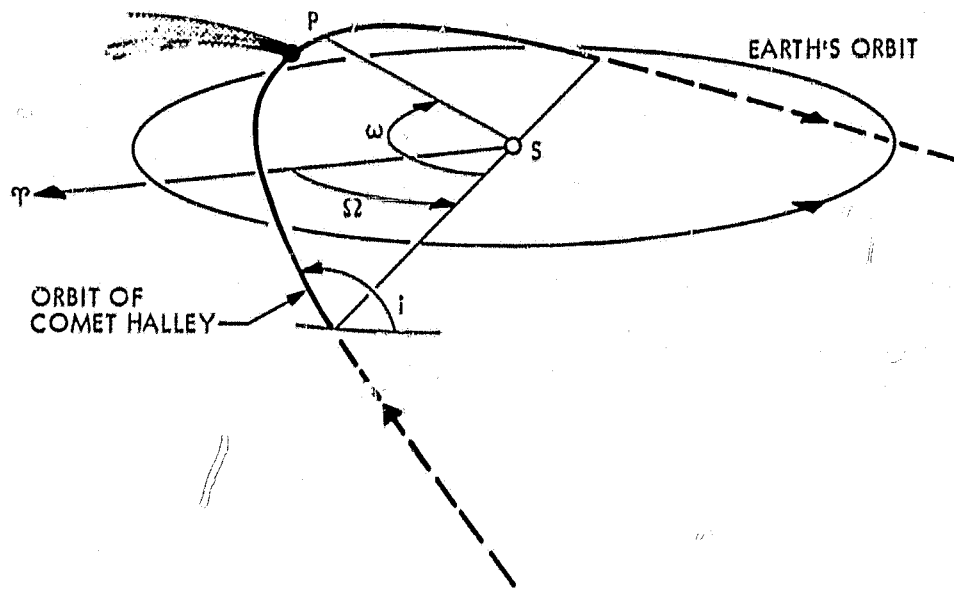
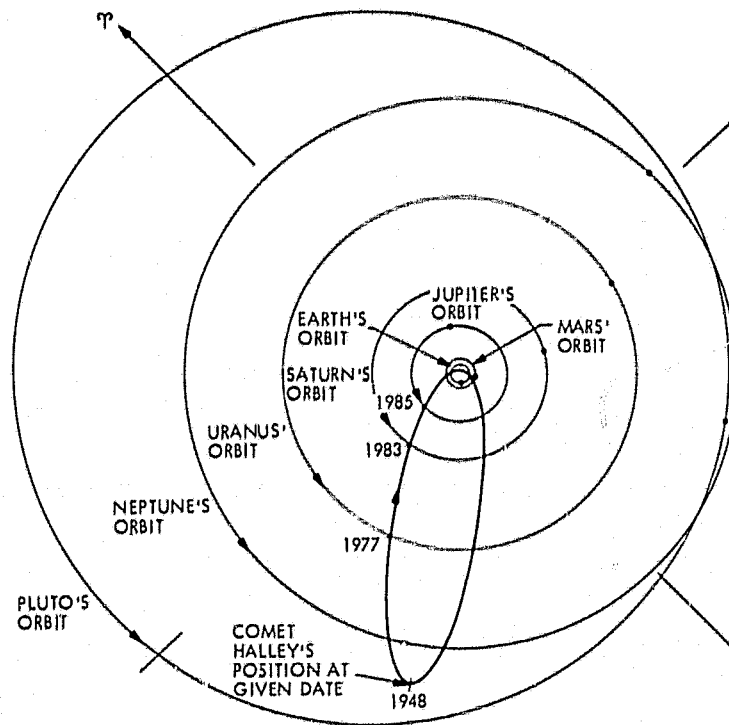


Fig. 1. Angular Elements of the Orbit of Comet Halley. For Comet Halley, the Orbital Inclination i is 162° , the Longitude of the Ascending Node Ω is 58° , and the Argument of Perihelion ω is 112° .



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Fig. 2. Ecliptic Plane Projection of Comet Halley's Orbit (1910-1986) Within the Solar System. The planetary positions are indicated for the time of the comet's perihelion passage.

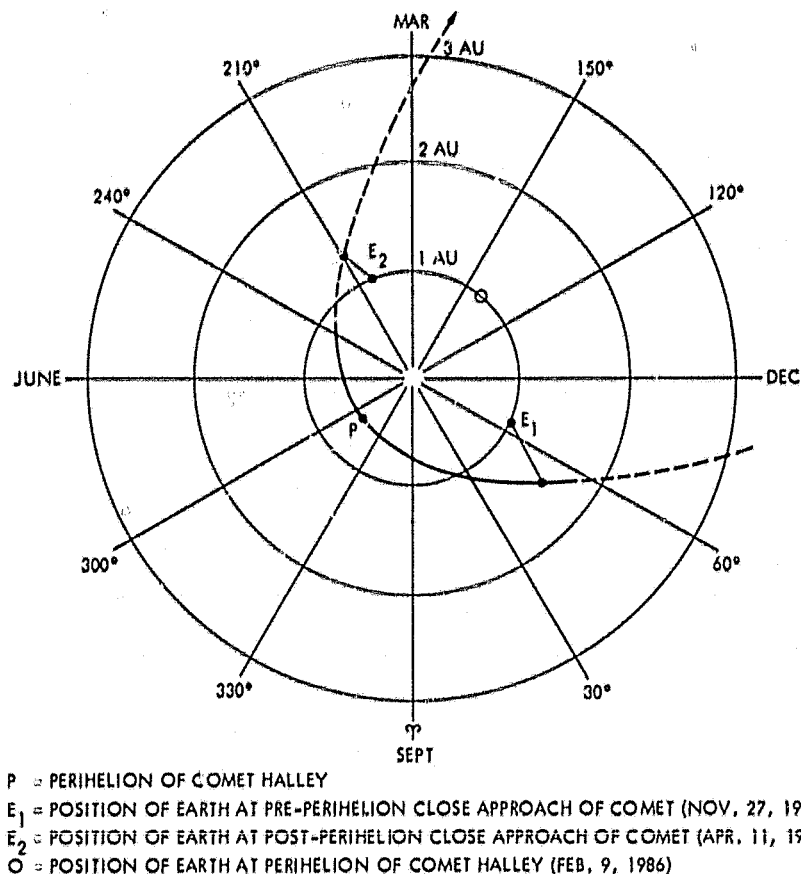


Fig. 3. Relative Positions of Comet Halley and Earth, 1985-1986.

denoted by the symbol Υ . Figure 4 shows the comet's path through the constellations for the period November 1985 through May 1986.

II. The Expected Physical Behavior of Comet Halley in 1985-1986

Like other active comets, Comet Halley's physical behavior is likely to change markedly from day to day. Anyone who attempts to predict the physical behavior of an active comet is almost certain to be incorrect. Nevertheless, an analysis of Comet Halley's physical behavior during the past few apparitions has been included in the hope that this information will serve as a rough guide to the comet's behavior in 1985-86. In an effort to predict the comet's apparent brightness, tail lengths, and coma diameters in 1985-86, an analysis of existing data is presented in the following subsections.

A. Brightness Estimates

Visual magnitude estimates of a comet depend upon the subjective judgment of the observer, the brightness of the

night sky, and the aperture size of the telescope employed. For the present analysis, no observer-dependent corrections or night-sky corrections could be made with the existing data. Using an empirical correction of 0.055 magnitudes per cm for refracting telescopes, the magnitude estimates made with the naked eye and telescopic apertures ≤ 33 cm were normalized to a standard aperture of 6.78 cm.⁽⁴⁾ Since only magnitude data from refracting telescopes were used, a separate normalization law for reflecting telescopes was not required. Where magnitude data were taken with telescopic apertures greater than 33 cm, no normalization was attempted. The value 0.055 magnitudes per cm completely breaks down for large-aperture telescopes, and insufficient data were available for establishing a normalization of Comet Halley magnitude data made with large-aperture telescopes.

Traditionally, the total apparent magnitude M_1 of a comet is expressed as

$$M_1 = M_0 + 5 \log \Delta + n \log r \quad (1)$$

where Δ and r are respectively the geocentric and heliocentric

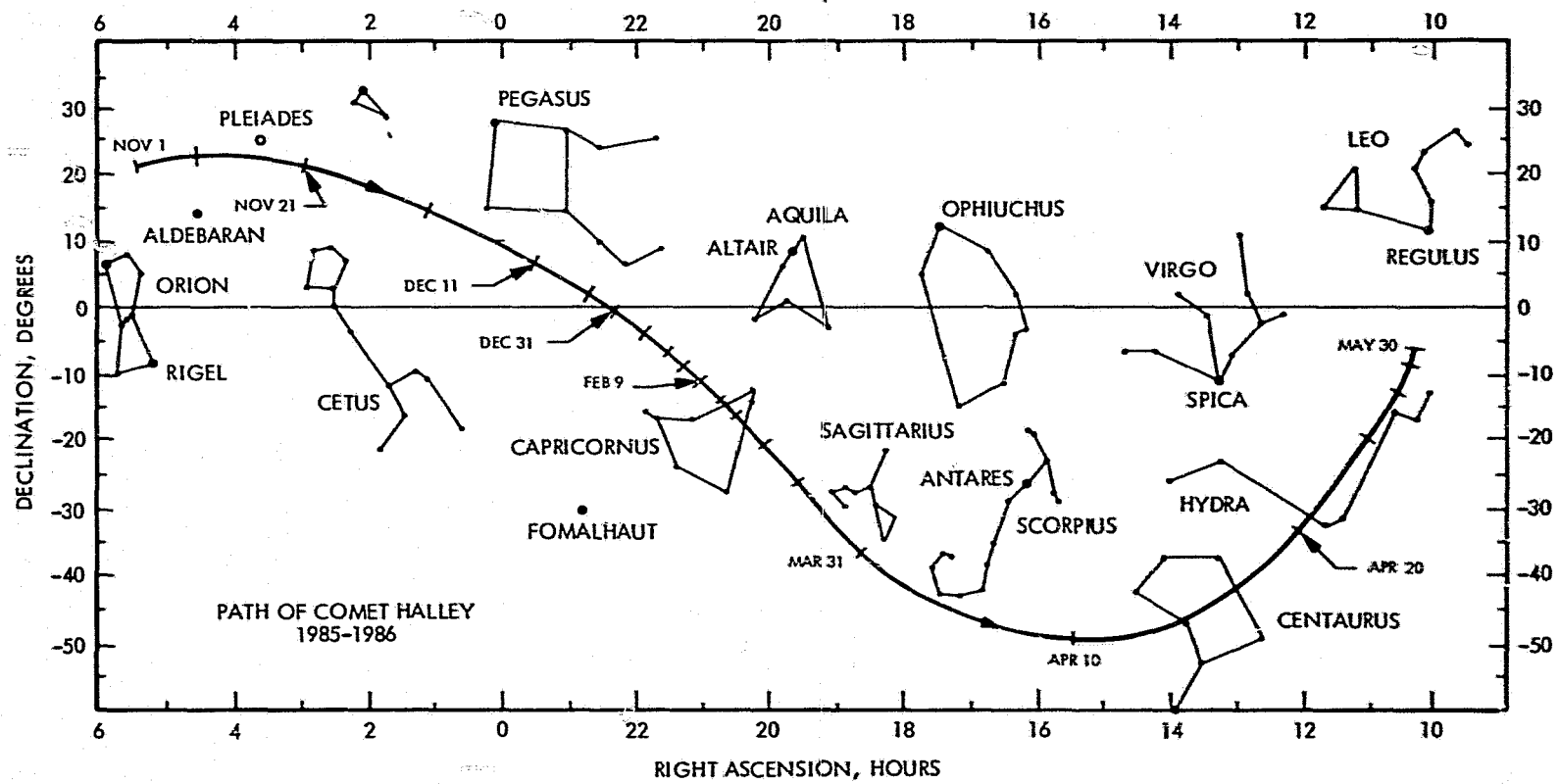


Fig. 4. Path of Comet Halley on the Celestial Sphere During November 1985–May 1986.

distance of the comet in AU, and M_2 is the total absolute magnitude of the comet ($M_1 = M_0$ when $\Delta = r = 1$). Figure 5 illustrates 1909-1910 visual apparent magnitudes plotted in a form $M_1 - 5 \log \Delta$ vs. $\log r$. For 1910, the intrinsic brightness of Comet Halley as a function of heliocentric distance was not symmetrical with respect to perihelion. Pre-perihelion, the total magnitude can be represented by the following formula of standard form:

$$M_1 = 5.0 + 5 \log \Delta + 13.1 \log r \quad (2)$$

Post-perihelion, the total magnitude is first fainter and then substantially brighter than corresponding pre-perihelion magnitudes at the same heliocentric distance. While Comet Halley's post-perihelion brightening is well established, the 1910 post-perihelion brightness dip between 0.6 and 1 AU may have been due in part to the comet's relatively low elongation angles (i.e., the M_1 estimates were not made in a completely dark sky). Data gaps, due to small solar elongation angles, are present for $-0.23 < \log r < 0.02$ (pre-perihelion) and for $0.33 < \log r < 0.51$ (post-perihelion). The pre- and post-perihelion brightness curves in Figure 5 should be useful for predicting observed total magnitudes in the coming apparition of Comet Halley. The apparent total magnitude estimates predicted in Appendix B were computed by evaluating curve fits of the data in Figure 5.

A separate analysis was conducted using brightness estimates that were described in the literature as nuclear magnitudes. Nuclear magnitude estimates M_2 made in large telescopes at great heliocentric distances were analyzed. The data used was photographic and could be fit with the following formula:

$$M_2 = 7.5 + 5 \log \Delta + 10 \log r \quad (3)$$

However, the earliest pre-perihelion observation of Comet Halley was made at $r = 3.6$ AU on August 25, 1909 and the latest post-perihelion observation was made at $r = 5.4$ AU on June 16, 1911; outside this range in heliocentric distance, the M_2 values presented in Appendix B are only extrapolated estimates. True nucleus brightness, as opposed to the apparent or photometric nucleus, must follow a $5 \log r$ behavior, of course.

B. Tail Lengths

To obtain some idea of Comet Halley's tail evolution with heliocentric distance r , we collected apparent tail-length data for the last three apparitions. Only naked-eye, angular, tail-length estimates were used in our analysis, and the assumption was made that the tail was always directly anti-solar. This latter assumption is somewhat in error for dust tails, but the

subjective nature of the tail-length estimates did not seem to warrant a more comprehensive analysis. Using the comet's solar-elongation angle β and the geocentric distance of the comet Δ , the actual, linear tail length s may be computed from the apparent (foreshortened) angular tail length t by

$$s = \frac{\Delta \sin t}{\sin(\beta - t)} \quad (4)$$

The linear tail lengths s , plotted as a function of heliocentric distance, are presented in Figure 6. While the actual tail lengths observed will depend upon the observing conditions and the optical instrument used, the shape of the curve in Figure 6 is suggestive. Comparing the 1759, 1835, and 1910 data, the comet's visual tail length appears to be longest after perihelion.

C. Coma Diameters

Figure 7 presents the linear coma diameters determined from visual observations made in 1909-11. The observed angular coma diameters, in each case, were multiplied by the geocentric distance of the comet at the time of observation to obtain the linear coma diameters. Note that the coma diameter reached a maximum value of approximately 200,000 km just after perihelion. Because the actual coma diameters will depend on the optical instrument used to observe the comet, the data given in Figure 7 are crude. Nevertheless, the curve does indicate the general evolution of the coma diameter with heliocentric distance.

III. Observing Conditions for Comet Halley in 1985-1986

As is evident from Figures 3 and 4, the changing positions of the comet and earth in 1985-86 will cause different observing conditions for the comet before and after perihelion. In general, the pre-perihelion positions of Comet Halley will allow better observing conditions for northern hemisphere observers, while southern hemisphere observations will be preferred post-perihelion.

For a given day, the comet's observability will depend upon the observer's latitude. We have assumed that the comet will be visible to an observer if the comet is above, and the sun is simultaneously more than 18° below the local horizon. This condition assures that evening astronomical twilight has ended and morning astronomical twilight has not yet begun (i.e., the comet is seen in a dark sky). The time interval for which this condition holds is referred to as the number of available dark hours. Figure 8 plots the available dark hours vs. calendar date for an observer at 35°N and 35°S latitude. Also plotted in Figure 8 is the total apparent magnitude M_1 vs. calendar date. Table 1 lists the dark hours vs. calendar date for observers

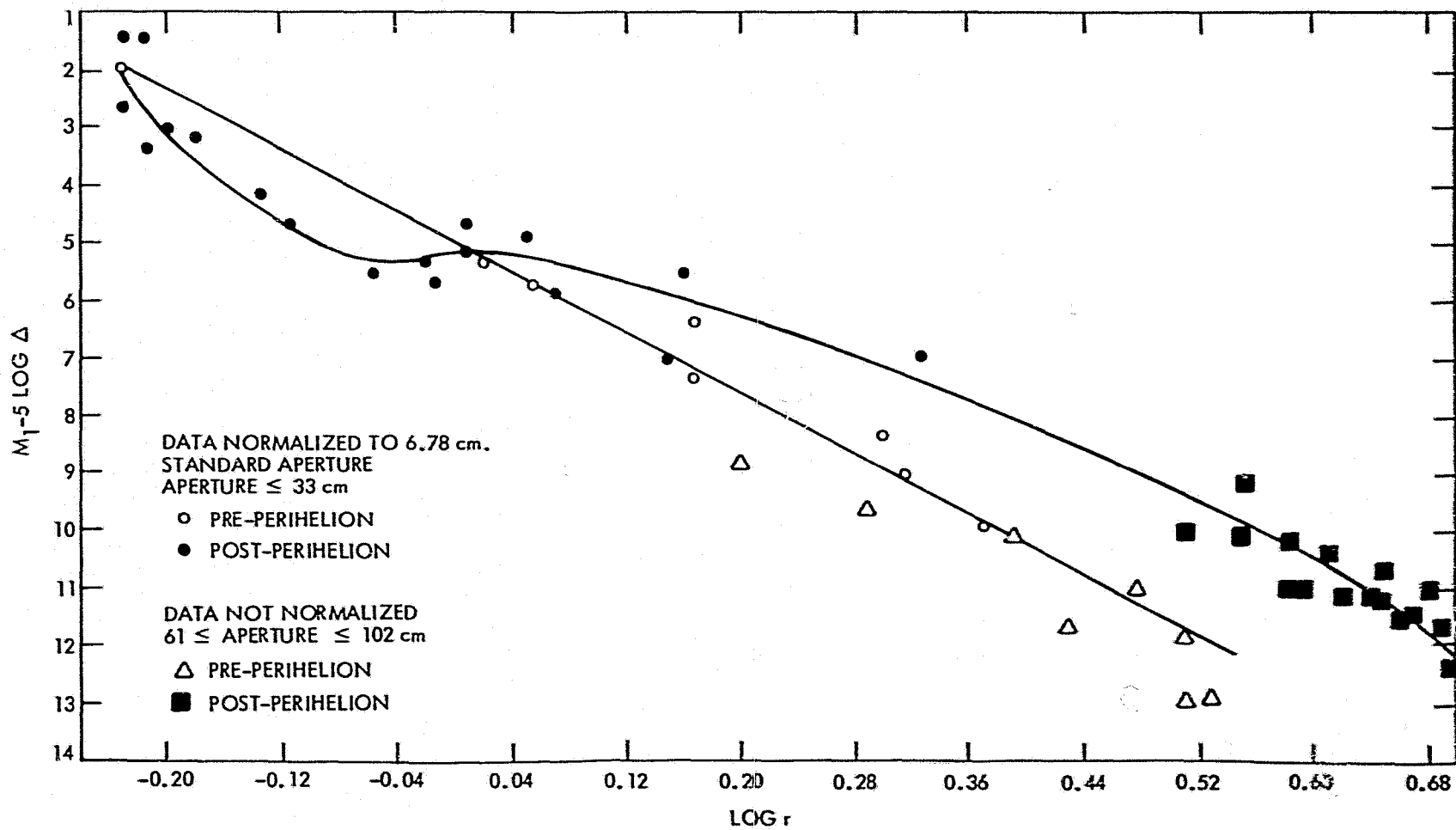


Fig. 5. Comet Halley Total Magnitude Estimates, 1909-10 Visual Estimates Only

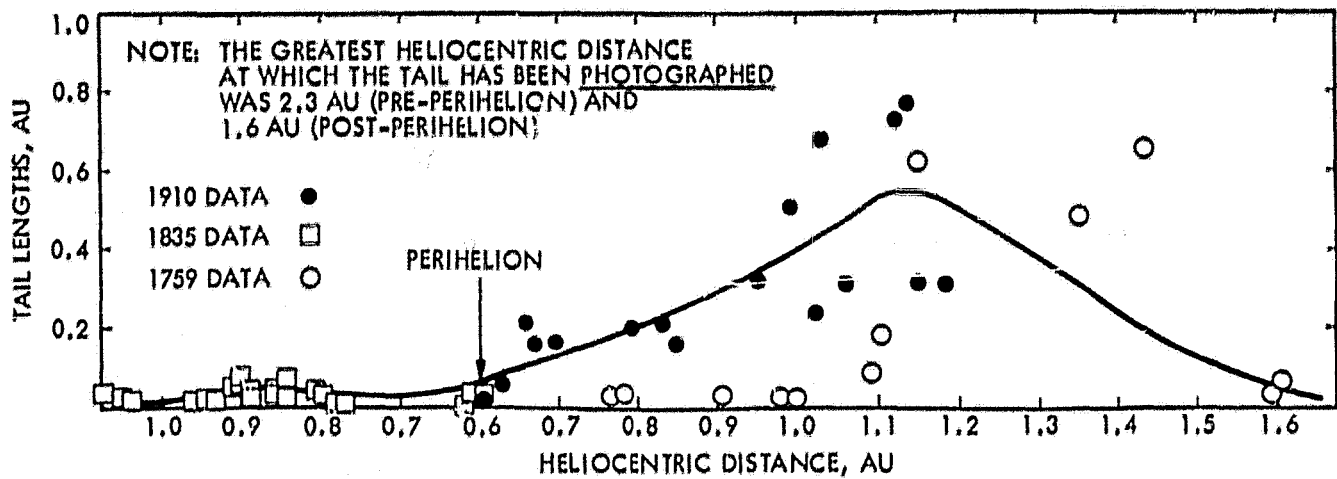


Fig. 6. Comet Halley Lines; Tail Lengths Computed from Naked-Eye Estimates.

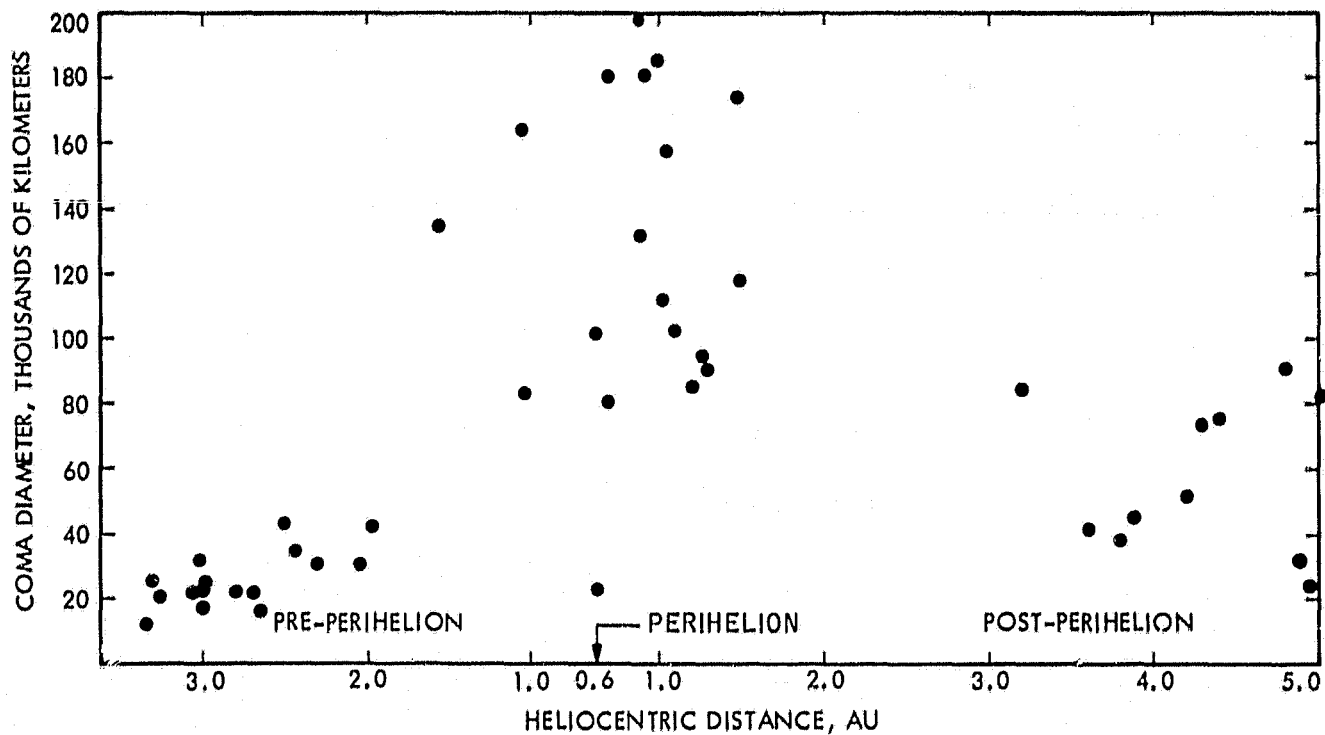
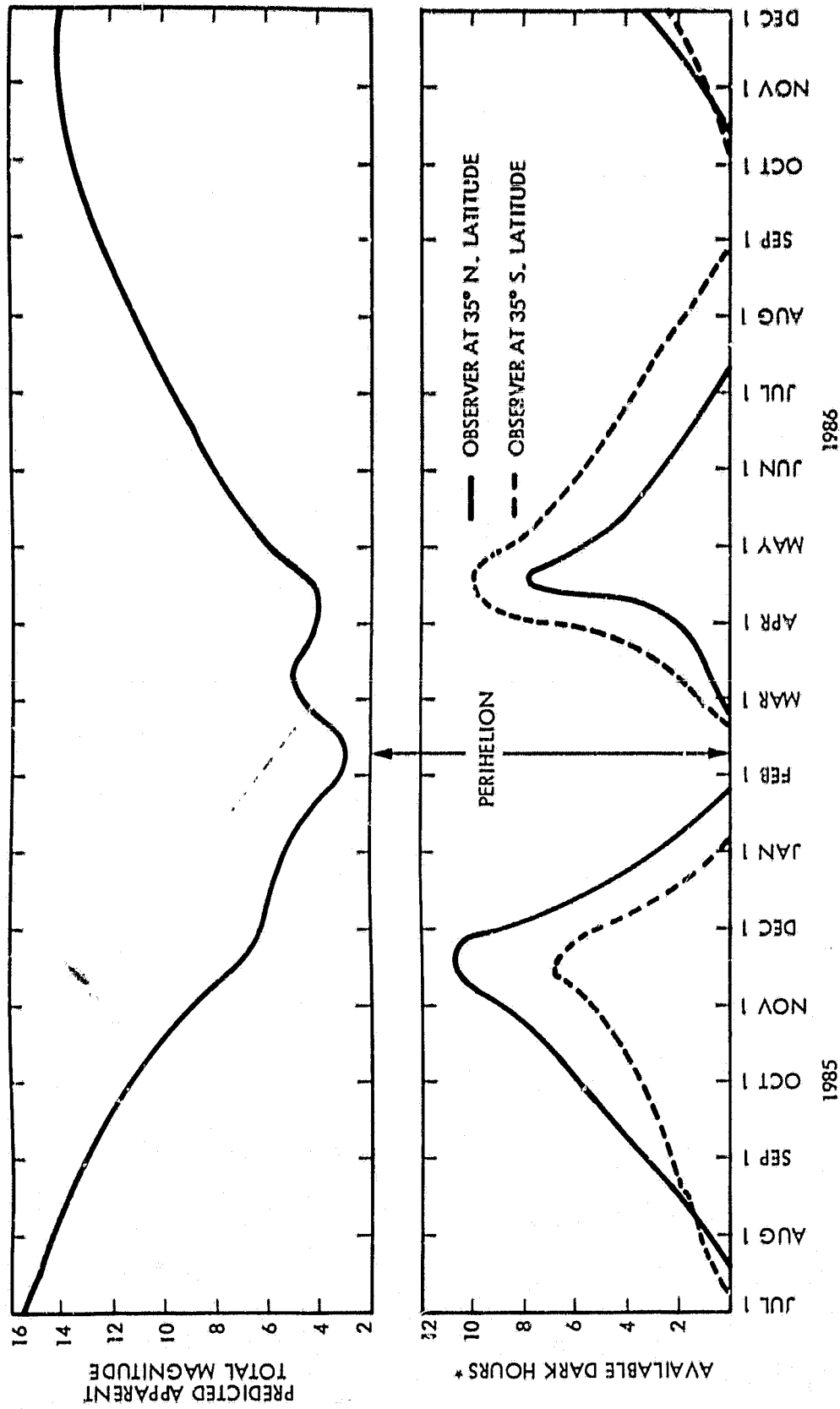


Fig. 7. Comet Halley 1909-1911 Visual Linear Coma Diameters.

located at 45°N , 30°N , 30°S , and 45°S . Table 1 also gives the predicted apparent total M_1 and nuclear M_2 magnitudes of the comet as a function of calendar date.

Figures 9-13 are schematic representations as to how Comet Halley may appear on various dates for observers located at latitudes of 40°N , 30°N , 20°N , 20°S , and 30°S .

The comet's elevation above the local horizon and its azimuth (degrees east of north) are given for various dates. For each date, the comet's position is given for the end of astronomical twilight if the comet is in the evening sky, or the beginning of astronomical twilight if the comet is in the morning sky. These positions correspond to times approximately 70-90 minutes after sunset or 70-90 minutes before sunrise. Very



*NUMBER OF HOURS WHEN COMET IS ABOVE, AND SUN IS MORE THAN 18° BELOW, THE LOCAL HORIZON

Fig. 8. Comet Halley 1985-1986 Ground-Based Observing Conditions.

Table 1. Ground-Based Observing Data, Comet Halley 1985-1986.

Date (1985)	Dark Hours				Apparent Magnitudes		Date (1986)	Dark Hours				Apparent Magnitudes	
	North 45°	Lat. 30°	South 30°	Lat. 45°	M ₁	M ₂		North 45°	Lat. 30°	South 30°	Lat. 45°	M ₁	M ₂
Jan. 1	11.6	10.9	6.8	3.5		17.9	Jan. 6	2.6	2.3	0.5	0	5.1	7.7
11	10.7	10.0	6.9	3.9		17.8	16	1.3	1.1	0	0	4.4	7.2
21	9.7	9.1	7.2	4.6		17.7	26	0	0	0	0	3.6	6.7
31	8.7	8.1	5.6	5.3		17.7	Feb. 5	0	0	0	0	3.0	6.2
Feb. 10	7.7	7.2	5.0	3.7		17.6	15	0	0	0	0	3.1	6.2
20	6.8	6.4	4.4	3.3		17.6	25	0	0.3	0.7	0.5	4.3	6.4
Mar. 2	5.8	5.5	3.9	2.9		17.5	Mar. 7	0.2	0.9	2.0	2.0	5.0	6.8
12	4.9	4.7	3.4	2.5		17.5	17	0.5	1.5	3.3	3.7	4.8	7.0
22	4.0	4.0	2.9	2.1		17.4	27	0.7	2.3	5.3	6.2	4.3	6.9
Apr. 1	3.2	3.2	2.4	1.8		17.4	Apr. 6	0	3.8	9.1	9.4	4.0	6.7
11	2.3	2.5	1.9	1.4		17.3	16	6.0	8.3	10.0	9.9	4.4	7.2
21	1.4	1.7	1.5	1.0		17.2	26	6.2	8.0	9.2	10.0	5.5	8.5
May 1	0.5	1.0	1.0	0.6		17.1	May 6	5.5	5.1	7.7	8.3	6.5	9.7
11	0	0.3	0.5	0.2		17.0	16	2.7	4.3	6.7	7.3	7.3	10.7
21	0	0	0	0		16.8	26	1.9	3.5	5.0	6.5	7.8	11.4
31	0	0	0	0		16.7	June 5	1.0	2.8	5.3	5.8	8.3	12.2
June 10	0	0	0	0		16.5	15	0.2	2.1	4.6	5.1	8.8	12.8
20	0	0	0	0		16.3	25	0	1.5	4.0	4.5	9.3	13.3
30	0	0	0	0		16.1	July 5	0	0.9	3.4	3.9	9.8	13.8
July 10	0	0	0.3	0.1		15.9	15	0	0.4	2.7	3.2	10.3	14.2
20	0	0.5	0.8	0.5	14.8	15.7	25	0	0	2.1	2.5	10.8	14.6
30	0.5	1.2	1.3	0.9	14.4	15.4	Aug. 4	0	0	1.5	1.9	11.3	14.9
Aug. 9	1.4	1.9	1.7	1.3	14.1	15.1	14	0	0	0.9	1.2	11.8	15.2
19	2.3	2.6	2.1	1.6	13.7	14.7	24	0	0	0.3	0.5	12.3	15.5
29	3.2	3.3	2.5	1.9	13.2	14.4	Sept. 3	0	0	0	0	12.7	15.7
Sept. 8	4.1	4.0	2.9	2.2	12.7	13.9	13	0	0	0	0	13.1	16.0
18	5.0	4.8	3.3	2.5	12.2	13.5	23	0	0	0	0	13.4	16.2
28	5.9	5.6	3.8	2.8	11.6	12.9	Oct. 3	0	0	0	0	13.6	16.3
Oct. 8	6.9	6.4	4.3	3.1	10.9	12.3	13	0	0.1	0.4	0	13.8	16.5
18	8.0	7.3	4.9	3.5	10.1	11.6	23	0.4	0.8	0.8	0.4	13.9	16.6
28	9.2	8.5	5.7	4.1	9.3	10.8	Nov. 2	1.2	1.5	1.2	0.7	14.0	16.8
Nov. 7	10.7	10.0	6.8	5.0	8.3	10.0	12	2.0	2.2	1.7	1.0	14.1	16.9
17	11.1	10.6	7.3	4.9	7.2	9.0	22	2.7	2.8	2.3	1.4	14.1	16.9
27	10.6	9.8	7.0	4.2	6.4	8.4							
Dec. 7	7.7	7.1	4.4	3.6	6.1	8.1							
17	5.5	5.1	2.8	1.0	5.9	8.1							
27	3.9	3.6	1.5	0	5.6	8.0							

Note: (1) For a particular observer's latitude, the number of dark hours is defined as the time interval during which the sun is below the local horizon by at least 18 degrees and the comet is simultaneously above the local horizon.

