LOW-PRECISION FORMULAE FOR PLANETARY POSITIONS

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ABSTRACT

This paper gives low-precision (1′) formulae for geocentric and heliocentric positions of the Sun, Moon, and planets, which are valid for any epoch within 300 years of the present.

Subject headings: functions: numerical methods — planets: general

I. INTRODUCTION

Numerous modern applications have created a demand for low-precision (1′) formulae for the positions of the Sun, Moon, and planets. Examples are automatic telescope setting, spacecraft orientation, tidal theory, and planetarium projector setting. With the power of a computerized formula manipulator which can handle algebraic and trigonometric expressions, the development of simple expressions for coordinates and elements from the existing analytic theories is now feasible. This paper presents the results of such developments in a form suitable for use with hand calculators, minicomputers, or microprocessors. The series are also available on punched cards or in the form of FORTRAN subroutines. The full precision formulae (1″ or better) with unlimited time validity are being developed.

II. THE ALGEBRAIC MANIPULATOR

Although it is unimportant for users of the formulae to understand how they were derived, some of the details may nonetheless be of interest. The algebraic manipulator is a collection of subroutines which do algebraic operations on harmonic series in order to solve a particular problem, such as the derivation of our lunar and planetary formulae. The particular manipulator used by us was written in FORTRAN in such a way that it is independent of the bit or word structure of any particular computer. In order to understand the operation of the manipulator, one needs to know the construction of a typical term. A term consists of the product of a coefficient, a polynomial function, and a trigonometric function. The polynomial function consists of the product of any number of variables, each raised to some positive integer power. The trigonometric function consists of a sine or cosine of the sum of integer multiples of any number of arguments. The user supplies a master FORTRAN program with his FORTRAN coding and certain parameters which describe his particular machine and problem. Parameters include the number of polynomial and trigonometric arguments and their possible ranges, available core, and disk space; and the number of bits per word. The master program then punches a FORTRAN deck, which is a tailor-made manipulator program, with arrays properly dimensioned and coding set for the particular application and computer. The user employs this program to solve his problem. The outputs are always in the form of series. The precision of the resulting series is determined by a tolerance supplied to the program. Both absolute and relative tolerances are acceptable. The algebraic manipulator is not needed to evaluate the formulae given in this paper.

III. FUNDAMENTAL ARGUMENTS

This section serves to introduce some notation and the basic arguments of the formulae described in later sections. The primary information needed by potential users is contained in this section.

Let ℓ be time measured in days from the new standard epoch, 2000 January 1.5 ephemeris (or dynamical) time, which is Julian date 2,451,545.0. At that epoch the estimated difference between ephemeris time (ET) and universal time (UT, or GMT) is less than 90 s, which is also true, historically, as far back as the early 17th century. None of the objects discussed here can move 1′ in 90 s; hence ET, UT, and GMT can be used interchangeably. So for any given Julian date and fraction (JD), the value of ℓ will be

$$\ell = \text{JD} - 2451545.0 . \tag{1}$$

We will also need time T in Julian centuries from the epoch 1900.0,

$$T = \ell/36525 + 1 . \tag{2}$$

T is the only polynomial variable needed in the formulae treated in this paper.

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In order to convert any Gregorian calendar date into a Julian date, a simple one-card FORTRAN statement algorithm[1] for the Julian day number at Greenwich mean *noon* is

$$JD = 367 * Y - 7 * [Y + (M + 9)/12]/4 - 3 * \{[Y + (M - 9)/7]/100 + 1\}/4 + 275 * M/9 + D + 1721029, \tag{3}$$

where Y is the year, M the month number, and D the day (all integers). A shorter form for calendar dates since 1900 March is

$$JD = 367 * Y - 7 * [Y + (M + 9)/12]/4 + 275 * M/9 + D + 1721014. \tag{4}$$

In the above formulae, division by integers implies truncation of the quotients to integers; no decimals are carried.

Next we need to calculate values for the fundamental arguments. These are the mean longitude (L), argument of latitude (F), and mean anomaly (G) for each planet. The expressions for these quantities, for each planet, are given below in units of revolutions (one revolution $= 360° = 2\pi = 6.283185307$ radians) and with enough significant figures to ensure a final precision of 1' for dates within ± 300 years. For more remote dates within historical times it is necessary to take the expressions for the fundamental arguments (*Explanatory Supplement to the Astronomical Ephemeris 1973*) with greater precision, and in some cases to include secular effects as well (Brouwer and von Woerkom 1950). As a practical matter, one should discard any integral number of revolutions, retaining only the fractional part of a revolution for each fundamental argument, in order to avoid the necessity of carrying additional digits into the sine and cosine functions in the formulae. The numbers in parentheses are argument numbers used in the series headings to identify the arguments.

Moon	(1)	$L_M = 0.606434 + 0.03660110129t$
	(2)	$G_M = 0.374897 + 0.03629164709t$
	(3)	$F_M = 0.259091 + 0.03674819520t$
	(4)	$D = L_M - L_S = 0.827362 + 0.03386319198t$
	(5)	$\Omega_M = L_M - F_M = 0.347343 - 0.00014709391t$
Sun	(7)	$L_S = 0.779072 + 0.00273790931t$
	(8)	$G_S = 0.993126 + 0.00273777850t$
Mercury	(9)	$L_1 = 0.700695 + 0.01136771400t$
	(10)	$G_1 = 0.485541 + 0.01136759566t$
	(11)	$F_1 = 0.566441 + 0.01136762384t$
Venus	(12)	$L_2 = 0.505498 + 0.00445046867t$
	(13)	$G_2 = 0.140023 + 0.00445036173t$
	(14)	$F_2 = 0.292498 + 0.00445040017t$
Mars	(15)	$L_4 = 0.987353 + 0.00145575328t$
	(16)	$G_4 = 0.053856 + 0.00145561327t$
	(17)	$F_4 = 0.849694 + 0.00145569465t$
Jupiter	(18)	$L_5 = 0.089608 + 0.00023080893t$
	(19)	$G_5 = 0.056531 + 0.00023080893t$
	(20)	$F_5 = 0.814794 + 0.00023080893t$
Saturn	(21)	$L_6 = 0.133295 + 0.00009294371t$
	(22)	$G_6 = 0.882987 + 0.00009294371t$
	(23)	$F_6 = 0.821218 + 0.00009294371t$

[1] These simple one-statement FORTRAN algorithms were designed and improved by Fliegel and Van Flandern (1968) and perfected to this compact form by P. M. Muller and R. N. Wimberly of the Jet Propulsion Laboratory, Pasadena, California (unpublished).

Uranus (24) $L_7 = 0.870169 + 0.00003269438t$

(25) $G_7 = 0.400589 + 0.00003269438t$

(26) $F_7 = 0.664614 + 0.00003265562t$

Neptune (27) $L_8 = 0.846912 + 0.00001672092t$

(28) $G_8 = 0.725368 + 0.00001672092t$

(29) $F_8 = 0.480856 + 0.00001663715t$

Pluto   (31) $L_9 = 0.663854 + 0.00001115482t$

(32) $G_9 = 0.041020 + 0.00001104864t$

(33) $F_9 = 0.357355 + 0.00001104864t$

The argument D is the mean elongation of the Moon from the Sun, and Ω is the longitude of the lunar ascending node. There is no argument of latitude for the Earth or the Sun since their orbital plane, the ecliptic, is used as the reference plane.

IV. ECLIPTIC COORDINATES

We summarize in the Appendix, using truncation and some manipulation of the existing analytic theories, the expressions for the heliocentric longitude (λ), latitudes (β, or BETA), and radius vectors (r, or RP) of the nine major planets, together with the geocentric ecliptic coordinates of the Sun and Moon. These coordinates refer to the mean equinox and ecliptic of date, with λ, β expressed in seconds of arc, and r expressed in astronomical units (AU) for the Sun and planets, or in Earth radii for the Moon (1 AU = 23454.8 Earth radii). To this precision, the true and mean equinoxes coincide (i.e., nutation is negligible). For convenience, the first term in the λ series, which is always L, has been transposed to the left and the remaining periodic terms are denoted by PLON. In the case of Pluto, the formulae are based on current-epoch mean elements which are rather uncertain and have a degraded precision of perhaps 15′.

For example, the first four terms of the series for the longitude of Jupiter are decoded as follows:

$$\lambda_5 - L_5 = 19934 \text{ arcsec} \sin G_5 + 5023 \text{ arcsec } T + 2511 \text{ arcsec} + 1093 \text{ arcsec} \cos (2G_5 - 5G_6) .$$

When the numerical values for L_5, G_5, G_6, and T are computed for a particular date from the expressions in § III, λ_5 may also be computed from the above formula.

The source theories have been taken from Newcomb (1898a) for Mercury, Venus, Mars, and the Earth and Sun; from Hill (1898) for Jupiter and Saturn; from Newcomb (1898b) for Uranus and Neptune; from current mean elements for Pluto; and from the *Improved Lunar Ephemeris* (1954) for the Moon. Hill's theories for Jupiter and Saturn were transformed from Hansen's form to the more familiar form used here.

V. EQUATORIAL COORDINATES

The ordinary geocentric coordinates are right ascension (α), declination (δ), and geocentric distance (ρ). If we start with ecliptic coordinates, the transformations to equatorial coordinates involve only a rotation about the line of equinoxes through the angle ϵ, the obliquity of the ecliptic, given by

$$\epsilon = 84428 \text{ arcsec} - 47 \text{ arcsec } T + 9 \text{ arcsec} \cos (\Omega_M) ; \tag{5}$$

together with a correction for nutation in longitude for each body involved, given by $\delta\lambda = -17$ arc sec $\sin (\Omega_M)$.

When working numerically, these transformations are easily accomplished through the formulae

$$\cos \delta \cos \alpha = \cos \beta \cos (\lambda + \delta\lambda) ,$$

$$\cos \delta \sin \alpha = \cos \beta \sin (\lambda + \delta\lambda) \cos \epsilon - \sin \beta \sin \epsilon ,$$

$$\sin \delta = \cos \beta \sin (\lambda + \delta\lambda) \sin \epsilon + \sin \beta \cos \epsilon . \tag{6}$$

However, these are not in a form which can be used with our computer formula manipulator, because λ is a circulating angle which may have any value, and we cannot take its sine or cosine by expanding into a power series in λ. (Such a series would never converge.) We must therefore consider ($\lambda + \delta\lambda$) as composed of two parts: L, which circulates; and $P = \lambda + \delta\lambda - L$, the purely periodic part of ($\lambda + \delta\lambda$), which remains small. We can then expand $\sin (\lambda + \delta\lambda)$, for example, into $\sin L \cos P + \cos L \sin P$. We retain L and its trigonometric functions in literal

form without expansion into power series because it is a member of our adopted set of fundamental arguments.

For exactly analogous reasons we must also make the substitution $\alpha = L + Q$, where $Q = \alpha - L$ is the purely periodic part of α. After expanding and multiplying by $\sin L$ or $\cos L$ where needed in order to combine terms, we finally arrive at

$$\alpha - L = Q = \tan^{-1}\left\{\frac{\sin P - \cos L[(1 - \cos \epsilon)(\sin L \cos P + \cos L \sin P) - \tan \beta \cos \epsilon]}{\cos P - \sin L[(1 - \cos \epsilon)(\sin L \cos P + \cos L \sin P) - \tan \beta \sin \epsilon]}\right\},$$

$$\delta = \sin^{-1}[\cos \beta \sin \epsilon(\sin L \cos P + \cos L \sin P) + \sin \beta \cos \epsilon]. \tag{7}$$

These are the formulae we need for the Sun and the Moon.

In the case of the planet, we wish to transfer additionally from a heliocentric to a geocentric perspective. We are trying, therefore, to describe with a single formula the complex paths which each planet traces among the stars, including retrograde motion and the magnifying effects of the changing geocentric distance. The problem divides naturally into two cases: planets inside the Earth's orbit, for which the mean right ascension is equal to the Sun's mean longitude, L_S; and planets outside the Earth's orbit, where the mean right ascension is equal to the mean longitude of the planet, L_4 through L_9. The basic transformation formulae, using subscript p for planet and subscript S for Sun, are

$$\xi = r_p \cos \beta_p \cos (\lambda_p + \delta\lambda) + r_S \cos \beta_S \cos (\lambda_S + \delta\lambda), \tag{8}$$

$$\eta = r_p[\cos \beta_p \sin (\lambda_p + \delta\lambda) \cos \epsilon - \sin \beta_p \sin \epsilon] + r_S[\cos \beta_S \sin (\lambda_S + \delta\lambda) \cos \epsilon - \sin \beta_S \sin \epsilon],$$

$$\zeta = r_p[\cos \beta_p \sin (\lambda_p + \delta\lambda) \sin \epsilon + \sin \beta_p \cos \epsilon] + r_S[\cos \beta_S \sin (\lambda_S + \delta\lambda) \sin \epsilon - \sin \beta_S \cos \epsilon],$$

and

$$\rho^2 = \xi^2 + \eta^2 + \zeta^2, \tan \alpha = \eta/\xi, \delta = \sin^{-1}(\zeta/\rho). \tag{9}$$

No special problems other than slow convergence occur in the manipulator development of formulae for ρ and δ. However, the α formula is trickier. We present the development here in some detail in order to illustrate some of the special problems inherent in formula manipulation. These fall into three general classes for the α formula. The first class concerns the need to substitute for circulating angles in terms of fundamental arguments, as already discussed. The second class involves the problem of division by a series which can take on a zero value, which is the case for ξ. The third class focuses on the problem of the rapidity of convergence of a series in different forms. For a planet exterior to the Earth,

$$\tan \alpha = \tan (L_p + Q_p) = \frac{\tan L_p + \tan Q_p}{1 - \tan L_p \tan Q_p} = \frac{\sin L_p + \cos L_p \tan Q_p}{\cos L_p - \sin L_p \tan Q_p} = \eta/\xi, \tag{10}$$

$$\xi \sin L_p + \xi \cos L_p \tan Q_p = \eta \sin L_p \tan Q_p, \tag{11}$$

$$\tan Q_p = \frac{\eta \cos L_p - \xi \sin L_p}{\eta \sin L_p + \xi \cos L_p}. \tag{12}$$

In order to examine the suitability of this last equation for calculation, we develop ξ and η using $(\lambda_p + \delta\lambda) = L_p + P_p$ and $(\lambda_S + \delta\lambda) = L_S + P_S$:

$$\eta = r_p \cos \beta_p \cos \epsilon(\sin L_p \cos P_p + \cos L_p \sin P_p)$$

$$- r_p \sin \beta_p \sin \epsilon + r_S \cos \beta_S \cos \epsilon(\sin L_S \cos P_S + \cos L_S \sin P_S) - r_S \sin \beta_S \sin \epsilon$$

$$\xi = r_p \cos \beta_p(\cos L_p \cos P_p - \sin L_p \sin P_p) + r_S \cos \beta_S(\cos L_S \cos P_S - \sin L_S \sin P_S). \tag{13}$$

The denominator of the $\tan Q_p$ expression becomes

$$\eta \sin L_p + \xi \cos L_p = r_p \cos \beta_p[\cos P_p + \sin L_p(1 - \cos \epsilon)(\sin L_p \cos P_p + \cos L_p \sin P_p)] + \cdots \tag{14}$$

in which the first term is always positive. Since $r_p > r_S$, this denominator can never assume a zero value. Therefore, equation (12) provides a suitable formula for calculations.

For the two planets interior to the Earth, $\alpha = L_S + Q_p$ and equation (12) must be replaced by

$$\tan Q_p = \frac{\eta \cos L_S - \xi \sin L_S}{\eta \sin L_S + \xi \cos L_S}. \tag{15}$$

Since Q_p is small for most planets, we might simply take the arctangent and add it to L_p in order to get α. However, for Venus and Mars Q_p is such a large fraction of a radian that the arctangent process converges very slowly and the number of terms required to reach a given precision (already quite large for these two planets) becomes several times greater. In order to avoid this difficulty and similar slow-convergence problems for δ and ρ, we introduce the three intermediaries U, V, and W, which are defined as follows:

$$\bar{\Delta}^2 U = \rho^2 \,,$$

$$\bar{\Delta} V = \rho \sin \delta = \eta \,,$$

$$\bar{\Delta} W = \rho \cos \delta \sin Q_p = \eta \cos L - \xi \sin L \,, \tag{16}$$

where $\bar{\Delta}$ is a scaling factor (constant for each body) which has been removed from the series in order to make them uniform in precision. U, V, and W may be represented by reasonably compact series, and the desired results may then be obtained using

$$\alpha = L + \sin^{-1}\left[\frac{W}{(U - V^2)^{1/2}}\right] \,,$$

$$\delta = \sin^{-1}\left(\frac{V}{\sqrt{U}}\right) \,,$$

$$\rho = \bar{\Delta}\sqrt{U} \,, \tag{17}$$

which are the equatorial coordinates based on the equinox and equator of date. L, in equations (16) and (17) only, is understood to be L_M for the Moon, L_S for the Sun or an interior planet (Mercury and Venus), and L_p for an exterior planet. (L always means L_p in the formulae for heliocentric longitude.) The series for U, V, and W are presented in the Appendix.

The following are the scaling factors $\bar{\Delta}$ to be used with U, V, and W:

Mercury	1.07693
Venus	1.23437
Mars	1.83094
Jupiter	5.30693
Saturn	9.61711
Uranus	19.24877
Neptune	30.08900
Pluto	41.32680
Sun	1.00021
Moon	60.40974

VI. NUMERICAL EXAMPLES

Tables 1–3 give evaluations of the fundamental arguments and of the six series for each body, at 0^h on 1969 June 28 (JD 2,440,400.5), when $\ell = -11{,}144.5$ and $T = 0.69488$. The series PLON and BETA are in arcseconds; RP is in AU for all bodies except the Moon, for which it is in Earth radii; and U, V, and W are dimensionless quantities. The comparison values were taken from the *American Ephemeris and Nautical Almanac* (*AENA*) for 1969.