(2) Magnitude estimates are based upon the comet's observed behavior in 1909-10. Predictions are for ideal observing conditions.

rough indications of the comet's tail length and orientation are given for a few representative dates along with the comet's apparent total magnitude M_1 in parenthesis. The tail-length estimates presented in Figures 9 through 13 were obtained by solving for t in formula (4) and using the data in Figure 6 and

Appendix B. Only the period when the comet is brightest (January-April, 1986) is represented on Figures 9-13. Note that the comet passes near opposition in April 1986; for some latitudes, it is then observable as both an evening and morning object.

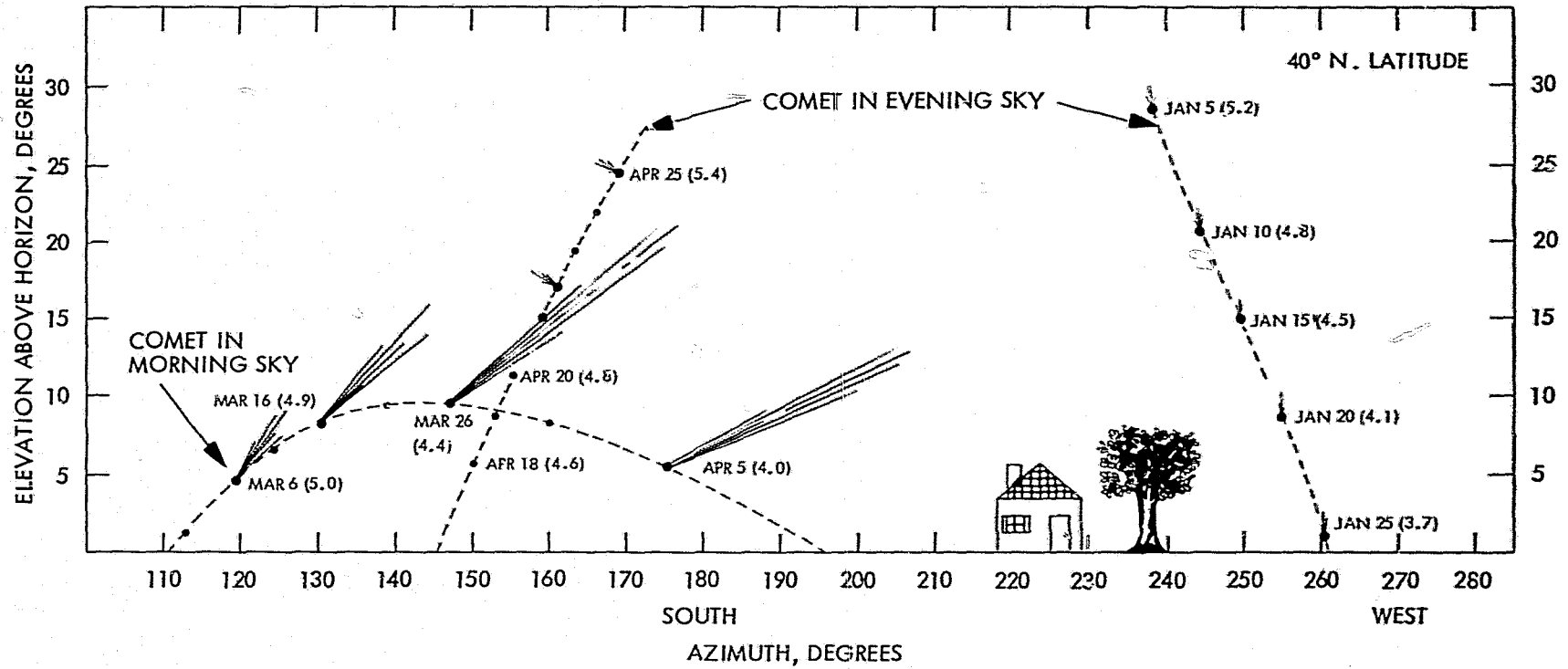


Fig. 9. Comet Halley Observing Conditions in 1986 for Observers Located at 40° North Latitude. Comet Positions are Given for Beginning of Morning Astronomical Twilight or End of Evening Astronomical Twilight. Approximate Total Visual Magnitudes are Given in Parentheses Following Dates. Viewing with Binoculars and Ideal Observing Conditions are Assumed.

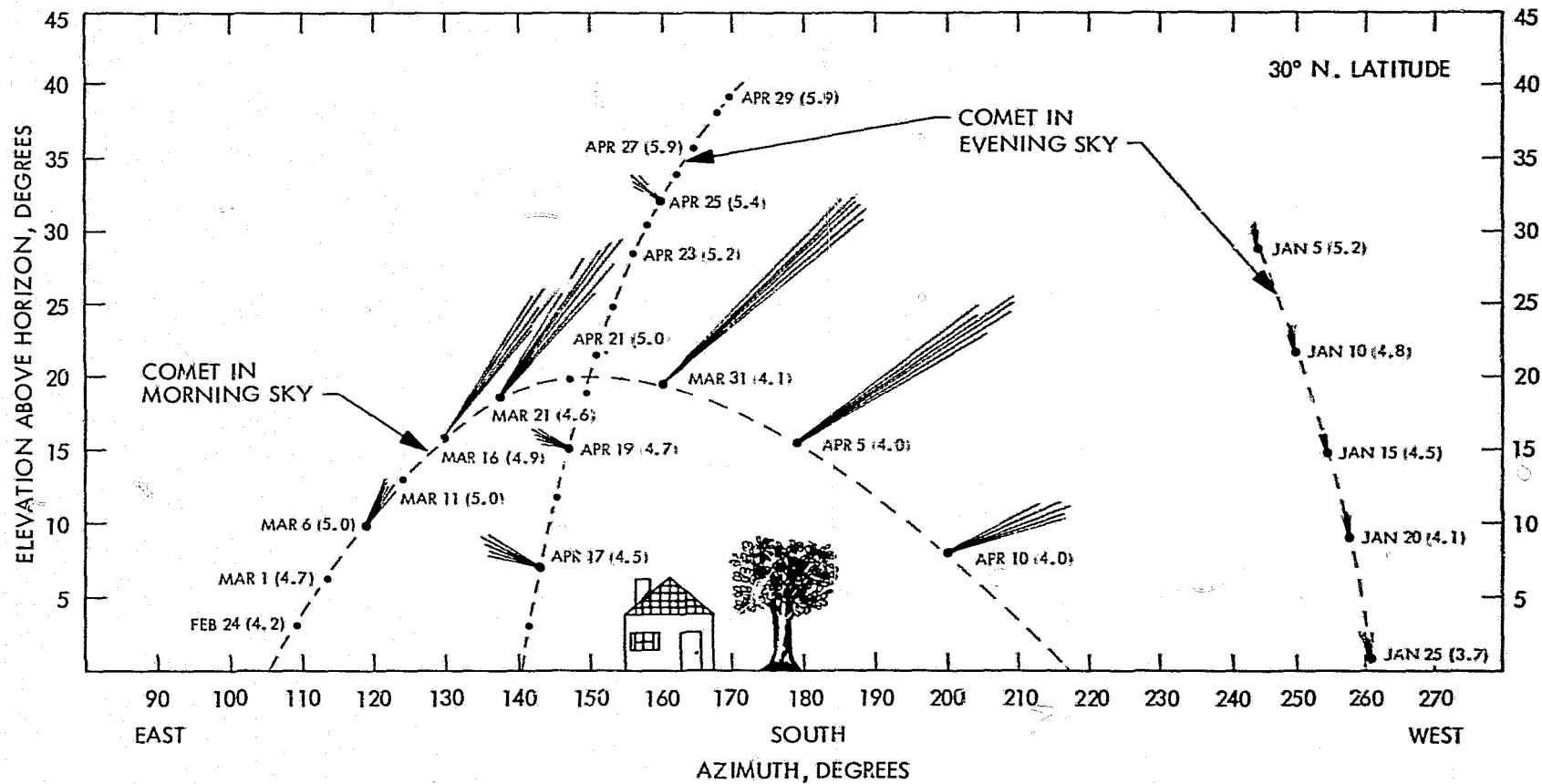


Fig. 10. Comet Halley Observing Conditions in 1986 for Observers Located at 30° North Latitude. Comet Positions are Given for Beginning of Morning Astronomical Twilight or End of Evening Astronomical Twilight. Approximate Total Visual Magnitudes are Given in Parentheses Following Dates. Viewing with Binoculars and Ideal Observing Conditions are Assumed.

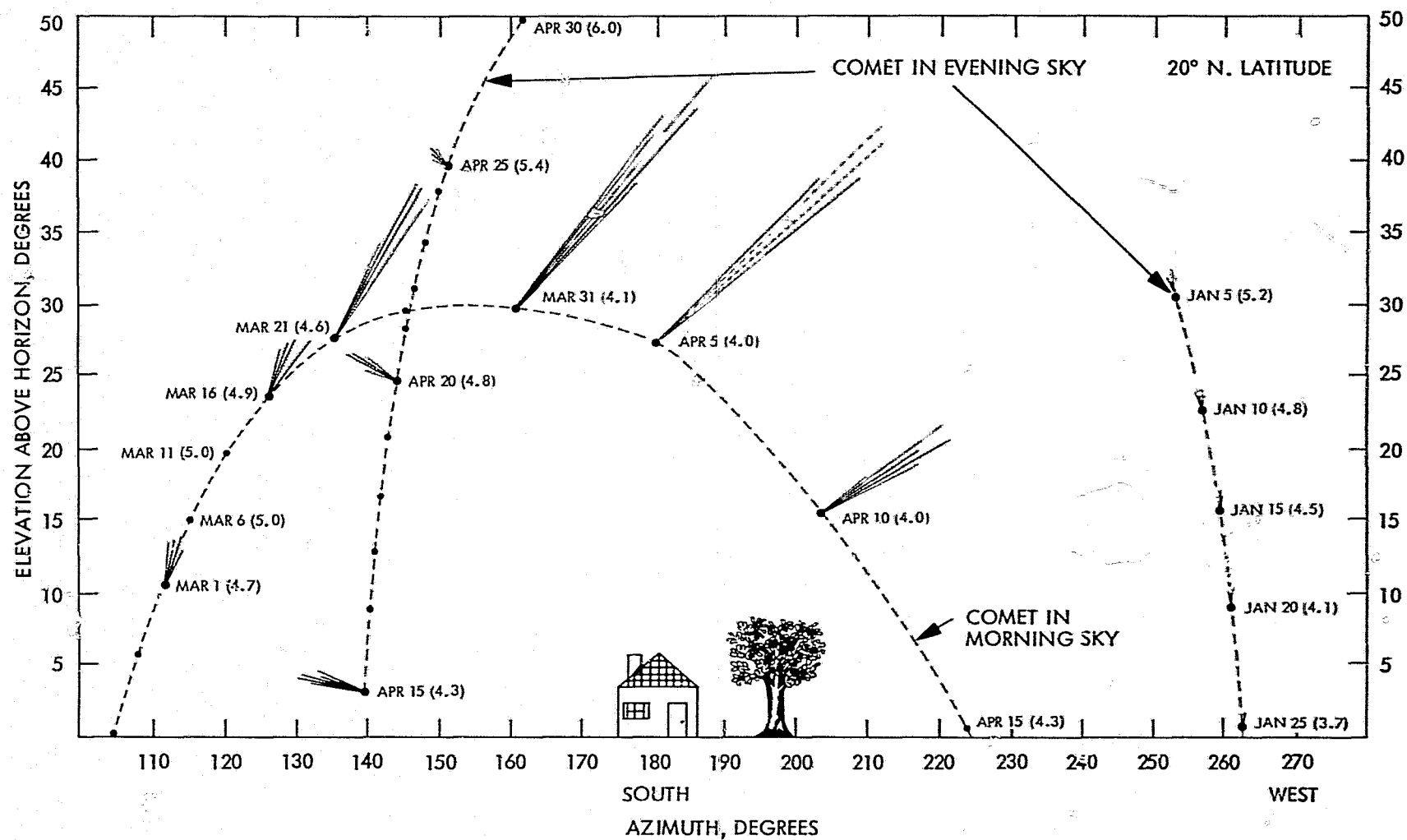


Fig. 11. Comet Halley Observing Conditions in 1986 for Observers Located at 20° North Latitude. Comet Positions are Given for Beginning of Morning Astronomical Twilight or End of Evening Astronomical Twilight. Approximate Total Visual Magnitudes are Given in Parentheses Following Dates. Viewing with Binoculars and Ideal Observing Conditions are Assumed.

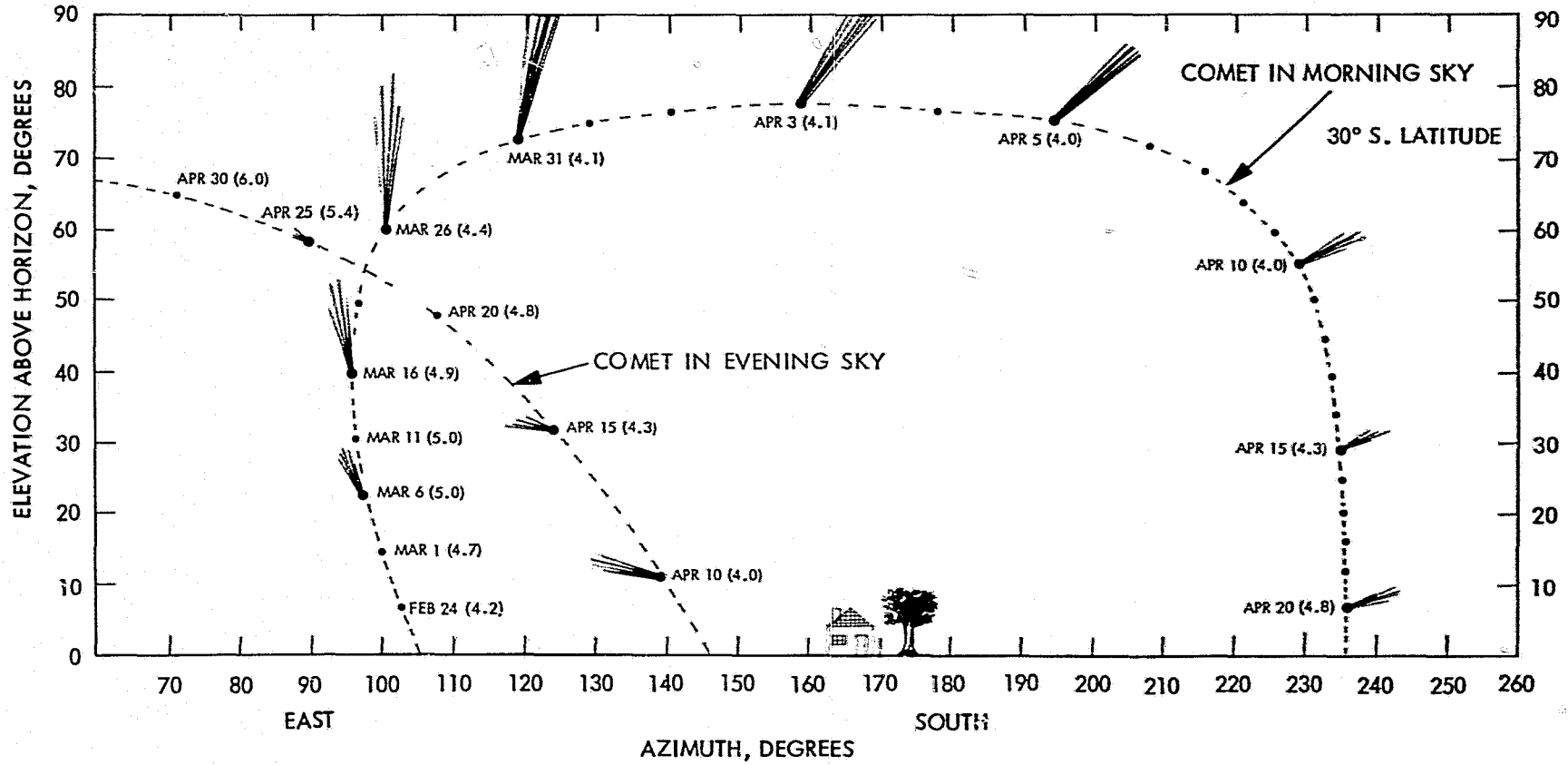


Fig. 13. Comet Halley Observing Conditions in 1986 for Observers Located at 30° South Latitude. Comet Positions are Given for Beginning of Morning Astronomical Twilight or End of Evening Astronomical Twilight. Approximate Total Visual Magnitudes are Given in Parentheses Following Dates. Viewing with Binoculars and Ideal Observing Conditions are Assumed.

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Appendix A
Historical, Physical, and Orbital Data

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Historical, Physical, and Orbital Data

Historical Data

Earliest probable recorded apparition	240 B.C.
Number of recorded apparitions From 240 B.C. to 1910 A.D., only the 164 B.C. apparition was not recorded.	28
Shortest period between returns to perihelion	74.42 years (1835-1910)
Longest period between returns to perihelion	79.25 years (451-530)
Closest approach to the earth	0.04 AU (April 11, 837)
Longest angular tail length recorded	93° (mid-April 837)
Brightest apparent magnitude recorded (approximate)	-3.5 (April 11, 837)

Physical Characteristics

Estimated diameter of nucleus	5 km
Estimated density of nucleus	1 g/cm ³
Estimated rotation period ^{A-1}	10.3 hours, direct
Observed spectra in 1910 ^{A-2}	CH, CN, C ₂ , C ₃ , Na D, CO ⁺ , N ₂ ⁺
Observed tails	Type I ion and Type II dust
Associated meteor streams	η Aquarid (Early May) and Orionid (late October)

Orbital Characteristics

Location of orbit pole	$\lambda = \Omega - 90^\circ = 328.15^\circ$ $\beta = 90^\circ - i = -72.24^\circ$
Location of perihelion	$\lambda = \Omega + \tan^{-1}(\tan \omega \cos i) = 305.32$ $\beta = \sin^{-1}(\sin \omega \sin i) = 16.45^\circ$
Heliocentric distance of orbit nodes	$r(\Omega) = q(1 + e)/(1 + e \cos \omega) = 1.81 \text{ AU}$ $r(\Upsilon) = q(1 + e)/(1 - e \cos \omega) = 0.85 \text{ AU}$
Distance of perihelion and aphelion above or below orbit plane (in AU)	$Z(q) = q \sin \omega \sin i = 0.17 \text{ AU}$ $Z(Q) = Q \sin \omega \sin i = 9.99 \text{ AU}$

Orbital velocity (In km/sec)

$$V = 29.8 \left[\frac{2}{r} - \frac{1}{a} \right]^{1/2}$$
$$= 29.8 \left[\frac{2}{r} - 0.0558 \right]^{1/2}$$

At perihellon $r = q$

$$V = 54.55 \text{ km/sec}$$

At aphellon $r = Q$

$$V = 0.91 \text{ km/sec}$$

Definitions

λ, β	ecliptic longitude, latitude
Ω, ϑ	longitude of the ascending, descending node
ω	argument of perihellon
i	inclination of orbit plane with respect to the ecliptic
q, Q	perihellon, aphellon distance in AU
e	orbital eccentricity
a	semimajor axis in AU

References

- A-1. Whipple, F. L., private communication, March 1, 1980.
- A-2. Bobrovnikoff, N. T. (1931) *Publications of the Lick Observatory*, v. 17, part II.

Appendix B
Ephemeris Data 1981-1987

Explanation of Symbols

J. D.	= Julian Date (Ephemeris Time)
R. A. 1950.0 DEC.	= Geocentric right ascension and declination referred to the mean equator and equinox of 1950.0. Light time corrections have been applied
R. A. APPN DEC.	= Apparent geocentric right ascension and declination. Light time, annual aberration, and nutation corrections have been applied, and R. A. and Dec. have been processed to the ephemeris date.
DELTA	= Geocentric distance of comet in AU
DELDOT	= Geocentric velocity of comet in km/sec
R	= Heliocentric distance of comet in AU
RDOT	= Heliocentric velocity of comet in km/sec
M_1	= Total magnitude = $5.0 + 5.0 \cdot \log(\Delta) + 13.1 \cdot \log(R)$, pre-perihellon. Post-perihellon, M_1 is determined empirically from the 1910-11 magnitude estimates (see Figure 5)
M_2	= Nuclear magnitude = $7.5 + 5.0 \cdot \log(\Delta) + 10.0 \cdot \log(R)$
NOTE:	In cases where M_1 is not computed, the corresponding column is filled with zeros (0.0).
THETA	= Sun-Earth-Comet angle in degrees
BETA	= Sun-Comet-Earth angle in degrees
MOON	= Comet-Earth-Moon angle in degrees

NOTES:

1. The following osculating orbital elements are consistent with the following ephemeris:

Epoch	2446480.50000	1986	FEB.	19.00000 (E.T.)
Perihellon Passage	2446471.16128	1986	FEB.	9.66128 (E.T.)
Perihellon Distance in AU	0.5870959			
Eccentricity	0.9672671			
Argument of Perihellon	111.85336			
Longitude of Ascending Node	58.15313			
Inclination	162.23779			

2. Angles are in degrees and are referred to the ecliptic and equinox of 1950.0.

Table B-1. Ephemeris (with Perturbations) for Comet Halley at 10-Day Intervals from December 25, 1980 to June 6, 1982.

YR	MO	DAY	HR	J.D.	R.A.	1950-0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1980	12	25	.0	2444598.5	7 15.465	+ 7	51.28	7 12.152	+ 7	48.01	13.60	-15.87	14.53	-8.26	.0	24.8	159.2	1.4	29
1981	1	4	.0	2444698.5	7 7.336	+ 7	55.57	7 9.026	+ 7	52.41	13.53	-19.41	14.48	-8.28	.0	24.8	164.9	1.0	147
1981	1	14	.0	2444678.5	7 4.155	+ 8	1.80	7 5.849	+ 7	58.77	13.48	-4.85	14.43	-8.30	.0	24.7	164.0	1.1	75
1981	1	24	.0	2444628.5	7 1.035	+ 8	9.79	7 2.734	+ 8	6.88	13.47	.54	14.38	-8.32	.0	24.7	157.2	1.5	83
1981	2	3	.0	2444638.5	6 58.092	+ 8	19.26	6 59.789	+ 8	16.47	13.49	5.61	14.33	-8.35	.0	24.7	149.1	2.1	166
1981	2	13	.0	2444648.5	6 55.418	+ 8	29.90	6 57.116	+ 8	27.22	13.53	17.13	14.29	-8.37	.0	24.7	139.3	2.6	35
1981	2	23	.0	2444658.5	6 53.102	+ 8	41.36	6 54.801	+ 8	38.78	13.60	13.94	14.24	-8.39	.0	24.7	128.3	3.1	96
1981	3	3	.0	2444668.5	6 51.207	+ 8	53.26	6 52.907	+ 8	50.76	13.69	16.98	14.19	-8.42	.0	24.7	118.2	3.5	136
1981	3	15	.0	2444678.5	6 49.782	+ 9	5.25	6 51.482	+ 9	2.82	13.67	19.11	14.14	-8.44	.0	24.7	108.2	3.8	12
1981	3	25	.0	2444688.5	6 48.552	+ 9	16.99	6 50.550	+ 9	14.60	13.91	20.33	14.09	-8.46	.0	24.7	98.3	4.0	128
1981	4	4	.0	2444698.5	6 48.420	+ 9	28.16	6 50.117	+ 9	25.79	14.02	20.67	14.04	-8.49	.0	24.7	88.6	4.1	99
1981	4	14	.0	2444708.5	6 48.478	+ 9	38.48	6 50.175	+ 9	36.12	14.15	20.09	13.99	-8.51	.0	24.7	79.1	4.0	43
1981	4	24	.0	2444718.5	6 49.001	+ 9	47.73	6 50.697	+ 9	45.34	14.26	18.73	13.94	-8.54	.0	24.7	69.7	3.9	159
1981	5	4	.0	2444728.5	6 49.952	+ 9	55.70	6 51.647	+ 9	53.29	14.36	16.65	13.90	-8.56	.0	24.7	60.5	3.6	62
1981	5	14	.0	2444738.5	6 51.289	+10	2.25	6 52.984	+ 9	59.78	14.45	13.88	13.85	-8.58	.0	24.7	51.4	3.3	75
1981	5	24	.0	2444748.5	6 52.960	+10	7.26	6 54.655	+10	4.72	14.52	10.59	13.80	-8.61	.0	24.7	42.6	2.9	161
1981	6	3	.0	2444758.5	6 54.912	+10	10.65	6 56.608	+10	8.04	14.57	6.84	13.75	-8.63	.0	24.7	34.1	2.4	26
1981	6	13	.0	2444768.5	6 57.087	+10	12.38	6 58.782	+10	9.69	14.60	2.72	13.70	-8.66	.0	24.7	26.0	1.9	106
1981	6	23	.0	2444778.5	6 59.424	+10	12.45	7 1.120	+10	9.67	14.61	-1.63	13.65	-8.68	.0	24.7	18.6	1.4	129
1981	7	3	.0	2444788.5	7 1.864	+10	10.29	7 3.561	+10	8.01	14.58	-6.16	13.60	-8.71	.0	24.7	13.4	1.0	16
1981	7	13	.0	2444798.5	7 4.345	+10	7.74	7 6.042	+10	4.77	14.53	-10.74	13.55	-8.73	.0	24.6	13.0	1.0	135
1981	7	23	.0	2444808.5	7 6.804	+10	3.10	7 8.502	+10	.03	14.46	-15.25	13.50	-8.76	.0	24.6	17.7	1.3	94
1981	8	2	.0	2444818.5	7 9.179	+ 9	57.09	7 10.879	+ 9	53.93	14.36	-19.66	13.44	-8.79	.0	24.6	24.9	1.8	46
1981	8	12	.0	2444828.5	7 11.406	+ 9	49.86	7 13.107	+ 9	46.61	14.23	-23.87	13.39	-8.81	.0	24.5	23.0	2.4	163
1981	8	22	.0	2444838.5	7 13.423	+ 9	41.59	7 15.125	+ 9	38.27	14.08	-27.60	13.34	-8.84	.0	24.5	41.5	2.9	58
1981	9	1	.0	2444848.5	7 15.169	+ 9	32.50	7 16.873	+ 9	29.10	13.91	-31.00	13.29	-8.86	.0	24.5	50.2	3.3	78
1981	9	11	.0	2444858.5	7 16.581	+ 9	22.82	7 18.267	+ 9	19.37	13.73	-33.81	13.24	-8.89	.0	24.4	59.2	3.7	157
1981	9	21	.0	2444868.5	7 17.603	+ 9	12.85	7 19.311	+ 9	9.36	13.53	-36.01	13.19	-8.92	.0	24.4	68.4	4.1	22
1981	10	1	.0	2444878.5	7 18.182	+ 9	2.88	7 19.893	+ 8	59.35	13.31	-37.20	13.14	-8.94	.0	24.3	77.8	4.3	109
1981	10	11	.0	2444888.5	7 18.271	+ 8	57.23	7 19.985	+ 8	49.70	13.09	-38.15	13.09	-8.97	.0	24.3	87.4	4.4	125
1981	10	21	.0	2444898.5	7 17.836	+ 8	44.25	7 19.553	+ 8	40.72	12.87	-37.97	13.03	-9.00	.0	24.2	97.1	4.3	22
1981	10	31	.0	2444908.5	7 16.851	+ 8	36.28	7 18.572	+ 8	32.78	12.66	-36.87	12.98	-9.03	.0	24.1	107.0	4.2	140
1981	11	10	.0	2444918.5	7 15.312	+ 8	29.66	7 17.036	+ 8	26.21	12.45	-34.83	12.93	-9.06	.0	24.1	117.0	3.9	88
1981	11	20	.0	2444928.5	7 13.235	+ 8	24.71	7 14.964	+ 8	21.33	12.26	-31.93	12.88	-9.08	.0	24.0	127.2	3.5	56
1981	11	30	.0	2444938.5	7 10.655	+ 8	21.68	7 12.389	+ 8	18.40	12.08	-28.15	12.82	-9.11	.0	24.0	137.3	3.0	166
1981	12	10	.0	2444948.5	7 7.638	+ 8	20.81	7 9.376	+ 8	17.63	11.93	-23.65	12.77	-9.14	.0	23.9	147.3	2.4	49
1981	12	20	.0	2444958.5	7 4.273	+ 8	22.19	7 6.015	+ 8	19.15	11.81	-18.60	12.72	-9.17	.0	23.9	156.6	1.8	92
1981	12	30	.0	2444968.5	7 .666	+ 8	25.86	7 2.413	+ 8	22.96	11.72	-13.23	12.67	-9.20	.0	23.9	163.9	1.2	144
1982	1	9	.0	2444978.5	6 56.947	+ 8	31.77	6 58.698	+ 8	29.02	11.66	-7.52	12.61	-9.23	.0	23.8	165.4	1.1	15
1982	1	19	.0	2444988.5	6 53.250	+ 8	39.72	6 55.003	+ 8	37.12	11.63	-1.97	12.56	-9.26	.0	23.8	159.8	1.6	126
1982	1	29	.0	2444998.5	6 49.708	+ 8	49.47	6 51.462	+ 8	47.02	11.64	3.31	12.51	-9.29	.0	23.8	151.0	2.2	108
1982	2	8	.0	2445008.5	6 46.444	+ 9	.69	6 48.202	+ 8	58.38	11.67	8.05	12.45	-9.32	.0	23.8	141.1	2.8	35
1982	2	18	.0	2445018.5	6 43.570	+ 9	12.99	6 45.329	+ 9	10.82	11.73	12.14	12.40	-9.35	.0	23.8	131.0	3.4	157
1982	2	28	.0	2445028.5	6 41.170	+ 9	26.00	6 42.926	+ 9	23.93	11.81	15.44	12.34	-9.38	.0	23.8	120.8	4.0	69
1982	3	10	.0	2445038.5	6 39.307	+ 9	39.30	6 41.066	+ 9	37.32	11.90	17.80	12.29	-9.41	.0	23.8	110.7	4.3	71
1982	3	20	.0	2445048.5	6 38.012	+ 9	52.51	6 39.772	+ 9	50.59	12.01	19.28	12.24	-9.44	.0	23.8	100.9	4.6	160
1982	3	30	.0	2445058.5	6 37.302	+10	5.29	6 39.061	+10	3.40	12.12	19.82	12.18	-9.47	.0	23.8	90.9	4.7	31
1982	4	9	.0	2445068.5	6 37.166	+10	17.30	6 38.925	+10	15.43	12.24	19.44	12.13	-9.50	.0	23.8	81.2	4.7	105
1982	4	19	.0	2445078.5	6 37.577	+10	28.28	6 39.336	+10	26.39	12.35	18.27	12.07	-9.53	.0	23.8	71.8	4.5	131
1982	4	29	.0	2445088.5	6 38.498	+10	37.99	6 40.257	+10	36.07	12.43	16.30	12.02	-9.56	.0	23.8	62.5	4.3	15
1982	5	9	.0	2445098.5	6 39.879	+10	46.25	6 41.637	+10	44.27	12.53	13.68	11.96	-9.60	.0	23.8	53.4	3.9	137
1982	5	19	.0	2445108.5	6 41.661	+10	52.91	6 43.419	+10	50.86	12.60	10.51	11.91	-9.63	.0	23.8	44.6	3.4	98
1982	5	29	.0	2445118.5	6 43.786	+10	57.86	6 45.544	+10	55.72	12.65	6.83	11.85	-9.66	.0	23.7	35.9	2.9	47
1982	6	6	.0	2445128.5	6 46.186	+11	1.04	6 47.945	+10	58.80	12.68	2.80	11.79	-9.69	.0	23.7	27.7	2.3	164

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Table B-2. Ephemeris (with Perturbations) for Comet Halley at 5-Day Intervals from June 18, 1982 to September 30, 1984.

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDTOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1982	6	18	.0	2445138.5	6 48.796	+11	2.42	6 50.555	+11	.07	12.69	-1.49	11.74	-9.73	.0	23.7	20.0	1.7	65
1982	6	23	.0	2445143.5	6 50.159	+11	2.43	6 51.919	+11	.03	12.68	-3.73	11.71	-9.74	.0	23.7	16.7	1.4	15
1982	6	26	.0	2445148.5	6 51.549	+11	1.99	6 53.310	+10	59.53	12.67	-5.99	11.58	-9.76	.0	23.7	13.9	1.2	60
1982	7	3	.0	2445153.5	6 52.956	+11	1.11	6 54.717	+10	58.60	12.64	-8.26	11.65	-9.78	.0	23.7	12.2	1.1	140
1982	7	8	.0	2445158.5	6 54.373	+10	59.80	6 56.134	+10	57.22	12.62	-10.53	11.62	-9.79	.0	23.7	11.9	1.0	156
1982	7	13	.0	2445163.5	6 55.790	+10	58.06	6 57.552	+10	55.43	12.58	-12.80	11.60	-9.81	.0	23.6	13.2	1.1	97
1982	7	18	.0	2445168.5	6 57.200	+10	55.92	6 58.962	+10	53.23	12.54	-15.07	11.57	-9.83	.0	23.6	15.6	1.4	30
1982	7	23	.0	2445173.5	6 58.593	+10	53.37	7 .357	+10	50.63	12.50	-17.32	11.54	-9.85	.0	23.6	18.5	1.6	47
1982	7	28	.0	2445178.5	6 59.960	+10	50.45	7 1.724	+10	47.64	12.44	-19.51	11.51	-9.86	.0	23.6	22.4	1.9	111
1982	8	2	.0	2445183.5	7 1.292	+10	47.16	7 3.056	+10	44.30	12.38	-21.64	11.48	-9.88	.0	23.6	26.2	2.2	165
1982	8	7	.0	2445188.5	7 2.580	+10	43.52	7 4.344	+10	40.61	12.32	-23.71	11.45	-9.90	.0	23.5	30.2	2.6	126
1982	8	12	.0	2445193.5	7 3.815	+10	39.57	7 5.580	+10	36.61	12.25	-25.71	11.43	-9.92	.0	23.5	34.4	2.9	63
1982	8	17	.0	2445198.5	7 4.990	+10	35.33	7 6.756	+10	32.32	12.17	-27.63	11.40	-9.93	.0	23.5	38.6	3.2	14
1982	8	22	.0	2445203.5	7 6.093	+10	30.81	7 7.860	+10	27.76	12.09	-29.45	11.37	-9.95	.0	23.5	42.9	3.5	80
1982	8	27	.0	2445208.5	7 7.115	+10	26.06	7 8.883	+10	22.96	12.00	-31.15	11.34	-9.97	.0	23.4	47.3	3.8	141
1982	9	1	.0	2445213.5	7 8.050	+10	21.13	7 9.818	+10	17.96	11.91	-32.72	11.31	-9.99	.0	23.4	51.7	4.0	154
1982	9	6	.0	2445218.5	7 8.886	+10	15.97	7 10.655	+10	12.80	11.81	-34.15	11.28	-10.01	.0	23.4	56.2	4.3	94
1982	9	11	.0	2445223.5	7 9.617	+10	12.71	7 11.397	+10	7.50	11.71	-35.45	11.25	-10.02	.0	23.4	60.7	4.5	28
1982	9	16	.0	2445228.5	7 10.232	+10	5.35	7 12.004	+10	2.11	11.61	-36.59	11.22	-10.04	.0	23.3	65.3	4.7	47
1982	9	21	.0	2445233.5	7 10.724	+9	59.92	7 12.496	+9	56.67	11.50	-37.55	11.19	-10.06	.0	23.3	69.9	4.8	112
1982	9	26	.0	2445238.5	7 11.094	+9	54.49	7 12.858	+9	51.21	11.39	-38.32	11.17	-10.08	.0	23.3	74.6	5.0	165
1982	10	1	.0	2445243.5	7 11.305	+9	49.08	7 13.080	+9	45.80	11.28	-38.89	11.14	-10.10	.0	23.2	79.3	5.1	124
1982	10	6	.0	2445248.5	7 11.391	+9	43.76	7 13.156	+9	40.47	11.17	-39.27	11.11	-10.12	.0	23.2	84.1	5.1	58
1982	10	11	.0	2445253.5	7 11.305	+9	38.55	7 13.082	+9	35.26	11.05	-39.46	11.08	-10.13	.0	23.2	88.9	5.2	18
1982	10	16	.0	2445258.5	7 11.071	+9	33.52	7 12.950	+9	30.23	10.94	-39.41	11.05	-10.15	.0	23.1	93.8	5.2	82
1982	10	21	.0	2445263.5	7 10.673	+9	28.71	7 12.454	+9	25.43	10.82	-39.13	11.02	-10.17	.0	23.1	98.7	5.1	143
1982	10	26	.0	2445268.5	7 10.109	+9	24.17	7 11.892	+9	20.91	10.71	-38.61	10.99	-10.19	.0	23.1	103.7	5.0	152
1982	10	31	.0	2445273.5	7 9.378	+9	19.95	7 11.152	+9	15.72	10.60	-37.86	10.96	-10.21	.0	23.0	108.7	4.9	90
1982	11	5	.0	2445278.5	7 8.478	+9	16.13	7 10.254	+9	12.90	10.49	-36.88	10.93	-10.23	.0	23.0	113.8	4.8	23
1982	11	10	.0	2445283.5	7 7.411	+9	12.66	7 9.199	+9	9.51	10.39	-35.68	10.90	-10.25	.0	23.0	119.0	4.6	53
1982	11	15	.0	2445288.5	7 6.177	+9	9.68	7 7.958	+9	6.57	10.29	-34.24	10.87	-10.27	.0	22.9	124.0	4.3	117
1982	11	20	.0	2445293.5	7 4.783	+9	7.21	7 6.575	+9	4.15	10.19	-32.56	10.84	-10.29	.0	22.9	129.1	4.1	165
1982	11	25	.0	2445298.5	7 3.234	+9	5.27	7 5.028	+9	2.28	10.10	-30.67	10.81	-10.31	.0	22.9	134.3	3.7	118
1982	11	30	.0	2445303.5	7 1.540	+9	3.92	7 3.337	+9	.99	10.01	-28.59	10.78	-10.33	.0	22.8	139.4	3.4	53
1982	12	5	.0	2445308.5	6 59.712	+9	3.16	7 1.512	+9	.30	9.94	-26.33	10.75	-10.34	.0	22.8	144.5	3.1	27
1982	12	10	.0	2445313.5	6 57.763	+9	3.02	6 59.555	+9	.25	9.86	-23.91	10.72	-10.36	.0	22.8	149.5	2.7	91
1982	12	15	.0	2445318.5	6 55.704	+9	3.52	6 57.510	+9	.83	9.80	-21.32	10.69	-10.38	.0	22.7	154.3	2.3	150
1982	12	20	.0	2445323.5	6 53.559	+9	4.67	6 55.366	+9	2.08	9.74	-18.62	10.66	-10.40	.0	22.7	158.9	1.9	142
1982	12	25	.0	2445328.5	6 51.341	+9	6.48	6 53.150	+9	3.98	9.69	-15.83	10.63	-10.42	.0	22.7	162.7	1.6	83
1982	12	30	.0	2445333.5	6 49.073	+9	8.93	6 50.884	+9	6.52	9.65	-12.99	10.60	-10.44	.0	22.7	165.4	1.3	19
1983	1	4	.0	2445338.5	6 46.775	+9	12.03	6 48.587	+9	9.70	9.61	-10.12	10.57	-10.47	.0	22.7	166.2	1.3	65
1983	1	9	.0	2445343.5	6 44.467	+9	15.69	6 46.281	+9	13.49	9.59	-7.24	10.54	-10.49	.0	22.6	164.9	1.4	128
1983	1	14	.0	2445348.5	6 42.171	+9	19.96	6 43.987	+9	17.86	9.57	-4.39	10.51	-10.51	.0	22.6	161.8	1.7	162
1983	1	19	.0	2445353.5	6 39.910	+9	24.78	6 41.728	+9	22.78	9.56	-1.60	10.48	-10.53	.0	22.6	157.7	2.0	108
1983	1	24	.0	2445358.5	6 37.707	+9	30.11	6 39.525	+9	28.21	9.56	1.09	10.45	-10.55	.0	22.6	153.1	2.4	45
1983	1	29	.0	2445363.5	6 35.580	+9	35.90	6 37.400	+9	34.10	9.57	3.64	10.42	-10.57	.0	22.6	148.2	2.9	33
1983	2	3	.0	2445368.5	6 33.547	+9	42.11	6 35.359	+9	40.00	9.58	6.05	10.39	-10.59	.0	22.6	143.1	3.3	103
1983	2	8	.0	2445373.5	6 31.527	+9	48.68	6 33.449	+9	47.06	9.61	8.31	10.37	-10.61	.0	22.6	138.0	3.7	160
1983	2	13	.0	2445378.5	6 29.834	+9	55.56	6 31.658	+9	54.03	9.63	10.38	10.35	-10.63	.0	22.6	132.8	4.0	132
1983	2	18	.0	2445383.5	6 28.184	+10	2.70	6 30.008	+10	1.25	9.67	12.24	10.30	-10.65	.0	22.6	127.6	4.4	70
1983	2	23	.0	2445388.5	6 26.688	+10	13.04	6 28.512	+10	9.65	9.70	13.86	10.27	-10.67	.0	22.5	122.4	4.7	20
1983	2	28	.0	2445393.5	6 25.355	+10	17.52	6 27.130	+10	16.20	9.74	15.25	10.24	-10.70	.0	22.5	117.2	4.9	71
1983	3	5	.0	2445398.5	6 24.190	+10	25.09	6 26.015	+10	23.82	9.79	16.42	10.21	-10.72	.0	22.5	112.1	5.2	135
1983	3	10	.0	2445403.5	6 23.200	+10	32.70	6 25.026	+10	31.48	9.84	17.35	10.17	-10.74	.0	22.5	107.0	5.4	145

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1983	3	15	.0	2445406.5	6	22.338	+10 40.29	5	24.214	+10 39.11	9.89	13.05	10.14	-10.76	.0	22.5	102.0	5.5	98
1983	3	20	.0	2445413.5	6	21.755	+10 47.62	5	23.582	+10 45.67	9.94	18.48	10.11	-10.78	.0	22.5	95.9	5.6	35
1983	3	25	.0	2445418.5	6	21.304	+10 55.23	5	23.130	+10 54.10	10.00	18.67	10.09	-10.81	.0	22.5	92.0	5.7	39
1983	3	30	.0	2445423.5	6	21.027	+11 2.48	5	22.853	+11 1.37	10.05	13.64	10.05	-10.83	.0	22.5	87.1	5.7	108
1983	4	4	.0	2445428.5	6	20.924	+11 9.53	5	22.750	+11 8.43	10.10	13.41	10.02	-10.85	.0	22.5	82.2	5.7	165
1983	4	9	.0	2445433.5	6	20.989	+11 16.35	5	22.816	+11 15.25	10.16	17.95	9.99	-10.87	.0	22.5	77.4	5.6	125
1983	4	14	.0	2445438.5	6	21.218	+11 22.89	5	23.045	+11 21.74	10.21	17.29	9.95	-10.90	.0	22.5	72.7	5.5	64
1983	4	19	.0	2445443.5	6	21.605	+11 29.13	5	23.432	+11 28.00	10.26	16.42	9.92	-10.92	.0	22.5	68.0	5.4	13
1983	4	24	.0	2445448.5	6	22.142	+11 35.02	5	23.959	+11 33.87	10.30	15.36	9.89	-10.94	.0	22.5	63.4	5.2	76
1983	4	29	.0	2445453.5	6	22.820	+11 40.55	6	24.647	+11 39.37	10.35	14.16	9.85	-10.97	.0	22.5	58.8	5.0	141
1983	5	4	.0	2445458.5	6	23.631	+11 45.68	6	25.458	+11 44.47	10.38	12.80	9.83	-10.99	.0	22.5	54.2	4.8	152
1983	5	9	.0	2445463.5	6	24.557	+11 50.41	6	26.394	+11 49.16	10.42	11.30	9.80	-11.01	.0	22.5	49.8	4.5	94
1983	5	14	.0	2445468.5	6	25.619	+11 54.71	6	27.447	+11 53.40	10.45	9.65	9.77	-11.04	.0	22.5	45.3	4.2	30
1983	5	19	.0	2445473.5	6	26.779	+11 58.55	5	28.607	+11 57.20	10.47	7.87	9.73	-11.06	.0	22.5	41.0	3.9	44
1983	5	24	.0	2445478.5	6	28.035	+12 1.93	6	29.853	+12 .52	10.50	6.01	9.70	-11.08	.0	22.5	36.7	3.6	111
1983	5	29	.0	2445483.5	6	29.377	+12 4.83	6	31.207	+12 3.36	10.51	4.06	9.67	-11.11	.0	22.5	32.5	3.2	166
1983	6	3	.0	2445488.5	6	30.798	+12 7.25	6	32.628	+12 5.72	10.52	2.03	9.64	-11.13	.0	22.4	28.4	2.9	124
1983	6	8	.0	2445493.5	6	32.297	+12 9.18	5	34.117	+12 7.59	10.52	-.08	9.61	-11.16	.0	22.4	24.4	2.5	63
1983	6	13	.0	2445498.5	6	33.835	+12 10.61	5	35.665	+12 9.94	10.52	-2.25	9.57	-11.18	.0	22.4	20.5	2.1	14
1983	6	18	.0	2445503.5	6	35.431	+12 11.53	6	37.262	+12 9.80	10.51	-4.48	9.54	-11.20	.0	22.4	17.0	1.6	60
1983	6	23	.0	2445508.5	6	37.054	+12 11.96	6	38.896	+12 10.15	10.49	-6.72	9.51	-11.23	.0	22.4	13.9	1.5	143
1983	6	28	.0	2445513.5	6	38.725	+12 11.89	6	40.558	+12 10.01	10.47	-8.97	9.48	-11.25	.0	22.4	11.7	1.3	151
1983	7	3	.0	2445518.5	6	40.405	+12 11.33	5	42.238	+12 9.38	10.44	-11.24	9.44	-11.28	.0	22.3	10.9	1.2	95
1983	7	8	.0	2445523.5	6	42.094	+12 10.28	5	43.927	+12 8.26	10.40	-13.52	9.41	-11.30	.0	22.3	11.7	1.3	31
1983	7	13	.0	2445528.5	6	43.781	+12 8.76	6	45.615	+12 6.65	10.36	-15.79	9.38	-11.33	.0	22.3	13.9	1.5	45
1983	7	18	.0	2445533.5	6	45.455	+12 6.76	5	47.289	+12 4.58	10.31	-18.03	9.35	-11.36	.0	22.3	16.9	1.8	113
1983	7	23	.0	2445538.5	6	47.105	+12 4.31	5	48.941	+12 2.36	10.26	-20.22	9.31	-11.38	.0	22.2	20.4	2.2	167
1983	7	28	.0	2445543.5	6	48.723	+12 1.42	6	50.559	+11 59.11	10.20	-22.36	9.28	-11.41	.0	22.2	24.2	2.6	123
1983	8	2	.0	2445548.5	6	50.297	+11 58.12	5	52.133	+11 55.73	10.13	-24.45	9.25	-11.43	.0	22.2	28.2	3.0	64
1983	8	7	.0	2445553.5	6	51.817	+11 54.42	5	53.655	+11 51.96	10.06	-26.50	9.21	-11.46	.0	22.2	32.3	3.4	13
1983	8	12	.0	2445558.5	6	53.273	+11 50.34	5	55.111	+11 47.82	9.98	-28.46	9.18	-11.49	.0	22.1	35.5	3.8	80
1983	8	17	.0	2445563.5	6	54.651	+11 45.91	5	56.489	+11 43.33	9.89	-30.31	9.15	-11.51	.0	22.1	40.7	4.1	144
1983	8	22	.0	2445568.5	6	55.941	+11 41.16	6	57.781	+11 38.52	9.80	-32.05	9.11	-11.54	.0	22.1	45.0	4.5	150
1983	8	27	.0	2445573.5	6	57.133	+11 36.13	5	58.973	+11 33.44	9.71	-33.68	9.08	-11.57	.0	22.0	49.4	4.8	93
1983	9	1	.0	2445578.5	6	58.215	+11 30.84	7	.056	+11 28.10	9.61	-35.20	9.05	-11.59	.0	22.0	53.8	5.2	32
1983	9	6	.0	2445583.5	6	59.177	+11 25.33	7	1.019	+11 22.54	9.50	-36.58	9.01	-11.62	.0	21.9	58.3	5.5	44
1983	9	11	.0	2445588.5	7	.006	+11 19.63	7	1.848	+11 16.82	9.40	-37.81	8.98	-11.65	.0	21.9	62.8	5.7	114
1983	9	16	.0	2445593.5	7	.639	+11 13.81	7	2.532	+11 10.96	9.28	-38.86	8.95	-11.68	.0	21.9	67.4	6.0	165
1983	9	21	.0	2445598.5	7	1.217	+11 7.90	7	3.061	+11 5.02	9.17	-39.73	8.91	-11.70	.0	21.8	72.0	6.2	120
1983	9	26	.0	2445603.5	7	1.579	+11 1.94	7	3.424	+10 59.05	9.06	-40.43	8.88	-11.73	.0	21.8	76.7	6.3	61
1983	10	1	.0	2445608.5	7	1.765	+10 55.99	7	3.511	+10 53.08	8.94	-40.95	8.85	-11.76	.0	21.7	81.5	6.4	15
1983	10	6	.0	2445613.5	7	1.763	+10 50.10	7	3.511	+10 47.19	8.82	-41.25	8.81	-11.79	.0	21.7	86.3	6.5	82
1983	10	11	.0	2445618.5	7	1.564	+10 44.32	7	3.413	+10 41.42	8.70	-41.33	8.78	-11.82	.0	21.6	91.2	6.5	146
1983	10	16	.0	2445623.5	7	1.158	+10 38.71	7	3.009	+10 35.83	8.58	-41.17	8.74	-11.85	.0	21.6	95.1	6.5	146
1983	10	21	.0	2445628.5	7	.541	+10 33.34	7	2.393	+10 30.48	8.46	-40.78	8.71	-11.88	.0	21.5	101.1	6.4	68
1983	10	26	.0	2445633.5	6	59.705	+10 28.25	7	1.559	+10 25.42	8.35	-40.17	8.67	-11.90	.0	21.5	105.1	6.3	27
1983	10	31	.0	2445638.5	6	58.647	+10 23.51	7	.503	+10 20.72	8.23	-39.32	8.64	-11.93	.0	21.4	111.2	6.1	48
1983	11	5	.0	2445643.5	6	57.362	+10 19.16	6	59.219	+10 16.43	8.12	-38.22	8.61	-11.96	.0	21.4	115.4	5.9	117
1983	11	10	.0	2445648.5	6	55.850	+10 15.28	5	57.710	+10 12.61	8.01	-36.85	8.57	-11.99	.0	21.3	121.6	5.6	164
1983	11	15	.0	2445653.5	6	54.114	+10 11.92	6	55.976	+10 9.33	7.91	-35.25	8.54	-12.02	.0	21.3	126.9	5.3	114
1983	11	20	.0	2445658.5	6	52.161	+10 9.13	5	54.025	+10 6.62	7.81	-33.43	8.50	-12.05	.0	21.3	132.1	4.9	53
1983	11	25	.0	2445663.5	6	49.999	+10 6.94	5	51.855	+10 4.53	7.71	-31.39	8.47	-12.09	.0	21.2	137.4	4.5	23
1983	11	30	.0	2445668.5	6	47.637	+10 5.51	5	49.536	+10 3.10	7.63	-29.14	8.43	-12.12	.0	21.2	142.7	4.1	68
1983	12	5	.0	2445673.5	6	45.092	+10 4.57	6	46.952	+10 2.37	7.54	-26.69	8.40	-12.15	.0	21.1	148.0	3.6	152
1983	12	10	.0	2445678.5	6	42.380	+10 4.45	6	44.253	+10 2.38	7.47	-24.07	8.35	-12.18	.0	21.1	153.1	3.1	138
1983	12	15	.0	2445683.5	6	39.526	+10 5.07	6	41.401	+10 3.13	7.41	-21.31	8.33	-12.21	.0	21.1	157.9	2.5	60
1983	12	20	.0	2445688.5	6	36.554	+10 6.45	5	38.431	+10 4.64	7.35	-18.45	8.29	-12.24	.0	21.0	162.2	2.1	19

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1983	12	25	.0	2445693.5	6 33.490	+10	8.58	6 35.370	+10	6.92	7.30	-15.51	9.25	-12.27	.0	21.0	165.5	1.7	61
1983	12	30	.0	2445698.5	6 30.363	+10	11.46	6 32.245	+10	9.94	7.26	-12.52	9.22	-12.31	.0	21.0	165.9	1.5	128
1984	1	4	.0	2445703.5	6 27.204	+10	15.07	6 29.089	+10	13.70	7.23	-9.50	8.19	-12.34	.0	20.9	165.9	1.7	158
1984	1	9	.0	2445708.5	6 24.046	+10	19.40	6 25.932	+10	18.18	7.20	-6.52	8.15	-12.37	.0	20.9	162.8	2.0	103
1984	1	14	.0	2445713.5	6 20.922	+10	24.41	6 22.809	+10	23.34	7.19	-3.61	8.11	-12.41	.0	20.9	158.6	2.5	44
1984	1	19	.0	2445718.5	6 17.863	+10	30.07	6 19.752	+10	29.14	7.18	-.80	8.08	-12.44	.0	20.9	153.7	3.1	32
1984	1	24	.0	2445723.5	6 14.898	+10	36.32	6 16.789	+10	35.53	7.18	1.88	8.04	-12.47	.0	20.9	148.6	3.7	103
1984	1	29	.0	2445728.5	6 12.056	+10	43.11	6 13.947	+10	42.46	7.19	4.42	8.01	-12.51	.0	20.8	143.3	4.2	163
1984	2	3	.0	2445733.5	6 9.362	+10	50.41	6 11.255	+10	49.89	7.21	6.77	7.97	-12.54	.0	20.8	137.9	4.8	126
1984	2	8	.0	2445738.5	6 6.841	+10	58.14	6 8.734	+10	57.75	7.23	8.91	7.93	-12.58	.0	20.8	132.5	5.3	68
1984	2	13	.0	2445743.5	6 4.513	+11	6.26	6 6.408	+11	5.98	7.26	10.80	7.90	-12.61	.0	20.8	127.1	5.7	14
1984	2	18	.0	2445748.5	6 2.394	+11	14.68	6 4.290	+11	14.51	7.30	12.46	7.86	-12.65	.0	20.8	121.7	6.1	72
1984	2	23	.0	2445753.5	6 .495	+11	23.37	6 2.392	+11	23.29	7.33	13.88	7.82	-12.68	.0	20.8	116.4	6.5	142
1984	2	28	.0	2445758.5	5 58.828	+11	32.25	6 .25	+11	32.25	7.37	15.05	7.79	-12.72	.0	20.8	111.1	6.8	149
1984	3	4	.0	2445763.5	5 57.399	+11	41.27	5 .6	+11	41.34	7.42	15.95	7.75	-12.75	.0	20.7	105.9	7.1	92
1984	3	9	.0	2445768.5	5 56.213	+11	50.37	5 58.7	+11	50.50	7.47	16.58	7.71	-12.79	.0	20.7	100.7	7.3	33
1984	3	14	.0	2445773.5	5 55.270	+11	59.49	5 57.4	+11	59.67	7.52	16.95	7.68	-12.83	.0	20.7	95.6	7.4	38
1984	3	19	.0	2445778.5	5 54.568	+12	8.58	5 56.4	+12	8.79	7.56	17.09	7.64	-12.86	.0	20.7	90.5	7.5	111
1984	3	24	.0	2445783.5	5 54.102	+12	17.58	5 56.002	+12	17.82	7.61	16.99	7.60	-12.90	.0	20.7	85.5	7.5	167
1984	3	29	.0	2445788.5	5 53.868	+12	26.45	5 55.769	+12	26.70	7.66	16.67	7.56	-12.94	.0	20.7	80.6	7.5	117
1984	4	3	.0	2445793.5	5 53.860	+12	35.14	5 55.761	+12	35.40	7.71	16.12	7.53	-12.98	.0	20.7	75.8	7.4	59
1984	4	8	.0	2445798.5	5 54.059	+12	43.61	5 55.971	+12	43.86	7.76	15.35	7.49	-13.01	.0	20.7	71.0	7.3	13
1984	4	13	.0	2445803.5	5 54.486	+12	51.82	5 56.388	+12	52.05	7.80	14.39	7.45	-13.05	.0	20.7	66.3	7.1	75
1984	4	18	.0	2445808.5	5 55.098	+12	59.71	5 57.001	+12	59.91	7.84	13.26	7.41	-13.09	.0	20.7	61.6	6.8	146
1984	4	23	.0	2445813.5	5 55.896	+13	7.27	5 57.800	+13	7.43	7.87	11.98	7.38	-13.13	.0	20.7	57.0	6.6	144
1984	4	28	.0	2445818.5	5 56.869	+13	14.46	5 58.774	+13	14.58	7.91	10.54	7.34	-13.17	.0	20.6	52.5	6.3	86
1984	5	3	.0	2445823.5	5 58.006	+13	21.25	5 59.912	+13	21.32	7.94	8.95	7.30	-13.21	.0	20.6	49.0	5.9	27
1984	5	8	.0	2445828.5	5 59.296	+13	27.61	6 1.203	+13	27.61	7.96	7.23	7.25	-13.25	.0	20.6	43.6	5.5	42
1984	5	13	.0	2445833.5	6 .724	+13	33.50	6 2.631	+13	33.44	7.98	5.40	7.22	-13.29	.0	20.6	39.3	5.1	112
1984	5	18	.0	2445838.5	6 2.278	+13	38.92	6 4.187	+13	38.79	7.99	3.50	7.19	-13.33	.0	20.6	35.0	4.6	167
1984	5	23	.0	2445843.5	6 3.948	+13	43.85	6 5.858	+13	43.64	8.00	1.50	7.15	-13.38	.0	20.6	30.8	4.2	115
1984	5	28	.0	2445848.5	6 5.722	+13	48.26	6 7.533	+13	47.97	8.00	-.58	7.11	-13.42	.0	20.5	26.7	3.7	57
1984	6	2	.0	2445853.5	6 7.598	+13	52.15	6 9.500	+13	51.76	7.99	-2.73	7.07	-13.46	.0	20.5	22.7	3.2	14
1984	6	7	.0	2445858.5	6 9.533	+13	55.49	6 11.446	+13	55.01	7.98	-4.92	7.03	-13.50	.0	20.5	18.9	2.7	78
1984	6	12	.0	2445863.5	6 11.544	+13	58.27	6 13.458	+13	57.70	7.97	-7.14	6.99	-13.55	.0	20.5	15.3	2.2	146
1984	6	17	.0	2445868.5	6 13.609	+14	.50	6 15.525	+13	59.83	7.94	-9.38	6.95	-13.59	.0	20.4	12.2	1.8	145
1984	6	22	.0	2445873.5	6 15.718	+14	2.17	6 17.634	+14	1.41	7.91	-11.65	6.91	-13.64	.0	20.4	10.0	1.5	87
1984	6	27	.0	2445878.5	6 17.858	+14	3.28	6 19.776	+14	2.41	7.87	-13.93	6.87	-13.68	.0	20.4	9.3	1.4	28
1984	7	2	.0	2445883.5	6 20.018	+14	3.81	6 21.937	+14	2.84	7.83	-16.21	6.83	-13.73	.0	20.3	10.5	1.6	44
1984	7	7	.0	2445888.5	6 22.184	+14	3.78	6 24.103	+14	2.71	7.78	-18.47	6.79	-13.77	.0	20.3	13.0	1.9	113
1984	7	12	.0	2445893.5	6 24.342	+14	3.20	6 26.263	+14	2.02	7.72	-20.69	6.75	-13.82	.0	20.2	16.2	2.4	168
1984	7	17	.0	2445898.5	6 26.481	+14	2.06	6 28.403	+14	.79	7.66	-22.87	6.71	-13.86	.0	20.2	19.9	2.9	117
1984	7	22	.0	2445903.5	6 28.589	+14	.39	6 30.512	+13	59.02	7.59	-25.02	6.67	-13.91	.0	20.1	23.7	3.5	59
1984	7	27	.0	2445908.5	6 30.653	+13	58.19	6 32.577	+13	56.72	7.52	-27.13	6.63	-13.96	.0	20.1	27.5	4.1	13
1984	8	1	.0	2445913.5	6 32.659	+13	55.48	6 34.583	+13	53.92	7.44	-29.17	6.59	-14.01	.0	20.0	31.7	4.6	79
1984	8	6	.0	2445918.5	6 34.589	+13	52.28	6 36.514	+13	50.63	7.35	-31.12	6.55	-14.06	.0	20.0	35.8	5.2	146
1984	8	11	.0	2445923.5	6 36.431	+13	48.61	6 38.358	+13	46.87	7.26	-32.97	6.51	-14.11	.0	19.9	40.0	5.7	145
1984	8	16	.0	2445928.5	6 38.172	+13	44.51	6 40.099	+13	42.69	7.16	-34.74	6.47	-14.16	.0	19.9	44.2	6.3	89
1984	8	21	.0	2445933.5	6 39.796	+13	39.99	6 41.723	+13	38.09	7.06	-36.41	6.43	-14.21	.0	19.8	48.5	6.8	33
1984	8	26	.0	2445938.5	6 41.285	+13	35.09	6 43.214	+13	33.12	6.95	-37.97	6.39	-14.26	.0	19.8	52.9	7.2	42
1984	8	31	.0	2445943.5	6 42.622	+13	29.84	6 44.552	+13	27.81	6.84	-39.39	6.35	-14.31	.0	19.7	57.3	7.7	114
1984	9	5	.0	2445948.5	6 43.790	+13	24.28	6 45.720	+13	22.20	6.72	-40.65	6.31	-14.36	.0	19.6	61.9	8.1	166
1984	9	10	.0	2445953.5	6 44.770	+13	18.47	6 46.701	+13	16.34	6.60	-41.77	6.27	-14.41	.0	19.6	66.3	8.5	116
1984	9	15	.0	2445958.5	6 45.545	+13	12.44	6 47.476	+13	10.27	6.48	-42.72	6.22	-14.47	.0	19.5	70.9	8.8	58
1984	9	20	.0	2445963.5	6 46.096	+13	6.25	6 48.029	+13	4.05	6.35	-43.51	6.18	-14.52	.0	19.4	75.6	9.1	14
1984	9	25	.0	2445968.5	6 46.401	+12	59.93	6 48.335	+12	57.72	6.23	-44.11	6.14	-14.58	.0	19.4	80.3	9.3	78
1984	9	30	.0	2445973.5	6 46.440	+12	53.56	6 48.375	+12	51.34	6.10	-44.49	6.10	-14.63	.0	19.3	85.1	9.4	149

Table B-3. Ephemeris (with Perturbations) for Comet Halley at Daily Intervals from October 5, 1984 to March 23, 1987.