As an example of the evaluations of one term in a series, consider the following fictitious term as it would appear in a series for the Sun:

$$T \qquad 157 \quad 8\,13\,16\,19$$

$$0.24570 \; 1 \; \text{SIN} \qquad 002 -3\;0\;0\;0$$

The value is therefore

$$0.24570 \times (+0.69488) \times \sin[2(-0.73356) - 3(-0.51803)] = 0.00026 \,,$$

where -0.73356 and -0.51803 are values of arguments 7 and 8 at our selected date, taken from Table 1.

TABLE 1
VALUES OF FUNDAMENTAL ARGUMENTS ON TEST DATE

Argument	Number	Value (in revolutions)	Argument	Number	Value (in revolutions)
L_M	1	−0.29454	L_5	18	−0.48264
G_M	2	−0.07736	G_5	19	−0.51572
F_M	3	−0.28117	F_5	20	−0.75746
D	4	−0.56098	L_6	21	−0.90252
Ω_M	5	−0.01337	G_6	22	−0.15282
L_S	7	−0.73356	F_6	23	−0.21459
G_S	8	−0.51805	L_7	24	+0.50581
L_1	9	−0.98679	G_7	25	+0.03623
G_1	10	−0.20063	F_7	26	+0.30068
F_1	11	−0.12004	L_8	27	+0.66057
L_2	12	−0.09275	G_8	28	+0.53902
G_2	13	−0.45703	F_8	29	+0.29544
F_2	14	−0.30499	L_9	31	+0.53954
L_4	15	−0.23629	G_9	32	−0.08211
G_4	16	−0.16823	F_9	33	+0.23422
F_4	17	−0.37329			

NOTE.—Integer numbers of revolutions are naturally discarded. Remember to multiply by 360° or 2π radians before taking the sine or cosine.

TABLE 2
VALUE OF SERIES ON TEST DATE

Object	PLON	β	RP	V	U	W
Mercury	−84564.1	−23166.8	0.37873	+0.29256	0.73726	−0.30869
Venus	−860.3	−11478.2	0.72810	+0.16590	0.40577	−0.44824
Mars	−35479.2	−3900.8	1.46455	−0.11128	0.07647	−0.14616
Jupiter	+8353.9	+4699.8	5.45233	+0.03645	1.07535	−0.13770
Saturn	−14455.6	−8880.1	9.26188	+0.20143	1.02469	−0.00215
Uranus	+4080.2	+2616.1	18.30772	+0.01066	0.91223	−0.02920
Neptune	−794.0	+6130.2	30.32659	−0.29748	0.96368	−0.05435
Pluto	−71157.4	+56142.1	31.83075	+0.22753	0.59985	−0.18865
Sun	+749.6	0.0	1.01665	+0.40208	1.03308	+0.01224
Moon	−14572.6	−17465.7	56.55545	−0.42120	0.87647	−0.09449

TABLE 3
COORDINATES ON TEST DATE

	Series	AENA		Series	AENA
Mercury:			**Uranus:**		
λ	341°15′51″	341°15′59″	λ	183°13′25″	183°13′36″
β	−6°26′07″	−6°26′17″	β	+0°43′36″	+0°43′45″
r	0.37873	0.37869	r	18.30772	18.30858
Δ	0.92470	0.92477	Δ	18.38464	18.38807
δ	+19°55′16″	+19°55′16″	δ	+0°38′21″	+0°38′33″
α	4ʰ53ᵐ45ˢ	4ʰ53ᵐ43ˢ	α	12ʰ01ᵐ21ˢ	12ʰ01ᵐ22ˢ
Venus:			**Neptune:**		
λ	326°22′16″	326°22′05″	λ	237°34′59″	237°34′50″
β	−3°11′18″	−3°11′22″	β	+1°42′10″	+1°43′10″
r	0.72810	0.72808	r	30.32659	30.32334
Δ	0.78630	0.78630	Δ	29.53747	29.53542
δ	+15°05′44″	+15°05′48″	δ	−17°38′23″	−17°38′34″
α	3ʰ16ᵐ32ˢ	3ʰ16ᵐ30ˢ	α	15ʰ37ᵐ54ˢ	15ʰ37ᵐ53ˢ
Mars:			**Pluto:**		
λ	265°04′50″	265°04′54″	λ	174°28′05″	174°25′43″
β	−1°05′01″	−1°04′53″	β	+15°35′42″	+15°33′31″
r	1.46455	1.46463	r	31.83075	31.77199
Δ	0.50631	0.50638	Δ	32.00763	31.98610
δ	−23°43′45″	−23°43′07″	δ	+17°05′03″	+17°05′46″
α	15ʰ58ᵐ41ˢ	15ʰ58ᵐ43ˢ	α	11ʰ47ᵐ53ˢ	11ʰ58ᵐ01ˢ
Jupiter:			**Sun:**		
λ	188°34′10″	188°34′03″	λ	96°07′38″	96°07′38″
β	+1°18′20″	+1°18′20″	β	0 0°00′00″	−0°00′01″
r	5.45233	5.45265	$r = \Delta$	1.01665	1.01659
Δ	5.50323	5.50390	δ	+23°18′11″	+23°18′14″
δ	+2°00′51″	+2°00′39″	α	6ʰ26ᵐ41ˢ	6ʰ26ᵐ40ˢ
α	1ʰ54ᵐ27ˢ	11ʰ54ᵐ27ˢ	**Moon:**		
Saturn:			λ	249°55′04″	249°55′03″
λ	31°04′43″	31°04′52″	β	−4°51′06″	−4°51′09″
β	−2°28′00″	−2°28′00″	$r = \Delta$	56.55545	56.55235
r	9.26188	9.26281	δ	−26°44′16″	+26°44′27″
Δ	9.73510	9.73504	α	16ʰ29ᵐ54ˢ	16ʰ29ᵐ54ˢ
δ	+11°28′40″	+11°28′39″			
α	2ʰ19ᵐ53ˢ	2ʰ19ᵐ54ˢ			

To program the series for a computer, use the material given in the Appendix; formula (1), (2), (3), or (4); the argument expressions in § III; formulae (17); and the scaling factors in § V (only if distances are desired). Note that any series may be truncated at any desired level of precision, with an error seldom exceeding the sum of the absolute values of the four largest terms which are omitted.

APPENDIX

Table 4 gives the trigonometric series for PLON, β, RP, V, U, and W for the Sun, Moon, and the planets. The terms listed should guarantee a precision of $\pm 1'$ for all bodies except Pluto ($\pm 15'$).

TABLE 4
TRIGONOMETRIC SERIES

SUN

PLON

COEFFICIENT	T		1	5	7	8	13	16	19
6910	0	SIN	0	0	0	1	0	0	0
72	0	SIN	0	0	0	2	0	0	0
-17	1	SIN	0	0	0	1	0	0	0
-7	0	COS	0	0	0	1	0	0	-1
6	0	SIN	1	0	-1	0	0	0	0
5	0	SIN	0	0	0	4	0	-8	3
-5	0	COS	0	0	0	2	-2	0	0
-4	0	SIN	0	0	0	1	-1	0	0
4	0	COS	0	0	0	4	0	-8	3
3	0	SIN	0	0	0	2	-2	0	0
-3	0	SIN	0	0	0	0	0	0	1
-3	0	SIN	0	0	0	2	0	0	-2

BETA

COEFFICIENT	T		1	5	7	8	13	16	19
0	0	SIN	0	0	0	0	0	0	0

RP

COEFFICIENT	T		1	5	7	8	13	16	19
1.00014	0	COS	0	0	0	0	0	0	0
-0.01675	0	COS	0	0	0	1	0	0	0
-0.00014	0	COS	0	0	0	2	0	0	0

V

COEFFICIENT	T		1	5	7	8	13	16	19
0.39785	0	SIN	0	0	1	0	0	0	0
-0.01000	0	SIN	0	0	1	-1	0	0	0
0.00333	0	SIN	0	0	1	1	0	0	0
-0.00021	1	SIN	0	0	1	0	0	0	0
0.00004	0	SIN	0	0	1	2	0	0	0
-0.00004	0	COS	0	0	1	0	0	0	0
-0.00004	0	SIN	0	1	-1	0	0	0	0
0.00003	1	SIN	0	0	1	-1	0	0	0

U

COEFFICIENT	T		1	5	7	8	13	16	19
1.00000	0	COS	0	0	0	0	0	0	0
-0.03349	0	COS	0	0	0	1	0	0	0
-0.00014	0	COS	0	0	0	2	0	0	0
0.00008	1	COS	0	0	0	1	0	0	0
-0.00003	0	SIN	0	0	0	1	0	0	-1

W

COEFFICIENT	T		1	5	7	8	13	16	19
-0.04129	0	SIN	0	0	2	0	0	0	0
0.03211	0	SIN	0	0	0	1	0	0	0
0.00104	0	SIN	0	0	2	-1	0	0	0
-0.00035	0	SIN	0	0	2	1	0	0	0
-0.00010	0	COS	0	0	0	0	0	0	0
-0.00008	1	SIN	0	0	0	1	0	0	0
-0.00008	0	SIN	0	1	0	0	0	0	0
0.00007	0	SIN	0	0	0	2	0	0	0
0.00005	1	SIN	0	0	2	0	0	0	0
0.00003	0	SIN	1	0	-1	0	0	0	0
-0.00002	0	COS	0	0	0	1	0	0	-1
0.00002	0	SIN	0	0	0	4	0	-8	3
-0.00002	0	SIN	0	0	0	1	-1	0	0
-0.00002	0	COS	0	0	0	2	-2	0	0

MERCURY

PLON

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
84378	0	SIN	0	0	0	0	0	1	0	0	0	0
10733	0	SIN	0	0	0	0	0	2	0	0	0	0
1892	0	SIN	0	0	0	0	0	3	0	0	0	0
-646	0	SIN	0	0	0	0	0	0	2	0	0	0
381	0	SIN	0	0	0	0	0	4	0	0	0	0
-306	0	SIN	0	0	0	0	0	1	-2	0	0	0
-274	0	SIN	0	0	0	0	0	1	2	0	0	0
-92	0	SIN	0	0	0	0	0	2	2	0	0	0
83	0	SIN	0	0	0	0	0	5	0	0	0	0

MERCURY (CONT.)

PLON

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
-28	0	SIN	0	0	0	0	0	3	2	0	0	0
25	0	SIN	0	0	0	0	0	2	-2	0	0	0
19	0	SIN	0	0	0	0	0	6	0	0	0	0
-9	0	SIN	0	0	0	0	0	4	2	0	0	0
8	1	SIN	0	0	0	0	0	1	0	0	0	0
7	0	COS	0	0	0	0	0	2	0	-5	0	0

BETA

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
24134	0	SIN	0	0	0	0	0	0	1	0	0	0
5180	0	SIN	0	0	0	0	0	1	-1	0	0	0
4910	0	SIN	0	0	0	0	0	1	1	0	0	0
1124	0	SIN	0	0	0	0	0	2	1	0	0	0
271	0	SIN	0	0	0	0	0	3	1	0	0	0
132	0	SIN	0	0	0	0	0	2	-1	0	0	0
67	0	SIN	0	0	0	0	0	4	1	0	0	0
18	0	SIN	0	0	0	0	0	3	-1	0	0	0
17	0	SIN	0	0	0	0	0	5	1	0	0	0
-10	0	SIN	0	0	0	0	0	0	3	0	0	0
-9	0	SIN	0	0	0	0	0	1	-3	0	0	0

RP

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
0.39528	0	COS	0	0	0	0	0	0	0	0	0	0
-0.07834	0	COS	0	0	0	0	0	1	0	0	0	0
-0.00795	0	COS	0	0	0	0	0	2	0	0	0	0
-0.00121	0	COS	0	0	0	0	0	3	0	0	0	0
-0.00022	0	COS	0	0	0	0	0	4	0	0	0	0

V

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
0.36951	0	SIN	0	0	1	0	0	0	0	0	0	0
0.13951	0	SIN	0	0	0	0	1	0	0	0	0	0
-0.04396	0	SIN	0	0	0	0	1	-1	0	0	0	0
0.03935	0	SIN	0	0	0	0	0	0	1	0	0	0
0.01419	0	SIN	0	0	0	0	1	1	0	0	0	0
0.01240	0	SIN	0	0	0	0	1	-1	0	0	0	0
-0.00928	0	SIN	0	0	1	-1	0	0	0	0	0	0
0.00400	0	SIN	0	0	0	0	0	1	1	0	0	0
0.00310	0	SIN	0	0	1	1	0	0	0	0	0	0
0.00216	0	SIN	0	0	0	0	1	2	0	0	0	0
0.00076	0	SIN	0	0	0	0	1	-2	0	0	0	0
0.00061	0	SIN	0	0	0	0	0	2	1	0	0	0
0.00052	0	SIN	0	0	0	0	1	0	-2	0	0	0
0.00039	0	SIN	0	0	0	0	1	3	0	0	0	0
-0.00022	0	SIN	0	0	0	0	0	2	-1	0	0	0
-0.00019	1	SIN	0	0	1	0	0	0	0	0	0	0
-0.00017	0	SIN	0	0	0	0	1	1	-2	0	0	0
0.00011	0	SIN	0	0	0	0	0	3	1	0	0	0
0.00008	0	SIN	0	0	0	0	1	4	0	0	0	0
-0.00007	1	SIN	0	0	0	0	1	0	0	0	0	0
-0.00007	0	COS	0	0	0	0	1	0	0	0	0	0
0.00005	0	SIN	0	0	0	0	1	-1	-2	0	0	0
0.00005	0	SIN	0	0	0	0	1	-3	0	0	0	0
-0.00005	0	COS	0	0	1	0	0	0	0	0	0	0
0.00004	0	SIN	0	0	1	2	0	0	0	0	0	0
-0.00004	0	SIN	0	1	-1	0	0	0	0	0	0	0
0.00003	1	SIN	0	0	1	-1	0	0	0	0	0	0
0.00002	0	SIN	0	0	0	0	0	4	1	0	0	0
0.00002	1	SIN	0	0	0	0	1	-1	0	0	0	0
-0.00002	0	COS	0	0	0	0	1	1	0	0	0	0
0.00002	0	SIN	0	0	0	0	1	5	0	0	0	0

U

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
1.00000	0	COS	0	0	0	0	0	0	0	0	0	0
0.65089	0	COS	0	0	1	0	-1	0	0	0	0	0
-0.20509	0	COS	0	0	1	0	-1	1	0	0	0	0
0.06621	0	COS	0	0	1	0	-1	-1	0	0	0	0
-0.05285	0	COS	0	0	0	0	0	1	0	0	0	0
-0.02888	0	COS	0	0	0	1	0	0	0	0	0	0
-0.01635	0	COS	0	0	1	-1	-1	0	0	0	0	0
0.01010	0	COS	0	0	1	0	-1	-2	0	0	0	0

TABLE 4—*Continued*

MERCURY (CONT.)

U

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
0.00545	0	COS	0	0	1	1	-1	0	0	0	0	0
0.00515	0	COS	0	0	1	-1	-1	1	0	0	0	0
0.00356	0	COS	0	0	1	0	-1	2	0	0	0	0
-0.00270	0	COS	0	0	0	0	0	2	0	0	0	0
0.00244	0	COS	0	0	1	0	-1	0	2	0	0	0
0.00183	0	COS	0	0	1	0	-1	-3	0	0	0	0
-0.00172	0	COS	0	0	1	1	-1	1	0	0	0	0
-0.00166	0	COS	0	0	1	-1	-1	-1	0	0	0	0
-0.00077	0	COS	0	0	1	0	-1	2	0	0	0	0
0.00055	0	COS	0	0	1	1	-1	-1	0	0	0	0
0.00036	0	COS	0	0	1	0	-1	-4	0	0	0	0
-0.00027	0	COS	0	0	0	0	0	3	0	0	0	0
-0.00025	0	COS	0	0	1	-1	-1	-2	0	0	0	0
0.00024	0	COS	0	0	1	0	-1	1	2	0	0	0
0.00024	0	COS	0	0	1	0	-1	3	0	0	0	0
-0.00021	0	SIN	0	0	1	0	-1	0	0	0	0	0
-0.00012	0	COS	0	0	0	2	0	0	0	0	0	0
-0.00009	0	COS	0	0	1	-1	-1	2	0	0	0	0
0.00008	0	COS	0	0	1	1	-1	-2	0	0	0	0
-0.00008	0	SIN	0	0	1	0	-1	-1	0	0	0	0
0.00007	1	COS	0	0	0	1	0	0	0	0	0	0
0.00007	0	COS	0	0	1	0	-1	-5	0	0	0	0
0.00007	0	COS	0	0	1	2	-1	0	0	0	0	0
-0.00006	0	COS	0	0	1	-1	-1	0	2	0	0	0
-0.00005	0	COS	0	0	1	-1	-1	-3	0	0	0	0
-0.00004	0	SIN	0	0	0	1	0	0	0	0	0	-1
0.00004	1	COS	0	0	1	-1	-1	0	0	0	0	0
-0.00004	0	COS	0	0	0	0	0	4	0	0	0	0
0.00004	0	COS	0	0	1	0	-1	2	2	0	0	0
-0.00004	0	SIN	0	0	2	0	-2	0	0	0	0	0
0.00003	0	SIN	0	0	0	2	0	0	0	-2	0	0

W

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
-0.33605	0	SIN	0	0	1	0	-1	0	0	0	0	0
0.10589	0	SIN	0	0	1	0	-1	1	0	0	0	0
-0.03835	0	SIN	0	0	2	0	0	0	0	0	0	0
-0.03418	0	SIN	0	0	1	0	-1	-1	0	0	0	0
0.02982	0	SIN	0	0	0	1	0	0	0	0	0	0
-0.01448	0	SIN	0	0	1	0	1	0	0	0	0	0
-0.00654	0	SIN	0	0	1	0	0	0	1	0	0	0
0.00854	0	SIN	0	0	1	0	0	0	-1	0	0	0
-0.00521	0	SIN	0	0	1	0	-1	-2	0	0	0	0
0.00456	0	SIN	0	0	1	0	1	-1	0	0	0	0
-0.00269	0	SIN	0	0	1	0	0	1	-1	0	0	0
0.00269	0	SIN	0	0	1	0	0	-1	1	0	0	0
-0.00184	0	SIN	0	0	1	0	-1	2	0	0	0	0
-0.00147	0	SIN	0	0	1	0	1	1	0	0	0	0
-0.00126	0	SIN	0	0	1	0	-1	0	2	0	0	0
0.00096	0	SIN	0	0	2	-1	0	0	0	0	0	0
-0.00094	0	SIN	0	0	1	0	-1	-3	0	0	0	0
-0.00087	0	SIN	0	0	1	0	0	1	1	0	0	0
0.00087	0	SIN	0	0	1	0	0	-1	-1	0	0	0
0.00040	0	SIN	0	0	1	0	-1	-1	2	0	0	0
-0.00032	0	SIN	0	0	2	1	0	0	0	0	0	0
-0.00022	0	SIN	0	0	1	0	1	2	0	0	0	0
-0.00019	0	SIN	0	0	1	0	-1	-4	0	0	0	0
-0.00018	0	COS	0	0	1	0	-1	0	0	0	0	0
-0.00013	0	SIN	0	0	1	0	0	2	1	0	0	0
0.00013	0	SIN	0	0	1	0	0	-2	-1	0	0	0
-0.00013	0	SIN	0	0	1	0	-1	1	2	0	0	0
-0.00013	0	SIN	0	0	1	0	-1	3	0	0	0	0
-0.00012	0	COS	0	0	0	0	0	0	0	0	0	0
-0.00008	0	SIN	0	0	1	0	1	-2	0	0	0	0
-0.00007	1	COS	0	0	0	1	0	0	0	0	0	0
-0.00007	0	SIN	1	0	0	0	0	0	0	0	0	0
-0.00007	0	SIN	0	0	0	2	0	0	0	0	0	0
0.00006	0	SIN	0	0	1	0	1	0	-2	0	0	0
-0.00005	0	SIN	0	0	1	0	0	2	-1	0	0	0
0.00005	0	SIN	0	0	1	0	0	-2	1	0	0	0
-0.00005	0	SIN	0	0	1	0	0	-2	1	0	0	0
-0.00005	0	COS	0	0	1	0	-1	-1	0	0	0	0
0.00004	1	SIN	0	0	2	0	0	0	0	0	0	0
-0.00004	0	SIN	0	0	1	0	1	3	0	0	0	0
-0.00004	0	SIN	0	0	1	0	-1	-5	0	0	0	0
0.00003	0	SIN	1	0	-1	0	0	0	0	0	0	0
-0.00003	0	COS	0	0	2	0	-2	0	0	0	0	0

MERCURY (CONT.)

W

COEFFICIENT	T		1	5	7	8	9	10	11	13	16	19
-0.00002	0	SIN	0	0	1	0	0	3	1	0	0	0
0.00002	0	SIN	0	0	1	0	0	-3	-1	0	0	0
-0.00002	0	COS	0	0	0	1	0	0	0	0	0	-1
0.00002	0	SIN	0	0	0	4	0	0	0	0	-8	3
0.00002	0	COS	0	0	1	0	-1	1	0	0	0	0
-0.00002	0	SIN	0	0	1	0	-1	2	2	0	0	0
-0.00002	0	SIN	0	0	0	1	0	0	0	-1	0	0
0.00002	0	SIN	0	0	1	0	1	1	-2	0	0	0
-0.00002	1	SIN	0	0	1	0	1	0	0	0	0	0
-0.00002	1	SIN	0	0	1	0	-1	0	0	0	0	0
-0.00002	0	COS	0	0	0	2	0	0	0	-2	0	0
-0.00002	0	SIN	0	1	-1	0	1	0	0	0	0	0

VENUS

PLON

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
2814	0	SIN	0	0	0	0	0	1	0	0	0
-181	0	SIN	0	0	0	0	0	0	2	0	0
-20	1	SIN	0	0	0	0	0	1	0	0	0
12	0	SIN	0	0	0	0	0	2	0	0	0
-10	0	COS	0	0	0	2	0	-2	0	0	0
7	0	COS	0	0	0	3	0	-3	0	0	0

BETA

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
12215	0	SIN	0	0	0	0	0	0	1	0	0
83	0	SIN	0	0	0	0	0	1	1	0	0
83	0	SIN	0	0	0	0	0	1	-1	0	0

RP

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
0.72335	0	COS	0	0	0	0	0	0	0	0	0
-0.00493	0	COS	0	0	0	0	0	1	0	0	0

V

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
0.32238	0	SIN	0	0	1	0	0	0	0	0	0
0.23301	0	SIN	0	0	0	0	1	0	0	0	0
0.03182	0	SIN	0	0	0	0	0	0	1	0	0
-0.00810	0	SIN	0	0	1	-1	0	0	0	0	0
0.00270	0	SIN	0	0	1	1	0	0	0	0	0
-0.00238	0	SIN	0	0	0	0	1	-1	0	0	0
0.00080	0	SIN	0	0	0	0	1	1	0	0	0
0.00033	0	SIN	0	0	0	0	0	1	-1	0	0
0.00020	0	SIN	0	0	0	0	1	0	-2	0	0
-0.00017	1	SIN	0	0	1	0	0	0	0	0	0
-0.00013	1	SIN	0	0	0	0	1	0	0	0	0
0.00011	0	SIN	0	0	0	0	1	1	0	0	0
-0.00006	0	COS	0	0	1	0	0	0	0	0	0
-0.00006	0	COS	0	0	0	0	1	0	0	0	0
0.00003	0	SIN	0	0	1	2	0	0	0	0	0
-0.00003	0	SIN	0	1	-1	0	0	0	0	0	0
0.00002	1	SIN	0	0	1	-1	0	0	0	0	0
-0.00002	0	SIN	0	1	0	0	-1	0	0	0	0

U

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
1.00000	0	COS	0	0	0	0	0	0	0	0	0
0.94848	0	COS	0	0	1	0	-1	0	0	0	0
-0.02383	0	COS	0	0	1	-1	-1	0	0	0	0
-0.02198	0	COS	0	0	1	0	1	0	0	0	0
-0.00970	0	COS	0	0	1	0	-1	1	0	0	0
0.00795	0	COS	0	0	1	1	-1	0	0	0	0
-0.00468	0	COS	0	0	0	0	1	0	0	0	0
0.00324	0	COS	0	0	1	0	-1	-1	0	0	0
0.00083	0	COS	0	0	1	0	-1	0	2	0	0
0.00025	0	COS	0	0	1	-1	-1	1	0	0	0
0.00010	0	COS	0	0	1	2	0	0	0	0	0
-0.00009	0	COS	0	0	2	0	0	0	0	0	0
-0.00008	0	COS	0	0	1	-1	-1	-1	0	0	0
-0.00008	0	COS	0	0	1	1	-1	1	0	0	0
-0.00006	0	SIN	0	0	1	0	-1	0	0	0	0

TABLE 4—*Continued*

VENUS (CONT.)

U

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
0.00006	1	COS	0	0	1	-1	-1	0	0	0	0
0.00006	1	COS	0	0	0	1	0	0	0	0	0
-0.00005	1	COS	0	0	1	0	-1	-1	0	0	0
0.00005	1	COS	0	0	1	0	-1	1	0	0	0
-0.00004	1	COS	0	0	1	0	-1	0	0	0	0
-0.00003	0	SIN	0	0	0	1	0	0	0	0	-1
0.00003	0	COS	0	0	1	-2	-1	0	0	0	0

W

COEFFICIENT	T		1	5	7	8	12	13	14	16	19
-0.56128	0	SIN	0	0	1	0	-1	0	0	0	0
-0.03345	0	SIN	0	0	2	0	0	0	0	0	0
0.02602	0	SIN	0	0	0	1	0	0	0	0	0
-0.02418	0	SIN	0	0	1	0	1	0	0	0	0
-0.00690	0	SIN	0	0	1	0	0	1	0	0	0
0.00690	0	SIN	0	0	1	0	0	0	-1	0	0
0.00574	0	SIN	0	0	1	0	-1	1	0	0	0
-0.00192	0	SIN	0	0	1	0	-1	-1	0	0	0
0.00084	0	SIN	0	0	2	-1	0	0	0	0	0
-0.00049	0	SIN	0	0	1	0	-1	0	2	0	0
-0.00028	0	SIN	0	0	2	1	0	0	0	0	0
0.00025	0	SIN	0	0	1	0	1	-1	0	0	0
-0.00018	0	COS	0	0	1	0	-1	0	0	0	0
-0.00014	0	COS	0	0	0	0	0	0	0	0	0
-0.00008	0	SIN	0	0	1	0	1	1	0	0	0
0.00007	0	SIN	0	0	1	0	0	-1	1	0	0
-0.00007	0	SIN	0	0	1	0	0	1	-1	0	0
-0.00006	1	SIN	0	0	0	1	0	0	0	0	0
-0.00006	0	SIN	0	1	0	0	0	0	0	0	0
0.00005	0	SIN	0	0	0	2	0	0	0	0	0
0.00004	1	SIN	0	0	2	0	0	0	0	0	0
-0.00003	0	COS	0	0	2	0	-2	0	0	0	0
0.00003	1	SIN	0	0	1	0	1	0	0	0	0
0.00003	1	SIN	0	0	1	0	-1	-1	0	0	0
-0.00003	1	SIN	0	0	1	0	-1	1	0	0	0
-0.00003	0	SIN	0	1	-1	0	1	0	0	0	0
0.00002	0	SIN	1	0	-1	0	0	0	0	0	0
-0.00002	0	SIN	0	0	1	0	0	1	1	0	0
0.00002	0	SIN	0	0	1	0	0	-1	-1	0	0
-0.00002	0	SIN	0	0	1	0	1	0	-2	0	0
-0.00002	0	SIN	0	1	1	0	-1	0	0	0	0
-0.00002	0	COS	0	0	0	1	0	0	0	0	-1
0.00002	0	SIN	0	0	0	4	0	0	0	-8	3
-0.00002	0	SIN	0	0	0	1	0	-1	0	0	0

MOON

PLON

COEFFICIENT	T		2	3	4	5	7	8	12
22640	0	SIN	1	0	0	0	0	0	0
-4586	0	SIN	1	0	-2	0	0	0	0
2370	0	SIN	0	0	2	0	0	0	0
769	0	SIN	2	0	0	0	0	0	0
-668	0	SIN	0	0	0	0	0	1	0
-412	0	SIN	0	2	0	0	0	0	0
-212	0	SIN	2	0	-2	0	0	0	0
-206	0	SIN	1	0	-2	0	0	1	0
192	0	SIN	1	0	2	0	0	0	0
165	0	SIN	0	0	2	0	0	-1	0
148	0	SIN	1	0	0	0	0	-1	0
-125	0	SIN	0	0	1	0	0	0	0
-110	0	SIN	1	0	0	0	0	1	0
-55	0	SIN	0	2	-2	0	0	0	0
-45	0	SIN	1	2	0	0	0	0	0
40	0	SIN	1	-2	0	0	0	0	0
-38	0	SIN	1	0	-4	0	0	0	0
36	0	SIN	3	0	0	0	0	0	0
-31	0	SIN	2	0	-4	0	0	0	0
28	0	SIN	1	0	-2	0	0	-1	0
-24	0	SIN	0	0	2	0	0	1	0
19	0	SIN	1	0	-1	0	0	0	0
18	0	SIN	0	0	1	0	0	1	0
15	0	SIN	1	0	2	0	0	-1	0
14	0	SIN	2	0	2	0	0	0	0
14	0	SIN	0	0	4	0	0	0	0
-13	0	SIN	3	0	-2	0	0	0	0

MOON (CONT.)

PLON

COEFFICIENT	T		2	3	4	5	7	8	12
-11	0	SIN	1	0	0	0	16	0	-18
10	0	SIN	2	0	0	0	0	-1	0
9	0	SIN	1	-2	-2	0	0	0	0
9	0	COS	1	0	0	0	16	0	-18
-9	0	SIN	2	0	-2	0	0	1	0
-8	0	SIN	1	0	1	0	0	0	0
8	0	SIN	0	0	2	0	0	-2	0
-8	0	SIN	2	0	0	0	0	1	0
-7	0	SIN	0	0	0	0	0	2	0
-7	0	SIN	1	0	-2	0	0	2	0
7	0	SIN	0	0	0	1	0	0	0
-6	0	SIN	1	-2	2	0	0	0	0
-6	0	SIN	0	2	2	0	0	0	0
-4	0	SIN	1	0	-4	0	0	1	0
4	1	COS	1	0	0	0	16	0	-18
-4	0	SIN	2	2	0	0	0	0	0
4	1	SIN	1	0	0	0	16	0	-18
3	0	SIN	1	0	-3	0	0	0	0
-3	0	SIN	1	0	2	0	0	1	0
-3	0	SIN	2	0	-4	0	0	1	0
3	0	SIN	1	0	0	0	0	-2	0
3	0	SIN	1	0	-2	0	0	-2	0
-2	0	SIN	2	0	-2	0	0	-1	0
-2	0	SIN	0	2	-2	0	0	1	0
2	0	SIN	1	0	4	0	0	0	0
2	0	SIN	4	0	0	0	0	0	0
2	0	SIN	0	0	4	0	0	-1	0
2	0	SIN	2	0	-1	0	0	0	0

BETA

COEFFICIENT	T		2	3	4	5	7	8	12
18461	0	SIN	0	1	0	0	0	0	0
1010	0	SIN	1	1	0	0	0	0	0
1000	0	SIN	1	-1	0	0	0	0	0
-624	0	SIN	0	1	-2	0	0	0	0
-199	0	SIN	1	-1	-2	0	0	0	0
-167	0	SIN	1	1	-2	0	0	0	0
117	0	SIN	0	1	2	0	0	0	0
62	0	SIN	2	1	0	0	0	0	0
33	0	SIN	1	-1	2	0	0	0	0
32	0	SIN	2	-1	0	0	0	0	0
-30	0	SIN	0	1	-2	0	0	1	0
-16	0	SIN	2	1	-2	0	0	0	0
15	0	SIN	1	1	2	0	0	0	0
12	0	SIN	0	1	-2	0	0	-1	0
-9	0	SIN	1	-1	-2	0	0	1	0
-8	0	SIN	0	1	0	1	0	0	0
8	0	SIN	0	1	2	0	0	-1	0
-7	0	SIN	1	1	-2	0	0	1	0
7	0	SIN	1	1	0	0	0	-1	0
-7	0	SIN	1	1	-4	0	0	0	0
-6	0	SIN	0	1	0	0	0	1	0
-6	0	SIN	0	3	0	0	0	0	0
6	0	SIN	1	-1	0	0	0	-1	0
-5	0	SIN	0	1	1	0	0	0	0
-5	0	SIN	1	1	0	0	0	1	0
-5	0	SIN	1	-1	0	0	0	1	0
5	0	SIN	0	1	0	0	0	-1	0
5	0	SIN	0	1	-1	0	0	0	0
4	0	SIN	3	1	0	0	0	0	0
-4	0	SIN	0	1	-4	0	0	0	0
-3	0	SIN	1	-1	-4	0	0	0	0
3	0	SIN	1	-3	0	0	0	0	0
-2	0	SIN	2	-1	-4	0	0	0	0
-2	0	SIN	0	3	-2	0	0	0	0
2	0	SIN	2	-1	2	0	0	0	0
2	0	SIN	1	-1	2	0	0	-1	0
2	0	SIN	2	-1	-2	0	0	0	0
2	0	SIN	3	-1	0	0	0	0	0

RP

COEFFICIENT	T		2	3	4	5	7	8	12
60.36298	0	COS	0	0	0	0	0	0	0
-3.27746	0	COS	1	0	0	0	0	0	0
-0.57994	0	COS	1	0	-2	0	0	0	0

TABLE 4—*Continued*

MOON (CONT.)