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1984	10	5	.0	2445978.5	6 46.193	+12 47.20	6 48.129	+12 44.99	5.97	-44.64	6.05	-14.69	.0	19.2	90.0	9.5	142		
1984	10	6	.0	2445979.5	6 46.107	+12 45.93	6 48.044	+12 43.73	5.95	-44.65	6.05	-14.70	.0	19.2	91.0	9.5	130		
1984	10	7	.0	2445980.5	6 46.009	+12 44.67	6 47.946	+12 42.47	5.92	-44.64	6.04	-14.71	.0	19.2	92.0	9.5	119		
1984	10	8	.0	2445981.5	6 45.899	+12 43.41	6 47.836	+12 41.22	5.89	-44.63	6.03	-14.72	.0	19.2	93.0	9.5	107		
1984	10	9	.0	2445982.5	6 45.776	+12 42.16	6 47.713	+12 39.97	5.87	-44.61	6.02	-14.73	.0	19.1	94.0	9.5	96		
1984	10	10	.0	2445983.5	6 45.640	+12 40.91	6 47.578	+12 38.73	5.84	-44.58	6.01	-14.74	.0	19.1	95.0	9.5	84		
1984	10	11	.0	2445984.5	6 45.492	+12 39.66	6 47.429	+12 37.49	5.82	-44.54	6.00	-14.76	.0	19.1	96.0	9.5	73		
1984	10	12	.0	2445985.5	6 45.330	+12 38.43	6 47.268	+12 36.26	5.79	-44.49	6.00	-14.77	.0	19.1	97.0	9.5	61		
1984	10	13	.0	2445986.5	6 45.155	+12 37.19	6 47.093	+12 35.03	5.77	-44.43	5.99	-14.78	.0	19.1	98.0	9.5	50		
1984	10	14	.0	2445987.5	6 44.966	+12 35.97	6 46.905	+12 33.82	5.74	-44.36	5.98	-14.79	.0	19.1	99.0	9.5	38		
1984	10	15	.0	2445988.5	6 44.764	+12 34.75	6 46.703	+12 32.61	5.71	-44.28	5.97	-14.80	.0	19.0	100.1	9.5	27		
1984	10	16	.0	2445989.5	6 44.548	+12 33.54	6 46.488	+12 31.40	5.69	-44.20	5.96	-14.81	.0	19.0	101.1	9.4	17		
1984	10	17	.0	2445990.5	6 44.319	+12 32.34	6 46.258	+12 30.21	5.66	-44.10	5.95	-14.83	.0	19.0	102.1	9.4	14		
1984	10	18	.0	2445991.5	6 44.075	+12 31.14	6 46.015	+12 29.03	5.64	-43.99	5.94	-14.84	.0	19.0	103.1	9.4	20		
1984	10	19	.0	2445992.5	6 43.817	+12 29.96	6 45.758	+12 27.86	5.61	-43.87	5.94	-14.85	.0	19.0	104.2	9.4	31		
1984	10	20	.0	2445993.5	6 43.545	+12 28.79	6 45.486	+12 26.70	5.59	-43.74	5.93	-14.86	.0	19.0	105.2	9.3	44		
1984	10	21	.0	2445994.5	6 43.258	+12 27.62	6 45.199	+12 25.55	5.56	-43.60	5.92	-14.87	.0	18.9	106.3	9.3	58		
1984	10	22	.0	2445995.5	6 42.957	+12 26.47	6 44.898	+12 24.41	5.54	-43.45	5.91	-14.88	.0	18.9	107.3	9.3	73		
1984	10	23	.0	2445996.5	6 42.641	+12 25.33	6 44.582	+12 23.29	5.51	-43.29	5.90	-14.90	.0	18.9	108.4	9.2	87		
1984	10	24	.0	2445997.5	6 42.310	+12 24.20	6 44.252	+12 22.17	5.49	-43.12	5.89	-14.91	.0	18.9	109.4	9.2	102		
1984	10	25	.0	2445998.5	6 41.964	+12 23.09	6 43.906	+12 21.08	5.46	-42.93	5.88	-14.92	.0	18.9	110.5	9.1	117		
1984	10	26	.0	2445999.5	6 41.603	+12 21.99	6 43.545	+12 19.99	5.44	-42.74	5.88	-14.93	.0	18.9	111.5	9.1	131		
1984	10	27	.0	2446000.5	6 41.227	+12 20.90	6 43.170	+12 18.92	5.41	-42.53	5.87	-14.94	.0	18.9	112.6	9.0	144		
1984	10	28	.0	2446001.5	6 40.835	+12 19.83	6 42.775	+12 17.86	5.39	-42.31	5.86	-14.96	.0	18.8	113.7	8.9	156		
1984	10	29	.0	2446002.5	6 40.429	+12 18.77	6 42.372	+12 16.83	5.36	-42.08	5.85	-14.97	.0	18.8	114.7	8.9	164		
1984	10	30	.0	2446003.5	6 40.006	+12 17.73	6 41.950	+12 15.81	5.34	-41.84	5.84	-14.98	.0	18.8	115.8	8.8	163		
1984	10	31	.0	2446004.5	6 39.569	+12 16.70	6 41.513	+12 14.80	5.32	-41.59	5.83	-14.99	.0	18.8	116.9	8.7	154		
1984	11	1	.0	2446005.5	6 39.115	+12 15.70	6 41.060	+12 13.82	5.29	-41.33	5.82	-15.00	.0	18.8	118.0	8.7	143		
1984	11	2	.0	2446006.5	6 38.647	+12 14.71	6 40.592	+12 12.85	5.27	-41.05	5.81	-15.02	.0	18.8	119.1	8.6	131		
1984	11	3	.0	2446007.5	6 38.162	+12 13.73	6 40.108	+12 11.90	5.24	-40.77	5.81	-15.03	.0	18.7	120.2	8.5	120		
1984	11	4	.0	2446008.5	6 37.662	+12 12.78	6 39.608	+12 10.97	5.22	-40.48	5.80	-15.04	.0	18.7	121.3	8.4	108		
1984	11	5	.0	2446009.5	6 37.146	+12 11.85	6 39.092	+12 10.06	5.20	-40.17	5.79	-15.05	.0	18.7	122.4	8.3	97		
1984	11	6	.0	2446010.5	6 36.614	+12 10.93	6 38.561	+12 9.17	5.17	-39.86	5.78	-15.06	.0	18.7	123.5	8.2	85		
1984	11	7	.0	2446011.5	6 36.067	+12 10.03	6 38.014	+12 8.30	5.15	-39.53	5.77	-15.08	.0	18.7	124.6	8.1	74		
1984	11	8	.0	2446012.5	6 35.504	+12 9.16	6 37.451	+12 7.45	5.13	-39.20	5.76	-15.09	.0	18.7	125.7	8.0	62		
1984	11	9	.0	2446013.5	6 34.925	+12 8.30	6 36.872	+12 6.62	5.11	-38.85	5.75	-15.10	.0	18.6	126.8	7.9	50		
1984	11	10	.0	2446014.5	6 34.330	+12 7.47	6 36.277	+12 5.82	5.08	-38.49	5.75	-15.11	.0	18.6	127.9	7.8	39		
1984	11	11	.0	2446015.5	6 33.719	+12 6.66	6 35.667	+12 5.03	5.06	-38.12	5.74	-15.13	.0	18.6	129.0	7.7	27		
1984	11	12	.0	2446016.5	6 33.092	+12 5.87	6 35.041	+12 4.27	5.04	-37.75	5.73	-15.14	.0	18.6	130.1	7.6	18		
1984	11	13	.0	2446017.5	6 32.450	+12 5.10	6 34.399	+12 3.54	5.02	-37.36	5.72	-15.15	.0	18.6	131.3	7.5	14		
1984	11	14	.0	2446018.5	6 31.792	+12 4.36	6 33.741	+12 2.83	5.00	-36.96	5.71	-15.16	.0	18.6	132.4	7.4	20		
1984	11	15	.0	2446019.5	6 31.117	+12 3.64	6 33.068	+12 2.14	4.98	-36.55	5.70	-15.18	.0	18.5	133.5	7.2	31		
1984	11	16	.0	2446020.5	6 30.428	+12 2.94	6 32.378	+12 1.48	4.95	-36.13	5.69	-15.19	.0	18.5	134.6	7.1	44		
1984	11	17	.0	2446021.5	6 29.722	+12 2.27	6 31.673	+12 .84	4.93	-35.69	5.68	-15.20	.0	18.5	135.8	7.0	57		
1984	11	18	.0	2446022.5	6 29.001	+12 1.62	6 30.953	+12 .23	4.91	-35.25	5.68	-15.21	.0	18.5	136.9	6.8	71		
1984	11	19	.0	2446023.5	6 28.264	+12 1.00	6 30.216	+11 59.64	4.89	-34.80	5.67	-15.23	.0	18.5	138.0	6.7	85		
1984	11	20	.0	2446024.5	6 27.512	+12 .40	6 29.464	+11 59.08	4.87	-34.33	5.66	-15.24	.0	18.5	139.2	6.6	100		
1984	11	21	.0	2446025.5	6 26.745	+11 59.83	6 28.697	+11 58.54	4.85	-33.85	5.65	-15.25	.0	18.4	140.3	6.4	114		
1984	11	22	.0	2446026.5	6 25.962	+11 59.29	6 27.915	+11 58.04	4.83	-33.37	5.64	-15.26	.0	18.4	141.5	6.3	128		
1984	11	23	.0	2446027.5	6 25.165	+11 58.77	6 27.118	+11 57.56	4.81	-32.87	5.63	-15.28	.0	18.4	142.6	6.1	142		
1984	11	24	.0	2446028.5	6 24.352	+11 58.28	6 26.306	+11 57.11	4.80	-32.36	5.62	-15.29	.0	18.4	143.8	6.0	155		
1984	11	25	.0	2446029.5	6 23.525	+11 57.82	6 25.480	+11 56.69	4.78	-31.85	5.61	-15.30	.0	18.4	144.9	5.8	164		
1984	11	26	.0	2446030.5	6 22.684	+11 57.39	6 24.639	+11 56.29	4.76	-31.32	5.60	-15.32	.0	18.4	146.0	5.6	163		
1984	11	27	.0	2446031.5	6 21.828	+11 56.98	6 23.783	+11 55.93	4.74	-30.78	5.60	-15.33	.0	18.4	147.2	5.5	154		

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1984	11	28	.0	2446032.5	6	20.958	+11 56.61	6	22.914	+11 55.60	4.72	-30.24	5.59	-15.34	.0	18.3	148.3	5.3	142
1984	11	29	.0	2446033.5	6	20.075	+11 56.26	6	22.031	+11 55.30	4.71	-29.69	5.58	-15.36	.0	18.3	149.4	5.2	131
1984	11	30	.0	2446034.5	6	19.178	+11 55.94	6	21.135	+11 55.02	4.69	-29.13	5.57	-15.37	.0	18.3	150.6	5.0	119
1984	12	1	.0	2446035.5	6	18.268	+11 55.66	6	20.225	+11 54.78	4.67	-28.56	5.56	-15.38	.0	18.3	151.7	4.8	107
1984	12	2	.0	2446036.5	6	17.345	+11 55.40	6	19.302	+11 54.57	4.66	-27.98	5.55	-15.39	.0	18.3	152.8	4.7	96
1984	12	3	.0	2446037.5	6	16.409	+11 55.17	6	18.366	+11 54.39	4.64	-27.40	5.54	-15.41	.0	18.3	153.9	4.5	84
1984	12	4	.0	2446038.5	6	15.461	+11 54.97	6	17.418	+11 54.24	4.62	-26.81	5.53	-15.42	.0	18.3	155.0	4.3	72
1984	12	5	.0	2446039.5	6	14.500	+11 54.81	6	16.459	+11 54.12	4.61	-26.21	5.52	-15.43	.0	18.2	156.1	4.1	60
1984	12	6	.0	2446040.5	6	13.529	+11 54.67	6	15.487	+11 54.03	4.59	-25.61	5.52	-15.45	.0	18.2	157.2	4.0	49
1984	12	7	.0	2446041.5	6	12.545	+11 54.57	6	14.504	+11 53.97	4.58	-25.00	5.51	-15.46	.0	18.2	158.3	3.8	37
1984	12	8	.0	2446042.5	6	11.551	+11 54.49	6	13.511	+11 53.95	4.57	-24.38	5.50	-15.47	.0	18.2	159.3	3.6	26
1984	12	9	.0	2446043.5	6	10.546	+11 54.45	6	12.506	+11 53.96	4.55	-23.76	5.49	-15.49	.0	18.2	160.4	3.5	17
1984	12	10	.0	2446044.5	6	9.531	+11 54.44	6	11.491	+11 53.99	4.54	-23.13	5.48	-15.50	.0	18.2	161.4	3.3	15
1984	12	11	.0	2446045.5	6	8.505	+11 54.46	6	10.466	+11 54.06	4.52	-22.50	5.47	-15.51	.0	18.2	162.3	3.1	22
1984	12	12	.0	2446046.5	6	7.470	+11 54.51	6	9.432	+11 54.17	4.51	-21.86	5.46	-15.53	.0	18.1	163.3	3.0	34
1984	12	13	.0	2446047.5	6	6.426	+11 54.59	6	8.388	+11 54.30	4.50	-21.22	5.45	-15.54	.0	18.1	164.2	2.8	47
1984	12	14	.0	2446048.5	6	5.374	+11 54.70	6	7.336	+11 54.47	4.49	-20.57	5.44	-15.55	.0	18.1	165.0	2.7	60
1984	12	15	.0	2446049.5	6	4.313	+11 54.85	6	6.275	+11 54.67	4.48	-19.92	5.44	-15.57	.0	18.1	165.8	2.5	74
1984	12	16	.0	2446050.5	6	3.244	+11 55.03	6	5.206	+11 54.90	4.46	-19.26	5.43	-15.58	.0	18.1	166.5	2.4	88
1984	12	17	.0	2446051.5	6	2.167	+11 55.24	6	4.131	+11 55.16	4.45	-18.60	5.42	-15.60	.0	18.1	167.1	2.3	102
1984	12	18	.0	2446052.5	6	1.084	+11 55.48	6	3.047	+11 55.46	4.44	-17.93	5.41	-15.61	.0	18.1	167.6	2.2	116
1984	12	19	.0	2446053.5	5	59.994	+11 55.76	6	1.958	+11 55.79	4.43	-17.27	5.40	-15.62	.0	18.1	168.1	2.2	130
1984	12	20	.0	2446054.5	5	58.899	+11 56.06	6	.862	+11 56.15	4.42	-16.60	5.39	-15.64	.0	18.0	168.3	2.1	143
1984	12	21	.0	2446055.5	5	57.798	+11 56.40	5	59.762	+11 56.54	4.41	-15.92	5.38	-15.65	.0	18.0	168.5	2.1	156
1984	12	22	.0	2446056.5	5	56.692	+11 56.78	5	58.656	+11 56.97	4.40	-15.25	5.37	-15.67	.0	18.0	168.5	2.1	164
1984	12	23	.0	2446057.5	5	55.582	+11 57.18	5	57.546	+11 57.43	4.40	-14.57	5.36	-15.68	.0	18.0	168.4	2.1	163
1984	12	24	.0	2446058.5	5	54.468	+11 57.62	5	56.433	+11 57.93	4.39	-13.90	5.35	-15.69	.0	18.0	168.1	2.2	153
1984	12	25	.0	2446059.5	5	53.350	+11 58.09	5	55.316	+11 58.46	4.38	-13.22	5.34	-15.71	.0	18.0	167.7	2.3	141
1984	12	26	.0	2446060.5	5	52.230	+11 58.60	5	54.196	+11 59.02	4.37	-12.55	5.34	-15.72	.0	18.0	167.2	2.3	129
1984	12	27	.0	2446061.5	5	51.108	+11 59.14	5	53.075	+11 59.61	4.37	-11.88	5.33	-15.74	.0	18.0	166.5	2.5	117
1984	12	28	.0	2446062.5	5	49.985	+11 59.71	5	51.951	+12 .24	4.36	-11.20	5.32	-15.75	.0	18.0	165.8	2.6	104
1984	12	29	.0	2446063.5	5	48.860	+12 .31	5	50.827	+12 .90	4.35	-10.54	5.31	-15.76	.0	17.9	165.0	2.7	93
1984	12	30	.0	2446064.5	5	47.735	+12 .95	5	49.702	+12 1.59	4.35	-9.87	5.30	-15.78	.0	17.9	164.2	2.9	81
1984	12	31	.0	2446065.5	5	46.611	+12 1.61	5	48.577	+12 2.31	4.34	-9.21	5.29	-15.79	.0	17.9	163.3	3.1	69
1985	1	1	.0	2446066.5	5	45.486	+12 2.31	5	47.453	+12 3.07	4.34	-8.55	5.28	-15.81	.0	17.9	162.3	3.2	57
1985	1	2	.0	2446067.5	5	44.363	+12 3.05	5	46.330	+12 3.86	4.33	-7.89	5.27	-15.82	.0	17.9	161.3	3.4	46
1985	1	3	.0	2446068.5	5	43.242	+12 3.81	5	45.209	+12 4.68	4.33	-7.24	5.26	-15.84	.0	17.9	160.3	3.6	34
1985	1	4	.0	2446069.5	5	42.123	+12 4.61	5	44.091	+12 5.53	4.32	-6.59	5.25	-15.85	.0	17.9	159.2	3.8	23
1985	1	5	.0	2446070.5	5	41.007	+12 5.44	5	42.975	+12 6.42	4.32	-5.95	5.24	-15.86	.0	17.9	158.1	4.0	15
1985	1	6	.0	2446071.5	5	39.894	+12 6.30	5	41.862	+12 7.33	4.32	-5.31	5.24	-15.88	.0	17.9	157.0	4.2	15
1985	1	7	.0	2446072.5	5	38.785	+12 7.19	5	40.754	+12 8.28	4.31	-4.68	5.23	-15.89	.0	17.9	155.9	4.4	24
1985	1	8	.0	2446073.5	5	37.681	+12 8.12	5	39.649	+12 9.26	4.31	-4.05	5.22	-15.91	.0	17.8	154.8	4.6	37
1985	1	9	.0	2446074.5	5	36.581	+12 9.07	5	38.550	+12 10.27	4.31	-3.43	5.21	-15.92	.0	17.8	153.6	4.8	50
1985	1	10	.0	2446075.5	5	35.487	+12 10.06	5	37.456	+12 11.31	4.31	-2.81	5.20	-15.94	.0	17.8	152.5	5.0	64
1985	1	11	.0	2446076.5	5	34.399	+12 11.08	5	36.368	+12 12.39	4.31	-2.21	5.19	-15.95	.0	17.8	151.3	5.2	78
1985	1	12	.0	2446077.5	5	33.317	+12 12.13	5	35.286	+12 13.49	4.30	-1.60	5.18	-15.97	.0	17.8	150.2	5.4	92
1985	1	13	.0	2446078.5	5	32.242	+12 13.21	5	34.211	+12 14.63	4.30	-1.01	5.17	-15.98	.0	17.8	149.0	5.6	106
1985	1	14	.0	2446079.5	5	31.174	+12 14.32	5	33.143	+12 15.79	4.30	-.42	5.16	-16.00	.0	17.8	147.8	5.8	120
1985	1	15	.0	2446080.5	5	30.114	+12 15.46	5	32.083	+12 16.98	4.30	.16	5.15	-16.01	.0	17.8	146.6	6.0	133
1985	1	16	.0	2446081.5	5	29.063	+12 16.63	5	31.032	+12 18.21	4.30	.73	5.14	-16.03	.0	17.8	145.4	6.2	147
1985	1	17	.0	2446082.5	5	28.020	+12 17.84	5	29.990	+12 19.47	4.30	1.30	5.13	-16.04	.0	17.8	144.2	6.4	159
1985	1	18	.0	2446083.5	5	26.987	+12 19.07	5	28.957	+12 20.75	4.30	1.85	5.12	-16.06	.0	17.8	143.0	6.6	166
1985	1	19	.0	2446084.5	5	25.964	+12 20.34	5	27.933	+12 22.07	4.31	2.40	5.12	-16.07	.0	17.8	141.8	6.8	162
1985	1	20	.0	2446085.5	5	24.951	+12 21.63	5	26.920	+12 23.41	4.31	2.94	5.11	-16.09	.0	17.8	140.6	7.0	151
1985	1	21	.0	2446086.5	5	23.948	+12 22.96	5	25.918	+12 24.79	4.31	3.46	5.10	-16.10	.0	17.7	139.4	7.2	139
1985	1	22	.0	2446087.5	5	22.957	+12 24.32	5	24.927	+12 26.20	4.31	3.98	5.09	-16.12	.0	17.7	138.2	7.4	127
1985	1	23	.0	2446088.5	5	21.977	+12 25.70	5	23.947	+12 27.63	4.31	4.48	5.08	-16.13	.0	17.7	137.0	7.6	114

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Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	1	24	.0	2446089.5	5	21.009	+12 27.12	5	22.975	+12 29.10	4.32	4.97	5.07	-16.15	.0	17.7	135.8	7.8	102
1985	1	25	.0	2446090.5	5	20.053	+12 28.56	5	22.023	+12 30.59	4.32	5.45	5.06	-16.16	.0	17.7	134.6	8.0	90
1985	1	26	.0	2446091.5	5	19.130	+12 30.04	5	21.080	+12 32.11	4.32	5.92	5.05	-16.18	.0	17.7	133.4	8.1	78
1985	1	27	.0	2446092.5	5	18.180	+12 31.54	5	20.150	+12 33.66	4.33	6.38	5.05	-16.19	.0	17.7	132.2	8.3	66
1985	1	28	.0	2446093.5	5	17.264	+12 33.07	5	19.233	+12 35.24	4.33	6.82	5.03	-16.21	.0	17.7	131.0	8.5	54
1985	1	29	.0	2446094.5	5	16.360	+12 34.63	5	18.330	+12 36.84	4.33	7.26	5.02	-16.23	.0	17.7	129.8	8.7	43
1985	1	30	.0	2446095.5	5	15.471	+12 36.22	5	17.441	+12 38.48	4.34	7.68	5.01	-16.24	.0	17.7	128.6	8.8	31
1985	1	31	.0	2446096.5	5	14.596	+12 37.84	5	16.566	+12 40.13	4.34	8.09	5.00	-16.26	.0	17.7	127.4	9.0	21
1985	2	1	.0	2446097.5	5	13.735	+12 39.48	5	15.705	+12 41.82	4.35	8.48	4.99	-16.27	.0	17.7	126.2	9.2	13
1985	2	2	.0	2446098.5	5	12.889	+12 41.15	5	14.855	+12 43.53	4.35	8.87	4.98	-16.29	.0	17.7	125.1	9.3	14
1985	2	3	.0	2446099.5	5	12.058	+12 42.85	5	14.028	+12 45.27	4.36	9.24	4.98	-16.30	.0	17.7	123.9	9.5	24
1985	2	4	.0	2446100.5	5	11.241	+12 44.57	5	13.212	+12 47.03	4.36	9.60	4.97	-16.32	.0	17.7	122.7	9.6	37
1985	2	5	.0	2446101.5	5	10.440	+12 46.32	5	12.411	+12 48.82	4.37	9.95	4.96	-16.34	.0	17.7	121.5	9.8	50
1985	2	6	.0	2446102.5	5	9.655	+12 48.09	5	11.625	+12 50.64	4.38	10.28	4.95	-16.35	.0	17.6	120.3	9.9	65
1985	2	7	.0	2446103.5	5	8.884	+12 49.89	5	10.855	+12 52.48	4.38	10.61	4.94	-16.37	.0	17.6	119.2	10.0	79
1985	2	8	.0	2446104.5	5	8.130	+12 51.72	5	10.101	+12 54.34	4.39	10.92	4.93	-16.38	.0	17.6	118.0	10.2	93
1985	2	9	.0	2446105.5	5	7.392	+12 53.57	5	9.362	+12 56.23	4.39	11.22	4.92	-16.40	.0	17.6	116.8	10.3	108
1985	2	10	.0	2446106.5	5	6.669	+12 55.45	5	8.640	+12 58.14	4.40	11.50	4.91	-16.42	.0	17.6	115.7	10.4	122
1985	2	11	.0	2446107.5	5	5.963	+12 57.35	5	7.934	+13 .07	4.41	11.78	4.90	-16.43	.0	17.6	114.5	10.6	136
1985	2	12	.0	2446108.5	5	5.273	+12 59.27	5	7.244	+13 2.03	4.41	12.04	4.89	-16.45	.0	17.6	113.4	10.7	150
1985	2	13	.0	2446109.5	5	4.600	+13 1.22	5	6.570	+13 4.01	4.42	12.29	4.88	-16.47	.0	17.6	112.2	10.8	162
1985	2	14	.0	2446110.5	5	3.943	+13 3.19	5	5.914	+13 6.01	4.43	12.53	4.87	-16.48	.0	17.6	111.1	10.9	168
1985	2	15	.0	2446111.5	5	3.303	+13 5.18	5	5.273	+13 8.04	4.44	12.76	4.86	-16.50	.0	17.6	109.9	11.0	162
1985	2	16	.0	2446112.5	5	2.679	+13 7.20	5	4.650	+13 10.09	4.44	12.97	4.85	-16.52	.0	17.6	108.8	11.1	150
1985	2	17	.0	2446113.5	5	2.073	+13 9.24	5	4.044	+13 12.16	4.45	13.17	4.84	-16.53	.0	17.6	107.7	11.2	138
1985	2	18	.0	2446114.5	5	1.483	+13 11.30	5	3.454	+13 14.25	4.46	13.35	4.83	-16.55	.0	17.6	106.5	11.3	126
1985	2	19	.0	2446115.5	5	.910	+13 13.39	5	2.881	+13 16.36	4.47	13.52	4.82	-16.57	.0	17.6	105.4	11.4	113
1985	2	20	.0	2446116.5	5	.354	+13 15.49	5	2.325	+13 18.49	4.47	13.68	4.81	-16.58	.0	17.6	104.3	11.5	101
1985	2	21	.0	2446117.5	4	59.815	+13 17.62	5	1.787	+13 20.65	4.48	13.83	4.80	-16.60	.0	17.6	103.2	11.6	89
1985	2	22	.0	2446118.5	4	59.293	+13 19.76	5	1.265	+13 22.82	4.49	13.96	4.79	-16.62	.0	17.6	102.0	11.6	77
1985	2	23	.0	2446119.5	4	58.788	+13 21.93	5	.760	+13 25.01	4.50	14.08	4.79	-16.63	.0	17.6	100.9	11.7	65
1985	2	24	.0	2446120.5	4	58.301	+13 24.12	5	.272	+13 27.22	4.51	14.19	4.78	-16.65	.0	17.6	99.8	11.8	53
1985	2	25	.0	2446121.5	4	57.830	+13 26.32	4	59.801	+13 29.45	4.51	14.29	4.77	-16.67	.0	17.6	98.7	11.8	42
1985	2	26	.0	2446122.5	4	57.376	+13 28.55	4	59.347	+13 31.69	4.52	14.37	4.76	-16.68	.0	17.5	97.6	11.9	31
1985	2	27	.0	2446123.5	4	56.938	+13 30.79	4	58.910	+13 33.96	4.53	14.44	4.75	-16.70	.0	17.5	96.5	12.0	20
1985	2	28	.0	2446124.5	4	56.518	+13 33.05	4	58.485	+13 36.24	4.54	14.50	4.74	-16.72	.0	17.5	95.4	12.0	12
1985	3	1	.0	2446125.5	4	56.114	+13 35.33	4	58.080	+13 38.53	4.55	14.54	4.73	-16.74	.0	17.5	94.4	12.1	13
1985	3	2	.0	2446126.5	4	55.727	+13 37.62	4	57.695	+13 40.85	4.56	14.58	4.72	-16.75	.0	17.5	93.3	12.1	23
1985	3	3	.0	2446127.5	4	55.357	+13 39.93	4	57.325	+13 43.17	4.56	14.60	4.71	-16.77	.0	17.5	92.2	12.1	35
1985	3	4	.0	2446128.5	4	55.003	+13 42.25	4	56.975	+13 45.52	4.57	14.61	4.70	-16.79	.0	17.5	91.1	12.2	48
1985	3	5	.0	2446129.5	4	54.665	+13 44.60	4	56.638	+13 47.88	4.58	14.61	4.69	-16.81	.0	17.5	90.1	12.2	62
1985	3	6	.0	2446130.5	4	54.344	+13 46.95	4	56.317	+13 50.25	4.59	14.60	4.68	-16.82	.0	17.5	89.0	12.2	76
1985	3	7	.0	2446131.5	4	54.039	+13 49.32	4	56.011	+13 52.63	4.60	14.58	4.67	-16.84	.0	17.5	87.9	12.3	90
1985	3	8	.0	2446132.5	4	53.749	+13 51.70	4	55.722	+13 55.03	4.61	14.55	4.66	-16.86	.0	17.5	86.9	12.3	105
1985	3	9	.0	2446133.5	4	53.476	+13 54.10	4	55.445	+13 57.44	4.61	14.51	4.65	-16.88	.0	17.5	85.8	12.3	120
1985	3	10	.0	2446134.5	4	53.219	+13 56.51	4	55.192	+13 59.86	4.62	14.46	4.64	-16.89	.0	17.5	84.8	12.3	135
1985	3	11	.0	2446135.5	4	52.977	+13 58.93	4	54.951	+14 2.30	4.63	14.40	4.63	-16.91	.0	17.5	83.8	12.3	149
1985	3	12	.0	2446136.5	4	52.752	+14 1.37	4	54.725	+14 4.74	4.64	14.33	4.62	-16.93	.0	17.5	82.7	12.3	162
1985	3	13	.0	2446137.5	4	52.541	+14 3.82	4	54.515	+14 7.20	4.65	14.25	4.61	-16.95	.0	17.5	81.7	12.3	169
1985	3	14	.0	2446138.5	4	52.347	+14 6.27	4	54.321	+14 9.67	4.66	14.16	4.60	-16.97	.0	17.5	80.7	12.3	163
1985	3	15	.0	2446139.5	4	52.167	+14 8.74	4	54.142	+14 12.14	4.66	14.06	4.59	-16.98	.0	17.5	79.6	12.3	151
1985	3	16	.0	2446140.5	4	52.003	+14 11.22	4	53.978	+14 14.63	4.67	13.95	4.58	-17.00	.0	17.5	78.6	12.3	139
1985	3	17	.0	2446141.5	4	51.854	+14 13.71	4	53.825	+14 17.13	4.68	13.83	4.57	-17.02	.0	17.5	77.6	12.3	127
1985	3	18	.0	2446142.5	4	51.720	+14 16.22	4	53.696	+14 19.64	4.69	13.70	4.56	-17.04	.0	17.4	76.6	12.3	114
1985	3	19	.0	2446143.5	4	51.601	+14 18.72	4	53.577	+14 22.16	4.70	13.56	4.55	-17.06	.0	17.4	75.6	12.2	102
1985	3	20	.0	2446144.5	4	51.497	+14 21.24	4	53.473	+14 24.68	4.70	13.40	4.54	-17.08	.0	17.4	74.6	12.2	90
1985	3	21	.0	2446145.5	4	51.407	+14 23.77	4	53.383	+14 27.21	4.71	13.24	4.53	-17.09	.0	17.4	73.6	12.2	78

Table B-3 (contd)