RP

COEFFICIENT	T		2	3	4	5	7	8	12
-0.46357	0	COS	0	0	2	0	0	0	0
-0.08904	0	COS	2	0	0	0	0	0	0
0.03865	0	COS	2	0	-2	0	0	0	0
-0.03237	0	COS	0	0	2	0	0	-1	0
-0.02688	0	COS	1	0	2	0	0	0	0
-0.02358	0	COS	1	0	-2	0	0	1	0
-0.02030	0	COS	1	0	0	0	0	-1	0
0.01719	0	COS	0	0	1	0	0	0	0
0.01671	0	COS	1	0	0	0	0	1	0
0.01247	0	COS	1	-2	0	0	0	0	0
0.00704	0	COS	0	0	0	0	0	1	0
0.00529	0	COS	0	0	2	0	0	1	0
-0.00524	0	COS	1	0	-4	0	0	0	0
0.00398	0	COS	1	0	-2	0	0	-1	0
-0.00366	0	COS	3	0	0	0	0	0	0
-0.00295	0	COS	2	0	-4	0	0	0	0
-0.00263	0	COS	0	0	1	0	0	1	0
0.00249	0	COS	3	0	-2	0	0	0	0
-0.00221	0	COS	1	0	2	0	0	-1	0
0.00185	0	COS	0	2	-2	0	0	0	0
-0.00161	0	COS	0	0	2	0	0	-2	0
0.00147	0	COS	1	2	-2	0	0	0	0
-0.00142	0	COS	0	0	4	0	0	0	0
0.00139	0	COS	2	0	-2	0	0	1	0
-0.00118	0	COS	1	0	-4	0	0	1	0
-0.00116	0	COS	2	0	2	0	0	0	0
-0.00110	0	COS	2	0	0	0	0	-1	0

V

COEFFICIENT	T		2	3	4	5	7	8	12
0.39558	0	SIN	0	1	0	1	0	0	0
0.08200	0	SIN	0	1	0	0	0	0	0
0.03257	0	SIN	1	-1	0	-1	0	0	0
0.01092	0	SIN	1	1	0	1	0	0	0
0.00666	0	SIN	1	-1	0	0	0	0	0
-0.00644	0	SIN	1	1	-2	1	0	0	0
-0.00331	0	SIN	0	1	-2	1	0	0	0
-0.00304	0	SIN	0	1	-2	0	0	0	0
-0.00240	0	SIN	1	-1	-2	-1	0	0	0
0.00226	0	SIN	1	1	0	0	0	0	0
-0.00108	0	SIN	1	1	-2	0	0	0	0
-0.00079	0	SIN	0	1	0	-1	0	0	0
0.00078	0	SIN	0	1	2	1	0	0	0
0.00066	0	SIN	0	1	0	1	0	-1	0
-0.00062	0	SIN	0	1	0	1	0	1	0
-0.00050	0	SIN	1	-1	-2	0	0	0	0
0.00045	0	SIN	2	1	0	1	0	0	0
-0.00031	0	SIN	2	1	-2	1	0	0	0
-0.00027	0	SIN	1	1	-2	1	0	1	0
-0.00024	0	SIN	0	1	-2	1	0	1	0
-0.00021	1	SIN	0	1	0	1	0	0	0
0.00018	0	SIN	0	1	-1	1	0	0	0
0.00016	0	SIN	0	1	2	0	0	0	0
0.00016	0	SIN	1	-1	0	-1	0	-1	0
-0.00016	0	SIN	2	-1	0	-1	0	0	0
-0.00015	0	SIN	0	1	-2	0	0	1	0
-0.00012	0	SIN	1	-1	-2	-1	0	1	0
-0.00011	0	SIN	1	-1	0	-1	0	1	0
0.00009	0	SIN	1	1	0	1	0	-1	0
0.00009	0	SIN	2	1	0	0	0	0	0
0.00008	0	SIN	2	-1	0	0	0	0	0
0.00008	0	SIN	1	1	2	1	0	0	0
-0.00008	0	SIN	0	3	-2	1	0	0	0
0.00007	0	SIN	1	-1	2	0	0	0	0
-0.00007	0	SIN	2	-1	-2	-1	0	0	0
-0.00007	0	SIN	1	1	0	1	0	1	0
-0.00006	0	SIN	0	1	1	1	0	0	0
0.00006	0	SIN	0	1	-2	0	0	-1	0
0.00006	0	SIN	1	-1	0	1	0	0	0
0.00006	0	SIN	0	1	2	1	0	-1	0
-0.00005	0	SIN	1	1	-2	0	0	1	0
-0.00004	0	SIN	2	1	-2	0	0	0	0
0.00004	0	SIN	1	-3	0	-1	0	0	0
0.00004	0	SIN	1	-1	0	0	0	-1	0
-0.00003	0	SIN	1	-1	0	0	0	1	0
0.00003	0	SIN	0	1	-1	0	0	0	0

MOON (CONT.)

V

COEFFICIENT	T		2	3	4	5	7	8	12
0.00003	0	SIN	0	1	-2	1	0	-1	0
-0.00003	0	SIN	0	1	-2	-1	0	0	0
0.00003	0	SIN	1	1	-2	1	0	-1	0
0.00003	0	SIN	0	1	0	0	0	-1	0
-0.00003	0	SIN	0	1	-1	1	0	-1	0
-0.00002	0	SIN	1	-1	-2	0	0	1	0
-0.00002	0	SIN	0	1	0	0	0	1	0
0.00002	0	SIN	1	1	-1	1	0	0	0
-0.00002	0	SIN	1	1	0	-1	0	0	0
0.00002	0	SIN	3	1	0	1	0	0	0
-0.00002	0	SIN	2	-1	-4	-1	0	0	0
0.00002	0	SIN	1	-1	-2	-1	0	-1	0
-0.00002	1	SIN	1	-1	0	-1	0	0	0
-0.00002	0	SIN	1	-1	-4	-1	0	0	0
-0.00002	0	SIN	1	1	-4	0	0	0	0
-0.00002	0	SIN	2	-1	-2	0	0	0	0
0.00002	0	SIN	1	1	2	0	0	0	0
0.00002	0	SIN	1	1	0	0	0	-1	0

U

COEFFICIENT	T		2	3	4	5	7	8	12
1.00000	0	COS	0	0	0	0	0	0	0
-0.10828	0	COS	1	0	0	0	0	0	0
-0.01880	0	COS	1	0	-2	0	0	0	0
-0.01479	0	COS	0	0	2	0	0	0	0
0.00181	0	COS	2	0	-2	0	0	0	0
-0.00147	0	COS	2	0	0	0	0	0	0
-0.00105	0	COS	0	0	2	0	0	-1	0
-0.00075	0	COS	1	0	-2	0	0	1	0
-0.00067	0	COS	1	0	0	0	0	-1	0
0.00057	0	COS	0	0	1	0	0	0	0
0.00055	0	COS	1	0	0	0	0	1	0
-0.00046	0	COS	1	0	2	0	0	0	0
0.00041	0	COS	1	-2	0	0	0	0	0
0.00024	0	COS	0	0	0	0	0	1	0
0.00017	0	COS	0	0	2	0	0	1	0
0.00013	0	COS	1	0	-2	0	0	-1	0
-0.00010	0	COS	1	0	-4	0	0	0	0
-0.00009	0	COS	0	0	1	0	0	1	0
0.00007	0	COS	2	0	-2	0	0	1	0
0.00006	0	COS	3	0	-2	0	0	1	0
0.00006	0	COS	0	2	-2	0	0	0	0
-0.00005	0	COS	0	0	2	0	0	-2	0
-0.00005	0	COS	2	0	-4	0	0	0	0
0.00005	0	COS	1	2	-2	0	0	0	0
-0.00005	0	COS	1	0	-1	0	0	0	0
-0.00004	0	COS	1	0	2	0	0	-1	0
-0.00004	0	COS	3	0	0	0	0	0	0
-0.00003	0	COS	1	0	-4	0	0	1	0
-0.00003	0	COS	2	-2	0	0	0	0	0
-0.00003	0	COS	0	2	0	0	0	0	0

W

COEFFICIENT	T		2	3	4	5	7	8	12
0.10478	0	SIN	1	0	0	0	0	0	0
-0.04105	0	SIN	0	0	2	0	0	0	0
-0.02130	0	SIN	1	0	-2	0	0	0	0
-0.01779	0	SIN	0	2	0	1	0	0	0
0.01774	0	SIN	0	0	0	1	0	0	0
0.00987	0	SIN	0	0	2	0	0	0	0
-0.00338	0	SIN	1	-2	0	-2	0	0	0
-0.00309	0	SIN	0	0	0	0	0	1	0
-0.00190	0	SIN	0	2	0	0	0	0	0
-0.00144	0	SIN	1	0	0	1	0	0	0
-0.00144	0	SIN	1	-2	0	-1	0	0	0
-0.00113	0	SIN	1	2	0	2	0	0	0
-0.00094	0	SIN	1	0	-2	0	0	1	0
-0.00092	0	SIN	2	0	-2	0	0	0	0
0.00071	0	SIN	0	0	2	0	0	-1	0
0.00070	0	SIN	2	0	0	0	0	0	0
0.00067	0	SIN	1	2	-2	2	0	0	0
0.00066	0	SIN	0	2	-2	1	0	0	0
-0.00066	0	SIN	0	0	2	1	0	0	0
0.00061	0	SIN	1	0	0	0	0	-1	0
-0.00058	0	SIN	0	0	1	0	0	0	0

TABLE 4—*Continued*

MOON (CONT.)

W

COEFFICIENT	T		2	3	4	5	7	8	12
-0.00049	0	SIN	1	2	0	1	0	0	0
-0.00049	0	SIN	1	0	0	-1	0	0	0
-0.00042	0	SIN	1	0	0	0	0	1	0
0.00034	0	SIN	0	2	-2	2	0	0	0
-0.00026	0	SIN	0	2	-2	0	0	0	0
0.00025	0	SIN	1	-2	-2	-2	0	0	0
0.00024	0	SIN	1	-2	0	0	0	0	0
0.00023	0	SIN	1	2	-2	1	0	0	0
0.00023	0	SIN	1	0	-2	-1	0	0	0
0.00019	0	SIN	1	0	2	0	0	0	0
0.00012	0	SIN	1	0	-2	0	0	-1	0
0.00011	0	SIN	1	0	-2	1	0	0	0
0.00011	0	SIN	1	-2	-2	-1	0	0	0
-0.00010	0	SIN	0	0	2	0	0	1	0
0.00009	0	SIN	1	0	-1	0	0	0	0
0.00008	0	SIN	0	0	1	0	0	1	0
-0.00008	0	SIN	0	2	2	2	0	0	0
-0.00008	0	SIN	0	0	0	2	0	0	0
-0.00007	0	SIN	0	2	0	2	0	-1	0
0.00006	0	SIN	0	2	0	2	0	1	0
-0.00005	0	SIN	1	2	0	0	0	0	0
0.00005	0	SIN	3	0	0	0	0	0	0
-0.00005	0	SIN	1	0	0	0	16	0	-18
-0.00005	0	SIN	2	2	0	2	0	0	0
0.00004	1	SIN	0	2	0	2	0	0	0
0.00004	0	COS	1	0	0	0	16	0	-18
-0.00004	0	SIN	1	-2	2	0	0	0	0
-0.00004	0	SIN	1	0	-4	0	0	0	0
-0.00004	0	SIN	3	0	-2	0	0	0	0
-0.00004	0	SIN	0	2	2	1	0	0	0
-0.00004	0	SIN	0	0	2	-1	0	0	0
-0.00003	0	SIN	0	0	0	0	0	2	0
-0.00003	0	SIN	1	0	-2	0	0	2	0
0.00003	0	SIN	0	2	-2	1	0	1	0
-0.00003	0	SIN	0	0	2	1	0	-1	0
0.00003	0	SIN	2	2	-2	2	0	0	0
0.00003	0	SIN	0	0	2	0	0	-2	0
-0.00003	0	SIN	2	0	-2	0	0	1	0
0.00003	0	SIN	1	2	-2	2	0	1	0
-0.00003	0	SIN	2	0	-4	0	0	0	0
0.00002	0	SIN	0	2	-2	2	0	1	0
-0.00002	0	SIN	2	2	0	1	0	0	0
-0.00002	0	SIN	2	0	0	-1	0	0	0
0.00002	1	COS	1	0	0	0	16	0	-18
0.00002	0	SIN	0	0	4	0	0	0	0
-0.00002	0	SIN	0	2	-1	2	0	0	0
-0.00002	0	SIN	1	2	-2	0	0	0	0
-0.00002	0	SIN	2	0	0	1	0	0	0
-0.00002	0	SIN	2	-2	0	-1	0	0	0
0.00002	0	SIN	1	0	2	0	0	-1	0
0.00002	0	SIN	2	0	0	0	0	-1	0
-0.00002	0	SIN	1	0	-4	0	0	1	0
0.00002	1	SIN	1	0	0	0	16	0	-18
-0.00002	0	SIN	1	-2	0	-2	0	-1	0
0.00002	0	SIN	2	-2	0	-2	0	0	0
-0.00002	0	SIN	1	0	2	1	0	0	0
-0.00002	0	SIN	1	-2	2	-1	0	0	0

MARS

PLON

COEFFICIENT	T		5	7	8	13	15	16	17	19
38451	0	SIN	0	0	0	0	0	1	0	0
2238	0	SIN	0	0	0	0	0	2	0	0
181	0	SIN	0	0	0	0	0	3	0	0
-52	0	SIN	0	0	0	0	0	0	2	0
37	1	SIN	0	0	0	0	0	1	0	0
-22	0	COS	0	0	0	0	0	1	0	-2
-19	0	SIN	0	0	0	0	0	1	0	-1
17	0	COS	0	0	0	0	0	1	0	-1
17	0	SIN	0	0	0	0	0	4	0	0
-16	0	COS	0	0	0	0	0	2	0	-2
13	0	COS	0	0	1	0	0	-2	0	0
-10	0	SIN	0	0	0	0	0	1	-2	0
-10	0	SIN	0	0	0	0	0	1	2	0
7	0	COS	0	0	1	0	0	-1	0	0
-7	0	COS	0	0	2	0	0	-3	0	0

MARS (CONT.)

PLON

COEFFICIENT	T		5	7	8	13	15	16	17	19
-5	0	SIN	0	0	0	1	0	-3	0	0
-5	0	SIN	0	0	1	0	0	-1	0	0
-5	0	SIN	0	0	1	0	0	-2	0	0
-4	0	COS	0	0	2	0	0	-4	0	0
4	1	SIN	0	0	0	0	0	2	0	0
4	0	COS	0	0	0	0	0	0	0	1
3	0	COS	0	0	0	1	0	-3	0	0
3	0	SIN	0	0	0	0	0	2	0	-2

BETA

COEFFICIENT	T		5	7	8	13	15	16	17	19
6603	0	SIN	0	0	0	0	0	0	1	0
622	0	SIN	0	0	0	0	0	1	-1	0
615	0	SIN	0	0	0	0	0	1	1	0
64	0	SIN	0	0	0	0	0	2	1	0

RP

COEFFICIENT	T		5	7	8	13	15	16	17	19
1.53031	0	COS	0	0	0	0	0	0	0	0
-0.14170	0	COS	0	0	0	0	0	1	0	0
-0.00660	0	COS	0	0	0	0	0	2	0	0
-0.00047	0	COS	0	0	0	0	0	3	0	0

V

COEFFICIENT	T		5	7	8	13	15	16	17	19
0.32967	0	SIN	0	0	0	0	1	0	0	0
0.21734	0	SIN	0	1	0	0	0	0	0	0
-0.04634	0	SIN	0	0	0	0	1	-1	0	0
0.02454	0	SIN	0	0	0	0	0	0	1	0
0.01535	0	SIN	0	0	0	0	1	1	0	0
-0.00546	0	SIN	0	1	-1	0	0	0	0	0
0.00345	0	SIN	0	0	0	0	1	-1	0	0
0.00182	0	SIN	0	1	1	0	0	0	0	0
0.00114	0	SIN	0	0	0	0	0	1	1	0
0.00107	0	SIN	0	0	0	0	1	2	0	0
0.00036	0	SIN	0	0	0	0	1	-2	0	0
-0.00018	1	SIN	0	0	0	0	1	0	0	0
-0.00011	1	SIN	0	1	0	0	0	0	0	0
0.00009	0	SIN	0	0	0	0	1	3	0	0
0.00008	0	SIN	0	0	0	0	1	0	-2	0
0.00008	0	SIN	0	0	0	0	0	2	1	0
-0.00005	0	COS	0	1	0	0	0	0	0	0
-0.00004	0	COS	0	0	0	0	1	0	0	0
-0.00003	0	SIN	1	0	0	0	-1	0	0	0
-0.00003	0	SIN	0	0	0	0	0	2	-1	0
-0.00002	0	COS	0	0	0	0	1	-1	0	2
0.00002	0	SIN	0	1	2	0	0	0	0	0
0.00002	0	SIN	0	0	0	0	1	-1	0	1
-0.00002	0	SIN	1	-1	0	0	0	0	0	0
-0.00002	0	COS	0	0	0	0	1	-2	0	2
-0.00002	1	SIN	0	0	0	0	1	-1	0	0
0.00002	0	COS	0	0	0	0	1	-1	0	1
0.00002	1	SIN	0	1	-1	0	0	0	0	0

U

COEFFICIENT	T		5	7	8	13	15	16	17	19
1.00000	0	COS	0	0	0	0	0	0	0	0
0.90471	0	COS	0	1	0	0	-1	0	0	0
-0.12909	0	COS	0	0	0	0	0	1	0	0
-0.12718	0	COS	0	1	0	0	-1	1	0	0
0.04212	0	COS	0	1	0	0	-1	-1	0	0
-0.02273	0	COS	0	1	-1	0	-1	0	0	0
-0.00999	0	COS	0	0	1	0	0	0	0	0
0.00758	0	COS	0	1	1	0	-1	0	0	0
0.00318	0	COS	0	1	-1	0	-1	1	0	0
-0.00300	0	COS	0	0	0	0	0	2	0	0
0.00294	0	COS	0	1	0	0	-1	-2	0	0
-0.00107	0	COS	0	1	1	0	-1	1	0	0
-0.00106	0	COS	0	1	-1	0	-1	-1	0	0
0.00099	0	COS	0	1	0	0	-1	2	0	0
0.00036	0	COS	0	1	1	0	-1	-1	0	0
0.00024	0	COS	0	1	0	0	-1	-3	0	0
0.00023	0	COS	0	1	0	0	-1	0	2	0

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TABLE 4—*Continued*

MARS (CONT.)

U

COEFFICIENT	T		5	7	8	13	15	16	17	19
-0.00014	0	COS	0	0	0	0	0	3	0	0
-0.00012	1	COS	0	1	0	0	-1	1	0	0
-0.00011	1	COS	0	0	0	0	0	1	0	0
0.00010	0	COS	0	1	2	0	-1	0	0	0
0.00008	0	SIN	0	1	0	0	-1	0	0	0
-0.00007	0	COS	0	1	-1	0	-1	-2	0	0
-0.00006	0	SIN	0	1	0	0	-1	1	0	-2
-0.00006	0	SIN	0	0	0	0	0	2	0	-2
0.00006	0	COS	0	1	0	0	-1	1	0	-1
0.00006	1	COS	0	1	-1	0	-1	0	0	0
-0.00006	0	SIN	0	1	0	0	-1	2	0	-2
0.00005	0	SIN	0	1	0	0	-1	1	0	-1
0.00005	0	COS	0	0	0	0	0	1	0	-1
0.00004	0	SIN	0	0	0	0	0	1	0	-1
0.00004	1	COS	0	1	0	0	-1	-1	0	0
-0.00004	0	COS	0	0	2	0	0	0	0	0
-0.00004	0	SIN	0	0	0	0	0	1	0	-2
-0.00004	0	COS	0	1	-1	0	-1	2	0	0
0.00004	0	COS	0	1	1	0	-1	-2	0	0
-0.00003	0	SIN	0	0	0	0	0	1	0	0
-0.00003	0	COS	0	1	0	0	-1	-1	2	0
-0.00003	0	SIN	0	1	0	0	-1	-1	0	2
0.00003	0	COS	0	1	-2	0	-1	0	0	0
0.00003	0	COS	0	1	0	0	-1	3	0	0

W

COEFFICIENT	T		5	7	8	13	15	16	17	19
0.52354	0	SIN	0	1	0	0	-1	0	0	0
0.14860	0	SIN	0	0	0	0	0	1	0	0
-0.03421	0	SIN	0	0	0	0	2	0	0	0
-0.02255	0	SIN	0	1	0	0	1	0	0	0
-0.01315	0	SIN	0	1	-1	0	-1	0	0	0
-0.00532	0	SIN	0	0	0	0	1	0	0	0
0.00532	0	SIN	0	0	0	0	1	0	-1	0
0.00481	0	SIN	0	0	0	0	2	-1	0	0
0.00439	0	SIN	0	1	1	0	-1	0	0	0
0.00171	0	SIN	0	0	0	0	0	2	0	0
-0.00159	0	SIN	0	0	0	0	2	1	0	0
0.00075	0	SIN	0	0	0	0	1	-1	1	0
-0.00075	0	SIN	0	0	0	0	1	1	-1	0
0.00057	0	SIN	0	1	-1	0	1	0	0	0
-0.00025	0	SIN	0	0	0	0	1	1	1	0
0.00025	0	SIN	0	0	0	0	1	-1	-1	0
-0.00020	0	SIN	0	0	0	0	0	0	2	0
-0.00019	0	SIN	0	1	1	0	1	0	0	0
0.00019	0	SIN	0	0	0	0	0	3	0	0
0.00015	1	SIN	0	0	0	0	0	1	0	0
-0.00014	0	COS	0	1	0	0	-1	0	0	0
-0.00011	0	SIN	0	0	0	0	2	2	0	0
-0.00011	0	COS	0	0	0	0	0	0	0	0
-0.00008	0	COS	0	0	0	0	0	1	0	-2
-0.00007	0	SIN	0	0	0	0	0	1	0	-1
-0.00007	0	SIN	1	0	0	0	0	0	0	0
0.00006	0	COS	0	0	0	0	0	1	0	-1
-0.00006	0	COS	0	0	0	0	0	2	0	-2
0.00006	0	SIN	0	1	2	0	-1	0	0	0
0.00005	0	COS	0	0	1	0	0	-2	0	0
0.00004	1	SIN	0	0	0	0	2	0	0	0
-0.00004	0	SIN	0	0	0	0	2	-2	0	0
0.00003	1	SIN	0	1	-1	0	-1	0	0	0
-0.00003	0	SIN	0	0	0	0	0	1	-2	0
0.00003	0	COS	0	0	1	0	0	-1	0	0
-0.00003	0	COS	0	0	2	0	0	-3	0	0
-0.00003	0	COS	0	2	0	0	-2	0	0	0
0.00003	1	SIN	0	1	0	0	1	0	0	0
0.00003	1	SIN	0	1	0	0	-1	0	0	0
-0.00002	0	SIN	1	1	0	0	-1	0	0	0
-0.00002	0	SIN	0	0	0	1	0	-3	0	0
-0.00002	0	SIN	0	0	1	0	0	-1	0	0
-0.00002	0	SIN	1	-1	0	0	1	0	0	0
-0.00002	0	SIN	0	0	1	0	0	-2	0	0
0.00002	0	SIN	0	1	-2	0	-1	0	0	0
-0.00002	0	SIN	0	0	0	0	1	2	1	0
0.00002	0	SIN	0	0	0	0	1	-2	-1	0
-0.00002	0	COS	0	0	2	0	0	-4	0	0

JUPITER

PLON

COEFFICIENT	T		5	7	8	18	19	22	25
19934	0	SIN	0	0	0	0	1	0	0
5023	1	COS	0	0	0	0	0	0	0
2511	0	COS	0	0	0	0	0	0	0
1093	0	COS	0	0	0	0	2	-5	0
601	0	SIN	0	0	0	0	2	0	0
-479	0	SIN	0	0	0	0	2	-5	0
-185	0	SIN	0	0	0	0	2	-2	0
137	0	SIN	0	0	0	0	3	-5	0
-131	0	SIN	0	0	0	0	1	-2	0
79	0	COS	0	0	0	0	1	-1	0
-76	0	COS	0	0	0	0	2	-2	0
-74	1	COS	0	0	0	0	1	0	0
68	1	SIN	0	0	0	0	1	0	0
66	0	COS	0	0	0	0	2	-3	0
63	0	COS	0	0	0	0	3	-5	0
53	0	COS	0	0	0	0	1	-5	0
49	0	SIN	0	0	0	0	2	-3	0
-43	1	SIN	0	0	0	0	2	-5	0
-37	0	COS	0	0	0	0	1	0	0
25	0	SIN	0	0	0	2	0	0	0
25	0	SIN	0	0	0	0	3	0	0
-23	0	SIN	0	0	0	0	1	-5	0
-19	1	COS	0	0	0	0	2	-5	0
17	0	COS	0	0	0	0	2	-4	0
17	0	COS	0	0	0	0	3	-3	0
-14	0	SIN	0	0	0	0	1	-1	0
-13	0	SIN	0	0	0	0	3	-4	0
-9	0	COS	0	0	0	2	0	0	0
9	0	COS	0	0	0	0	0	1	0
-9	0	SIN	0	0	0	0	0	1	0
-9	0	SIN	0	0	0	0	3	-2	0
9	0	SIN	0	0	0	0	4	-5	0
9	0	SIN	0	0	0	0	2	-6	3
-8	0	COS	0	0	0	0	4	-10	0
7	0	COS	0	0	0	0	3	-4	0
-7	0	COS	0	0	0	0	1	-3	0
-7	0	SIN	0	0	0	0	4	-10	0
-7	0	SIN	0	0	0	0	1	-3	0
6	0	COS	0	0	0	0	4	-5	0
-6	0	SIN	0	0	0	0	3	-3	0
5	0	COS	0	0	0	0	0	2	0
-4	0	SIN	0	0	0	0	4	-4	0
-4	0	COS	0	0	0	0	0	3	0
4	0	COS	0	0	0	0	2	-1	0
-4	0	COS	0	0	0	0	3	-2	0
-4	1	COS	0	0	0	0	2	0	0
3	1	SIN	0	0	0	0	2	0	0
3	0	COS	0	0	0	0	0	5	0
3	0	COS	0	0	0	0	5	-10	0
3	0	SIN	0	0	0	0	0	2	0
-2	0	SIN	0	0	0	2	-1	0	0
2	0	SIN	0	0	0	2	1	0	0
-2	1	SIN	0	0	0	0	3	-5	0
-2	1	SIN	0	0	0	0	1	-5	0

BETA

COEFFICIENT	T		5	7	8	18	19	22	25
-4692	0	COS	0	0	0	0	1	0	0
259	0	SIN	0	0	0	0	1	0	0
227	0	COS	0	0	0	0	0	0	0
-227	0	COS	0	0	0	0	2	0	0
30	1	SIN	0	0	0	0	1	0	0
21	1	COS	0	0	0	0	1	0	0
16	0	SIN	0	0	0	0	3	-5	0
-13	0	SIN	0	0	0	0	1	-5	0
-12	0	COS	0	0	0	0	3	0	0
12	0	SIN	0	0	0	0	2	0	0
7	0	COS	0	0	0	0	3	-5	0
-5	0	COS	0	0	0	0	1	-5	0

RP

COEFFICIENT	T		5	7	8	18	19	22	25
5.20883	0	COS	0	0	0	0	0	0	0
-0.25122	0	COS	0	0	0	0	1	0	0
-0.00604	0	COS	0	0	0	0	2	0	0

TABLE 4—*Continued*

JUPITER (CONT.)

RP

COEFFICIENT	T		5	7	8	18	19	22	25
0.00260	0	COS	0	0	0	0	2	-2	0
-0.00170	0	COS	0	0	0	0	3	-5	0
-0.00106	0	SIN	0	0	0	0	2	-2	0
-0.00091	1	SIN	0	0	0	0	1	0	0
-0.00084	1	COS	0	0	0	0	1	0	0
0.00069	0	SIN	0	0	0	0	2	-3	0
-0.00067	0	SIN	0	0	0	0	1	-5	0
0.00066	0	SIN	0	0	0	0	3	-5	0
0.00063	0	SIN	0	0	0	0	1	-1	0
-0.00051	0	COS	0	0	0	0	2	-3	0
-0.00046	0	SIN	0	0	0	0	1	0	0
-0.00029	0	COS	0	0	0	0	1	-5	0
0.00027	0	COS	0	0	0	0	1	-2	0
-0.00022	0	COS	0	0	0	0	3	0	0
-0.00021	0	SIN	0	0	0	0	2	-5	0

V

COEFFICIENT	T		5	7	8	18	19	22	25
0.38966	0	SIN	0	0	0	1	0	0	0
0.07498	0	SIN	0	1	0	0	0	0	0
-0.02828	0	SIN	0	0	0	1	-1	0	0
-0.02049	0	COS	0	0	0	0	1	0	0
0.00948	1	COS	0	0	0	1	0	0	0
0.00942	0	SIN	0	0	0	1	1	0	0
0.00472	0	COS	0	0	0	1	0	0	0
-0.00188	0	SIN	0	1	-1	0	0	0	0
0.00149	0	COS	0	0	0	0	0	0	0
0.00113	0	SIN	0	0	0	0	1	0	0
0.00103	0	COS	0	0	0	1	2	-5	0
0.00103	0	COS	0	0	0	1	-2	5	0
-0.00079	1	COS	0	0	0	1	-1	0	0
0.00063	0	SIN	0	1	1	0	0	0	0
-0.00049	0	COS	0	0	0	0	2	0	0
-0.00047	0	SIN	0	0	0	1	2	-5	0
0.00043	0	SIN	0	0	0	1	-2	5	0
-0.00040	0	COS	0	0	0	1	-1	0	0
-0.00033	1	SIN	0	0	0	1	0	0	0
0.00032	0	SIN	0	0	0	1	2	0	0
0.00026	0	SIN	0	0	0	1	-2	2	0
-0.00023	0	SIN	0	0	0	1	-3	5	0
0.00019	1	COS	0	0	0	1	1	0	0
0.00014	0	SIN	0	0	0	1	-1	2	0
0.00013	1	SIN	0	0	0	0	1	0	0
-0.00012	2	SIN	0	0	0	1	0	0	0
-0.00011	0	COS	0	0	0	1	-2	2	0
-0.00011	0	SIN	0	0	0	1	1	-2	0
0.00010	0	COS	0	0	0	1	-1	1	0
0.00010	0	COS	0	0	0	1	1	0	0
0.00009	1	COS	0	0	0	0	1	0	0
0.00009	0	SIN	0	0	0	1	-2	0	0
0.00009	0	COS	0	0	0	1	-2	3	0
-0.00008	0	SIN	0	0	0	1	2	-2	0
-0.00007	1	SIN	0	0	0	1	-1	0	0
0.00007	0	SIN	0	0	0	0	3	-5	0
-0.00007	0	SIN	0	0	0	1	-2	3	0
-0.00007	1	SIN	0	0	0	1	2	-5	0
0.00006	0	COS	0	0	0	1	3	-5	0
-0.00006	0	SIN	0	0	0	0	1	-5	0
0.00005	0	SIN	0	0	0	1	3	-5	0
0.00005	0	COS	0	0	0	1	1	-1	0
0.00005	0	COS	0	0	0	1	-1	5	0
-0.00004	0	COS	0	1	0	0	0	0	0
-0.00004	1	SIN	0	1	0	0	0	0	0
-0.00004	0	SIN	1	0	0	-1	0	0	0
0.00004	0	COS	0	0	0	1	2	-3	0
-0.00003	0	COS	0	0	0	1	2	-2	0
-0.00003	1	COS	0	0	0	1	2	-5	0
0.00003	0	COS	0	0	0	0	3	-5	0
0.00003	0	SIN	0	0	0	1	2	-3	0
0.00003	0	SIN	0	0	0	0	2	0	0
0.00003	1	SIN	0	0	0	1	1	0	0
0.00002	0	SIN	0	0	0	1	0	0	0
0.00002	0	COS	0	0	0	1	-3	3	0
0.00002	0	SIN	0	0	0	1	-1	5	0
-0.00002	0	COS	0	0	0	0	1	-5	0
-0.00002	0	COS	0	0	0	0	3	0	0

JUPITER (CONT.)

V

COEFFICIENT	T		5	7	8	18	19	22	25
0.00002	0	COS	0	0	0	1	2	-4	0
0.00002	0	COS	0	0	0	1	-2	4	0
0.00002	1	SIN	0	0	0	1	-2	5	0

U

COEFFICIENT	T		5	7	8	18	19	22	25
1.00000	0	COS	0	0	0	0	0	0	0
0.36891	0	COS	0	1	0	-1	0	0	0
-0.09288	0	COS	0	0	0	0	1	0	0
-0.02678	0	COS	0	1	0	-1	1	0	0
-0.00927	0	COS	0	1	-1	-1	0	0	0
0.00898	1	SIN	0	1	0	-1	0	0	0
0.00892	0	COS	0	1	0	-1	-1	0	0
0.00467	0	SIN	0	1	0	-1	0	0	0
0.00309	0	COS	0	1	1	-1	0	0	0
-0.00119	0	COS	0	0	1	0	0	0	0
-0.00111	0	COS	0	0	0	0	2	0	0
0.00098	0	SIN	0	1	0	-1	-2	0	0
0.00098	0	SIN	0	1	0	-1	2	-5	0
0.00096	0	COS	0	0	0	0	2	-2	0
-0.00075	1	SIN	0	1	0	-1	1	0	0
0.00067	0	COS	0	1	-1	-1	1	0	0
-0.00063	0	COS	0	0	0	0	3	-5	0
-0.00045	0	COS	0	1	0	-1	-2	5	0
0.00041	0	COS	0	1	0	-1	2	-5	0
-0.00040	0	SIN	0	0	0	0	2	-2	0
-0.00039	0	SIN	0	1	0	-1	1	0	0
-0.00035	1	SIN	0	0	0	0	1	0	0
-0.00032	1	COS	0	0	0	0	1	0	0
0.00030	0	COS	0	1	0	-1	-2	0	0
0.00025	0	SIN	0	0	0	0	2	-3	0
0.00025	0	COS	0	1	0	-1	2	-2	0
-0.00024	0	SIN	0	0	0	0	1	-5	0
0.00024	0	SIN	0	0	0	0	3	-5	0
0.00023	0	SIN	0	0	0	0	1	-1	0
-0.00022	1	SIN	0	1	-1	-1	0	0	0
-0.00022	0	COS	0	1	1	-1	1	0	0
-0.00022	0	COS	0	1	-1	-1	-1	0	0
-0.00021	0	COS	0	1	0	-1	3	-5	0
-0.00019	0	COS	0	0	0	0	2	-3	0
0.00018	1	SIN	0	1	0	-1	-1	0	0
-0.00017	0	SIN	0	0	0	0	1	0	0
0.00014	0	COS	0	1	0	-1	1	-2	0
-0.00011	1	COS	0	1	0	-1	0	0	0
-0.00011	0	SIN	0	1	-1	-1	0	0	0
-0.00011	2	COS	0	1	0	-1	0	0	0
-0.00011	0	COS	0	0	0	0	1	-5	0
-0.00010	0	SIN	0	1	0	-1	2	-2	0
0.00010	0	SIN	0	0	0	0	3	-3	0
-0.00010	0	COS	0	1	0	-1	-1	2	0
0.00009	0	SIN	0	1	0	-1	1	-1	0
0.00009	0	SIN	0	1	0	-1	-1	0	0
0.00009	0	COS	0	0	0	0	1	-2	0
0.00009	0	COS	0	1	0	-1	2	0	0
0.00008	0	SIN	0	1	0	-1	2	-3	0
-0.00008	1	COS	0	1	0	-1	1	0	0
0.00008	1	SIN	0	1	1	-1	0	0	0
-0.00008	0	COS	0	1	0	-1	-2	2	0
0.00007	0	COS	0	1	1	-1	-1	0	0
-0.00007	0	SIN	0	0	0	0	2	-5	0
-0.00006	0	COS	0	0	0	0	2	0	0
-0.00006	0	COS	0	1	0	-1	2	-3	0
-0.00006	1	COS	0	1	0	-1	-2	5	0
0.00006	0	SIN	0	1	0	-1	-3	5	0
0.00005	0	COS	0	1	0	-1	-3	5	0
0.00005	0	SIN	0	1	0	-1	-1	1	0
0.00005	0	SIN	0	1	0	-1	1	-5	0
0.00005	0	COS	0	0	0	0	3	-3	0
0.00004	0	SIN	0	0	0	0	1	-2	0
0.00004	0	COS	0	1	2	-1	0	0	0
0.00004	0	SIN	0	1	1	-1	0	0	0
0.00003	0	SIN	0	0	0	0	0	1	0
0.00003	0	SIN	0	1	0	-1	-2	3	0
-0.00003	0	SIN	0	0	0	0	1	-3	0