YR	MN	DY	HR	J.D _t	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	3	22	.0	2446146.5	4 51.332	+14 26.30		4 53.30E	+14 29.75		4.72	13.07	4.52	-17.11	.0	17.4	72.6	12.1	67
1985	3	23	.0	2446147.5	4 51.272	+14 28.85		4 53.24E	+14 32.29		4.73	12.89	4.51	-17.13	.0	17.4	71.6	12.1	55
1985	3	24	.0	2446148.5	4 51.225	+14 31.39		4 53.201	+14 34.84		4.73	12.71	4.50	-17.15	.0	17.4	70.6	12.1	44
1985	3	25	.0	2446149.5	4 51.192	+14 33.95		4 53.165	+14 37.40		4.74	12.51	4.49	-17.17	.0	17.4	69.6	12.0	32
1985	3	26	.0	2446150.5	4 51.173	+14 36.51		4 53.15C	+14 39.96		4.75	12.30	4.48	-17.19	.0	17.4	68.6	12.0	21
1985	3	27	.0	2446151.5	4 51.168	+14 39.07		4 53.14E	+14 42.52		4.76	12.09	4.47	-17.21	.0	17.4	67.6	11.9	12
1985	3	28	.0	2446152.5	4 51.177	+14 41.64		4 53.15E	+14 45.09		4.76	11.86	4.46	-17.23	.0	17.4	66.7	11.9	10
1985	3	29	.0	2446153.5	4 51.198	+14 44.22		4 53.177	+14 47.67		4.77	11.63	4.45	-17.24	.0	17.4	65.7	11.8	19
1985	3	30	.0	2446154.5	4 51.233	+14 46.80		4 53.212	+14 50.24		4.78	11.39	4.44	-17.26	.0	17.4	64.7	11.7	31
1985	3	31	.0	2446155.5	4 51.281	+14 49.38		4 53.26C	+14 52.82		4.78	11.15	4.43	-17.28	.0	17.4	63.8	11.7	43
1985	4	1	.0	2446156.5	4 51.342	+14 51.96		4 53.32E	+14 55.40		4.79	10.90	4.42	-17.30	.0	17.4	62.8	11.6	56
1985	4	2	.0	2446157.5	4 51.415	+14 54.55		4 53.39E	+14 57.99		4.80	10.64	4.41	-17.32	.0	17.4	61.8	11.5	70
1985	4	3	.0	2446158.5	4 51.501	+14 57.13		4 53.48E	+15 .57		4.80	10.37	4.40	-17.34	.0	17.3	60.9	11.4	84
1985	4	4	.0	2446159.5	4 51.600	+14 59.72		4 53.58C	+15 3.16		4.81	10.13	4.39	-17.36	.0	17.3	59.9	11.4	99
1985	4	5	.0	2446160.5	4 51.710	+15 2.31		4 53.691	+15 5.74		4.81	9.82	4.38	-17.38	.0	17.3	59.0	11.3	114
1985	4	6	.0	2446161.5	4 51.833	+15 4.90		4 53.814	+15 8.32		4.82	9.53	4.37	-17.40	.0	17.3	58.1	11.2	129
1985	4	7	.0	2446162.5	4 51.967	+15 7.49		4 53.945	+15 10.91		4.82	9.24	4.36	-17.42	.0	17.3	57.1	11.1	143
1985	4	8	.0	2446163.5	4 52.113	+15 10.08		4 54.095	+15 13.49		4.83	8.95	4.35	-17.44	.0	17.3	56.2	11.0	157
1985	4	9	.0	2446164.5	4 52.271	+15 12.67		4 54.253	+15 16.07		4.83	8.64	4.34	-17.46	.0	17.3	55.3	10.9	169
1985	4	10	.0	2446165.5	4 52.440	+15 15.26		4 54.423	+15 18.65		4.84	8.33	4.33	-17.48	.0	17.3	54.3	10.8	167
1985	4	11	.0	2446166.5	4 52.620	+15 17.85		4 54.604	+15 21.23		4.84	8.02	4.32	-17.50	.0	17.3	53.4	10.7	155
1985	4	12	.0	2446167.5	4 52.812	+15 20.44		4 54.797	+15 23.81		4.85	7.70	4.31	-17.52	.0	17.3	52.5	10.6	143
1985	4	13	.0	2446168.5	4 53.015	+15 23.02		4 55.00C	+15 26.39		4.85	7.37	4.30	-17.54	.0	17.3	51.6	10.5	130
1985	4	14	.0	2446169.5	4 53.229	+15 25.61		4 55.214	+15 28.96		4.86	7.04	4.29	-17.56	.0	17.3	50.7	10.4	118
1985	4	15	.0	2446170.5	4 53.453	+15 28.19		4 55.435	+15 31.53		4.86	6.70	4.28	-17.58	.0	17.2	49.7	10.3	106
1985	4	16	.0	2446171.5	4 53.688	+15 30.76		4 55.675	+15 34.10		4.86	6.35	4.27	-17.60	.0	17.2	48.8	10.2	94
1985	4	17	.0	2446172.5	4 53.934	+15 33.34		4 55.921	+15 36.66		4.87	6.00	4.26	-17.62	.0	17.2	47.9	10.1	82
1985	4	18	.0	2446173.5	4 54.190	+15 35.91		4 56.177	+15 39.22		4.87	5.64	4.25	-17.64	.0	17.2	47.0	10.0	70
1985	4	19	.0	2446174.5	4 54.456	+15 38.47		4 56.444	+15 41.77		4.87	5.28	4.24	-17.66	.0	17.2	46.1	9.8	59
1985	4	20	.0	2446175.5	4 54.732	+15 41.03		4 56.72C	+15 44.31		4.88	4.91	4.23	-17.68	.0	17.2	45.2	9.7	47
1985	4	21	.0	2446176.5	4 55.018	+15 43.58		4 57.007	+15 46.85		4.88	4.54	4.22	-17.70	.0	17.2	44.3	9.6	36
1985	4	22	.0	2446177.5	4 55.314	+15 46.13		4 57.303	+15 49.39		4.88	4.16	4.21	-17.73	.0	17.2	43.4	9.4	25
1985	4	23	.0	2446178.5	4 55.619	+15 48.68		4 57.605	+15 51.92		4.89	3.77	4.20	-17.75	.0	17.2	42.6	9.3	14
1985	4	24	.0	2446179.5	4 55.934	+15 51.21		4 57.924	+15 54.44		4.89	3.39	4.19	-17.77	.0	17.2	41.7	9.2	9
1985	4	25	.0	2446180.5	4 56.258	+15 53.74		4 58.245	+15 56.95		4.89	2.99	4.18	-17.79	.0	17.2	40.8	9.0	15
1985	4	26	.0	2446181.5	4 56.590	+15 56.26		4 58.582	+15 59.46		4.89	2.60	4.17	-17.81	.0	17.1	39.9	8.9	26
1985	4	27	.0	2446182.5	4 56.932	+15 58.78		4 58.925	+16 1.96		4.89	2.20	4.16	-17.83	.0	17.1	39.0	8.8	38
1985	4	28	.0	2446183.5	4 57.283	+16 1.28		4 59.27E	+16 4.45		4.89	1.79	4.15	-17.85	.0	17.1	38.2	8.6	50
1985	4	29	.0	2446184.5	4 57.642	+16 3.78		4 59.63E	+16 6.93		4.89	1.39	4.14	-17.87	.0	17.1	37.3	8.5	63
1985	4	30	.0	2446185.5	4 58.010	+16 6.27		5 .004	+16 9.40		4.89	.98	4.13	-17.90	.0	17.1	36.4	8.3	77
1985	5	1	.0	2446186.5	4 58.386	+16 8.75		5 .38C	+16 11.86		4.90	.56	4.12	-17.92	.0	17.1	35.6	8.2	91
1985	5	2	.0	2446187.5	4 58.770	+16 11.22		5 .765	+16 14.31		4.90	.15	4.11	-17.94	.0	17.1	34.7	8.0	105
1985	5	3	.0	2446188.5	4 59.162	+16 13.68		5 1.15E	+16 16.76		4.90	-.27	4.10	-17.96	.0	17.1	33.8	7.9	120
1985	5	4	.0	2446189.5	4 59.562	+16 16.13		5 1.55E	+16 19.19		4.90	-.69	4.09	-17.98	.0	17.1	33.0	7.7	135
1985	5	5	.0	2446190.5	4 59.969	+16 18.57		5 1.967	+16 21.61		4.89	-1.12	4.08	-18.01	.0	17.1	32.1	7.6	149
1985	5	6	.0	2446191.5	5 .385	+16 21.01		5 2.383	+16 24.02		4.89	-1.54	4.07	-18.03	.0	17.0	31.3	7.4	163
1985	5	7	.0	2446192.5	5 .808	+16 23.43		5 2.80E	+16 26.42		4.89	-1.97	4.06	-18.05	.0	17.0	30.4	7.2	171
1985	5	8	.0	2446193.5	5 1.238	+16 25.83		5 3.237	+16 28.81		4.89	-2.40	4.04	-18.07	.0	17.0	29.6	7.1	162
1985	5	9	.0	2446194.5	5 1.676	+16 28.23		5 3.67E	+16 31.18		4.89	-2.84	4.03	-18.09	.0	17.0	28.7	6.9	149
1985	5	10	.0	2446195.5	5 2.120	+16 30.62		5 4.121	+16 33.55		4.89	-3.28	4.02	-18.12	.0	17.0	27.9	6.7	137
1985	5	11	.0	2446196.5	5 2.572	+16 33.00		5 4.574	+16 35.90		4.89	-3.72	4.01	-18.14	.0	17.0	27.1	6.6	124
1985	5	12	.0	2446197.5	5 3.031	+16 35.36		5 5.034	+16 38.25		4.88	-4.16	4.00	-18.16	.0	17.0	26.2	6.4	112
1985	5	13	.0	2446198.5	5 3.497	+16 37.71		5 5.50C	+16 40.58		4.88	-4.61	3.99	-18.18	.0	17.0	25.4	6.2	100
1985	5	14	.0	2446199.5	5 3.969	+16 40.05		5 5.973	+16 42.89		4.88	-5.06	3.98	-18.21	.0	16.9	24.6	6.1	88
1985	5	15	.0	2446200.5	5 4.448	+16 42.38		5 6.453	+16 45.20		4.88	-5.51	3.97	-18.23	.0	16.9	23.8	5.9	76
1985	5	16	.0	2446201.5	5 4.934	+16 44.69		5 6.935	+16 47.48		4.87	-5.96	3.96	-18.25	.0	16.9	22.9	5.7	64
1985	5	17	.0	2446202.5	5 5.426	+16 46.99		5 7.431	+16 49.76		4.87	-6.42	3.95	-18.28	.0	16.9	22.1	5.5	53

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	5	18	.0	2446203.5	5	5.924	+16 49.28	5	7.930	+16 52.02	4.87	-6.88	3.94	-18.30	.0	16.9	21.3	5.4	41
1985	5	19	.0	2446204.5	5	6.428	+16 51.55	5	8.435	+16 54.27	4.86	-7.34	3.93	-18.32	.0	16.9	20.5	5.2	30
1985	5	20	.0	2446205.5	5	6.938	+16 53.81	5	8.945	+16 56.50	4.86	-7.81	3.92	-18.35	.0	16.9	19.7	5.0	19
1985	5	21	.0	2446206.5	5	7.453	+16 56.05	5	9.462	+16 58.72	4.85	-8.27	3.91	-18.37	.0	16.8	18.9	4.8	10
1985	5	22	.0	2446207.5	5	7.975	+16 58.28	5	9.984	+17 .93	4.85	-8.74	3.90	-18.39	.0	16.8	18.1	4.6	10
1985	5	23	.0	2446208.5	5	8.502	+17 .49	5	10.512	+17 3.11	4.84	-9.21	3.89	-18.42	.0	16.8	17.3	4.4	20
1985	5	24	.0	2446209.5	5	9.034	+17 2.69	5	11.045	+17 5.29	4.84	-9.68	3.88	-18.44	.0	16.8	16.5	4.3	32
1985	5	25	.0	2446210.5	5	9.572	+17 4.88	5	11.584	+17 7.45	4.83	-10.15	3.87	-18.47	.0	16.8	15.7	4.1	44
1985	5	26	.0	2446211.5	5	10.115	+17 7.05	5	12.127	+17 9.59	4.82	-10.62	3.85	-18.49	.0	16.8	15.0	3.9	57
1985	5	27	.0	2446212.5	5	10.663	+17 9.20	5	12.676	+17 11.72	4.82	-11.09	3.84	-18.51	.0	16.8	14.2	3.7	70
1985	5	28	.0	2446213.5	5	11.215	+17 11.33	5	13.225	+17 13.83	4.81	-11.56	3.83	-18.54	.0	16.7	13.4	3.5	83
1985	5	29	.0	2446214.5	5	11.773	+17 13.45	5	13.787	+17 15.92	4.81	-12.04	3.82	-18.56	.0	16.7	12.7	3.3	97
1985	5	30	.0	2446215.5	5	12.335	+17 15.56	5	14.350	+17 18.00	4.80	-12.51	3.81	-18.59	.0	16.7	12.0	3.2	111
1985	5	31	.0	2446216.5	5	12.901	+17 17.65	5	14.917	+17 20.06	4.79	-12.98	3.80	-18.61	.0	16.7	11.2	3.0	125
1985	6	1	.0	2446217.5	5	13.472	+17 19.72	5	15.485	+17 22.10	4.78	-13.45	3.79	-18.64	.0	16.7	10.5	2.8	140
1985	6	2	.0	2446218.5	5	14.047	+17 21.77	5	16.065	+17 24.12	4.78	-13.93	3.78	-18.66	.0	16.7	9.8	2.6	154
1985	6	3	.0	2446219.5	5	14.627	+17 23.81	5	16.645	+17 26.13	4.77	-14.40	3.77	-18.69	.0	16.7	9.2	2.5	167
1985	6	4	.0	2446220.5	5	15.211	+17 25.83	5	17.230	+17 28.12	4.76	-14.87	3.76	-18.71	.0	16.6	8.5	2.3	170
1985	6	5	.0	2446221.5	5	15.798	+17 27.83	5	17.818	+17 30.10	4.75	-15.35	3.75	-18.74	.0	16.6	7.9	2.1	158
1985	6	6	.0	2446222.5	5	16.390	+17 29.82	5	18.411	+17 32.06	4.74	-15.82	3.74	-18.76	.0	16.6	7.3	2.0	145
1985	6	7	.0	2446223.5	5	16.985	+17 31.79	5	19.007	+17 34.00	4.73	-16.30	3.73	-18.79	.0	16.6	6.8	1.9	132
1985	6	8	.0	2446224.5	5	17.584	+17 33.74	5	19.607	+17 35.93	4.72	-16.77	3.71	-18.81	.0	16.6	6.4	1.7	119
1985	6	9	.0	2446225.5	5	18.187	+17 35.68	5	20.211	+17 37.83	4.71	-17.25	3.70	-18.84	.0	16.6	6.0	1.6	107
1985	6	10	.0	2446226.5	5	18.793	+17 37.60	5	20.818	+17 39.72	4.70	-17.73	3.69	-18.86	.0	16.5	5.7	1.6	95
1985	6	11	.0	2446227.5	5	19.403	+17 39.50	5	21.428	+17 41.59	4.69	-18.20	3.68	-18.89	.0	16.5	5.5	1.5	83
1985	6	12	.0	2446228.5	5	20.016	+17 41.38	5	22.042	+17 43.45	4.68	-18.68	3.67	-18.92	.0	16.5	5.4	1.5	71
1985	6	13	.0	2446229.5	5	20.633	+17 43.25	5	22.659	+17 45.28	4.67	-19.16	3.66	-18.94	.0	16.5	5.5	1.5	60
1985	6	14	.0	2446230.5	5	21.252	+17 45.09	5	23.275	+17 47.10	4.66	-19.64	3.65	-18.97	.0	16.5	5.6	1.6	48
1985	6	15	.0	2446231.5	5	21.874	+17 46.92	5	23.902	+17 48.89	4.65	-20.12	3.64	-18.99	.0	16.4	5.9	1.6	37
1985	6	16	.0	2446232.5	5	22.500	+17 48.73	5	24.528	+17 50.67	4.64	-20.59	3.63	-19.02	.0	16.4	6.3	1.7	26
1985	6	17	.0	2446233.5	5	23.127	+17 50.53	5	25.157	+17 52.43	4.62	-21.07	3.62	-19.05	.0	16.4	6.7	1.9	15
1985	6	18	.0	2446234.5	5	23.758	+17 52.30	5	25.788	+17 54.18	4.61	-21.55	3.61	-19.07	.0	16.4	7.2	2.0	8
1985	6	19	.0	2446235.5	5	24.391	+17 54.06	5	26.422	+17 55.90	4.60	-22.03	3.59	-19.10	.0	16.4	7.7	2.2	14
1985	6	20	.0	2446236.5	5	25.026	+17 55.79	5	27.058	+17 57.61	4.59	-22.50	3.58	-19.13	.0	16.3	8.3	2.4	25
1985	6	21	.0	2446237.5	5	25.664	+17 57.51	5	27.697	+17 59.29	4.57	-22.98	3.57	-19.16	.0	16.3	9.0	2.5	37
1985	6	22	.0	2446238.5	5	26.303	+17 59.21	5	28.337	+18 .96	4.56	-23.45	3.56	-19.18	.0	16.3	9.6	2.7	50
1985	6	23	.0	2446239.5	5	26.945	+18 .89	5	28.975	+18 2.61	4.55	-23.93	3.55	-19.21	.0	16.3	10.3	2.9	63
1985	6	24	.0	2446240.5	5	27.588	+18 2.55	5	29.623	+18 4.24	4.53	-24.40	3.54	-19.24	.0	16.3	11.0	3.1	76
1985	6	25	.0	2446241.5	5	28.233	+18 4.19	5	30.269	+18 5.86	4.52	-24.87	3.53	-19.26	.0	16.2	11.7	3.3	90
1985	6	26	.0	2446242.5	5	28.880	+18 5.82	5	30.916	+18 7.45	4.50	-25.33	3.52	-19.29	.0	16.2	12.4	3.6	103
1985	6	27	.0	2446243.5	5	29.528	+18 7.42	5	31.565	+18 9.02	4.49	-25.80	3.51	-19.32	.0	16.2	13.1	3.8	117
1985	6	28	.0	2446244.5	5	30.177	+18 9.01	5	32.215	+18 10.57	4.47	-26.26	3.49	-19.35	.0	16.2	13.8	4.0	131
1985	6	29	.0	2446245.5	5	30.828	+18 10.58	5	32.867	+18 12.11	4.46	-26.73	3.48	-19.38	.0	16.2	14.6	4.2	145
1985	6	30	.0	2446246.5	5	31.480	+18 12.13	5	33.519	+18 13.63	4.44	-27.19	3.47	-19.41	.0	16.1	15.3	4.4	159
1985	7	1	.0	2446247.5	5	32.133	+18 13.66	5	34.173	+18 15.13	4.43	-27.65	3.46	-19.43	.0	16.1	16.1	4.7	170
1985	7	2	.0	2446248.5	5	32.787	+18 15.17	5	34.828	+18 16.61	4.41	-28.10	3.45	-19.46	.0	16.1	16.8	4.9	167
1985	7	3	.0	2446249.5	5	33.441	+18 16.67	5	35.484	+18 18.07	4.39	-28.56	3.44	-19.49	.0	16.1	17.6	5.1	155
1985	7	4	.0	2446250.5	5	34.097	+18 18.14	5	36.140	+18 19.51	4.38	-29.02	3.43	-19.52	.0	16.1	18.3	5.4	142
1985	7	5	.0	2446251.5	5	34.753	+18 19.60	5	36.797	+18 20.94	4.36	-29.47	3.42	-19.55	.0	16.0	19.1	5.6	129
1985	7	6	.0	2446252.5	5	35.410	+18 21.04	5	37.454	+18 22.35	4.34	-29.92	3.40	-19.58	.0	16.0	19.9	5.8	116
1985	7	7	.0	2446253.5	5	36.067	+18 22.47	5	38.112	+18 23.74	4.33	-30.37	3.39	-19.61	.0	16.0	20.6	6.1	103
1985	7	8	.0	2446254.5	5	36.724	+18 23.87	5	38.770	+18 25.11	4.31	-30.82	3.38	-19.64	.0	16.0	21.4	6.3	91
1985	7	9	.0	2446255.5	5	37.382	+18 25.26	5	39.428	+18 26.47	4.29	-31.27	3.37	-19.67	.0	15.9	22.2	6.5	80
1985	7	10	.0	2446256.5	5	38.040	+18 26.63	5	40.087	+18 27.80	4.27	-31.72	3.36	-19.70	.0	15.9	22.9	6.8	68
1985	7	11	.0	2446257.5	5	38.697	+18 27.98	5	40.745	+18 29.12	4.25	-32.17	3.35	-19.73	.0	15.9	23.7	7.0	56
1985	7	12	.0	2446258.5	5	39.355	+18 29.31	5	41.403	+18 30.42	4.23	-32.61	3.34	-19.76	15.0	15.9	24.5	7.3	45
1985	7	13	.0	2446259.5	5	40.012	+18 30.63	5	42.061	+18 31.71	4.22	-33.05	3.32	-19.79	15.0	15.8	25.3	7.5	33

Table B-3 (contd)

YR	MN	DY	HR	J.D _t	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	7	14	.0	2446260.5	5	40.669	+18 31.93	5	42.715	+18 32.97	4.20	-33.49	3.31	-19.82	14.9	15.8	26.0	7.7	22
1985	7	15	.0	2446261.5	5	41.325	+18 33.21	5	43.375	+18 34.22	4.18	-33.93	3.30	-19.85	14.9	15.8	26.8	8.0	12
1985	7	16	.0	2446262.5	5	41.980	+18 34.47	5	44.031	+18 35.45	4.16	-34.37	3.29	-19.88	14.9	15.8	27.6	8.2	8
1985	7	17	.0	2446263.5	5	42.634	+18 35.72	5	44.687	+18 36.67	4.14	-34.80	3.28	-19.91	14.8	15.7	28.4	8.5	17
1985	7	18	.0	2446264.5	5	43.287	+18 36.95	5	45.341	+18 37.87	4.12	-35.23	3.27	-19.94	14.8	15.7	29.2	8.7	29
1985	7	19	.0	2446265.5	5	43.939	+18 38.16	5	45.993	+18 39.05	4.10	-35.66	3.26	-19.97	14.8	15.7	30.0	9.0	42
1985	7	20	.0	2446266.5	5	44.590	+18 39.36	5	46.645	+18 40.21	4.08	-36.09	3.24	-20.00	14.7	15.7	30.7	9.2	55
1985	7	21	.0	2446267.5	5	45.239	+18 40.54	5	47.294	+18 41.36	4.06	-36.51	3.23	-20.03	14.7	15.6	31.5	9.5	69
1985	7	22	.0	2446268.5	5	45.886	+18 41.71	5	47.942	+18 42.50	4.03	-36.93	3.22	-20.06	14.7	15.6	32.3	9.7	82
1985	7	23	.0	2446269.5	5	46.531	+18 42.86	5	48.588	+18 43.61	4.01	-37.35	3.21	-20.10	14.7	15.6	33.1	10.0	96
1985	7	24	.0	2446270.5	5	47.174	+18 43.99	5	49.231	+18 44.71	3.99	-37.76	3.20	-20.13	14.6	15.6	33.9	10.2	110
1985	7	25	.0	2446271.5	5	47.815	+18 45.11	5	49.873	+18 45.80	3.97	-38.17	3.19	-20.16	14.6	15.5	34.7	10.5	124
1985	7	26	.0	2446272.5	5	48.454	+18 46.21	5	50.512	+18 46.87	3.95	-38.57	3.17	-20.19	14.6	15.5	35.5	10.7	137
1985	7	27	.0	2446273.5	5	49.090	+18 47.30	5	51.145	+18 47.93	3.92	-38.98	3.16	-20.22	14.5	15.5	36.3	10.9	151
1985	7	28	.0	2446274.5	5	49.723	+18 48.38	5	51.783	+18 48.97	3.90	-39.38	3.15	-20.26	14.5	15.4	37.1	11.2	164
1985	7	29	.0	2446275.5	5	50.353	+18 49.44	5	52.414	+18 50.00	3.88	-39.77	3.14	-20.29	14.5	15.4	37.9	11.4	171
1985	7	30	.0	2446276.5	5	50.981	+18 50.49	5	53.043	+18 51.02	3.86	-40.16	3.13	-20.32	14.4	15.4	38.7	11.7	163
1985	7	31	.0	2446277.5	5	51.605	+18 51.52	5	53.668	+18 52.02	3.83	-40.55	3.12	-20.36	14.4	15.4	39.5	11.9	151
1985	8	1	.0	2446278.5	5	52.227	+18 52.54	5	54.290	+18 53.01	3.81	-40.94	3.10	-20.39	14.3	15.3	40.3	12.2	138
1985	8	2	.0	2446279.5	5	52.844	+18 53.56	5	54.908	+18 54.00	3.79	-41.32	3.09	-20.42	14.3	15.3	41.1	12.4	125
1985	8	3	.0	2446280.5	5	53.458	+18 54.55	5	55.523	+18 54.96	3.76	-41.71	3.08	-20.46	14.3	15.3	41.9	12.7	112
1985	8	4	.0	2446281.5	5	54.069	+18 55.54	5	56.134	+18 55.92	3.74	-42.08	3.07	-20.49	14.2	15.2	42.7	12.9	100
1985	8	5	.0	2446282.5	5	54.675	+18 56.52	5	56.741	+18 56.87	3.71	-42.46	3.06	-20.52	14.2	15.2	43.5	13.2	88
1985	8	6	.0	2446283.5	5	55.277	+18 57.48	5	57.344	+18 57.80	3.69	-42.83	3.05	-20.56	14.2	15.2	44.3	13.4	76
1985	8	7	.0	2446284.5	5	55.875	+18 58.44	5	57.942	+18 58.73	3.66	-43.20	3.03	-20.59	14.1	15.1	45.1	13.7	64
1985	8	8	.0	2446285.5	5	56.468	+18 59.38	5	58.536	+18 59.64	3.64	-43.57	3.02	-20.63	14.1	15.1	45.9	13.9	53
1985	8	9	.0	2446286.5	5	57.056	+19 .32	5	59.124	+19 .55	3.61	-43.93	3.01	-20.66	14.1	15.1	46.7	14.2	41
1985	8	10	.0	2446287.5	5	57.639	+19 1.25	5	59.708	+19 1.44	3.59	-44.29	3.00	-20.70	14.0	15.0	47.5	14.4	30
1985	8	11	.0	2446288.5	5	58.217	+19 2.17	6	.287	+19 2.33	3.56	-44.65	2.99	-20.73	14.0	15.0	48.4	14.7	19
1985	8	12	.0	2446289.5	5	58.790	+19 3.08	6	.860	+19 3.22	3.54	-45.00	2.97	-20.77	13.9	15.0	49.2	14.9	9
1985	8	13	.0	2446290.5	5	59.356	+19 3.98	6	1.427	+19 4.09	3.51	-45.35	2.96	-20.80	13.9	14.9	50.0	15.2	10
1985	8	14	.0	2446291.5	5	59.916	+19 4.88	6	1.988	+19 4.96	3.48	-45.69	2.95	-20.84	13.9	14.9	50.8	15.4	21
1985	8	15	.0	2446292.5	6	.470	+19 5.77	6	2.543	+19 5.82	3.46	-46.03	2.94	-20.87	13.8	14.9	51.6	15.7	34
1985	8	16	.0	2446293.5	6	1.017	+19 6.65	6	3.091	+19 6.68	3.43	-46.37	2.93	-20.91	13.8	14.8	52.5	15.9	47
1985	8	17	.0	2446294.5	6	1.558	+19 7.53	6	3.632	+19 7.53	3.40	-46.70	2.91	-20.95	13.7	14.8	53.3	16.2	60
1985	8	18	.0	2446295.5	6	2.091	+19 8.41	6	4.165	+19 8.38	3.38	-47.03	2.90	-20.98	13.7	14.8	54.1	16.4	74
1985	8	19	.0	2446296.5	6	2.616	+19 9.28	6	4.691	+19 9.23	3.35	-47.35	2.89	-21.02	13.7	14.7	55.0	16.7	88
1985	8	20	.0	2446297.5	6	3.133	+19 10.15	6	5.205	+19 10.08	3.32	-47.67	2.88	-21.06	13.6	14.7	55.8	16.9	102
1985	8	21	.0	2446298.5	6	3.643	+19 11.02	6	5.715	+19 10.92	3.29	-47.98	2.87	-21.09	13.6	14.7	56.6	17.2	117
1985	8	22	.0	2446299.5	6	4.143	+19 11.89	6	6.220	+19 11.76	3.27	-48.28	2.85	-21.13	13.5	14.6	57.5	17.4	131
1985	8	23	.0	2446300.5	6	4.635	+19 12.75	6	6.713	+19 12.60	3.24	-48.58	2.84	-21.17	13.5	14.6	58.3	17.6	144
1985	8	24	.0	2446301.5	6	5.118	+19 13.62	6	7.194	+19 13.44	3.21	-48.88	2.83	-21.21	13.4	14.5	59.2	17.9	158
1985	8	25	.0	2446302.5	6	5.591	+19 14.49	6	7.670	+19 14.29	3.18	-49.17	2.82	-21.25	13.4	14.5	60.0	18.1	169
1985	8	26	.0	2446303.5	6	6.054	+19 15.37	6	8.134	+19 15.14	3.15	-49.46	2.80	-21.28	13.4	14.5	60.9	18.4	169
1985	8	27	.0	2446304.5	6	6.508	+19 16.25	6	8.588	+19 16.00	3.12	-49.74	2.79	-21.32	13.3	14.4	61.7	18.6	158
1985	8	28	.0	2446305.5	6	6.950	+19 17.13	6	9.032	+19 16.86	3.10	-50.01	2.78	-21.36	13.3	14.4	62.6	18.8	145
1985	8	29	.0	2446306.5	6	7.382	+19 18.02	6	9.464	+19 17.72	3.07	-50.28	2.77	-21.40	13.2	14.4	63.4	19.1	132
1985	8	30	.0	2446307.5	6	7.803	+19 18.91	6	9.886	+19 18.60	3.04	-50.55	2.75	-21.44	13.2	14.3	64.3	19.3	120
1985	8	31	.0	2446308.5	6	8.212	+19 19.82	6	10.295	+19 19.48	3.01	-50.81	2.74	-21.48	13.1	14.3	65.2	19.5	107
1985	9	1	.0	2446309.5	6	8.608	+19 20.73	6	10.692	+19 20.38	2.98	-51.07	2.73	-21.52	13.1	14.2	66.0	19.7	95
1985	9	2	.0	2446310.5	6	8.992	+19 21.65	6	11.077	+19 21.28	2.95	-51.32	2.72	-21.56	13.0	14.2	66.9	20.0	83
1985	9	3	.0	2446311.5	6	9.363	+19 22.58	6	11.448	+19 22.19	2.92	-51.57	2.70	-21.60	13.0	14.1	67.8	20.2	71
1985	9	4	.0	2446312.5	6	9.720	+19 23.53	6	11.806	+19 23.12	2.89	-51.81	2.69	-21.64	12.9	14.1	68.7	20.4	60
1985	9	5	.0	2446313.5	6	10.064	+19 24.49	6	12.150	+19 24.06	2.86	-52.05	2.68	-21.68	12.9	14.1	69.6	20.6	48
1985	9	6	.0	2446314.5	6	10.392	+19 25.47	6	12.475	+19 25.02	2.83	-52.28	2.67	-21.72	12.8	14.0	70.5	20.9	37
1985	9	7	.0	2446315.5	6	10.705	+19 26.46	6	12.793	+19 26.00	2.80	-52.51	2.65	-21.76	12.8	14.0	71.3	21.1	25
1985	9	8	.0	2446316.5	6	11.002	+19 27.47	6	13.091	+19 27.00	2.77	-52.73	2.64	-21.80	12.7	13.9	72.2	21.3	14

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OF POOR QUALITY

Table B-3 (cont'd)

YR	MN	DY	HR	J.D.	R.N.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	9	9	.0	2446317.5	6	11.283	+19 28.50	6 13.372	+19 28.01	2.74	-52.94	2.63	-21.84	12.7	13.9	73.1	21.5	8	
1985	9	10	.0	2446318.5	6	11.546	+19 29.55	6 13.636	+19 29.05	2.71	-53.15	2.62	-21.88	12.6	13.8	74.1	21.7	14	
1985	9	11	.0	2446319.5	6	11.791	+19 30.63	6 13.883	+19 30.11	2.68	-53.36	2.60	-21.93	12.6	13.8	75.0	21.9	26	
1985	9	12	.0	2446320.5	6	12.018	+19 31.73	6 14.111	+19 31.20	2.65	-53.55	2.59	-21.97	12.5	13.7	75.9	22.1	39	
1985	9	13	.0	2446321.5	6	12.225	+19 32.85	6 14.318	+19 32.31	2.62	-53.74	2.58	-22.01	12.5	13.7	76.8	22.3	52	
1985	9	14	.0	2446322.5	6	12.412	+19 34.00	6 14.506	+19 33.46	2.58	-53.92	2.57	-22.05	12.4	13.7	77.7	22.5	66	
1985	9	15	.0	2446323.5	6	12.578	+19 35.19	6 14.672	+19 34.63	2.55	-54.09	2.55	-22.10	12.4	13.6	78.7	22.7	81	
1985	9	16	.0	2446324.5	6	12.722	+19 36.40	6 14.817	+19 35.84	2.52	-54.26	2.54	-22.14	12.3	13.6	79.6	22.9	95	
1985	9	17	.0	2446325.5	6	12.842	+19 37.65	6 14.938	+19 37.08	2.49	-54.42	2.53	-22.18	12.3	13.5	80.5	23.1	110	
1985	9	18	.0	2446326.5	6	12.939	+19 38.93	6 15.036	+19 38.36	2.46	-54.57	2.52	-22.23	12.2	13.5	81.5	23.3	124	
1985	9	19	.0	2446327.5	6	13.012	+19 40.25	6 15.105	+19 39.67	2.43	-54.71	2.50	-22.27	12.1	13.4	82.5	23.5	139	
1985	9	20	.0	2446328.5	6	13.058	+19 41.61	6 15.156	+19 41.03	2.40	-54.85	2.49	-22.31	12.1	13.4	83.4	23.6	153	
1985	9	21	.0	2446329.5	6	13.078	+19 43.02	6 15.177	+19 42.43	2.36	-54.97	2.48	-22.36	12.0	13.3	84.4	23.8	165	
1985	9	22	.0	2446330.5	6	13.069	+19 44.47	6 15.165	+19 43.88	2.33	-55.09	2.46	-22.40	12.0	13.3	85.4	24.0	171	
1985	9	23	.0	2446331.5	6	13.031	+19 45.97	6 15.133	+19 45.38	2.30	-55.20	2.45	-22.45	11.9	13.2	86.4	24.1	162	
1985	9	24	.0	2446332.5	6	12.964	+19 47.52	6 15.066	+19 46.94	2.27	-55.30	2.44	-22.49	11.8	13.1	87.4	24.3	150	
1985	9	25	.0	2446333.5	6	12.864	+19 49.12	6 14.968	+19 48.54	2.24	-55.40	2.42	-22.54	11.8	13.1	88.4	24.4	137	
1985	9	26	.0	2446334.5	6	12.731	+19 50.77	6 14.836	+19 50.21	2.20	-55.48	2.41	-22.58	11.7	13.0	89.4	24.6	124	
1985	9	27	.0	2446335.5	6	12.564	+19 52.49	6 14.671	+19 51.93	2.17	-55.56	2.40	-22.63	11.7	13.0	90.4	24.7	112	
1985	9	28	.0	2446336.5	6	12.361	+19 54.26	6 14.468	+19 53.71	2.14	-55.63	2.39	-22.68	11.6	12.9	91.4	24.8	100	
1985	9	29	.0	2446337.5	6	12.121	+19 56.10	6 14.228	+19 55.56	2.11	-55.69	2.37	-22.72	11.5	12.9	92.4	25.0	87	
1985	9	30	.0	2446338.5	6	11.841	+19 58.00	6 13.945	+19 57.48	2.08	-55.74	2.36	-22.77	11.5	12.8	93.5	25.1	75	
1985	10	1	.0	2446339.5	6	11.520	+19 59.98	6 13.625	+19 59.47	2.04	-55.78	2.35	-22.82	11.4	12.8	94.5	25.2	63	
1985	10	2	.0	2446340.5	6	11.155	+20 2.02	6 13.266	+20 1.53	2.01	-55.82	2.33	-22.87	11.3	12.7	95.6	25.3	52	
1985	10	3	.0	2446341.5	6	10.746	+20 4.14	6 12.857	+20 3.67	1.98	-55.84	2.32	-22.91	11.3	12.6	96.7	25.4	40	
1985	10	4	.0	2446342.5	6	10.288	+20 6.34	6 12.401	+20 5.89	1.95	-55.85	2.31	-22.96	11.2	12.6	97.8	25.4	28	
1985	10	5	.0	2446343.5	6	9.782	+20 8.62	6 11.895	+20 8.20	1.91	-55.85	2.29	-23.01	11.1	12.5	98.9	25.5	17	
1985	10	6	.0	2446344.5	6	9.222	+20 10.98	6 11.337	+20 10.59	1.88	-55.84	2.28	-23.06	11.1	12.5	100.0	25.6	8	
1985	10	7	.0	2446345.5	6	8.608	+20 13.43	6 10.725	+20 13.07	1.85	-55.81	2.27	-23.11	11.0	12.4	101.1	25.6	11	
1985	10	8	.0	2446346.5	6	7.936	+20 15.98	6 10.054	+20 15.65	1.82	-55.77	2.25	-23.16	10.9	12.3	102.3	25.7	22	
1985	10	9	.0	2446347.5	6	7.203	+20 18.61	6 9.322	+20 18.33	1.79	-55.72	2.24	-23.20	10.8	12.3	103.4	25.7	35	
1985	10	10	.0	2446348.5	6	6.406	+20 21.35	6 8.526	+20 21.90	1.75	-55.66	2.23	-23.25	10.8	12.2	104.6	25.7	48	
1985	10	11	.0	2446349.5	6	5.541	+20 24.18	6 7.663	+20 23.98	1.72	-55.58	2.21	-23.30	10.7	12.1	105.8	25.7	62	
1985	10	12	.0	2446350.5	6	4.605	+20 27.11	6 6.725	+20 26.96	1.69	-55.49	2.20	-23.35	10.6	12.1	107.0	25.7	76	
1985	10	13	.0	2446351.5	6	3.594	+20 30.15	6 5.715	+20 30.05	1.66	-55.38	2.19	-23.40	10.5	12.0	108.2	25.7	91	
1985	10	14	.0	2446352.5	6	2.504	+20 33.30	6 4.631	+20 33.26	1.63	-55.25	2.17	-23.46	10.5	11.9	109.5	25.7	106	
1985	10	15	.0	2446353.5	6	1.330	+20 36.56	6 3.458	+20 36.58	1.59	-55.10	2.16	-23.51	10.4	11.9	110.8	25.6	121	
1985	10	16	.0	2446354.5	6	.068	+20 39.93	6 2.198	+20 40.01	1.56	-54.93	2.15	-23.56	10.3	11.8	112.0	25.5	136	
1985	10	17	.0	2446355.5	5	58.713	+20 43.41	6 .844	+20 43.56	1.53	-54.75	2.13	-23.61	10.2	11.7	113.3	25.4	151	
1985	10	18	.0	2446356.5	5	57.259	+20 47.01	5 59.392	+20 47.23	1.50	-54.54	2.12	-23.66	10.1	11.6	114.7	25.3	166	
1985	10	19	.0	2446357.5	5	55.701	+20 50.72	5 57.835	+20 51.03	1.47	-54.32	2.10	-23.71	10.1	11.6	116.0	25.2	172	
1985	10	20	.0	2446358.5	5	54.032	+20 54.55	5 56.165	+20 54.94	1.44	-54.07	2.09	-23.77	10.0	11.5	117.4	25.0	162	
1985	10	21	.0	2446359.5	5	52.247	+20 58.48	5 54.385	+20 58.97	1.40	-53.80	2.08	-23.82	9.9	11.4	118.8	24.8	148	
1985	10	22	.0	2446360.5	5	50.338	+21 2.53	5 52.477	+21 3.11	1.37	-53.50	2.06	-23.87	9.8	11.3	120.3	24.6	135	
1985	10	23	.0	2446361.5	5	48.297	+21 6.67	5 50.438	+21 7.36	1.34	-53.17	2.05	-23.92	9.7	11.3	121.7	24.4	122	
1985	10	24	.0	2446362.5	5	46.117	+21 10.92	5 48.261	+21 11.72	1.31	-52.82	2.04	-23.98	9.6	11.2	123.2	24.1	109	
1985	10	25	.0	2446363.5	5	43.789	+21 15.25	5 45.933	+21 16.11	1.28	-52.44	2.02	-24.03	9.5	11.1	124.8	23.8	96	
1985	10	26	.0	2446364.5	5	41.304	+21 19.66	5 43.445	+21 20.71	1.25	-52.03	2.01	-24.09	9.5	11.0	126.4	23.5	83	
1985	10	27	.0	2446365.5	5	38.651	+21 24.14	5 40.798	+21 25.33	1.22	-51.58	1.99	-24.14	9.4	10.9	128.0	23.1	71	
1985	10	28	.0	2446366.5	5	35.820	+21 28.66	5 37.965	+21 29.99	1.19	-51.09	1.98	-24.19	9.3	10.8	129.6	22.7	58	
1985	10	29	.0	2446367.5	5	32.800	+21 33.20	5 34.951	+21 34.69	1.16	-50.57	1.97	-24.25	9.2	10.8	131.3	22.3	46	
1985	10	30	.0	2446368.5	5	29.579	+21 37.75	5 31.731	+21 39.40	1.13	-50.00	1.95	-24.30	9.1	10.7	133.1	21.8	33	
1985	10	31	.0	2446369.5	5	26.144	+21 42.26	5 28.297	+21 44.09	1.11	-49.39	1.94	-24.36	9.0	10.6	134.9	21.3	21	
1985	11	1	.0	2446370.5	5	22.481	+21 46.70	5 24.635	+21 48.72	1.08	-48.73	1.92	-24.41	8.9	10.5	136.7	20.7	9	
1985	11	2	.0	2446371.5	5	18.576	+21 51.02	5 20.731	+21 53.25	1.05	-48.02	1.91	-24.47	8.8	10.4	138.6	20.1	6	
1985	11	3	.0	2446372.5	5	14.413	+21 55.18	5 16.568	+21 57.61	1.02	-47.24	1.90	-24.52	8.7	10.3	140.6	19.4	18	
1985	11	4	.0	2446373.5	5	9.976	+21 59.10	5 12.133	+22 1.76	.99	-46.41	1.88	-24.58	8.6	10.2	142.6	18.7	31	

Table B-3 (contu)

YR	MO	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1985	11	5	.0	2446374.5	5	5.250	+22 2.71	5	7.407	+22 5.61	.97	-45.51	1.87	-24.64	8.5	10.1	144.7	17.9	44
1985	11	6	.0	2446375.5	5	.218	+22 5.92	5	2.374	+22 9.08	.94	-44.53	1.85	-24.69	8.4	10.0	146.8	17.0	58
1985	11	7	.0	2446376.5	4	54.860	+22 8.64	4	57.016	+22 12.07	.92	-43.48	1.84	-24.75	8.3	10.0	149.1	16.1	72
1985	11	8	.0	2446377.5	4	49.162	+22 10.74	4	51.376	+22 14.46	.89	-42.35	1.82	-24.80	8.2	9.9	151.4	15.1	87
1985	11	9	.0	2446378.5	4	43.105	+22 12.09	4	45.257	+22 16.11	.87	-41.12	1.81	-24.86	8.1	9.8	153.8	14.0	103
1985	11	10	.0	2446379.5	4	36.672	+22 12.54	4	38.852	+22 16.88	.84	-39.80	1.80	-24.92	8.0	9.7	156.3	12.8	119
1985	11	11	.0	2446380.5	4	29.849	+22 11.92	4	31.996	+22 16.59	.82	-38.37	1.78	-24.97	7.9	9.6	158.8	11.6	135
1985	11	12	.0	2446381.5	4	22.623	+22 10.04	4	24.765	+22 15.05	.80	-36.84	1.77	-25.03	7.8	9.5	161.5	10.2	152
1985	11	13	.0	2446382.5	4	14.981	+22 6.69	4	17.115	+22 12.06	.78	-35.20	1.75	-25.09	7.6	9.4	164.2	8.8	169
1985	11	14	.0	2446383.5	4	6.917	+22 1.64	4	9.046	+22 7.39	.76	-33.44	1.74	-25.15	7.5	9.3	167.1	7.3	173
1985	11	15	.0	2446384.5	3	58.426	+21 54.67	4	.551	+22 .81	.74	-31.55	1.72	-25.20	7.4	9.2	170.0	5.7	156
1985	11	16	.0	2446385.5	3	49.510	+21 45.51	3	51.627	+21 52.05	.72	-29.54	1.71	-25.26	7.3	9.1	172.9	4.1	139
1985	11	17	.0	2446386.5	3	40.177	+21 33.94	3	42.284	+21 40.89	.71	-27.41	1.69	-25.32	7.2	9.0	175.8	2.4	123
1985	11	18	.0	2446387.5	3	30.441	+21 19.69	3	32.537	+21 27.06	.69	-25.16	1.68	-25.37	7.1	8.9	177.7	1.3	107
1985	11	19	.0	2446388.5	3	20.324	+21 2.56	3	22.406	+21 10.34	.68	-22.78	1.66	-25.43	7.1	8.9	176.1	2.3	92
1985	11	20	.0	2446389.5	3	9.856	+20 42.35	3	11.927	+20 50.55	.66	-20.29	1.65	-25.49	7.0	8.8	173.0	4.2	77
1985	11	21	.0	2446390.5	2	59.077	+20 18.91	3	1.133	+20 27.51	.65	-17.69	1.64	-25.54	6.9	8.7	169.6	6.3	62
1985	11	22	.0	2446391.5	2	48.832	+19 52.15	2	50.072	+20 1.15	.64	-15.00	1.62	-25.60	6.8	8.6	166.0	8.5	47
1985	11	23	.0	2446392.5	2	36.776	+19 22.04	2	38.801	+19 31.42	.64	-12.23	1.61	-25.65	6.7	8.6	162.3	10.8	32
1985	11	24	.0	2446393.5	2	25.369	+18 48.64	2	27.377	+18 58.39	.63	-9.41	1.59	-25.71	6.6	8.5	158.6	13.1	18
1985	11	25	.0	2446394.5	2	13.877	+18 12.08	2	15.866	+18 22.17	.63	-6.55	1.58	-25.77	6.6	8.5	154.8	15.5	5
1985	11	26	.0	2446395.5	2	2.366	+17 32.59	2	4.340	+17 43.00	.62	-3.67	1.56	-25.82	6.5	8.4	151.0	17.9	12
1985	11	27	.0	2446396.5	1	50.905	+16 50.46	1	52.862	+17 1.16	.62	-0.80	1.55	-25.87	6.4	8.4	147.2	20.2	26
1985	11	28	.0	2446397.5	1	39.559	+16 6.05	1	41.500	+16 17.01	.62	2.03	1.53	-25.93	6.4	8.3	143.4	22.6	40
1985	11	29	.0	2446398.5	1	28.390	+15 19.78	1	30.315	+15 30.97	.62	4.81	1.52	-25.98	6.3	8.3	139.6	25.0	55
1985	11	30	.0	2446399.5	1	17.454	+14 32.09	1	19.365	+14 43.47	.63	7.50	1.50	-26.03	6.3	8.3	135.8	27.3	70
1985	12	1	.0	2446400.5	1	6.800	+13 43.44	1	8.697	+13 54.99	.63	10.10	1.49	-26.09	6.3	8.2	132.1	29.5	84
1985	12	2	.0	2446401.5	0	56.468	+12 54.27	0	58.354	+13 5.96	.64	12.58	1.47	-26.14	6.2	8.2	128.5	31.7	99
1985	12	3	.0	2446402.5	0	46.492	+12 5.02	0	48.366	+12 16.83	.65	14.93	1.46	-26.19	6.2	8.2	124.9	33.7	114
1985	12	4	.0	2446403.5	0	36.894	+11 16.09	0	38.755	+11 27.97	.66	17.15	1.44	-26.24	6.2	8.2	121.4	35.7	129
1985	12	5	.0	2446404.5	0	27.692	+10 27.80	0	29.548	+10 39.75	.67	19.22	1.43	-26.29	6.1	8.2	118.0	37.6	144
1985	12	6	.0	2446405.5	0	18.895	+9 40.47	0	20.743	+9 52.46	.68	21.14	1.41	-26.33	6.1	8.1	114.7	39.4	159
1985	12	7	.0	2446406.5	0	10.505	+8 54.34	0	12.346	+9 6.35	.69	22.91	1.40	-26.38	6.1	8.1	111.5	41.1	169
1985	12	8	.0	2446407.5	0	2.519	+8 9.60	0	4.355	+8 21.61	.70	24.53	1.38	-26.42	6.1	8.1	108.3	42.7	162
1985	12	9	.0	2446408.5	23	54.932	+7 26.39	23	56.763	+7 38.39	.72	26.01	1.36	-26.47	6.1	8.1	105.3	44.1	147
1985	12	10	.0	2446409.5	23	47.732	+6 44.82	23	49.560	+6 56.80	.73	27.35	1.35	-26.51	6.0	8.1	102.4	45.5	131
1985	12	11	.0	2446410.5	23	40.907	+6 4.93	23	42.731	+6 16.88	.75	28.56	1.33	-26.55	6.0	8.1	99.6	46.7	114
1985	12	12	.0	2446411.5	23	34.441	+5 26.78	23	36.263	+5 38.69	.77	29.63	1.32	-26.59	6.0	8.1	96.8	47.9	98
1985	12	13	.0	2446412.5	23	28.318	+4 50.34	23	30.135	+5 2.21	.79	30.59	1.30	-26.62	6.0	8.1	94.2	48.9	81
1985	12	14	.0	2446413.5	23	22.520	+4 15.61	23	24.340	+4 27.43	.80	31.43	1.29	-26.65	6.0	8.1	91.6	49.8	66
1985	12	15	.0	2446414.5	23	17.031	+3 42.54	23	18.851	+3 54.30	.82	32.16	1.27	-26.69	5.9	8.1	89.1	50.7	50
1985	12	16	.0	2446415.5	23	11.832	+3 11.09	23	13.652	+3 22.79	.84	32.80	1.26	-26.71	5.9	8.1	86.7	51.4	36
1985	12	17	.0	2446416.5	23	6.907	+2 41.19	23	8.724	+2 52.83	.86	33.34	1.24	-26.74	5.9	8.1	84.4	52.1	22
1985	12	18	.0	2446417.5	23	2.238	+2 12.77	23	4.057	+2 24.35	.88	33.80	1.23	-26.76	5.9	8.1	82.1	52.7	12
1985	12	19	.0	2446418.5	22	57.808	+1 45.77	22	59.628	+1 57.28	.90	34.17	1.21	-26.78	5.9	8.1	79.9	53.1	14
1985	12	20	.0	2446419.5	22	53.603	+1 20.10	22	55.423	+1 31.54	.92	34.47	1.20	-26.79	5.8	8.1	77.6	53.6	24
1985	12	21	.0	2446420.5	22	49.606	+0 55.69	22	51.428	+1 7.07	.94	34.70	1.18	-26.80	5.8	8.1	75.7	53.9	36
1985	12	22	.0	2446421.5	22	45.805	+0 32.48	22	47.627	+0 43.79	.96	34.87	1.16	-26.81	5.8	8.1	73.7	54.2	48
1985	12	23	.0	2446422.5	22	42.185	+0 10.38	22	44.005	+0 21.63	.98	34.97	1.15	-26.81	5.7	8.1	71.7	54.4	60
1985	12	24	.0	2446423.5	22	38.734	-0 10.67	22	40.555	+0 .51	1.00	35.02	1.13	-26.80	5.7	8.0	69.7	54.5	73
1985	12	25	.0	2446424.5	22	35.440	-0 30.74	22	37.266	-0 19.63	1.02	35.02	1.12	-26.79	5.7	8.0	67.8	54.6	85
1985	12	26	.0	2446425.5	22	32.291	-0 49.90	22	34.115	-0 38.85	1.04	34.96	1.10	-26.77	5.6	8.0	66.0	54.6	98
1985	12	27	.0	2446426.5	22	29.278	-1 8.21	22	31.107	-0 57.22	1.06	34.85	1.09	-26.75	5.6	8.0	64.2	54.5	111
1985	12	28	.0	2446427.5	22	26.390	-1 25.73	22	28.220	-1 14.81	1.08	34.70	1.07	-26.72	5.6	8.0	62.4	54.4	123
1985	12	29	.0	2446428.5	22	23.618	-1 42.52	22	25.445	-1 31.65	1.10	34.51	1.06	-26.68	5.5	7.9	60.6	54.2	136
1985	12	30	.0	2446429.5	22	20.953	-1 58.63	22	22.786	-1 47.82	1.12	34.27	1.04	-26.63	5.5	7.9	58.9	54.0	149
1985	12	31	.0	2446430.5	22	18.387	-2 14.11	22	20.222	-2 3.37	1.14	34.00	1.03	-26.58	5.4	7.9	57.2	53.7	160

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON		
1986	1	1	.0	2446431.5	22	15.913	-2	29.01	22	17.745	-2	18.33	1.16	33.68	1.01	-26.51	5.4	7.9	55.5	53.4	167
1986	1	2	.0	2446432.5	22	13.522	-2	43.38	22	15.366	-2	32.75	1.18	33.33	.99	-26.43	5.3	7.8	53.9	53.0	162
1986	1	3	.0	2446433.5	22	11.210	-2	57.26	22	13.045	-2	46.69	1.20	32.93	.98	-26.34	5.3	7.8	52.3	52.6	150
1986	1	4	.0	2446434.5	22	8.968	-3	10.69	22	10.805	-3	1.18	1.22	32.51	.96	-26.24	5.2	7.8	50.7	52.1	137
1986	1	5	.0	2446435.5	22	6.792	-3	23.72	22	8.634	-3	13.26	1.23	32.04	.95	-26.12	5.2	7.7	49.1	51.5	123
1986	1	6	.0	2446436.5	22	4.675	-3	36.37	22	6.515	-3	25.97	1.25	31.54	.93	-25.99	5.1	7.7	47.5	50.9	109
1986	1	7	.0	2446437.5	22	2.612	-3	48.69	22	4.457	-3	38.34	1.27	31.00	.92	-25.85	5.0	7.7	46.0	50.3	94
1986	1	8	.0	2446438.5	22	.598	-4	.70	22	2.445	-3	50.41	1.29	30.43	.90	-25.68	5.0	7.6	44.4	49.6	79
1986	1	9	.0	2446439.5	21	58.628	-4	12.46	22	.477	-4	2.22	1.31	29.82	.89	-25.50	4.9	7.6	42.9	48.8	64
1986	1	10	.0	2446440.5	21	56.697	-4	23.97	21	58.548	-4	13.79	1.32	29.18	.87	-25.29	4.8	7.5	41.4	48.0	49
1986	1	11	.0	2446441.5	21	54.802	-4	35.28	21	56.654	-4	25.15	1.34	28.49	.86	-25.07	4.8	7.5	39.9	47.2	35
1986	1	12	.0	2446442.5	21	52.937	-4	46.42	21	54.791	-4	36.34	1.36	27.78	.85	-24.82	4.7	7.4	38.4	46.2	22
1986	1	13	.0	2446443.5	21	51.099	-4	57.41	21	52.955	-4	47.39	1.37	27.02	.83	-24.54	4.6	7.4	36.9	45.3	13
1986	1	14	.0	2446444.5	21	49.284	-5	8.29	21	51.142	-4	58.32	1.39	26.23	.82	-24.24	4.6	7.3	35.4	44.2	15
1986	1	15	.0	2446445.5	21	47.489	-5	19.07	21	49.348	-5	9.15	1.40	25.40	.80	-23.91	4.5	7.3	34.0	43.2	25
1986	1	16	.0	2446446.5	21	45.710	-5	29.79	21	47.571	-5	19.93	1.42	24.53	.79	-23.55	4.4	7.2	32.5	42.0	37
1986	1	17	.0	2446447.5	21	43.944	-5	40.47	21	45.806	-5	30.66	1.43	23.62	.78	-23.15	4.3	7.2	31.0	40.8	49
1986	1	18	.0	2446448.5	21	42.188	-5	51.14	21	44.052	-5	41.38	1.44	22.66	.76	-22.71	4.3	7.1	29.5	39.6	61
1986	1	19	.0	2446449.5	21	40.439	-6	1.82	21	42.305	-5	52.11	1.46	21.67	.75	-22.24	4.2	7.1	28.2	38.2	73
1986	1	20	.0	2446450.5	21	38.695	-6	12.52	21	40.563	-6	2.87	1.47	20.64	.74	-21.73	4.1	7.0	26.7	36.9	85
1986	1	21	.0	2446451.5	21	36.954	-6	23.28	21	38.821	-6	13.68	1.48	19.56	.72	-21.17	4.0	7.0	25.3	35.4	98
1986	1	22	.0	2446452.5	21	35.212	-6	34.12	21	37.084	-6	24.57	1.49	18.44	.71	-20.57	3.9	6.9	23.9	34.0	110
1986	1	23	.0	2446453.5	21	33.469	-6	45.05	21	35.343	-6	35.55	1.50	17.27	.70	-19.92	3.9	6.8	22.5	32.4	122
1986	1	24	.0	2446454.5	21	31.722	-6	56.10	21	33.598	-6	46.65	1.51	16.05	.69	-19.22	3.8	6.8	21.0	30.8	134
1986	1	25	.0	2446455.5	21	29.970	-7	7.28	21	31.848	-6	57.90	1.52	14.79	.68	-18.47	3.7	6.7	19.6	29.2	146
1986	1	26	.0	2446456.5	21	28.211	-7	18.61	21	30.092	-7	9.29	1.53	13.48	.67	-17.66	3.6	6.7	18.2	27.5	158
1986	1	27	.0	2446457.5	21	26.445	-7	30.12	21	28.328	-7	20.85	1.54	12.12	.66	-16.80	3.6	6.6	16.9	25.7	167
1986	1	28	.0	2446458.5	21	24.671	-7	41.80	21	26.558	-7	32.60	1.54	10.72	.65	-15.88	3.5	6.6	15.5	23.9	164
1986	1	29	.0	2446459.5	21	22.888	-7	53.69	21	24.776	-7	44.54	1.55	9.27	.64	-14.91	3.4	6.5	14.2	22.1	154
1986	1	30	.0	2446460.5	21	21.095	-8	5.78	21	22.986	-7	56.70	1.55	7.77	.63	-13.87	3.3	6.5	12.9	20.3	141
1986	1	31	.0	2446461.5	21	19.294	-8	18.11	21	21.187	-8	9.09	1.56	6.23	.62	-12.78	3.3	6.4	11.6	18.5	127
1986	2	1	.0	2446462.5	21	17.484	-8	30.66	21	19.375	-8	21.70	1.56	4.65	.62	-11.64	3.2	6.4	10.4	16.7	113
1986	2	2	.0	2446463.5	21	15.665	-8	43.46	21	17.563	-8	34.50	1.56	3.02	.61	-10.44	3.2	6.3	9.3	15.1	99
1986	2	3	.0	2446464.5	21	13.838	-8	56.51	21	15.740	-8	47.68	1.56	1.36	.61	-9.19	3.1	6.3	8.3	13.6	85
1986	2	4	.0	2446465.5	21	12.005	-9	9.81	21	13.910	-9	1.04	1.56	0.00	.60	-7.90	3.1	6.3	7.4	12.3	70
1986	2	5	.0	2446466.5	21	10.166	-9	23.38	21	12.074	-9	14.67	1.56	-2.04	.60	-6.57	3.0	6.2	6.8	11.4	56
1986	2	6	.0	2446467.5	21	8.324	-9	37.21	21	10.235	-9	28.57	1.56	-3.77	.59	-5.20	3.0	6.2	6.5	10.9	41
1986	2	7	.0	2446468.5	21	6.478	-9	51.31	21	8.392	-9	42.73	1.56	-5.52	.59	-3.80	3.0	6.2	6.6	11.0	28
1986	2	8	.0	2446469.5	21	4.631	-10	5.67	21	6.545	-9	57.16	1.56	-7.28	.59	-2.38	2.9	6.2	6.9	11.7	15
1986	2	9	.0	2446470.5	21	2.785	-10	20.30	21	4.707	-10	11.86	1.55	-9.04	.59	-0.95	2.9	6.1	7.6	12.8	11
1986	2	10	.0	2446471.5	21	.942	-10	35.20	21	2.867	-10	26.83	1.54	-10.79	.59	0.49	2.9	6.1	8.5	13.4	20
1986	2	11	.0	2446472.5	20	59.102	-10	50.36	21	1.031	-10	42.06	1.54	-12.52	.59	1.92	3.0	6.1	9.5	16.1	32
1986	2	12	.0	2446473.5	20	57.268	-11	5.79	20	59.201	-10	57.56	1.53	-14.24	.59	3.34	3.0	6.1	10.7	18.1	45
1986	2	13	.0	2446474.5	20	55.442	-11	21.48	20	57.378	-11	13.32	1.52	-15.93	.59	4.75	3.0	6.1	11.9	20.1	58
1986	2	14	.0	2446475.5	20	53.624	-11	37.43	20	55.564	-11	29.34	1.51	-17.59	.59	6.13	3.0	6.1	13.2	22.3	70
1986	2	15	.0	2446476.5	20	51.816	-11	53.65	20	53.755	-11	45.62	1.50	-19.20	.60	7.47	3.1	6.2	14.5	24.4	83
1986	2	16	.0	2446477.5	20	50.018	-12	10.13	20	51.966	-12	2.17	1.49	-20.78	.60	8.78	3.2	6.2	15.9	26.6	95
1986	2	17	.0	2446478.5	20	48.232	-12	26.87	20	50.184	-12	18.98	1.48	-22.31	.61	10.04	3.2	6.2	17.3	28.8	107
1986	2	18	.0	2446479.5	20	46.457	-12	43.88	20	48.413	-12	36.06	1.46	-23.78	.62	11.26	3.3	6.2	18.7	30.9	119
1986	2	19	.0	2446480.5	20	44.693	-13	1.18	20	46.654	-12	53.42	1.45	-25.21	.62	12.42	3.5	6.2	20.1	33.0	131
1986	2	20	.0	2446481.5	20	42.941	-13	18.75	20	44.907	-13	11.06	1.43	-26.58	.63	13.53	3.6	6.3	21.5	35.1	144
1986	2	21	.0	2446482.5	20	41.200	-13	36.62	20	43.170	-13	29.00	1.42	-27.89	.64	14.58	3.7	6.3	22.9	37.1	156
1986	2	22	.0	2446483.5	20	39.468	-13	54.80	20	41.443	-13	47.25	1.40	-29.14	.65	15.58	3.9	6.3	24.3	39.1	167
1986	2	23	.0	2446484.5	20	37.743	-14	13.31	20	39.723	-14	5.83	1.39	-30.34	.66	16.51	4.0	6.4	25.8	41.0	169
1986	2	24	.0	2446485.5	20	36.025	-14	32.16	20	38.010	-14	24.74	1.37	-31.48	.67	17.39	4.1	6.4	27.2	42.9	159
1986	2	25	.0	2446486.5	20	34.311	-14	51.37	20	36.301	-14	44.03	1.35	-32.57	.68	18.22	4.3	6.4	28.7	44.6	146
1986	2	26	.0	2446487.5	20	32.598	-15	10.98	20	34.593	-15	3.70	1.33	-33.60	.69	18.99	4.4	6.5	30.1	46.4	132

Table B-3 (cont'd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1986	2	27	.0	2446488.5	20	30.884	-15 31.00	20	32.884	-15 23.79	1.31	-34.58	.70	19.70	4.5	6.5	31.6	48.0	118
1986	2	28	.0	2446489.5	20	29.165	-15 51.47	20	31.17C	-15 44.34	1.29	-35.51	.71	20.37	4.6	6.6	33.0	49.6	103
1986	3	1	.0	2446490.5	20	27.437	-16 52.43	20	29.44E	-16 5.37	1.27	-36.38	.72	20.99	4.7	6.6	34.5	51.1	89
1986	3	2	.0	2446491.5	20	25.696	-16 32.92	20	27.713	-16 26.92	1.25	-37.21	.73	21.56	4.8	6.6	36.0	52.5	74
1986	3	3	.0	2446492.5	20	23.938	-16 55.97	20	25.961	-16 49.04	1.23	-37.98	.75	22.08	4.9	6.7	37.4	53.9	60
1986	3	4	.0	2446493.5	20	22.157	-17 18.64	20	24.187	-17 11.78	1.20	-38.71	.76	22.57	5.0	6.7	38.9	55.2	45
1986	3	5	.0	2446494.5	20	20.348	-17 41.97	20	22.385	-17 35.19	1.18	-39.39	.77	23.01	5.0	6.7	40.4	56.4	31
1986	3	6	.0	2446495.5	20	18.505	-18 6.03	20	20.54E	-17 59.33	1.16	-40.03	.79	23.42	5.0	6.8	41.9	57.6	17
1986	3	7	.0	2446496.5	20	16.620	-18 30.88	20	18.67C	-18 24.26	1.14	-40.62	.80	23.79	5.0	6.8	43.5	58.7	6
1986	3	8	.0	2446497.5	20	14.686	-18 56.59	20	16.744	-18 50.04	1.11	-41.17	.81	24.14	5.0	6.8	45.0	59.7	13
1986	3	9	.0	2446498.5	20	12.695	-19 23.23	20	14.761	-19 16.77	1.09	-41.67	.83	24.45	5.0	6.9	46.6	60.7	26
1986	3	10	.0	2446499.5	20	10.638	-19 50.87	20	12.712	-19 44.50	1.06	-42.13	.84	24.73	5.0	6.9	48.1	61.5	40
1986	3	11	.0	2446500.5	20	8.505	-20 19.62	20	10.587	-20 13.34	1.04	-42.54	.86	24.99	5.0	6.9	49.7	62.4	53
1986	3	12	.0	2446501.5	20	6.285	-20 49.57	20	8.37E	-20 43.38	1.01	-42.90	.87	25.22	5.0	6.9	51.3	63.1	67
1986	3	13	.0	2446502.5	20	3.966	-21 20.81	20	6.065	-21 14.73	.99	-43.22	.88	25.43	4.9	6.9	53.0	63.8	80
1986	3	14	.0	2446503.5	20	1.533	-21 53.47	20	3.642	-21 47.49	.96	-43.49	.90	25.62	4.9	7.0	54.6	64.4	92
1986	3	15	.0	2446504.5	19	58.971	-22 27.66	20	1.091	-22 21.79	.94	-43.71	.91	25.79	4.9	7.0	56.3	64.9	105
1986	3	16	.0	2446505.5	19	56.264	-23 3.52	19	58.395	-22 57.27	.91	-43.88	.93	25.95	4.8	7.0	58.1	65.3	118
1986	3	17	.0	2446506.5	19	53.392	-23 41.18	19	55.535	-23 35.56	.89	-44.00	.94	26.08	4.8	7.0	59.8	65.7	130
1986	3	18	.0	2446507.5	19	50.333	-24 20.81	19	52.486	-24 15.32	.86	-44.05	.96	26.20	4.7	7.0	61.7	65.9	143
1986	3	19	.0	2446508.5	19	47.062	-25 2.56	19	49.232	-24 57.22	.84	-44.05	.97	26.31	4.7	7.0	63.5	66.1	156
1986	3	20	.0	2446509.5	19	43.551	-25 46.62	19	45.735	-25 41.44	.81	-43.97	.99	26.40	4.6	7.0	65.4	66.2	169
1986	3	21	.0	2446510.5	19	39.767	-26 33.16	19	41.967	-26 28.15	.79	-43.83	1.00	26.49	4.6	7.0	67.4	66.2	177
1986	3	22	.0	2446511.5	19	35.672	-27 22.39	19	37.89C	-27 17.57	.76	-43.60	1.02	26.56	4.5	7.0	69.5	66.1	163
1986	3	23	.0	2446512.5	19	31.224	-28 14.49	19	33.46C	-28 9.87	.74	-43.28	1.04	26.62	4.5	7.0	71.6	65.9	149
1986	3	24	.0	2446513.5	19	26.373	-29 9.66	19	28.62E	-29 5.28	.71	-42.87	1.05	26.67	4.5	7.0	73.8	65.6	134
1986	3	25	.0	2446514.5	19	21.359	-30 8.11	19	23.33E	-30 3.98	.69	-42.35	1.07	26.71	4.4	7.0	76.1	65.2	119
1986	3	26	.0	2446515.5	19	15.216	-31 9.99	19	17.51E	-31 6.15	.66	-41.71	1.08	26.74	4.4	6.9	78.5	64.6	104
1986	3	27	.G	2446516.5	19	8.764	-32 15.46	19	11.09C	-32 11.93	.64	-40.94	1.10	26.77	4.3	6.9	81.0	63.9	88
1986	3	28	.0	2446517.5	19	1.611	-33 24.60	19	3.965	-33 21.42	.62	-40.01	1.11	26.79	4.3	6.9	83.6	63.0	71
1986	3	29	.0	2446518.5	18	53.650	-34 37.41	18	56.034	-34 34.62	.59	-38.91	1.13	26.80	4.2	6.9	86.4	62.0	55
1986	3	30	.0	2446519.5	18	44.758	-35 53.75	18	47.174	-35 51.41	.57	-37.61	1.14	26.81	4.2	6.9	89.2	60.8	39
1986	3	31	.0	2446520.5	18	34.790	-37 13.31	18	37.241	-37 11.47	.55	-36.09	1.16	26.81	4.1	6.8	92.3	59.4	24
1986	4	1	.0	2446521.5	18	23.586	-38 35.50	18	26.074	-38 34.25	.53	-34.33	1.17	26.80	4.1	6.8	95.5	57.9	11
1986	4	2	.0	2446522.5	18	10.970	-39 59.41	18	13.495	-39 58.81	.51	-32.30	1.19	26.79	4.1	6.8	98.9	56.1	15
1986	4	3	.0	2446523.5	17	56.752	-41 23.66	17	59.315	-41 23.80	.49	-29.98	1.21	26.78	4.0	6.8	102.4	54.1	29
1986	4	4	.0	2446524.5	17	40.750	-42 46.30	17	43.347	-42 47.28	.48	-27.35	1.22	26.77	4.0	6.8	106.2	51.9	45
1986	4	5	.0	2446525.5	17	22.802	-44 4.77	17	25.43C	-44 6.69	.46	-24.35	1.24	26.75	4.0	6.7	110.1	49.5	61
1986	4	6	.0	2446526.5	17	2.810	-45 15.84	17	5.455	-45 18.79	.45	-21.02	1.25	26.72	4.0	6.7	114.1	46.8	77
1986	4	7	.0	2446527.5	16	40.781	-46 15.72	16	43.43E	-46 19.78	.44	-17.35	1.27	26.69	4.0	6.7	118.3	44.1	92
1986	4	8	.0	2446528.5	16	16.875	-47 .34	16	19.52C	-47 5.57	.43	-13.37	1.28	26.66	4.0	6.7	122.6	41.1	108
1986	4	9	.0	2446529.5	15	51.450	-47 25.83	15	54.06E	-47 32.24	.42	-9.11	1.30	26.63	4.0	6.8	126.8	38.1	123
1986	4	10	.0	2446530.5	15	25.059	-47 29.12	15	27.61E	-47 36.69	.42	-4.64	1.31	26.60	4.0	6.8	131.0	35.1	136
1986	4	11	.0	2446531.5	14	58.399	-47 8.60	15	.88E	-47 17.23	.42	-0.03	1.33	26.56	4.0	6.8	135.0	32.2	147
1986	4	12	.0	2446532.5	14	32.212	-46 24.45	14	34.607	-46 34.01	.42	4.62	1.34	26.52	4.1	6.9	138.8	29.4	152
1986	4	13	.0	2446533.5	14	7.168	-45 18.69	14	9.471	-45 29.03	.42	9.23	1.36	26.48	4.1	7.0	142.1	26.9	145
1986	4	14	.0	2446534.5	13	43.775	-43 54.76	13	45.98E	-44 5.72	.43	13.70	1.37	26.44	4.2	7.0	144.9	24.4	138
1986	4	15	.0	2446535.5	13	22.340	-42 16.93	13	24.471	-42 28.36	.44	17.97	1.39	26.39	4.3	7.1	147.1	23.1	125
1986	4	16	.0	2446536.5	13	2.982	-40 29.64	13	5.041	-40 41.40	.45	21.98	1.41	26.35	4.4	7.2	148.5	21.9	112
1986	4	17	.0	2446537.5	12	45.678	-38 37.00	12	47.677	-38 48.99	.46	25.69	1.42	26.30	4.5	7.3	149.3	21.2	98
1986	4	18	.0	2446538.5	12	30.311	-36 42.48	12	32.26C	-36 54.61	.48	29.08	1.44	26.25	4.6	7.5	149.3	20.9	83
1986	4	19	.0	2446539.5	12	16.711	-34 48.83	12	18.621	-35 1.04	.50	32.16	1.45	26.20	4.7	7.6	148.8	21.0	69
1986	4	20	.0	2446540.5	12	4.691	-32 58.06	12	6.57C	-33 10.31	.51	34.93	1.47	26.15	4.8	7.7	147.8	21.4	56
1986	4	21	.0	2446541.5	11	54.068	-31 11.56	11	55.92E	-31 23.80	.54	37.41	1.48	26.10	4.9	7.9	146.4	22.1	43
1986	4	22	.0	2446542.5	11	44.665	-29 30.18	11	46.501	-29 42.40	.56	39.62	1.50	26.05	5.1	8.0	144.8	22.8	33
1986	4	23	.0	2446543.5	11	36.329	-27 54.39	11	38.15C	-28 6.58	.58	41.59	1.51	26.00	5.2	8.1	143.1	23.6	29
1986	4	24	.0	2446544.5	11	28.919	-26 24.37	11	30.73C	-26 36.51	.61	43.34	1.53	25.95	5.3	8.2	141.3	24.4	34