TABLE 4—*Continued*

JUPITER (CONT.)										
W			TRIGONOMETRIC ARGUMENTS							
COEFFICIENT	T		5	7	8	18	19	22	25	
0.18063	0	SIN	0	1	0	-1	0	0	0	
0.09081	0	SIN	0	0	0	0	1	0	0	
-0.04032	0	SIN	0	0	0	2	0	0	0	
0.02286	1	COS	0	0	0	0	0	0	0	
0.01138	0	COS	0	0	0	0	0	0	0	
-0.00778	0	SIN	0	1	0	1	0	0	0	
0.00497	0	COS	0	0	0	0	2	-5	0	
-0.00454	0	SIN	0	1	-1	-1	0	0	0	
0.00445	0	COS	0	0	0	1	1	0	0	
0.00445	0	COS	0	0	0	1	-1	0	0	
0.00293	0	SIN	0	0	0	2	-1	0	0	
-0.00218	0	SIN	0	0	0	0	2	-5	0	
0.00151	0	SIN	0	1	1	-1	0	0	0	
-0.00144	1	COS	0	0	0	0	1	0	0	
-0.00099	1	COS	0	0	0	2	0	0	0	
-0.00097	0	SIN	0	0	0	2	1	0	0	
-0.00083	0	SIN	0	0	0	0	2	-2	0	
-0.00072	0	COS	0	0	0	0	1	0	0	
0.00067	0	SIN	0	0	0	0	3	-5	0	
-0.00064	0	COS	0	0	0	1	0	0	0	
-0.00060	0	SIN	0	0	0	0	1	-2	0	
0.00054	0	SIN	0	0	0	0	2	0	0	
-0.00053	0	COS	0	0	0	2	0	0	0	
0.00036	0	COS	0	0	0	0	1	-1	0	
-0.00034	0	COS	0	0	0	0	2	-2	0	
0.00030	0	COS	0	0	0	0	2	-3	0	
0.00028	1	SIN	0	0	0	0	1	0	0	
-0.00025	0	SIN	0	0	0	1	1	0	0	
0.00025	0	SIN	0	0	0	1	-1	0	0	
0.00022	0	SIN	0	0	0	0	2	-3	0	
-0.00020	1	SIN	0	0	0	0	2	-5	0	
0.00020	0	SIN	0	1	-1	1	0	0	0	
0.00016	0	COS	0	0	0	0	3	-5	0	
0.00012	0	COS	0	0	0	0	1	-5	0	
0.00011	0	COS	0	0	0	1	2	0	0	
0.00011	0	COS	0	0	0	1	-2	0	0	
-0.00011	0	COS	0	0	0	2	2	-5	0	
-0.00011	0	COS	0	0	0	2	-2	5	0	
-0.00010	0	COS	0	1	0	-1	0	0	0	
-0.00009	1	COS	0	0	0	0	2	-5	0	
0.00008	1	COS	0	0	0	2	-1	0	0	
-0.00008	0	SIN	1	0	0	0	0	0	0	
0.00008	0	COS	0	0	0	0	2	-4	0	
-0.00007	0	SIN	0	0	0	0	1	-1	0	
-0.00007	0	SIN	0	1	1	1	0	0	0	
0.00006	0	COS	0	0	0	0	3	-3	0	
-0.00006	0	SIN	0	0	0	0	3	-4	0	
0.00006	1	SIN	0	0	0	2	0	0	0	
-0.00005	0	SIN	0	0	0	0	1	-5	0	
0.00005	0	SIN	0	0	0	2	2	-5	0	
-0.00004	0	SIN	0	0	0	2	-2	5	0	
0.00004	0	COS	0	0	0	2	-1	0	0	
-0.00004	0	SIN	0	0	0	0	0	1	0	
0.00004	0	SIN	0	0	0	0	2	-6	3	
0.00004	0	COS	0	0	0	0	0	1	0	
-0.00004	0	COS	0	0	0	0	4	-10	0	
-0.00004	0	SIN	0	0	0	0	1	-3	0	
-0.00003	0	COS	0	0	0	0	1	-3	0	
0.00003	0	COS	0	0	0	0	3	-4	0	
-0.00003	0	SIN	0	0	0	0	4	-10	0	
-0.00003	0	SIN	0	0	0	2	2	0	0	
0.00003	1	COS	0	0	0	0	2	0	0	
-0.00003	1	SIN	0	0	0	1	1	0	0	
0.00003	1	SIN	0	0	0	1	-1	0	0	
-0.00003	0	SIN	0	0	0	0	3	-3	0	
-0.00003	0	SIN	0	0	0	2	-2	2	0	
0.00002	0	COS	0	0	0	0	0	2	0	
0.00002	0	SIN	0	0	0	2	-3	5	0	
-0.00002	1	COS	0	0	0	1	1	0	0	
-0.00002	1	COS	0	0	0	1	-1	0	0	
-0.00002	2	SIN	0	0	0	0	1	0	0	
-0.00002	1	COS	0	0	0	2	1	0	0	
0.00002	0	SIN	0	1	2	-1	0	0	0	
-0.00002	0	SIN	0	0	0	0	4	-4	0	
0.00002	1	COS	0	0	0	0	2	-2	0	
0.00002	0	SIN	0	0	0	0	3	0	0	

SATURN										
PLON			TRIGONOMETRIC ARGUMENTS							
COEFFICIENT	T		5	7	8	19	21	22	25	
23045	0	SIN	0	0	0	0	0	1	0	
5014	1	COS	0	0	0	0	0	0	0	
-2689	0	COS	0	0	0	2	0	-5	0	
2507	0	COS	0	0	0	0	0	0	0	
1177	0	SIN	0	0	0	2	0	-5	0	
-826	0	COS	0	0	0	2	0	-4	0	
802	0	SIN	0	0	0	0	0	2	0	
425	0	SIN	0	0	0	1	0	-2	0	
-229	1	COS	0	0	0	0	0	1	0	
-153	0	COS	0	0	0	2	0	-6	0	
-142	1	SIN	0	0	0	0	0	1	0	
-114	0	COS	0	0	0	0	0	1	0	
101	1	SIN	0	0	0	2	0	-5	0	
-70	0	COS	0	0	0	0	2	0	0	
67	0	SIN	0	0	0	0	2	0	0	
66	0	SIN	0	0	0	2	0	-6	0	
60	1	COS	0	0	0	2	0	-5	0	
41	0	SIN	0	0	0	1	0	-3	0	
39	0	SIN	0	0	0	0	0	3	0	
31	0	SIN	0	0	0	1	0	-1	0	
31	0	SIN	0	0	0	2	0	-2	0	
-29	0	COS	0	0	0	2	0	-3	0	
-28	0	SIN	0	0	0	2	0	-6	3	
28	0	COS	0	0	0	1	0	-3	0	
22	1	SIN	0	0	0	2	0	-4	0	
-22	0	SIN	0	0	0	0	0	1	-3	
20	0	SIN	0	0	0	2	0	-3	0	
20	0	COS	0	0	0	4	0	-10	0	
19	0	COS	0	0	0	0	0	2	-3	
19	0	SIN	0	0	0	4	0	-10	0	
-17	1	COS	0	0	0	0	0	2	0	
-16	0	COS	0	0	0	0	0	1	-3	
-12	0	SIN	0	0	0	2	0	-4	0	
12	0	COS	0	0	0	1	0	0	0	
-12	0	SIN	0	0	0	0	0	2	-2	
-11	1	SIN	0	0	0	0	0	2	0	
-11	0	COS	0	0	0	2	0	-7	0	
10	0	SIN	0	0	0	2	0	-3	0	
10	0	COS	0	0	0	2	0	-2	0	
9	0	SIN	0	0	0	4	0	-9	0	
-8	0	SIN	0	0	0	0	0	1	-2	
-8	0	COS	0	0	0	0	2	1	0	
8	0	COS	0	0	0	0	2	-1	0	
8	0	COS	0	0	0	0	0	1	-1	
-8	0	SIN	0	0	0	2	0	-1	0	
7	0	SIN	0	0	0	0	2	1	0	
-7	0	COS	0	0	0	1	0	-2	0	
-7	0	COS	0	0	0	0	0	2	0	
-6	1	SIN	0	0	0	4	0	-10	0	
6	1	COS	0	0	0	4	0	-10	0	
6	1	SIN	0	0	0	2	0	-6	0	
-5	0	SIN	0	0	0	3	0	-7	0	
-5	0	COS	0	0	0	3	0	-3	0	
-5	0	COS	0	0	0	0	0	2	-2	
5	0	SIN	0	0	0	3	0	-4	0	
5	0	SIN	0	0	0	2	0	-7	0	
4	0	SIN	0	0	0	3	0	-3	0	
4	0	SIN	0	0	0	3	0	-5	0	
4	1	COS	0	0	0	1	0	-2	0	
3	1	COS	0	0	0	2	0	-4	0	
3	0	COS	0	0	0	2	0	-6	3	
-3	1	SIN	0	0	0	0	2	0	0	
3	1	COS	0	0	0	2	0	-6	0	
-3	1	COS	0	0	0	0	2	0	0	
3	0	COS	0	0	0	3	0	-7	0	
3	0	COS	0	0	0	4	0	-9	0	
3	0	SIN	0	0	0	3	0	-6	0	
3	0	SIN	0	0	0	2	0	-1	0	
3	0	SIN	0	0	0	1	0	-4	0	
2	0	COS	0	0	0	0	0	3	-3	
2	1	SIN	0	0	0	1	0	-2	0	
2	0	SIN	0	0	0	0	0	4	0	
-2	0	COS	0	0	0	3	0	-4	0	
-2	0	COS	0	0	0	2	0	-1	0	
-2	0	SIN	0	0	0	2	0	-7	3	
2	0	COS	0	0	0	1	0	-4	0	
2	0	COS	0	0	0	4	0	-11	0	

TABLE 4—*Continued*

SATURN (CONT.)

PLON

COEFFICIENT	T		5	7	8	19	21	22	25
-2	0	SIN	0	0	0	0	0	1	-1

BETA

COEFFICIENT	T		5	7	8	19	21	22	25
8297	0	SIN	0	0	0	0	0	1	0
-3346	0	COS	0	0	0	0	0	1	0
462	0	SIN	0	0	0	0	0	2	0
-189	0	COS	0	0	0	0	0	2	0
185	0	COS	0	0	0	0	0	0	0
79	1	COS	0	0	0	0	0	1	0
-71	0	COS	0	0	0	2	0	-4	0
46	0	SIN	0	0	0	2	0	-6	0
-45	0	COS	0	0	0	2	0	-6	0
29	0	SIN	0	0	0	0	0	3	0
-20	0	COS	0	0	0	2	0	-3	0
18	1	SIN	0	0	0	0	0	1	0
-14	0	COS	0	0	0	2	0	-5	0
-11	0	COS	0	0	0	0	0	3	0
-10	1	COS	0	0	0	0	0	0	0
9	0	SIN	0	0	0	1	0	-3	0
8	0	SIN	0	0	0	1	0	-1	0
-6	0	SIN	0	0	0	2	0	-3	0
5	0	SIN	0	0	0	2	0	-7	0
-5	0	COS	0	0	0	2	0	-7	0
4	0	SIN	0	0	0	2	0	-5	0
-4	1	SIN	0	0	0	0	0	2	0
-3	0	COS	0	0	0	1	0	-1	0
3	0	COS	0	0	0	1	0	-3	0
3	1	SIN	0	0	0	2	0	-4	0
3	0	SIN	0	0	0	1	0	-2	0
2	0	SIN	0	0	0	0	0	4	0
-2	0	COS	0	0	0	2	0	-2	0

RP

COEFFICIENT	T		5	7	8	19	21	22	25
9.55774	0	COS	0	0	0	0	0	0	0
-0.53252	0	COS	0	0	0	0	0	1	0
-0.01878	0	SIN	0	0	0	2	0	-4	0
-0.01482	0	COS	0	0	0	0	0	2	0
0.00817	0	SIN	0	0	0	1	0	-1	0
-0.00539	0	COS	0	0	0	1	0	-2	0
-0.00524	1	SIN	0	0	0	0	0	1	0
0.00349	0	SIN	0	0	0	2	0	-5	0
0.00347	0	SIN	0	0	0	2	0	-6	0
0.00328	1	COS	0	0	0	0	0	1	0
-0.00225	0	SIN	0	0	0	0	0	1	0
0.00149	0	COS	0	0	0	2	0	-6	0
-0.00126	0	COS	0	0	0	2	0	-2	0
0.00104	0	COS	0	0	0	1	0	-1	0
0.00101	0	COS	0	0	0	2	0	-5	0
0.00098	0	COS	0	0	0	1	0	-3	0
-0.00073	0	COS	0	0	0	2	0	-3	0
-0.00062	0	COS	0	0	0	0	0	3	0
0.00042	0	SIN	0	0	0	0	0	2	-3
0.00041	0	SIN	0	0	0	2	0	-2	0
-0.00040	0	SIN	0	0	0	1	0	-3	0
0.00040	0	COS	0	0	0	2	0	-4	0
-0.00028	1	COS	0	0	0	0	0	0	0
-0.00023	0	SIN	0	0	0	1	0	0	0
0.00020	0	SIN	0	0	0	2	0	-7	0

V

COEFFICIENT	T		5	7	8	19	21	22	25
0.39412	0	SIN	0	0	0	0	1	0	0
0.04138	0	SIN	0	1	0	0	0	0	0
0.03664	0	SIN	0	0	0	0	0	1	0
-0.03310	0	SIN	0	0	0	0	1	-1	0
-0.01480	0	COS	0	0	0	0	0	1	0
0.01099	0	SIN	0	0	0	0	1	1	0
0.00957	1	COS	0	0	0	0	1	0	0
0.00471	0	COS	0	0	0	0	1	0	0
-0.00259	0	COS	0	0	0	2	1	-5	0
-0.00255	0	COS	0	0	0	2	-1	-5	0
0.00123	0	COS	0	0	0	0	0	0	0

SATURN (CONT.)

V

COEFFICIENT	T		5	7	8	19	21	22	25
0.00118	0	SIN	0	0	0	2	1	-5	0
-0.00113	1	COS	0	0	0	0	1	-1	0
0.00107	0	SIN	0	0	0	2	-1	-5	0
-0.00104	0	SIN	0	1	-1	0	0	0	0
0.00102	0	SIN	0	0	0	0	0	2	0
-0.00096	0	COS	0	0	0	2	-1	-4	0
-0.00056	0	COS	0	0	0	0	1	-1	0
0.00053	0	SIN	0	0	0	0	1	2	0
0.00051	0	SIN	0	0	0	1	-1	-2	0
-0.00048	0	COS	0	0	0	2	1	-4	0
-0.00042	0	COS	0	0	0	0	0	2	0
0.00035	1	COS	0	0	0	0	0	1	0
0.00035	0	SIN	0	1	1	0	0	0	0
-0.00032	1	SIN	0	0	0	0	1	0	0
-0.00032	0	COS	0	0	0	2	0	-4	0
0.00029	0	SIN	0	0	0	1	1	-2	0
0.00024	1	SIN	0	0	0	0	1	-1	0
0.00022	0	SIN	0	0	0	0	1	-2	0
0.00020	0	SIN	0	0	0	2	0	-6	0
-0.00019	0	COS	0	0	0	2	0	-6	0
-0.00017	0	COS	0	0	0	1	1	-1	0
0.00017	0	COS	0	0	0	1	-1	-1	0
0.00016	1	COS	0	0	0	0	1	1	0
0.00016	1	SIN	0	0	0	2	1	-5	0
-0.00015	0	COS	0	0	0	2	-1	-6	0
-0.00012	0	SIN	0	0	0	2	-1	-4	0
-0.00012	2	SIN	0	0	0	0	1	0	0
-0.00009	0	COS	0	0	0	2	0	-5	0
0.00009	1	COS	0	0	0	2	1	-5	0
0.00009	1	SIN	0	0	0	0	0	1	0
0.00008	0	COS	0	0	0	0	1	1	0
-0.00007	1	SIN	0	0	0	0	1	1	0
0.00007	0	COS	0	0	0	0	1	-2	0
-0.00007	0	COS	0	0	0	0	1	2	0
-0.00007	1	COS	0	0	0	0	0	0	0
-0.00007	0	COS	0	0	0	0	3	0	0
0.00006	0	SIN	0	0	0	0	3	0	0
0.00006	0	SIN	0	0	0	2	-1	-6	0
0.00006	0	SIN	0	0	0	1	1	-1	0
0.00006	0	COS	0	0	0	2	-1	-3	0
0.00006	0	SIN	0	0	0	2	-1	-2	0
0.00005	0	SIN	0	0	0	1	0	-3	0
0.00004	0	SIN	0	0	0	0	0	3	0
-0.00004	0	COS	0	0	0	2	0	-3	0
0.00004	0	SIN	0	0	0	2	-1	-3	0
-0.00004	0	COS	0	1	0	0	0	0	0
0.00004	0	SIN	0	0	0	1	-1	-3	0
-0.00004	0	SIN	1	0	0	0	-1	0	0
0.00004	1	SIN	0	0	0	2	-1	-5	0
0.00003	0	COS	0	0	0	1	1	-3	0
0.00003	0	SIN	0	0	0	2	1	-4	0
0.00003	0	SIN	0	0	0	0	1	3	0
0.00003	1	SIN	0	0	0	2	1	-4	0
0.00003	0	SIN	0	0	0	1	1	-3	0
-0.00003	0	SIN	0	0	0	1	-1	-1	0
0.00003	1	COS	0	0	0	2	-1	-5	0
-0.00003	0	COS	0	0	0	2	1	-3	0
-0.00003	0	SIN	0	0	0	2	1	-6	3
-0.00003	0	SIN	0	0	0	2	-1	-6	3
0.00003	0	COS	0	0	0	0	1	-2	3
0.00003	0	SIN	0	0	0	1	0	-1	0
0.00003	0	COS	0	0	0	4	-1	-10	0
0.00003	0	SIN	0	0	0	2	0	-5	0
0.00003	0	SIN	0	0	0	4	-1	-10	0
-0.00002	1	SIN	0	1	0	0	0	0	0
0.00002	0	SIN	0	0	0	0	1	-1	3
-0.00002	0	SIN	0	0	0	0	1	1	-3
0.00002	0	COS	0	0	0	1	0	-3	0
0.00002	0	COS	0	0	0	1	-1	-3	0
-0.00002	0	COS	0	0	0	0	0	3	0
0.00002	2	SIN	0	0	0	0	1	-1	0
0.00002	0	COS	0	0	0	2	-1	-2	0
-0.00002	0	COS	0	0	0	0	1	-1	3
-0.00002	0	COS	0	0	0	0	1	1	-3
0.00002	0	SIN	0	0	0	4	-1	-9	0

TABLE 4—*Continued*

SATURN (CONT.)