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1986	4	25	.0	2446545.5	11 22.318	-25	10	11 24.120	-25	12.18	.63	44.89	1.54	25.89	5.4	8.4	139.4	25.1	44
1986	4	26	.0	2446546.5	11 16.420	-23	41.41	11 18.217	-23	53.44	.66	46.28	1.56	25.84	5.5	8.5	137.5	25.9	57
1986	4	27	.0	2446547.5	11 11.140	-22	28.05	11 12.932	-22	40.03	.68	47.50	1.57	25.78	5.6	8.6	135.7	26.6	72
1986	4	28	.0	2446548.5	11 6.399	-21	19.74	11 8.185	-21	31.66	.71	48.60	1.59	25.73	5.8	8.8	133.8	27.3	86
1986	4	29	.0	2446549.5	11 2.134	-20	16.15	11 3.922	-20	28.01	.74	49.58	1.60	25.67	5.9	8.9	132.0	27.9	100
1986	4	30	.0	2446550.5	10 58.289	-19	16.97	11 .076	-19	28.77	.77	50.45	1.62	25.62	6.0	9.0	130.3	28.4	114
1986	5	1	.0	2446551.5	10 54.816	-18	21.86	10 56.602	-18	33.61	.80	51.23	1.63	25.56	6.1	9.1	128.6	28.9	127
1986	5	2	.0	2446552.5	10 51.674	-17	30.54	10 53.460	-17	42.24	.83	51.93	1.65	25.50	6.2	9.3	126.9	29.3	139
1986	5	3	.0	2446553.5	10 48.827	-16	42.70	10 50.614	-16	54.34	.86	52.55	1.66	25.45	6.3	9.4	125.3	29.7	148
1986	5	4	.0	2446554.5	10 46.245	-15	58.09	10 48.032	-16	9.70	.89	53.11	1.67	25.39	6.3	9.5	123.7	30.1	154
1986	5	5	.0	2446555.5	10 43.901	-15	16.45	10 45.685	-15	28.01	.92	53.61	1.69	25.33	6.4	9.6	122.2	30.4	153
1986	5	6	.0	2446556.5	10 41.771	-14	37.56	10 43.560	-14	49.00	.95	54.06	1.70	25.28	6.5	9.7	120.7	30.6	147
1986	5	7	.0	2446557.5	10 39.834	-14	1.19	10 41.624	-14	12.67	.98	54.47	1.72	25.22	6.6	9.8	119.2	30.8	138
1986	5	8	.0	2446558.5	10 38.073	-13	27.17	10 39.865	-13	38.61	1.01	54.83	1.73	25.16	6.7	9.9	117.8	31.0	127
1986	5	9	.0	2446559.5	10 36.472	-12	55.30	10 38.265	-13	6.71	1.05	55.15	1.75	25.11	6.8	10.0	116.4	31.2	116
1986	5	10	.0	2446560.5	10 35.017	-12	25.44	10 36.811	-12	36.82	1.08	55.43	1.76	25.05	6.8	10.1	115.0	31.3	105
1986	5	11	.0	2446561.5	10 33.695	-11	57.42	10 35.490	-12	8.75	1.11	55.69	1.78	24.99	6.9	10.2	113.7	31.4	94
1986	5	12	.0	2446562.5	10 32.494	-11	31.13	10 34.291	-11	42.46	1.14	55.91	1.79	24.94	7.0	10.3	112.4	31.4	82
1986	5	13	.0	2446563.5	10 31.406	-11	6.43	10 33.204	-11	17.74	1.17	56.11	1.81	24.88	7.1	10.4	111.2	31.5	71
1986	5	14	.0	2446564.5	10 30.420	-10	43.21	10 32.215	-10	54.50	1.21	56.28	1.82	24.82	7.1	10.5	109.9	31.5	60
1986	5	15	.0	2446565.5	10 29.530	-10	21.38	10 31.330	-10	32.64	1.24	56.43	1.83	24.77	7.2	10.6	108.7	31.5	49
1986	5	16	.0	2446566.5	10 28.727	-10	.83	10 30.525	-10	12.07	1.27	56.56	1.85	24.71	7.3	10.7	107.5	31.5	38
1986	5	17	.0	2446567.5	10 28.006	-9	41.48	10 29.808	-9	52.70	1.31	56.67	1.86	24.65	7.3	10.8	106.3	31.4	28
1986	5	18	.0	2446568.5	10 27.359	-9	23.25	10 29.162	-9	34.46	1.34	56.76	1.88	24.60	7.4	10.9	105.2	31.3	22
1986	5	19	.0	2446569.5	10 26.783	-9	6.06	10 28.588	-9	17.26	1.37	56.83	1.89	24.54	7.4	11.0	104.0	31.3	22
1986	5	20	.0	2446570.5	10 26.272	-8	49.86	10 28.078	-9	1.05	1.40	56.89	1.90	24.49	7.5	11.0	102.9	31.2	29
1986	5	21	.0	2446571.5	10 25.821	-8	34.58	10 27.628	-8	45.75	1.44	56.93	1.92	24.43	7.6	11.1	101.8	31.1	40
1986	5	22	.0	2446572.5	10 25.427	-8	20.17	10 27.235	-8	31.33	1.47	56.96	1.93	24.38	7.6	11.2	100.7	31.0	53
1986	5	23	.0	2446573.5	10 25.086	-8	6.56	10 26.895	-8	17.71	1.50	56.98	1.95	24.32	7.7	11.3	99.6	30.8	67
1986	5	24	.0	2446574.5	10 24.794	-7	53.72	10 26.604	-8	4.86	1.54	56.98	1.96	24.27	7.7	11.4	98.6	30.7	81
1986	5	25	.0	2446575.5	10 24.549	-7	41.60	10 26.360	-7	52.73	1.57	56.97	1.98	24.21	7.8	11.4	97.5	30.6	96
1986	5	26	.0	2446576.5	10 24.347	-7	30.15	10 26.155	-7	41.28	1.60	56.95	1.99	24.16	7.8	11.5	96.5	30.4	110
1986	5	27	.0	2446577.5	10 24.187	-7	19.35	10 25.995	-7	30.48	1.63	56.93	2.00	24.10	7.9	11.6	95.5	30.2	124
1986	5	28	.0	2446578.5	10 24.065	-7	9.15	10 25.878	-7	20.27	1.67	56.89	2.02	24.05	7.9	11.7	94.5	30.1	137
1986	5	29	.0	2446579.5	10 23.979	-6	59.52	10 25.794	-7	10.64	1.70	56.84	2.03	24.00	8.0	11.7	93.5	29.9	149
1986	5	30	.0	2446580.5	10 23.929	-6	50.44	10 25.743	-7	1.56	1.73	56.78	2.04	23.94	8.0	11.8	92.5	29.7	157
1986	5	31	.0	2446581.5	10 23.910	-6	41.88	10 25.723	-6	52.99	1.77	56.71	2.06	23.89	8.1	11.9	91.5	29.5	160
1986	6	1	.0	2446582.5	10 23.923	-6	33.81	10 25.735	-6	44.92	1.80	56.64	2.07	23.84	8.1	11.9	90.5	29.3	155
1986	6	2	.0	2446583.5	10 23.965	-6	26.20	10 25.781	-6	37.31	1.83	56.55	2.09	23.78	8.2	12.0	89.6	29.1	146
1986	6	3	.0	2446584.5	10 24.035	-6	19.04	10 25.852	-6	30.14	1.86	56.46	2.10	23.73	8.2	12.1	88.6	28.9	136
1986	6	4	.0	2446585.5	10 24.131	-6	12.30	10 25.948	-6	23.41	1.90	56.36	2.11	23.68	8.3	12.1	87.7	28.7	125
1986	6	5	.0	2446586.5	10 24.252	-6	5.96	10 26.070	-6	17.07	1.93	56.25	2.13	23.63	8.3	12.2	86.7	28.4	114
1986	6	6	.0	2446587.5	10 24.397	-6	.01	10 26.215	-6	11.12	1.96	56.13	2.14	23.58	8.4	12.3	85.8	28.2	103
1986	6	7	.0	2446588.5	10 24.565	-5	54.43	10 26.383	-6	5.54	1.99	56.00	2.15	23.52	8.4	12.3	84.9	28.0	92
1986	6	8	.0	2446589.5	10 24.754	-5	49.20	10 26.573	-6	.32	2.03	55.88	2.17	23.47	8.5	12.4	84.0	27.7	81
1986	6	9	.0	2446590.5	10 24.963	-5	44.31	10 26.783	-5	55.43	2.06	55.72	2.18	23.42	8.5	12.5	83.0	27.5	69
1986	6	10	.0	2446591.5	10 25.192	-5	39.74	10 27.012	-5	50.86	2.09	55.57	2.19	23.37	8.6	12.5	82.1	27.3	58
1986	6	11	.0	2446592.5	10 25.439	-5	35.48	10 27.260	-5	46.61	2.12	55.41	2.21	23.32	8.6	12.6	81.2	27.0	47
1986	6	12	.0	2446593.5	10 25.704	-5	31.51	10 27.525	-5	42.64	2.15	55.25	2.22	23.27	8.7	12.6	80.3	26.8	36
1986	6	13	.0	2446594.5	10 25.986	-5	27.83	10 27.808	-5	38.97	2.19	55.08	2.24	23.22	8.7	12.7	79.5	26.5	26
1986	6	14	.0	2446595.5	10 26.284	-5	24.42	10 28.106	-5	35.56	2.22	54.90	2.25	23.17	8.8	12.7	78.6	26.3	19
1986	6	15	.0	2446596.5	10 26.597	-5	21.27	10 28.419	-5	32.42	2.25	54.71	2.26	23.12	8.8	12.8	77.7	26.0	18
1986	6	16	.0	2446597.5	10 26.925	-5	18.38	10 28.746	-5	29.53	2.28	54.52	2.28	23.07	8.9	12.9	76.8	25.8	25
1986	6	17	.0	2446598.5	10 27.266	-5	15.72	10 29.088	-5	26.88	2.31	54.33	2.29	23.03	8.9	12.9	76.0	25.5	35
1986	6	18	.0	2446599.5	10 27.620	-5	13.30	10 29.443	-5	24.46	2.34	54.12	2.30	22.98	9.0	13.0	75.1	25.2	48
1986	6	19	.0	2446600.5	10 27.988	-5	11.10	10 29.810	-5	22.27	2.37	53.91	2.32	22.93	9.0	13.0	74.2	25.0	61
1986	6	20	.0	2446601.5	10 28.367	-5	9.11	10 30.185	-5	20.29	2.41	53.70	2.33	22.88	9.1	13.1	73.4	24.7	75

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Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1986	6	21	.0	2446602.5	10 28.757	- 5	7.33	10 30.581	- 5	18.52	2.44	53.48	2.34	22.83	9.1	13.1	72.5	21.5	90
1986	6	22	.0	2446603.5	10 29.159	- 5	5.75	10 30.982	- 5	16.94	2.47	53.26	2.35	22.79	9.2	13.2	71.7	21.2	104
1986	6	23	.0	2446604.5	10 29.571	- 5	4.36	10 31.394	- 5	15.56	2.50	53.03	2.37	22.74	9.2	13.2	70.8	23.9	118
1986	6	24	.0	2446605.5	10 29.993	- 5	3.16	10 31.817	- 5	14.36	2.53	52.80	2.38	22.69	9.3	13.3	70.0	23.6	132
1986	6	25	.0	2446606.5	10 30.425	- 5	2.13	10 32.245	- 5	13.35	2.56	52.56	2.39	22.65	9.3	13.3	69.2	23.4	145
1986	6	26	.0	2446607.5	10 30.866	- 5	1.28	10 32.690	- 5	12.50	2.59	52.32	2.41	22.60	9.4	13.4	68.3	23.1	156
1986	6	27	.0	2446608.5	10 31.316	- 5	.59	10 33.140	- 5	11.82	2.62	52.08	2.42	22.55	9.4	13.4	67.5	22.8	162
1986	6	28	.0	2446609.5	10 31.774	- 5	.07	10 33.595	- 5	11.31	2.65	51.82	2.43	22.51	9.5	13.5	66.7	22.6	160
1986	6	29	.0	2446610.5	10 32.241	- 4	59.70	10 34.065	- 5	10.95	2.68	51.57	2.45	22.46	9.5	13.5	65.9	22.3	151
1986	6	30	.0	2446611.5	10 32.716	- 4	59.49	10 34.540	- 5	10.74	2.71	51.30	2.46	22.47	9.6	13.6	65.0	22.0	141
1986	7	1	.0	2446612.5	10 33.198	- 4	59.43	10 35.021	- 5	10.68	2.74	51.03	2.47	22.37	9.6	13.6	64.2	21.7	130
1986	7	2	.0	2446613.5	10 33.688	- 4	59.50	10 35.512	- 5	10.77	2.77	50.76	2.49	22.33	9.7	13.7	63.4	21.5	119
1986	7	3	.0	2446614.5	10 34.185	- 4	59.72	10 36.005	- 5	11.00	2.80	50.48	2.50	22.29	9.7	13.7	62.6	21.2	108
1986	7	4	.0	2446615.5	10 34.688	- 5	.07	10 36.513	- 5	11.36	2.83	50.20	2.51	22.24	9.8	13.8	61.8	20.9	97
1986	7	5	.0	2446616.5	10 35.198	- 5	.56	10 37.023	- 5	11.85	2.86	49.91	2.52	22.20	9.8	13.8	61.0	20.6	85
1986	7	6	.0	2446617.5	10 35.714	- 5	1.17	10 37.535	- 5	12.48	2.88	49.62	2.54	22.15	9.9	13.8	60.2	20.3	74
1986	7	7	.0	2446618.5	10 36.236	- 5	1.91	10 38.061	- 5	13.22	2.91	49.32	2.55	22.11	9.9	13.9	59.4	20.1	63
1986	7	8	.0	2446619.5	10 36.763	- 5	2.76	10 38.588	- 5	14.09	2.94	49.01	2.56	22.07	10.0	13.9	58.6	19.8	52
1986	7	9	.0	2446620.5	10 37.296	- 5	3.74	10 39.121	- 5	15.07	2.97	48.71	2.57	22.02	10.0	14.0	57.8	19.5	40
1986	7	10	.0	2446621.5	10 37.834	- 5	4.83	10 39.655	- 5	16.17	3.00	48.39	2.59	21.98	10.1	14.0	57.0	19.2	30
1986	7	11	.0	2446622.5	10 38.377	- 5	6.02	10 40.202	- 5	17.37	3.03	48.07	2.60	21.94	10.1	14.1	56.2	19.0	20
1986	7	12	.0	2446623.5	10 38.924	- 5	7.33	10 40.745	- 5	18.69	3.05	47.75	2.61	21.90	10.2	14.1	55.4	18.7	15
1986	7	13	.0	2446624.5	10 39.476	- 5	8.74	10 41.300	- 5	20.10	3.08	47.43	2.63	21.86	10.2	14.1	54.6	18.4	19
1986	7	14	.0	2446625.5	10 40.032	- 5	10.25	10 41.856	- 5	21.62	3.11	47.10	2.64	21.82	10.3	14.2	53.8	18.1	29
1986	7	15	.0	2446626.5	10 40.591	- 5	11.86	10 42.416	- 5	23.24	3.13	46.76	2.65	21.77	10.3	14.2	53.0	17.8	41
1986	7	16	.0	2446627.5	10 41.155	- 5	13.57	10 42.975	- 5	24.96	3.16	46.42	2.66	21.73	10.4	14.3	52.2	17.6	54
1986	7	17	.0	2446628.5	10 41.722	- 5	15.36	10 43.546	- 5	26.76	3.19	46.08	2.68	21.69	10.4	14.3	51.5	17.3	67
1986	7	18	.0	2446629.5	10 42.292	- 5	17.25	10 44.116	- 5	28.66	3.21	45.74	2.69	21.65	10.5	14.3	50.7	17.0	81
1986	7	19	.0	2446630.5	10 42.865	- 5	19.23	10 44.690	- 5	30.65	3.24	45.39	2.70	21.61	10.5	14.4	49.9	16.7	95
1986	7	20	.0	2446631.5	10 43.442	- 5	21.29	10 45.266	- 5	32.72	3.27	45.04	2.71	21.57	10.6	14.4	49.1	16.4	109
1986	7	21	.0	2446632.5	10 44.021	- 5	23.43	10 45.846	- 5	34.87	3.29	44.68	2.73	21.53	10.6	14.4	48.3	16.2	123
1986	7	22	.0	2446633.5	10 44.602	- 5	25.66	10 46.427	- 5	37.11	3.32	44.33	2.74	21.49	10.7	14.5	47.6	15.9	137
1986	7	23	.0	2446634.5	10 45.187	- 5	27.97	10 47.012	- 5	39.42	3.34	43.96	2.75	21.45	10.7	14.5	46.8	15.6	150
1986	7	24	.0	2446635.5	10 45.773	- 5	30.35	10 47.598	- 5	41.81	3.37	43.60	2.76	21.41	10.8	14.6	46.0	15.3	160
1986	7	25	.0	2446636.5	10 46.362	- 5	32.81	10 48.187	- 5	44.28	3.39	43.23	2.78	21.37	10.8	14.6	45.3	15.1	164
1986	7	26	.0	2446637.5	10 46.954	- 5	35.34	10 48.778	- 5	46.82	3.42	42.86	2.79	21.34	10.9	14.6	44.5	14.8	158
1986	7	27	.0	2446638.5	10 47.547	- 5	37.94	10 49.371	- 5	49.43	3.44	42.49	2.80	21.30	10.9	14.7	43.7	14.5	148
1986	7	28	.0	2446639.5	10 48.142	- 5	40.62	10 49.966	- 5	52.12	3.47	42.11	2.81	21.26	11.0	14.7	43.0	14.2	137
1986	7	29	.0	2446640.5	10 48.739	- 5	43.36	10 50.563	- 5	54.87	3.49	41.73	2.82	21.22	11.0	14.7	42.2	14.0	126
1986	7	30	.0	2446641.5	10 49.337	- 5	46.17	10 51.162	- 5	57.69	3.52	41.34	2.84	21.18	11.1	14.8	41.5	13.7	115
1986	7	31	.0	2446642.5	10 49.937	- 5	49.05	10 51.762	- 6	60.58	3.54	40.95	2.85	21.15	11.1	14.8	40.7	13.4	104
1986	8	1	.0	2446643.5	10 50.539	- 5	51.99	10 52.363	- 6	63.53	3.56	40.56	2.86	21.11	11.2	14.8	39.9	13.2	92
1986	8	2	.0	2446644.5	10 51.141	- 5	55.00	10 52.966	- 6	66.55	3.59	40.16	2.87	21.07	11.2	14.9	39.2	12.9	81
1986	8	3	.0	2446645.5	10 51.745	- 5	58.07	10 53.570	- 6	69.62	3.61	39.76	2.89	21.03	11.3	14.9	38.4	12.6	70
1986	8	4	.0	2446646.5	10 52.350	- 6	1.20	10 54.175	- 6	72.76	3.63	39.35	2.90	21.00	11.3	14.9	37.7	12.4	58
1986	8	5	.0	2446647.5	10 52.956	- 6	4.39	10 54.780	- 6	75.96	3.66	38.95	2.91	20.96	11.4	15.0	36.9	12.1	47
1986	8	6	.0	2446648.5	10 53.562	- 6	7.63	10 55.387	- 6	79.21	3.68	38.54	2.92	20.92	11.4	15.0	36.2	11.8	36
1986	8	7	.0	2446649.5	10 54.169	- 6	10.94	10 55.994	- 6	82.53	3.70	38.12	2.93	20.89	11.5	15.0	35.4	11.6	25
1986	8	8	.0	2446650.5	10 54.777	- 6	14.30	10 56.601	- 6	85.89	3.72	37.70	2.95	20.85	11.5	15.0	34.7	11.3	14
1986	8	9	.0	2446651.5	10 55.385	- 6	17.71	10 57.205	- 6	29.31	3.74	37.28	2.96	20.82	11.6	15.1	34.0	11.0	15
1986	8	10	.0	2446652.5	10 55.993	- 6	21.17	10 57.817	- 6	32.78	3.77	36.86	2.97	20.78	11.6	15.1	33.2	10.8	23
1986	8	11	.0	2446653.5	10 56.601	- 6	24.69	10 58.426	- 6	36.30	3.79	36.43	2.98	20.74	11.7	15.1	32.5	10.5	34
1986	8	12	.0	2446654.5	10 57.209	- 6	28.25	10 59.034	- 6	39.88	3.81	36.01	2.99	20.71	11.7	15.2	31.8	10.3	46
1986	8	13	.0	2446655.5	10 57.817	- 6	31.86	10 59.642	- 6	43.50	3.83	35.58	3.01	20.67	11.8	15.2	31.0	10.0	59
1986	8	14	.0	2446656.5	10 58.425	- 6	35.52	11 .250	- 6	47.17	3.85	35.14	3.02	20.64	11.8	15.2	30.3	9.8	73
1986	8	15	.0	2446657.5	10 59.033	- 6	39.23	11 .857	- 6	50.88	3.87	34.71	3.03	20.61	11.9	15.3	29.6	9.5	86
1986	8	16	.0	2446658.5	10 59.640	- 6	42.98	11 1.464	- 6	54.64	3.89	34.27	3.04	20.57	11.9	15.3	28.9	9.3	100

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1986	8	17	.0	2446659.5	11	.246	- 6 46.77	11	2.071	- 6 58.44	3.91	33.83	3.05	20.54	12.0	15.3	28.2	9.0	114
1986	8	18	.0	2446660.5	11	.852	- 6 50.61	11	2.677	- 7 2.28	3.93	33.39	3.07	20.50	12.0	15.3	27.5	8.8	128
1986	8	19	.0	2446661.5	11	1.456	- 6 54.48	11	3.282	- 7 6.17	3.95	32.95	3.08	20.47	12.1	15.4	26.8	8.5	141
1986	8	20	.0	2446662.5	11	2.061	- 6 58.40	11	3.886	- 7 10.09	3.97	32.51	3.09	20.43	12.1	15.4	26.1	8.3	153
1986	8	21	.0	2446663.5	11	2.664	- 7 2.36	11	4.489	- 7 14.06	3.98	32.07	3.10	20.40	12.2	15.4	25.4	8.0	163
1986	8	22	.0	2446664.5	11	3.266	- 7 6.36	11	5.091	- 7 18.06	4.00	31.62	3.11	20.37	12.2	15.4	24.7	7.8	164
1986	8	23	.0	2446665.5	11	3.867	- 7 10.39	11	5.692	- 7 22.10	4.02	31.17	3.12	20.33	12.2	15.5	24.0	7.6	156
1986	8	24	.0	2446666.5	11	4.467	- 7 14.46	11	6.292	- 7 26.18	4.04	30.72	3.14	20.30	12.3	15.5	23.3	7.3	166
1986	8	25	.0	2446667.5	11	5.065	- 7 18.57	11	6.890	- 7 30.30	4.06	30.26	3.15	20.27	12.3	15.5	22.6	7.1	134
1986	8	26	.0	2446668.5	11	5.663	- 7 22.72	11	7.488	- 7 34.45	4.07	29.81	3.16	20.24	12.4	15.5	22.0	6.9	123
1986	8	27	.0	2446669.5	11	6.259	- 7 26.90	11	8.084	- 7 38.64	4.09	29.35	3.17	20.20	12.4	15.6	21.3	6.7	112
1986	8	28	.0	2446670.5	11	6.853	- 7 31.11	11	8.678	- 7 42.86	4.11	28.89	3.18	20.17	12.5	15.6	20.7	6.4	100
1986	8	29	.0	2446671.5	11	7.446	- 7 35.36	11	9.271	- 7 47.11	4.12	28.43	3.19	20.14	12.5	15.6	20.1	6.2	89
1986	8	30	.0	2446672.5	11	8.037	- 7 39.64	11	9.862	- 7 51.40	4.14	27.96	3.21	20.11	12.5	15.6	19.4	6.0	78
1986	8	31	.0	2446673.5	11	8.626	- 7 43.95	11	10.452	- 7 55.72	4.16	27.49	3.22	20.08	12.6	15.7	18.8	5.8	66
1986	9	1	.0	2446674.5	11	9.214	- 7 48.30	11	11.040	- 8 0.07	4.17	27.02	3.23	20.04	12.6	15.7	18.2	5.6	55
1986	9	2	.0	2446675.5	11	9.799	- 7 52.67	11	11.625	- 8 4.45	4.19	26.55	3.24	20.01	12.7	15.7	17.7	5.4	43
1986	9	3	.0	2446676.5	11	10.382	- 7 57.08	11	12.209	- 8 8.86	4.20	26.08	3.25	19.98	12.7	15.7	17.1	5.2	32
1986	9	4	.0	2446677.5	11	10.963	- 8 1.51	11	12.790	- 8 13.30	4.22	25.61	3.26	19.95	12.7	15.8	16.6	5.1	22
1986	9	5	.0	2446678.5	11	11.542	- 8 5.97	11	13.368	- 8 17.77	4.23	25.13	3.28	19.92	12.8	15.8	16.0	4.9	15
1986	9	6	.0	2446679.5	11	12.118	- 8 10.46	11	13.944	- 8 22.26	4.25	24.65	3.29	19.89	12.8	15.8	15.5	4.7	17
1986	9	7	.0	2446680.5	11	12.692	- 8 14.97	11	14.518	- 8 26.78	4.26	24.17	3.30	19.86	12.9	15.8	15.1	4.6	27
1986	9	8	.0	2446681.5	11	13.263	- 8 19.51	11	15.089	- 8 31.33	4.27	23.69	3.31	19.83	12.9	15.9	14.6	4.4	39
1986	9	9	.0	2446682.5	11	13.831	- 8 24.08	11	15.657	- 8 35.90	4.29	23.22	3.32	19.80	12.9	15.9	14.2	4.3	52
1986	9	10	.0	2446683.5	11	14.396	- 8 28.66	11	16.223	- 8 40.49	4.30	22.74	3.33	19.77	13.0	15.9	13.8	4.1	65
1986	9	11	.0	2446684.5	11	14.958	- 8 33.27	11	16.785	- 8 45.11	4.31	22.25	3.34	19.74	13.0	15.9	13.5	4.0	79
1986	9	12	.0	2446685.5	11	15.517	- 8 37.91	11	17.344	- 8 49.74	4.33	21.77	3.36	19.71	13.0	15.9	13.2	3.9	92
1986	9	13	.0	2446686.5	11	16.073	- 8 42.56	11	17.901	- 8 54.40	4.34	21.29	3.37	19.68	13.1	16.0	13.0	3.8	106
1986	9	14	.0	2446687.5	11	16.625	- 8 47.23	11	18.453	- 8 59.08	4.35	20.81	3.38	19.65	13.1	16.0	12.8	3.8	119
1986	9	15	.0	2446688.5	11	17.174	- 8 51.92	11	19.003	- 9 3.78	4.36	20.33	3.39	19.62	13.1	16.0	12.6	3.7	132
1986	9	16	.0	2446689.5	11	17.720	- 8 56.63	11	19.558	- 9 8.49	4.38	19.85	3.40	19.59	13.2	16.0	12.5	3.7	145
1986	9	17	.0	2446690.5	11	18.262	- 9 1.36	11	20.091	- 9 13.23	4.39	19.37	3.41	19.56	13.2	16.0	12.4	3.6	156
1986	9	18	.0	2446691.5	11	18.800	- 9 6.11	11	20.625	- 9 17.98	4.40	18.89	3.42	19.53	13.2	16.1	12.4	3.6	164
1986	9	19	.0	2446692.5	11	19.335	- 9 10.87	11	21.164	- 9 22.75	4.41	18.41	3.43	19.50	13.3	16.1	12.5	3.6	163
1986	9	20	.0	2446693.5	11	19.866	- 9 15.65	11	21.695	- 9 27.53	4.42	17.93	3.45	19.47	13.3	16.1	12.6	3.6	154
1986	9	21	.0	2446694.5	11	20.392	- 9 20.45	11	22.222	- 9 32.33	4.43	17.45	3.46	19.44	13.3	16.1	12.8	3.7	143
1986	9	22	.0	2446695.5	11	20.915	- 9 25.26	11	22.745	- 9 37.15	4.44	16.96	3.47	19.42	13.3	16.1	13.0	3.7	131
1986	9	23	.0	2446696.5	11	21.434	- 9 30.08	11	23.264	- 9 41.98	4.45	16.48	3.48	19.39	13.4	16.2	13.2	3.8	120
1986	9	24	.0	2446697.5	11	21.948	- 9 34.92	11	23.778	- 9 46.82	4.46	16.00	3.49	19.36	13.4	16.2	13.5	3.9	109
1986	9	25	.0	2446698.5	11	22.459	- 9 39.78	11	24.289	- 9 51.68	4.47	15.51	3.50	19.33	13.4	16.2	13.9	3.9	97
1986	9	26	.0	2446699.5	11	22.964	- 9 44.64	11	24.795	- 9 56.55	4.48	15.03	3.51	19.30	13.5	16.2	14.3	4.0	86
1986	9	27	.0	2446700.5	11	23.466	- 9 49.52	11	25.296	-10 1.44	4.48	14.55	3.52	19.28	13.5	16.2	14.7	4.1	75
1986	9	28	.0	2446701.5	11	23.962	- 9 54.41	11	25.793	-10 6.33	4.49	14.06	3.54	19.25	13.5	16.2	15.1	4.2	63
1986	9	29	.0	2446702.5	11	24.454	- 9 59.32	11	26.285	-10 11.24	4.50	13.58	3.55	19.22	13.5	16.3	15.6	4.4	52
1986	9	30	.0	2446703.5	11	24.941	-10 4.23	11	26.773	-10 16.15	4.51	13.10	3.56	19.19	13.6	16.3	16.1	4.5	40
1986	10	1	.0	2446704.5	11	25.423	-10 9.15	11	27.255	-10 21.08	4.52	12.61	3.57	19.17	13.6	16.3	16.7	4.6	29
1986	10	2	.0	2446705.5	11	25.899	-10 14.08	11	27.732	-10 26.01	4.52	12.13	3.58	19.14	13.6	16.3	17.3	4.8	19
1986	10	3	.0	2446706.5	11	26.371	-10 19.02	11	28.203	-10 30.96	4.53	11.65	3.59	19.11	13.6	16.3	17.9	4.9	14
1986	10	4	.0	2446707.5	11	26.837	-10 24.00	11	28.670	-10 35.90	4.54	11.17	3.60	19.08	13.6	16.3	18.5	5.0	20
1986	10	5	.0	2446708.5	11	27.297	-10 28.95	11	29.130	-10 40.86	4.54	10.69	3.61	19.06	13.7	16.4	19.1	5.2	31
1986	10	6	.0	2446709.5	11	27.752	-10 33.86	11	29.585	-10 45.82	4.55	10.21	3.62	19.03	13.7	16.4	19.7	5.3	44
1986	10	7	.0	2446710.5	11	28.201	-10 38.84	11	30.035	-10 50.79	4.55	9.73	3.63	19.00	13.7	16.4	20.4	5.5	58
1986	10	8	.0	2446711.5	11	28.644	-10 43.80	11	30.478	-10 55.76	4.56	9.26	3.65	18.98	13.7	16.4	21.1	5.7	71
1986	10	9	.0	2446712.5	11	29.081	-10 48.77	11	30.916	-11 0.73	4.57	8.79	3.66	18.95	13.7	16.4	21.8	5.8	85
1986	10	10	.0	2446713.5	11	29.511	-10 53.74	11	31.347	-11 5.71	4.57	8.32	3.67	18.93	13.8	16.4	22.5	6.0	99
1986	10	11	.0	2446714.5	11	29.936	-10 58.72	11	31.772	-11 10.68	4.58	7.85	3.68	18.90	13.8	16.5	23.2	6.1	112
1986	10	12	.0	2446715.5	11	30.354	-11 3.69	11	32.190	-11 15.66	4.58	7.38	3.69	18.87	13.8	16.5	23.9	6.3	125

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1986	10	13	.0	2446716.5	11	30.765	-11 8.66	11	32.602	-11 20.64	4.58	6.92	3.70	18.85	13.8	16.5	24.7	6.5	138
1986	10	14	.0	2446717.5	11	31.170	-11 13.63	11	33.007	-11 25.61	4.59	6.46	3.71	18.82	13.8	16.5	25.4	6.6	150
1986	10	15	.0	2446718.5	11	31.568	-11 18.60	11	33.405	-11 30.59	4.59	6.00	3.72	18.80	13.8	16.5	26.2	6.8	160
1986	10	16	.0	2446719.5	11	31.959	-11 23.57	11	33.796	-11 35.56	4.59	5.54	3.73	18.77	13.9	16.5	26.9	6.9	164
1986	10	17	.0	2446720.5	11	32.343	-11 28.54	11	34.181	-11 40.52	4.60	5.09	3.74	18.75	13.9	16.5	27.7	7.1	159
1986	10	18	.0	2446721.5	11	32.720	-11 33.50	11	34.558	-11 45.49	4.60	4.64	3.75	18.72	13.9	16.5	28.5	7.3	150
1986	10	19	.0	2446722.5	11	33.089	-11 38.46	11	34.928	-11 50.45	4.60	4.19	3.77	18.70	13.9	16.6	29.3	7.4	139
1986	10	20	.0	2446723.5	11	33.451	-11 43.41	11	35.290	-11 55.41	4.61	3.74	3.78	18.67	13.9	16.6	30.0	7.6	127
1986	10	21	.0	2446724.5	11	33.806	-11 48.36	11	35.645	-12 0.36	4.61	3.30	3.79	18.65	13.9	16.6	30.8	7.7	116
1986	10	22	.0	2446725.5	11	34.153	-11 53.30	11	35.992	-12 5.30	4.61	2.86	3.80	18.62	13.9	16.6	31.6	7.9	105
1986	10	23	.0	2446726.5	11	34.492	-11 58.23	11	36.333	-12 10.24	4.61	2.42	3.81	18.60	13.9	16.6	32.5	8.1	93
1986	10	24	.0	2446727.5	11	34.824	-12 3.16	11	36.665	-12 15.17	4.61	1.98	3.82	18.57	14.0	16.6	33.3	8.2	82
1986	10	25	.0	2446728.5	11	35.147	-12 8.08	11	36.988	-12 20.09	4.61	1.54	3.83	18.55	14.0	16.7	34.1	8.4	71
1986	10	26	.0	2446729.5	11	35.462	-12 12.99	11	37.304	-12 25.00	4.61	1.11	3.84	18.52	14.0	16.7	34.9	8.5	59
1986	10	27	.0	2446730.5	11	35.769	-12 17.89	11	37.611	-12 29.91	4.61	.68	3.85	18.50	14.0	16.7	35.7	8.7	48
1986	10	28	.0	2446731.5	11	36.067	-12 22.78	11	37.905	-12 34.80	4.61	.26	3.86	18.48	14.0	16.7	36.6	8.8	37
1986	10	29	.0	2446732.5	11	36.356	-12 27.65	11	38.195	-12 39.67	4.61	-.17	3.87	18.45	14.0	16.7	37.4	9.0	26
1986	10	30	.0	2446733.5	11	36.636	-12 32.52	11	38.480	-12 44.54	4.61	-.59	3.88	18.43	14.0	16.7	38.3	9.1	17
1986	10	31	.0	2446734.5	11	36.908	-12 37.36	11	38.752	-12 49.39	4.61	-1.00	3.89	18.40	14.0	16.7	39.1	9.3	16
1986	11	1	.0	2446735.5	11	37.170	-12 42.20	11	39.014	-12 54.23	4.61	-1.41	3.90	18.38	14.0	16.7	40.0	9.4	24
1986	11	2	.0	2446736.5	11	37.423	-12 47.02	11	39.268	-12 59.05	4.61	-1.82	3.92	18.36	14.0	16.7	40.8	9.5	36
1986	11	3	.0	2446737.5	11	37.666	-12 51.82	11	39.511	-13 3.85	4.61	-2.22	3.93	18.33	14.0	16.8	41.7	9.7	50
1986	11	4	.0	2446738.5	11	37.900	-12 56.60	11	39.746	-13 8.64	4.61	-2.62	3.94	18.31	14.0	16.8	42.6	9.8	64
1986	11	5	.0	2446739.5	11	38.124	-13 1.36	11	39.970	-13 13.40	4.61	-3.01	3.95	18.29	14.1	16.8	43.4	9.9	78
1986	11	6	.0	2446740.5	11	38.337	-13 6.11	11	40.184	-13 18.15	4.61	-3.40	3.96	18.26	14.1	16.8	44.3	10.1	92
1986	11	7	.0	2446741.5	11	38.541	-13 10.83	11	40.388	-13 22.87	4.60	-3.78	3.97	18.24	14.1	16.8	45.2	10.2	106
1986	11	8	.0	2446742.5	11	38.734	-13 15.52	11	40.582	-13 27.57	4.60	-4.15	3.98	18.22	14.1	16.8	46.1	10.3	119
1986	11	9	.0	2446743.5	11	38.917	-13 20.20	11	40.765	-13 32.25	4.60	-4.52	3.99	18.19	14.1	16.8	46.9	10.5	132
1986	11	10	.0	2446744.5	11	39.088	-13 24.85	11	40.937	-13 36.90	4.60	-4.89	4.00	18.17	14.1	16.8	47.8	10.6	144
1986	11	11	.0	2446745.5	11	39.250	-13 29.47	11	41.095	-13 41.53	4.59	-5.25	4.01	18.15	14.1	16.8	48.7	10.7	155
1986	11	12	.0	2446746.5	11	39.400	-13 34.07	11	41.245	-13 46.12	4.59	-5.60	4.02	18.13	14.1	16.9	49.6	10.8	162
1986	11	13	.0	2446747.5	11	39.539	-13 38.63	11	41.385	-13 50.69	4.59	-5.95	4.03	18.10	14.1	16.9	50.5	10.9	162
1986	11	14	.0	2446748.5	11	39.667	-13 43.17	11	41.517	-13 55.23	4.58	-6.29	4.04	18.08	14.1	16.9	51.4	11.0	154
1986	11	15	.0	2446749.5	11	39.783	-13 47.68	11	41.634	-13 59.75	4.58	-6.62	4.05	18.06	14.1	16.9	52.3	11.1	144
1986	11	16	.0	2446750.5	11	39.888	-13 52.16	11	41.735	-14 4.23	4.58	-6.95	4.06	18.04	14.1	16.9	53.3	11.2	133
1986	11	17	.0	2446751.5	11	39.981	-13 56.60	11	41.833	-14 8.67	4.57	-7.28	4.07	18.01	14.1	16.9	54.2	11.4	122
1986	11	18	.0	2446752.5	11	40.062	-14 1.02	11	41.914	-14 13.09	4.57	-7.60	4.08	17.99	14.1	16.9	55.1	11.5	110
1986	11	19	.0	2446753.5	11	40.131	-14 5.39	11	41.984	-14 17.47	4.56	-7.91	4.09	17.97	14.1	16.9	56.0	11.5	99
1986	11	20	.0	2446754.5	11	40.188	-14 9.74	11	42.041	-14 21.81	4.56	-8.22	4.10	17.95	14.1	16.9	57.0	11.6	88
1986	11	21	.0	2446755.5	11	40.233	-14 14.04	11	42.086	-14 26.12	4.55	-8.52	4.11	17.93	14.1	16.9	57.9	11.7	76
1986	11	22	.0	2446756.5	11	40.265	-14 18.31	11	42.115	-14 30.39	4.55	-8.81	4.12	17.90	14.1	16.9	58.8	11.8	65
1986	11	23	.0	2446757.5	11	40.284	-14 22.54	11	42.135	-14 34.62	4.54	-9.10	4.14	17.88	14.1	17.0	59.8	11.9	54
1986	11	24	.0	2446758.5	11	40.290	-14 26.72	11	42.145	-14 38.81	4.54	-9.38	4.15	17.86	14.1	17.0	60.7	12.0	43
1986	11	25	.0	2446759.5	11	40.283	-14 30.87	11	42.135	-14 42.96	4.53	-9.65	4.16	17.84	14.1	17.0	61.7	12.1	32
1986	11	26	.0	2446760.5	11	40.263	-14 34.97	11	42.115	-14 47.06	4.53	-9.92	4.17	17.82	14.1	17.0	62.6	12.1	22
1986	11	27	.0	2446761.5	11	40.230	-14 39.02	11	42.086	-14 51.12	4.52	-10.17	4.18	17.80	14.1	17.0	63.6	12.2	17
1986	11	28	.0	2446762.5	11	40.183	-14 43.03	11	42.035	-14 55.13	4.52	-10.42	4.19	17.78	14.1	17.0	64.5	12.3	20
1986	11	29	.0	2446763.5	11	40.122	-14 46.99	11	41.975	-14 59.09	4.51	-10.67	4.20	17.76	14.1	17.0	65.5	12.3	30
1986	11	30	.0	2446764.5	11	40.047	-14 50.90	11	41.904	-15 3.00	4.50	-10.90	4.21	17.73	14.1	17.0	66.4	12.4	42
1986	12	1	.0	2446765.5	11	39.958	-14 54.76	11	41.815	-15 6.86	4.50	-11.13	4.22	17.71	14.1	17.0	67.4	12.5	56
1986	12	2	.0	2446766.5	11	39.854	-14 58.56	11	41.712	-15 10.67	4.49	-11.34	4.23	17.69	14.1	17.0	68.4	12.5	70
1986	12	3	.0	2446767.5	11	39.736	-15 2.31	11	41.595	-15 14.42	4.48	-11.55	4.24	17.67	14.1	17.0	69.4	12.6	85
1986	12	4	.0	2446768.5	11	39.604	-15 6.00	11	41.463	-15 18.11	4.48	-11.75	4.25	17.65	14.1	17.0	70.4	12.6	99
1986	12	5	.0	2446769.5	11	39.456	-15 9.64	11	41.316	-15 21.75	4.47	-11.94	4.26	17.63	14.1	17.0	71.3	12.7	113
1986	12	6	.0	2446770.5	11	39.294	-15 13.21	11	41.154	-15 25.32	4.46	-12.12	4.27	17.61	14.1	17.1	72.3	12.7	127
1986	12	7	.0	2446771.5	11	39.116	-15 16.72	11	40.976	-15 28.83	4.46	-12.28	4.28	17.59	14.1	17.1	73.3	12.7	140
1986	12	8	.0	2446772.5	11	38.923	-15 20.16	11	40.784	-15 32.28	4.45	-12.44	4.29	17.57	14.1	17.1	74.3	12.8	151

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	ETA	MOON
1986	12	9	.0	2446773.5	11 38.715	-15	23.54	11 40.576	-15	35.66	4.44	-12.59	4.30	17.55	14.1	17.1	75.3	12.8	160
1986	12	10	.0	2446774.5	11 38.491	-15	26.85	11 40.352	-15	38.97	4.43	-12.73	4.31	17.53	14.1	17.1	76.3	12.8	161
1986	12	11	.0	2446775.5	11 38.252	-15	30.10	11 40.113	-15	42.22	4.43	-12.86	4.32	17.51	14.1	17.1	77.3	12.9	156
1986	12	12	.0	2446776.5	11 37.997	-15	33.27	11 39.858	-15	45.39	4.42	-12.98	4.33	17.49	14.1	17.1	78.3	12.9	146
1986	12	13	.0	2446777.5	11 37.726	-15	36.37	11 39.588	-15	48.49	4.41	-13.09	4.34	17.47	14.1	17.1	79.4	12.9	135
1986	12	14	.0	2446778.5	11 37.439	-15	39.39	11 39.301	-15	51.52	4.40	-13.19	4.35	17.45	14.1	17.1	80.4	12.9	124
1986	12	15	.0	2446779.5	11 37.137	-15	42.34	11 38.995	-15	54.47	4.40	-13.29	4.36	17.43	14.1	17.1	81.4	12.9	113
1986	12	16	.0	2446780.5	11 36.818	-15	45.21	11 38.680	-15	57.34	4.39	-13.37	4.37	17.41	14.1	17.1	82.4	12.9	102
1986	12	17	.0	2446781.5	11 36.482	-15	48.01	11 38.345	-16	.14	4.38	-13.44	4.38	17.39	14.1	17.1	83.5	12.9	91
1986	12	18	.0	2446782.5	11 36.131	-15	50.72	11 37.992	-16	2.85	4.37	-13.50	4.39	17.37	14.1	17.1	84.5	12.9	79
1986	12	19	.0	2446783.5	11 35.762	-15	53.34	11 37.626	-16	5.48	4.37	-13.55	4.40	17.35	14.1	17.1	85.5	12.9	68
1986	12	20	.0	2446784.5	11 35.378	-15	55.88	11 37.241	-16	8.02	4.36	-13.59	4.41	17.33	14.1	17.1	86.6	12.9	57
1986	12	21	.0	2446785.5	11 34.976	-15	58.34	11 36.840	-16	10.47	4.35	-13.62	4.42	17.31	14.1	17.1	87.6	12.8	46
1986	12	22	.0	2446786.5	11 34.558	-16	.70	11 36.421	-16	12.84	4.34	-13.63	4.43	17.29	14.1	17.2	88.7	12.8	35
1986	12	23	.0	2446787.5	11 34.123	-16	2.97	11 35.986	-16	15.11	4.33	-13.64	4.44	17.27	14.1	17.2	89.7	12.8	26
1986	12	24	.0	2446788.5	11 33.671	-16	5.15	11 35.534	-16	17.29	4.33	-13.64	4.45	17.25	14.1	17.2	90.8	12.8	19
1986	12	25	.0	2446789.5	11 33.202	-16	7.24	11 35.065	-16	19.37	4.32	-13.62	4.46	17.23	14.1	17.2	91.8	12.7	20
1986	12	26	.0	2446790.5	11 32.716	-16	9.22	11 34.575	-16	21.36	4.31	-13.59	4.47	17.21	14.1	17.2	92.9	12.7	27
1986	12	27	.0	2446791.5	11 32.213	-16	11.10	11 34.076	-16	23.24	4.30	-13.55	4.48	17.20	14.1	17.2	94.0	12.7	38
1986	12	28	.0	2446792.5	11 31.692	-16	12.89	11 33.556	-16	25.02	4.29	-13.50	4.49	17.18	14.1	17.2	95.0	12.6	51
1986	12	29	.0	2446793.5	11 31.155	-16	14.56	11 33.018	-16	26.70	4.29	-13.44	4.50	17.16	14.1	17.2	96.1	12.6	65
1986	12	30	.0	2446794.5	11 30.600	-16	16.13	11 32.464	-16	28.27	4.28	-13.36	4.51	17.14	14.1	17.2	97.2	12.5	79
1986	12	31	.0	2446795.5	11 30.028	-16	17.59	11 31.892	-16	29.73	4.27	-13.27	4.52	17.12	14.1	17.2	98.3	12.4	94
1987	1	1	.0	2446796.5	11 29.439	-16	18.94	11 31.303	-16	31.08	4.26	-13.17	4.53	17.10	14.1	17.2	99.3	12.4	108
1987	1	2	.0	2446797.5	11 28.832	-16	20.17	11 30.696	-16	32.31	4.26	-13.05	4.54	17.08	14.1	17.2	100.4	12.3	123
1987	1	3	.0	2446798.5	11 28.208	-16	21.29	11 30.073	-16	33.43	4.25	-12.92	4.55	17.06	14.1	17.2	101.5	12.2	136
1987	1	4	.0	2446799.5	11 27.568	-16	22.29	11 29.432	-16	34.43	4.24	-12.78	4.56	17.05	14.1	17.2	102.6	12.2	148
1987	1	5	.0	2446800.5	11 26.910	-16	23.17	11 28.774	-16	35.30	4.23	-12.62	4.57	17.03	14.1	17.2	103.7	12.1	157
1987	1	6	.0	2446801.5	11 26.236	-16	23.92	11 28.095	-16	36.06	4.23	-12.45	4.58	17.01	14.1	17.2	104.8	12.0	160
1987	1	7	.0	2446802.5	11 25.544	-16	24.56	11 27.408	-16	36.69	4.22	-12.27	4.59	16.99	14.1	17.2	105.9	11.9	155
1987	1	8	.0	2446803.5	11 24.836	-16	25.07	11 26.695	-16	37.20	4.21	-12.08	4.60	16.97	14.1	17.2	107.0	11.8	146
1987	1	9	.0	2446804.5	11 24.112	-16	25.45	11 25.975	-16	37.57	4.21	-11.88	4.61	16.96	14.1	17.3	108.1	11.7	135
1987	1	10	.0	2446805.5	11 23.371	-16	25.70	11 25.233	-16	37.82	4.20	-11.66	4.62	16.94	14.1	17.3	109.2	11.6	124
1987	1	11	.0	2446806.5	11 22.614	-16	25.82	11 24.476	-16	37.94	4.19	-11.43	4.63	16.92	14.1	17.3	110.3	11.5	113
1987	1	12	.0	2446807.5	11 21.840	-16	25.81	11 23.703	-16	37.93	4.19	-11.18	4.64	16.90	14.1	17.3	111.5	11.4	102
1987	1	13	.0	2446808.5	11 21.051	-16	25.66	11 22.913	-16	37.78	4.18	-10.93	4.65	16.88	14.1	17.3	112.6	11.3	91
1987	1	14	.0	2446809.5	11 20.246	-16	25.38	11 22.108	-16	37.50	4.17	-10.66	4.66	16.87	14.1	17.3	113.7	11.2	79
1987	1	15	.0	2446810.5	11 19.425	-16	24.97	11 21.287	-16	37.08	4.17	-10.38	4.67	16.85	14.2	17.3	114.8	11.0	68
1987	1	16	.0	2446811.5	11 18.589	-16	24.41	11 20.451	-16	36.52	4.16	-10.09	4.68	16.83	14.2	17.3	115.9	10.9	57
1987	1	17	.0	2446812.5	11 17.738	-16	23.71	11 19.595	-16	35.82	4.16	-9.79	4.69	16.81	14.2	17.3	117.1	10.8	46
1987	1	18	.0	2446813.5	11 16.872	-16	22.88	11 18.733	-16	34.97	4.15	-9.47	4.70	16.80	14.2	17.3	118.2	10.6	36
1987	1	19	.0	2446814.5	11 15.991	-16	21.89	11 17.851	-16	33.99	4.14	-9.15	4.70	16.78	14.2	17.3	119.3	10.5	27
1987	1	20	.0	2446815.5	11 15.096	-16	20.77	11 16.956	-16	32.86	4.14	-8.81	4.71	16.76	14.2	17.3	120.4	10.4	21
1987	1	21	.0	2446816.5	11 14.186	-16	19.50	11 16.046	-16	31.58	4.13	-8.45	4.72	16.74	14.2	17.3	121.6	10.2	22
1987	1	22	.0	2446817.5	11 13.263	-16	18.08	11 15.122	-16	30.16	4.13	-8.09	4.73	16.73	14.2	17.3	122.7	10.1	29
1987	1	23	.0	2446818.5	11 12.326	-16	16.51	11 14.185	-16	28.58	4.13	-7.71	4.74	16.71	14.3	17.3	123.8	9.9	39
1987	1	24	.0	2446819.5	11 11.376	-16	14.80	11 13.234	-16	26.86	4.12	-7.32	4.75	16.69	14.3	17.3	124.9	9.8	51
1987	1	25	.0	2446820.5	11 10.413	-16	12.94	11 12.271	-16	24.99	4.12	-6.92	4.76	16.67	14.3	17.4	126.1	9.6	64
1987	1	26	.0	2446821.5	11 9.437	-16	10.92	11 11.295	-16	22.97	4.11	-6.51	4.77	16.66	14.3	17.4	127.2	9.5	78
1987	1	27	.0	2446822.5	11 8.449	-16	8.75	11 10.306	-16	20.80	4.11	-6.08	4.78	16.64	14.3	17.4	128.3	9.3	92
1987	1	28	.0	2446823.5	11 7.449	-16	6.43	11 9.306	-16	18.47	4.11	-5.65	4.79	16.62	14.4	17.4	129.4	9.1	106
1987	1	29	.0	2446824.5	11 6.438	-16	3.96	11 8.295	-16	15.99	4.10	-5.20	4.80	16.61	14.4	17.4	130.5	9.0	120
1987	1	30	.0	2446825.5	11 5.416	-16	1.34	11 7.272	-16	13.36	4.10	-4.73	4.81	16.59	14.4	17.4	131.7	8.8	134
1987	1	31	.0	2446826.5	11 4.383	-15	58.56	11 6.235	-16	10.57	4.10	-4.26	4.82	16.57	14.4	17.4	132.8	8.6	146
1987	2	1	.0	2446827.5	11 3.340	-15	55.63	11 5.196	-16	7.63	4.09	-3.78	4.83	16.56	14.4	17.4	133.9	8.5	155
1987	2	2	.0	2446828.5	11 2.288	-15	52.55	11 4.143	-16	4.54	4.09	-3.28	4.84	16.54	14.5	17.4	135.0	8.3	158
1987	2	3	.0	2446829.5	11 1.227	-15	49.32	11 3.081	-16	1.30	4.09	-2.78	4.85	16.52	14.5	17.4	136.1	8.1	152

Table B-3 (contd)

YR	MN	DY	HR	J.D.	R.A.	1950.0	DEC.	R.A.	APPN	DEC.	DELTA	DELDOT	R	RDOT	M ₁	M ₂	THETA	BETA	MOON
1987	2	4	.0	2446830.5	11	.157	-15 45.93	11	2.011	-15 57.90	4.09	-2.26	4.86	16.51	14.5	17.4	137.2	7.9	143
1987	2	5	.0	2446831.5	10	59.079	-15 42.40	11	.932	-15 54.36	4.09	-1.74	4.87	16.49	14.6	17.4	138.2	7.8	132
1987	2	6	.0	2446832.5	10	57.993	-15 38.72	10	59.846	-15 50.66	4.09	-1.21	4.88	16.47	14.6	17.4	139.3	7.6	121
1987	2	7	.0	2446833.5	10	56.901	-15 34.89	10	58.753	-15 46.82	4.09	-.67	4.89	16.46	14.6	17.4	140.4	7.4	110
1987	2	8	.0	2446834.5	10	55.802	-15 30.91	10	57.654	-15 42.83	4.09	-.12	4.90	16.44	14.6	17.5	141.4	7.2	99
1987	2	9	.0	2446835.5	10	54.697	-15 26.79	10	56.549	-15 38.70	4.09	.44	4.91	16.42	14.7	17.5	142.5	7.0	88
1987	2	10	.0	2446836.5	10	53.586	-15 22.52	10	55.438	-15 34.42	4.09	1.00	4.92	16.41	14.7	17.5	143.5	6.9	76
1987	2	11	.0	2446837.5	10	52.471	-15 18.12	10	54.322	-15 30.00	4.09	1.57	4.93	16.39	14.7	17.5	144.5	6.7	65
1987	2	12	.0	2446838.5	10	51.352	-15 13.57	10	53.202	-15 25.44	4.09	2.15	4.93	16.38	14.8	17.5	145.6	6.5	54
1987	2	13	.0	2446839.5	10	50.228	-15 8.88	10	52.079	-15 20.74	4.09	2.74	4.94	16.36	14.8	17.5	146.5	6.3	44
1987	2	14	.0	2446840.5	10	49.102	-15 4.06	10	50.952	-15 15.90	4.09	3.33	4.95	16.34	14.9	17.5	147.5	6.1	34
1987	2	15	.0	2446841.5	10	47.973	-14 59.11	10	49.822	-15 10.93	4.09	3.93	4.96	16.33	14.9	17.5	148.5	6.0	26
1987	2	16	.0	2446842.5	10	46.841	-14 54.02	10	48.690	-15 5.83	4.10	4.53	4.97	16.31	14.9	17.5	149.4	5.8	22
1987	2	17	.0	2446843.5	10	45.708	-14 48.80	10	47.557	-15 .59	4.10	5.14	4.98	16.30	15.0	17.5	150.3	5.6	25
1987	2	18	.0	2446844.5	10	44.575	-14 43.46	10	46.422	-14 55.23	4.10	5.75	4.99	16.28	.0	17.5	151.2	5.5	33
1987	2	19	.0	2446845.5	10	43.440	-14 37.93	10	45.288	-14 49.75	4.11	6.37	5.00	16.26	.0	17.6	152.0	5.3	44
1987	2	20	.0	2446846.5	10	42.306	-14 32.40	10	44.154	-14 44.14	4.11	7.00	5.01	16.25	.0	17.6	152.8	5.2	55
1987	2	21	.0	2446847.5	10	41.173	-14 26.69	10	43.020	-14 38.42	4.11	7.63	5.02	16.23	.0	17.6	153.6	5.0	68
1987	2	22	.0	2446848.5	10	40.041	-14 20.87	10	41.888	-14 32.58	4.12	8.26	5.03	16.22	.0	17.6	154.4	4.9	81
1987	2	23	.0	2446849.5	10	38.910	-14 14.93	10	40.757	-14 26.62	4.12	8.90	5.04	16.20	.0	17.6	155.1	4.7	94
1987	2	24	.0	2446850.5	10	37.782	-14 8.89	10	39.629	-14 20.56	4.13	9.54	5.05	16.19	.0	17.6	155.7	4.6	108
1987	2	25	.0	2446851.5	10	36.657	-14 2.73	10	38.504	-14 14.39	4.13	10.18	5.06	16.17	.0	17.6	156.3	4.5	121
1987	2	26	.0	2446852.5	10	35.536	-13 56.48	10	37.382	-14 8.12	4.14	10.83	5.07	16.15	.0	17.6	156.9	4.4	134
1987	2	27	.0	2446853.5	10	34.419	-13 50.13	10	36.265	-14 1.74	4.15	11.48	5.08	16.14	.0	17.6	157.3	4.3	146
1987	2	28	.0	2446854.5	10	33.306	-13 43.68	10	35.152	-13 55.28	4.15	12.13	5.08	16.12	.0	17.7	157.8	4.2	154
1987	3	1	.0	2446855.5	10	32.199	-13 37.14	10	34.044	-13 48.72	4.16	12.78	5.09	16.11	.0	17.7	158.1	4.2	156
1987	3	2	.0	2446856.5	10	31.097	-13 30.51	10	32.942	-13 42.07	4.17	13.43	5.10	16.09	.0	17.7	158.4	4.1	150
1987	3	3	.0	2446857.5	10	30.002	-13 23.80	10	31.847	-13 35.34	4.18	14.09	5.11	16.08	.0	17.7	158.6	4.0	140
1987	3	4	.0	2446858.5	10	28.914	-13 17.02	10	30.759	-13 28.54	4.19	14.74	5.12	16.06	.0	17.7	158.8	4.0	129
1987	3	5	.0	2446859.5	10	27.833	-13 10.16	10	29.678	-13 21.66	4.19	15.39	5.13	16.05	.0	17.7	158.9	4.0	118
1987	3	6	.0	2446860.5	10	26.760	-13 3.23	10	28.605	-13 14.71	4.20	16.03	5.14	16.03	.0	17.7	158.9	4.0	106
1987	3	7	.0	2446861.5	10	25.695	-12 56.23	10	27.540	-13 7.69	4.21	16.68	5.15	16.02	.0	17.7	158.8	4.0	95
1987	3	8	.0	2446862.5	10	24.639	-12 49.18	10	26.484	-13 .62	4.22	17.32	5.16	16.00	.0	17.8	158.6	4.0	84
1987	3	9	.0	2446863.5	10	23.593	-12 42.07	10	25.438	-12 53.49	4.23	17.96	5.17	15.99	.0	17.8	158.4	4.1	72
1987	3	10	.0	2446864.5	10	22.556	-12 34.91	10	24.401	-12 46.30	4.24	18.60	5.18	15.97	.0	17.8	158.1	4.1	62
1987	3	11	.0	2446865.5	10	21.529	-12 27.69	10	23.374	-12 39.07	4.25	19.24	5.19	15.96	.0	17.8	157.7	4.2	51
1987	3	12	.0	2446866.5	10	20.513	-12 20.44	10	22.358	-12 31.80	4.27	19.87	5.20	15.94	.0	17.8	157.3	4.2	41
1987	3	13	.0	2446867.5	10	19.508	-12 13.15	10	21.353	-12 24.48	4.28	20.49	5.21	15.93	.0	17.8	156.8	4.3	31
1987	3	14	.0	2446868.5	10	18.514	-12 5.82	10	20.359	-12 17.13	4.29	21.11	5.21	15.91	.0	17.8	156.3	4.4	25
1987	3	15	.0	2446869.5	10	17.531	-11 58.46	10	19.376	-12 9.75	4.30	21.73	5.22	15.90	.0	17.8	155.7	4.5	23
1987	3	16	.0	2446870.5	10	16.561	-11 51.08	10	18.406	-12 2.35	4.31	22.34	5.23	15.89	.0	17.9	155.1	4.6	28
1987	3	17	.0	2446871.5	10	15.603	-11 43.67	10	17.448	-11 54.92	4.33	22.95	5.24	15.87	.0	17.9	154.4	4.7	37
1987	3	18	.0	2446872.5	10	14.657	-11 36.25	10	16.502	-11 47.47	4.34	23.55	5.25	15.86	.0	17.9	153.7	4.8	48
1987	3	19	.0	2446873.5	10	13.725	-11 28.81	10	15.570	-11 40.01	4.35	24.15	5.26	15.84	.0	17.9	152.9	4.9	60
1987	3	20	.0	2446874.5	10	12.805	-11 21.36	10	14.651	-11 32.54	4.37	24.74	5.27	15.83	.0	17.9	152.2	5.1	73
1987	3	21	.0	2446875.5	10	11.899	-11 13.90	10	13.745	-11 25.07	4.38	25.33	5.28	15.81	.0	17.9	151.4	5.2	86
1987	3	22	.0	2446876.5	10	11.007	-11 6.44	10	12.853	-11 17.59	4.40	25.91	5.29	15.80	.0	17.9	150.5	5.3	99
1987	3	23	.0	2446877.5	10	10.129	-10 58.99	10	11.975	-11 10.11	4.41	26.48	5.30	15.78	.0	18.0	149.7	5.5	112

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