U

COEFFICIENT	T		5	7	8	19	21	22	25
			TRIGONOMETRIC ARGUMENTS						
1.00000	0	COS	0	0	0	0	0	0	0
0.20588	0	COS	0	1	0	0	-1	0	0
-0.10998	0	COS	0	0	0	0	0	1	0
-0.01729	0	COS	0	1	0	0	-1	1	0
0.00574	0	COS	0	1	0	0	-1	-1	0
-0.00517	0	COS	0	1	-1	0	-1	0	0
0.00500	1	SIN	0	1	0	0	-1	0	0
-0.00389	0	SIN	0	0	0	2	0	-4	0
0.00269	0	SIN	0	1	0	0	-1	0	0
0.00172	0	COS	0	1	1	0	-1	0	0
0.00168	0	SIN	0	0	0	1	0	-1	0
-0.00153	0	COS	0	0	0	0	0	2	0
-0.00135	0	SIN	0	1	0	-2	-1	5	0
-0.00133	0	SIN	0	1	0	2	-1	-5	0
-0.00113	0	COS	0	0	0	1	0	-2	0
-0.00109	1	SIN	0	0	0	0	0	1	0
0.00081	0	SIN	0	0	0	2	0	-5	0
0.00070	0	SIN	0	0	0	2	0	-6	0
0.00067	1	COS	0	0	0	0	0	1	0
0.00062	0	COS	0	1	0	-2	-1	5	0
-0.00059	1	SIN	0	1	0	0	-1	1	0
-0.00056	0	COS	0	1	0	2	-1	-5	0
-0.00051	0	SIN	0	0	0	0	0	1	0
-0.00050	0	SIN	0	1	0	2	-1	-4	0
0.00043	0	COS	0	1	-1	0	-1	1	0
-0.00036	0	COS	0	1	0	0	0	0	0
0.00033	0	COS	0	0	0	2	0	-6	0
-0.00031	0	SIN	0	1	0	0	-1	1	0
-0.00028	0	COS	0	0	0	2	0	-2	0
0.00027	0	COS	0	1	0	0	-1	-2	0
-0.00027	0	COS	0	1	0	1	-1	-2	0
-0.00025	0	SIN	0	1	0	-2	-1	4	0
0.00025	0	COS	0	0	0	1	0	-1	0
0.00022	0	COS	0	0	0	1	0	-3	0
0.00019	0	COS	0	0	0	2	0	-5	0
0.00015	0	COS	0	1	0	-1	-1	2	0
-0.00014	0	COS	0	1	1	0	-1	1	0
-0.00014	0	COS	0	1	-1	0	-1	-1	0
-0.00014	0	COS	0	0	0	2	0	-3	0
-0.00013	1	SIN	0	1	-1	0	-1	0	0
0.00012	0	COS	0	1	0	0	-1	2	0
0.00012	1	COS	0	1	0	0	-1	1	0
-0.00009	0	SIN	0	1	0	-1	-1	1	0
0.00009	0	SIN	0	1	0	1	-1	-1	0
0.00009	0	COS	0	0	0	2	0	-4	0
0.00009	0	SIN	0	0	0	0	0	2	-3
0.00008	1	SIN	0	1	0	0	-1	-1	0
0.00008	1	COS	0	1	0	-2	-1	5	0
-0.00008	0	SIN	0	0	0	1	0	0	0
-0.00008	1	COS	0	0	0	0	0	0	0
-0.00008	0	SIN	0	1	0	2	-1	-6	0
0.00007	0	SIN	0	0	0	2	0	-2	0
0.00007	0	SIN	0	0	0	2	0	-3	0
-0.00006	0	SIN	0	0	0	1	0	-3	0
0.00006	0	COS	0	1	0	2	-1	-4	0
-0.00006	0	SIN	0	1	-1	0	-1	0	0
-0.00006	2	COS	0	1	0	0	-1	0	0
-0.00006	1	COS	0	1	0	0	-1	0	0
0.00006	1	COS	0	0	0	2	0	-6	0
0.00005	0	COS	0	1	1	0	-1	-1	0
0.00005	1	SIN	0	0	0	2	0	-4	0
0.00005	1	SIN	0	1	0	-2	-1	5	0
-0.00004	0	SIN	0	0	0	3	0	-3	0
0.00004	0	SIN	0	1	0	0	-1	-1	0
0.00004	0	SIN	0	0	0	0	0	2	0
0.00004	1	SIN	0	1	1	0	-1	0	0
0.00004	0	SIN	0	1	0	0	-1	2	0
-0.00004	0	COS	0	0	0	0	0	2	-3
-0.00004	0	SIN	0	1	0	0	-1	-2	0
0.00004	0	COS	0	0	0	2	0	-7	0
-0.00004	1	COS	0	1	0	0	-1	-1	0
-0.00004	1	COS	0	0	0	0	0	2	0
0.00004	0	SIN	0	0	0	2	0	-7	0
-0.00003	0	SIN	0	1	0	0	-3	0	0
-0.00003	0	SIN	0	1	0	0	1	0	0
0.00003	0	SIN	0	1	-1	-2	-1	5	0
0.00003	0	COS	0	1	0	0	-3	0	0

SATURN (CONT.)

U

COEFFICIENT	T		5	7	8	19	21	22	25
			TRIGONOMETRIC ARGUMENTS						
0.00003	0	SIN	0	1	-1	2	-1	-5	0
-0.00003	0	COS	0	1	0	0	1	0	0
-0.00003	0	SIN	0	0	0	1	0	-2	0
-0.00003	0	COS	0	1	0	2	-1	-6	0
-0.00003	0	COS	0	0	0	0	0	3	0
0.00003	0	COS	0	1	0	-1	-1	1	0

W

COEFFICIENT	T		5	7	8	19	21	22	25
			TRIGONOMETRIC ARGUMENTS						
0.10619	0	SIN	0	0	0	0	0	1	0
0.09967	0	SIN	0	1	0	0	-1	0	0
-0.04059	0	SIN	0	0	0	2	0	0	0
0.02307	1	COS	0	0	0	0	0	0	0
-0.01237	0	COS	0	0	0	2	0	-5	0
0.01151	0	COS	0	0	0	0	0	0	0
-0.00795	0	SIN	0	0	0	0	1	1	0
0.00795	0	SIN	0	0	0	0	1	-1	0
0.00542	0	SIN	0	0	0	2	0	-5	0
-0.00429	0	SIN	0	1	0	0	1	0	0
-0.00347	0	COS	0	0	0	2	0	-4	0
0.00340	0	SIN	0	0	0	0	2	-1	0
0.00321	0	COS	0	0	0	0	1	1	0
0.00321	0	COS	0	0	0	0	1	-1	0
-0.00250	0	SIN	0	1	-1	0	-1	0	0
-0.00235	1	COS	0	0	0	0	0	1	0
0.00195	0	SIN	0	0	0	1	0	-2	0
-0.00116	0	COS	0	0	0	0	0	1	0
-0.00112	0	SIN	0	0	0	0	2	1	0
-0.00100	1	COS	0	0	0	2	0	0	0
0.00083	0	SIN	0	1	1	0	-1	0	0
-0.00082	0	COS	0	0	0	2	0	0	0
0.00072	0	SIN	0	0	0	0	0	2	0
-0.00069	1	SIN	0	0	0	0	0	1	0
-0.00053	0	COS	0	0	0	0	1	0	0
0.00046	1	SIN	0	0	0	2	0	-5	0
-0.00035	0	COS	0	0	0	2	0	-6	0
0.00028	1	COS	0	0	0	2	0	-5	0
0.00027	0	COS	0	0	0	2	2	-5	0
0.00026	0	COS	0	0	0	2	-2	-5	0
-0.00022	0	SIN	0	0	0	0	1	2	0
0.00022	0	SIN	0	0	0	0	1	-2	0
-0.00022	0	SIN	0	0	0	2	0	-4	0
0.00017	0	SIN	0	0	0	1	0	-3	0
0.00015	0	SIN	0	0	0	2	0	-6	0
0.00013	0	SIN	0	0	0	2	0	-2	0
-0.00013	0	SIN	0	0	0	2	0	-6	3
0.00013	0	COS	0	0	0	1	0	-3	0
-0.00012	0	SIN	0	0	0	2	2	-5	0
0.00012	1	COS	0	0	0	0	2	-1	0
0.00011	0	SIN	0	0	0	2	0	-3	0
0.00011	0	SIN	0	1	-1	0	1	0	0
-0.00011	0	SIN	0	0	0	2	-2	-5	0
0.00010	0	COS	0	0	0	2	-2	-4	0
-0.00010	0	SIN	0	0	0	0	0	1	-3
0.00010	0	COS	0	0	0	2	0	0	0
-0.00010	0	COS	0	1	0	0	-1	0	0
0.00009	0	COS	0	0	0	4	0	-10	0
0.00009	0	COS	0	0	0	0	1	2	0
0.00009	0	COS	0	0	0	0	1	-2	0
0.00009	0	COS	0	0	0	0	0	2	-3
0.00009	0	SIN	0	0	0	4	0	-10	0
-0.00008	0	SIN	1	0	0	0	0	0	0
-0.00008	1	COS	0	0	0	0	1	1	0
-0.00008	1	COS	0	0	0	0	1	-1	0
-0.00008	0	COS	0	0	0	0	0	1	-3
0.00007	0	COS	0	0	0	2	1	-4	0
0.00007	0	COS	0	0	0	2	-1	-4	0
0.00007	0	SIN	0	0	0	1	0	-1	0
0.00006	0	SIN	0	0	0	0	0	3	0
0.00006	0	COS	0	0	0	2	0	-3	0
0.00006	1	SIN	0	0	0	2	0	-4	0
-0.00005	0	SIN	0	0	0	0	0	2	-2
-0.00005	0	SIN	0	0	0	1	-2	-2	0
-0.00005	0	SIN	0	0	0	0	2	2	0
0.00005	0	SIN	0	0	0	4	0	-9	0
0.00005	1	SIN	0	0	0	0	2	0	0

TABLE 4—*Continued*

SATURN (CONT.)

W

COEFFICIENT	T		5	7	8	19	21	22	25
0.00005	0	COS	0	0	0	2	2	-4	0
0.00005	0	SIN	0	0	0	0	0	2	-3
-0.00004	0	SIN	0	0	0	2	1	-6	0
-0.00004	0	SIN	0	0	0	2	-1	-6	0
-0.00004	2	SIN	0	0	0	0	0	1	0
0.00004	0	COS	0	0	0	2	1	-6	0
0.00004	0	COS	0	0	0	2	-1	-6	0
0.00004	0	COS	0	0	0	2	0	-2	0
-0.00004	0	SIN	0	0	0	0	0	1	-2
0.00004	0	COS	0	0	0	0	0	1	-1
-0.00004	0	SIN	0	1	1	0	1	0	0
-0.00003	0	SIN	0	0	0	1	2	-2	0
0.00003	1	SIN	0	0	0	4	0	-10	0
0.00003	1	COS	0	0	0	0	1	0	0
-0.00003	0	COS	0	0	0	0	2	1	0
0.00003	1	COS	0	0	0	4	0	-10	0
-0.00003	1	SIN	0	0	0	0	2	-1	0
-0.00002	0	SIN	0	0	0	3	0	-7	0
0.00002	1	COS	0	0	0	0	0	2	0
-0.00002	0	SIN	0	0	0	0	2	-2	0
-0.00002	0	COS	0	0	0	2	0	-7	0
-0.00002	0	COS	0	0	0	0	0	2	-2
-0.00002	0	COS	0	0	0	0	0	3	0
0.00002	0	SIN	0	0	0	3	0	-4	0
-0.00002	0	COS	0	0	0	3	0	-3	0
0.00002	0	COS	0	0	0	2	1	-5	0
0.00002	0	COS	0	0	0	2	-1	-5	0
0.00002	1	SIN	0	0	0	1	0	-1	0
0.00002	0	COS	0	0	0	1	2	-1	0
-0.00002	0	COS	0	0	0	1	-2	-1	0
-0.00002	1	COS	0	0	0	0	2	1	0
0.00002	0	COS	0	0	0	1	0	0	0
-0.00002	1	SIN	0	0	0	2	2	-5	0
0.00002	0	COS	0	0	0	2	-2	-6	0

URANUS

PLON

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
19397	0	SIN	0	0	0	0	0	0	1	0	0
570	0	SIN	0	0	0	0	0	0	2	0	0
-536	1	COS	0	0	0	0	0	0	1	0	0
143	0	SIN	0	0	0	0	1	0	-2	0	0
110	1	SIN	0	0	0	0	0	0	1	0	0
102	0	SIN	0	0	0	0	1	0	-3	0	0
76	0	COS	0	0	0	0	1	0	-3	0	0
-49	0	SIN	0	0	0	1	0	0	-1	0	0
32	2	COS	0	0	0	0	0	0	0	0	0
-30	1	COS	0	0	0	0	0	0	2	0	0
29	0	SIN	0	0	0	2	-6	0	3	0	0
29	0	COS	0	0	0	0	0	0	2	0	-2
-28	0	COS	0	0	0	0	0	0	1	0	-1
23	0	SIN	0	0	0	0	0	0	3	0	0
-21	0	COS	0	0	0	1	0	0	-1	0	0
20	0	SIN	0	0	0	0	0	0	1	0	-1
20	0	COS	0	0	0	0	1	0	-2	0	0
-19	0	COS	0	0	0	0	1	0	-1	0	0
17	0	SIN	0	0	0	0	0	0	2	0	-3
14	0	SIN	0	0	0	0	0	0	3	0	-3
13	0	SIN	0	0	0	0	1	0	-1	0	0
-12	2	COS	0	0	0	0	0	0	1	0	0
-12	0	COS	0	0	0	0	0	0	1	0	0
10	0	SIN	0	0	0	0	0	0	2	0	-2
-9	0	SIN	0	0	0	0	0	0	0	2	0
-9	2	SIN	0	0	0	0	0	0	1	0	0
9	0	COS	0	0	0	0	0	0	2	0	-3
8	1	COS	0	0	0	0	1	0	-2	0	0
7	1	COS	0	0	0	0	1	0	-3	0	0
-7	1	COS	0	0	0	0	1	0	-3	0	0
7	1	SIN	0	0	0	0	0	0	2	0	0
6	0	SIN	0	0	0	2	-6	0	2	0	0
6	0	COS	0	0	0	2	-6	0	2	0	0
5	0	SIN	0	0	0	0	1	0	-4	0	0
-4	0	SIN	0	0	0	0	0	0	3	0	-4
4	0	COS	0	0	0	0	0	0	3	0	-3
-3	0	COS	0	0	0	0	0	0	0	0	1
-2	0	SIN	0	0	0	0	0	0	0	0	1

URANUS (CONT.)

BETA

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
2775	0	SIN	0	0	0	0	0	0	0	1	0
131	0	SIN	0	0	0	0	0	0	1	-1	0
130	0	SIN	0	0	0	0	0	0	1	1	0

RP

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
19.21216	0	COS	0	0	0	0	0	0	0	0	0
-0.90154	0	COS	0	0	0	0	0	0	1	0	0
-0.02488	1	SIN	0	0	0	0	0	0	1	0	0
-0.02121	0	COS	0	0	0	0	0	0	2	0	0
-0.00585	0	COS	0	0	0	0	1	0	-2	0	0
-0.00508	1	COS	0	0	0	0	0	0	1	0	0
-0.00451	0	COS	0	0	0	1	0	0	-1	0	0
0.00336	0	SIN	0	0	0	0	1	0	-1	0	0
0.00198	0	SIN	0	0	0	1	0	0	-1	0	0
0.00118	0	COS	0	0	0	0	1	0	-3	0	0
0.00107	0	SIN	0	0	0	0	1	0	-2	0	0
-0.00103	1	SIN	0	0	0	0	0	0	2	0	0
-0.00081	0	COS	0	0	0	0	0	0	3	0	-3

V

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
0.39633	0	SIN	0	0	0	0	0	1	0	0	0
-0.02799	0	SIN	0	0	0	0	0	1	-1	0	0
0.02067	0	SIN	0	1	0	0	0	0	0	0	0
0.01232	0	SIN	0	0	0	0	0	0	0	1	0
0.00932	0	SIN	0	0	0	0	0	1	1	0	0
0.00087	0	SIN	0	0	0	0	0	0	1	-1	0
-0.00077	1	COS	0	0	0	0	0	1	-1	0	0
-0.00052	0	SIN	0	1	-1	0	0	0	0	0	0
0.00033	0	SIN	0	0	0	0	0	1	2	0	0
0.00029	0	SIN	0	0	0	0	0	0	1	1	0
-0.00026	1	COS	0	0	0	0	0	1	1	0	0
-0.00022	1	SIN	0	0	0	0	0	1	0	0	0
0.00019	0	SIN	0	0	0	0	1	-1	-2	0	0
0.00017	0	SIN	0	1	1	0	0	0	0	0	0
-0.00014	1	SIN	0	0	0	0	0	1	-1	0	0
0.00011	0	SIN	0	0	0	0	0	1	-2	0	0
0.00010	0	SIN	0	0	0	0	1	1	-3	0	0
-0.00009	0	SIN	0	0	0	1	0	1	-1	0	0
0.00009	0	SIN	0	0	0	0	1	-1	-3	0	0
0.00008	0	COS	0	0	0	0	1	1	-3	0	0
0.00008	0	SIN	0	0	0	0	1	1	-2	0	0
0.00007	0	COS	0	0	0	0	1	-1	-3	0	0
0.00006	2	COS	0	0	0	0	0	1	0	0	0
-0.00005	0	COS	0	0	0	0	1	1	-1	0	0
0.00005	1	SIN	0	0	0	0	0	1	1	0	0
-0.00004	0	COS	0	0	0	1	0	1	-1	0	0
-0.00004	0	COS	0	1	0	0	0	0	0	0	0
0.00004	0	COS	0	0	0	0	0	1	-2	0	2
-0.00003	0	COS	0	0	0	0	0	1	-1	0	1
0.00003	0	SIN	0	0	0	2	-6	1	3	0	0
0.00003	0	SIN	0	0	0	2	-6	-1	3	0	0
0.00003	0	COS	0	0	0	0	1	-1	-2	0	0
0.00002	0	SIN	0	0	0	0	1	1	0	0	0
-0.00002	0	SIN	0	0	0	0	1	-1	0	0	0
-0.00002	0	SIN	0	0	0	0	0	1	-3	0	3
-0.00002	1	COS	0	0	0	0	0	0	1	-1	0
0.00002	0	COS	0	0	0	0	0	1	1	0	-1
0.00002	0	COS	0	0	0	0	0	1	2	0	-2
0.00002	0	SIN	0	0	0	0	0	1	1	0	-1
-0.00002	0	SIN	0	0	0	0	0	1	-1	0	1
0.00002	0	SIN	0	0	0	0	0	1	0	-2	0
0.00002	0	SIN	0	0	0	0	0	1	2	0	-3
-0.00002	0	SIN	0	0	0	0	0	1	-2	0	3
0.00002	0	COS	0	0	0	0	1	-1	-1	0	0
-0.00002	0	SIN	1	0	0	0	0	1	0	0	0
-0.00002	0	SIN	1	0	0	0	0	-1	0	0	0
-0.00002	1	COS	0	0	0	0	0	1	2	0	0

U

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
1.00000	0	COS	0	0	0	0	0	0	0	0	0
0.10346	0	COS	0	1	0	0	0	-1	0	0	0

TABLE 4—*Continued*

URANUS (CONT.)

U

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
-0.09344	0	COS	0	0	0	0	0	0	1	0	0
-0.00731	0	COS	0	1	0	0	0	-1	1	0	0
-0.00260	0	COS	0	1	-1	0	0	-1	0	0	0
-0.00258	1	SIN	0	0	0	0	0	0	1	0	0
0.00243	0	COS	0	1	0	0	0	-1	-1	0	0
-0.00110	0	COS	0	0	0	0	0	0	2	0	0
0.00087	0	COS	0	1	1	0	0	-1	0	0	0
-0.00061	0	COS	0	0	0	0	1	0	-2	0	0
-0.00052	1	COS	0	0	0	0	0	0	1	0	0
-0.00047	0	COS	0	0	0	1	0	0	-1	0	0
0.00035	0	SIN	0	0	0	0	1	0	-1	0	0
0.00020	0	SIN	0	0	0	1	0	0	-1	0	0
-0.00020	1	SIN	0	1	0	0	0	-1	1	0	0
0.00020	0	SIN	0	1	0	0	0	-1	0	0	0
0.00018	0	COS	0	1	-1	0	0	-1	1	0	0
0.00013	0	COS	0	0	0	0	1	0	-3	0	0
0.00010	0	SIN	0	0	0	0	1	0	-2	0	0
-0.00009	0	COS	0	0	1	0	0	0	0	0	0
0.00009	0	COS	0	1	0	0	0	-1	-2	0	0
-0.00008	0	COS	0	0	0	0	0	0	3	0	-3
0.00008	0	SIN	0	0	0	0	0	0	2	0	-2
-0.00008	1	SIN	0	0	0	0	0	0	2	0	0
-0.00007	0	SIN	0	0	0	0	1	0	-3	0	0
-0.00006	0	SIN	0	0	0	0	0	0	1	0	-1
-0.00006	0	COS	0	1	1	0	0	-1	1	0	0
-0.00006	0	COS	0	1	-1	0	0	-1	-1	0	0
-0.00006	1	SIN	0	1	0	0	0	-1	-1	0	0
-0.00005	0	COS	0	1	0	0	1	-1	-2	0	0
-0.00004	1	COS	0	1	0	0	0	-1	1	0	0
0.00004	2	COS	0	0	0	0	0	0	1	0	0
0.00003	0	COS	0	0	0	1	0	0	0	0	0

W

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
0.08987	0	SIN	0	0	0	0	0	0	1	0	0
0.04980	0	SIN	0	1	0	0	0	-1	0	0	0
-0.04113	0	SIN	0	0	0	0	0	2	0	0	0
0.00290	0	SIN	0	0	0	0	0	2	-1	0	0
-0.00267	0	SIN	0	0	0	0	0	1	0	1	0
0.00267	0	SIN	0	0	0	0	0	1	0	-1	0
-0.00248	1	COS	0	0	0	0	0	0	1	0	0
-0.00215	0	SIN	0	1	0	0	0	1	0	0	0
-0.00125	0	SIN	0	1	-1	0	0	-1	0	0	0
-0.00097	0	SIN	0	0	0	0	0	2	1	0	0
0.00065	0	SIN	0	0	0	0	1	0	-2	0	0
0.00053	0	SIN	0	0	0	0	0	0	2	0	0
0.00051	1	SIN	0	0	0	0	0	0	1	0	0
0.00047	0	SIN	0	0	0	0	1	0	-3	0	0
0.00042	0	SIN	0	1	1	0	0	-1	0	0	0
0.00035	0	COS	0	0	0	0	1	0	-3	0	0
-0.00022	0	SIN	0	0	0	1	0	0	-1	0	0
-0.00019	0	SIN	0	0	0	0	0	1	1	-1	0
0.00019	0	SIN	0	0	0	0	0	1	-1	1	0
0.00015	2	COS	0	0	0	0	0	0	0	0	0
0.00014	0	SIN	0	0	0	2	-6	0	3	0	0
0.00013	0	COS	0	0	0	0	0	0	2	0	-2
-0.00013	0	COS	0	0	0	0	0	0	1	0	-1
-0.00010	0	COS	0	0	0	1	0	0	-1	0	0
-0.00010	0	COS	0	1	0	0	0	-1	0	0	0
0.00009	0	SIN	0	0	0	0	0	0	1	0	-1
0.00009	0	COS	0	0	0	0	1	0	-2	0	0
-0.00009	0	COS	0	0	0	0	1	0	-1	0	0
0.00008	0	SIN	0	0	0	0	0	0	2	0	-3
0.00008	1	COS	0	0	0	0	0	2	-1	0	0
-0.00008	0	SIN	1	0	0	0	0	0	0	0	0
0.00007	0	SIN	0	0	0	0	0	0	3	0	-3
-0.00006	2	COS	0	0	0	0	0	0	1	0	0
-0.00006	0	SIN	0	0	0	0	1	1	0	0	0
0.00006	0	SIN	0	0	0	0	0	1	-1	-1	0
-0.00006	0	COS	0	0	0	0	0	0	1	0	0
0.00005	0	SIN	0	1	-1	0	0	1	0	0	0
0.00005	1	SIN	0	0	0	0	0	2	0	0	0
0.00005	0	SIN	0	0	0	0	0	0	2	0	-2
-0.00004	0	SIN	0	0	0	0	0	0	0	2	0
0.00004	0	COS	0	0	0	0	0	0	2	0	-3
0.00003	1	COS	0	0	0	0	1	0	-3	0	0

URANUS (CONT.)

W

COEFFICIENT	T		5	7	8	19	22	24	25	26	28
-0.00003	0	SIN	0	0	0	0	0	2	2	0	0
-0.00003	2	SIN	0	0	0	0	0	0	1	0	0
0.00003	1	COS	0	0	0	0	1	0	-2	0	0
0.00003	0	SIN	0	0	0	0	1	0	-1	0	0
0.00003	0	SIN	0	0	0	2	-6	0	2	0	0
0.00003	1	COS	0	0	0	0	0	2	1	0	0
0.00003	0	COS	0	0	0	2	-6	0	2	0	0
-0.00003	1	SIN	0	0	0	0	1	0	-3	0	0
-0.00003	1	COS	0	0	0	0	0	0	2	0	0
-0.00002	0	COS	0	0	0	0	0	0	0	0	0
0.00002	0	SIN	0	0	0	0	0	0	3	0	0
-0.00002	0	SIN	0	0	0	0	0	0	3	0	-4
0.00002	0	COS	0	0	0	0	0	0	3	0	-3
-0.00002	0	SIN	0	0	0	0	1	-2	-2	0	0
-0.00002	0	SIN	0	1	1	0	0	1	0	0	0
0.00002	1	SIN	0	0	0	0	0	2	-1	0	0

NEPTUNE

PLON

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
3523	0	SIN	0	0	0	0	0	0	0	0	1	0
-50	0	SIN	0	0	0	0	0	0	0	0	0	2
-43	1	COS	0	0	0	0	0	0	0	0	1	0
29	0	SIN	0	0	0	1	0	0	0	0	-1	0
19	0	SIN	0	0	0	0	0	0	0	0	2	0
-18	0	COS	0	0	0	1	0	0	0	0	-1	0
13	0	COS	0	0	0	0	1	0	0	0	-1	0
13	0	SIN	0	0	0	0	1	0	0	0	-1	0
-9	0	SIN	0	0	0	0	0	0	2	0	-3	0
9	0	COS	0	0	0	0	0	0	2	0	-2	0
-5	0	COS	0	0	0	0	0	0	2	0	-3	0
-4	1	SIN	0	0	0	0	0	0	0	0	1	0
4	0	COS	0	0	0	0	0	0	1	0	-2	0
4	2	SIN	0	0	0	0	0	0	0	0	1	0

BETA

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
6404	0	SIN	0	0	0	0	0	0	0	0	0	1
55	0	SIN	0	0	0	0	0	0	0	0	1	1
55	0	SIN	0	0	0	0	0	0	0	0	1	-1
-33	1	SIN	0	0	0	0	0	0	0	0	0	1

RP

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
30.07175	0	COS	0	0	0	0	0	0	0	0	0	0
-0.25701	0	COS	0	0	0	0	0	0	0	0	1	0
-0.00787	0	COS	0	0	0	0	0	2	-1	-2	0	0
0.00409	0	COS	0	0	0	1	0	0	0	0	-1	0
-0.00314	1	SIN	0	0	0	0	0	0	0	0	1	0
0.00250	0	SIN	0	0	0	1	0	0	0	0	-1	0
-0.00194	0	SIN	0	0	0	0	1	0	0	0	-1	0
0.00185	0	COS	0	0	0	0	1	0	0	0	-1	0

V

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
0.39763	0	SIN	0	0	0	0	0	0	0	1	0	0
0.02846	0	SIN	0	0	0	0	0	0	0	0	0	1
0.01323	0	SIN	0	1	0	0	0	0	0	0	0	0
-0.00510	0	SIN	0	0	0	0	0	0	0	1	-1	0
0.00170	0	SIN	0	0	0	0	0	0	0	1	1	0
0.00036	0	SIN	0	0	0	0	0	0	0	1	1	-1
-0.00033	0	SIN	0	1	-1	0	0	0	0	0	0	0
-0.00021	1	SIN	0	0	0	0	0	0	0	1	0	0
-0.00015	1	SIN	0	0	0	0	0	0	0	0	0	1
0.00012	0	SIN	0	0	0	0	0	0	0	1	1	1
0.00011	0	SIN	0	1	1	0	0	0	0	0	0	0
0.00010	0	SIN	0	0	0	0	0	0	0	1	0	-2
-0.00006	1	COS	0	0	0	0	0	0	0	1	-1	0
0.00005	0	SIN	0	0	0	1	0	0	0	1	-1	0
0.00005	0	SIN	0	0	0	0	0	2	-1	-3	0	0
-0.00005	0	SIN	0	0	0	0	0	2	-1	-1	0	0
-0.00004	0	COS	0	1	0	0	0	0	0	0	0	0
-0.00003	0	COS	0	0	0	1	0	0	0	1	-1	0

TABLE 4—*Continued*

NEPTUNE (CONT.)

V

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
0.00003	0	COS	0	0	0	0	1	0	0	1	-1	0
0.00002	0	SIN	0	0	0	0	1	0	0	1	-1	0
0.00002	0	SIN	0	0	0	0	1	0	0	1	0	0
-0.00002	0	SIN	0	0	0	0	1	0	0	-1	0	0
-0.00002	1	COS	0	0	0	0	0	0	0	1	1	0
-0.00002	0	SIN	1	0	0	0	0	0	0	1	0	0
-0.00002	0	SIN	1	0	0	0	0	0	0	-1	0	0

U

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
1.00000	0	COS	0	0	0	0	0	0	0	0	0	0
0.06640	0	COS	0	1	0	0	0	0	0	-1	0	0
-0.01707	0	COS	0	0	0	0	0	0	0	0	1	0
-0.00167	0	COS	0	1	-1	0	0	0	0	-1	0	0
-0.00085	0	COS	0	1	0	0	0	0	0	-1	1	0
0.00056	0	COS	0	1	1	0	0	0	0	-1	0	0
-0.00052	0	COS	0	0	0	0	0	2	-1	-2	0	0
0.00028	0	COS	0	1	0	0	0	0	0	-1	-1	0
0.00028	0	COS	0	0	0	1	0	0	0	0	-1	0
-0.00021	1	SIN	0	0	0	0	0	0	0	0	1	0
0.00020	0	SIN	0	1	0	0	0	0	0	-1	0	0
0.00017	0	SIN	0	0	0	1	0	0	0	0	-1	0
-0.00013	0	SIN	0	0	0	0	1	0	0	0	-1	0
0.00012	0	COS	0	0	0	0	1	0	0	0	-1	0
-0.00011	0	SIN	0	0	0	0	0	0	1	0	-1	0
-0.00007	0	COS	0	0	0	0	0	0	1	0	-1	0
-0.00004	0	COS	0	0	1	0	0	0	0	0	0	0
0.00003	1	COS	0	0	0	0	0	0	0	0	1	0

W

COEFFICIENT	T		5	7	8	19	22	24	25	27	28	29
-0.04126	0	SIN	0	0	0	0	0	0	0	2	0	0
0.03186	0	SIN	0	1	0	0	0	0	0	-1	0	0
0.01636	0	SIN	0	0	0	0	0	0	0	0	1	0
-0.00617	0	SIN	0	0	0	0	0	0	0	1	0	1
0.00617	0	SIN	0	0	0	0	0	0	0	1	0	-1
-0.00137	0	SIN	0	1	0	0	0	0	0	1	0	0
-0.00080	0	SIN	0	1	-1	0	0	0	0	-1	0	0
0.00053	0	SIN	0	0	0	0	0	0	0	2	-1	0
0.00027	0	SIN	0	1	1	0	0	0	0	-1	0	0
-0.00023	0	SIN	0	0	0	0	0	0	0	0	0	2
-0.00020	1	COS	0	0	0	0	0	0	0	0	1	0
-0.00018	0	SIN	0	0	0	0	0	0	0	2	1	0
0.00013	0	SIN	0	0	0	1	0	0	0	0	-1	0
-0.00010	0	COS	0	1	0	0	0	0	0	-1	0	0
-0.00008	0	COS	0	0	0	1	0	0	0	0	-1	0
0.00008	0	SIN	0	0	0	0	0	0	0	1	-1	1
-0.00008	0	SIN	0	0	0	0	0	0	0	1	1	-1
-0.00008	0	SIN	1	0	0	0	0	0	0	0	0	0
0.00006	0	COS	0	0	0	0	1	0	0	0	-1	0
0.00006	0	SIN	0	0	0	0	1	0	0	0	-1	0
0.00005	1	SIN	0	0	0	0	0	0	0	2	0	0
-0.00004	0	SIN	0	0	0	0	0	0	2	0	-3	0
0.00004	0	COS	0	0	0	0	0	0	2	0	-2	0
0.00004	1	SIN	0	0	0	0	0	0	0	1	0	1
-0.00004	1	SIN	0	0	0	0	0	0	0	1	0	-1
0.00003	0	SIN	0	1	-1	0	0	0	0	1	0	0
-0.00003	0	SIN	0	0	0	0	0	0	0	1	1	1
0.00003	0	SIN	0	0	0	0	0	0	0	1	-1	-1
-0.00002	0	COS	0	0	0	0	0	0	2	0	-3	0
0.00002	0	COS	0	0	0	0	0	0	1	0	-2	0
-0.00002	0	COS	0	0	0	0	0	0	0	0	0	0
-0.00002	1	SIN	0	0	0	0	0	0	0	0	1	0

PLUTO

PLON

COEFFICIENT	T		31	32	33	7
101577	0	SIN	0	1	0	0
15517	0	SIN	0	2	0	0
-3593	0	SIN	0	0	2	0
3414	0	SIN	0	3	0	0
-2201	0	SIN	0	1	-2	0
-1871	0	SIN	0	1	2	0
839	0	SIN	0	4	0	0

PLUTO (CONT.)

PLON

COEFFICIENT	T		31	32	33	7
-757	0	SIN	0	2	2	0
-285	0	SIN	0	3	2	0
227	2	SIN	0	1	0	0
218	0	SIN	0	2	-2	0
200	1	SIN	0	1	0	0

BETA

COEFFICIENT	T		31	32	33	7
57726	0	SIN	0	0	1	0
15257	0	SIN	0	1	-1	0
14102	0	SIN	0	1	1	0
3870	0	SIN	0	2	1	0
1138	0	SIN	0	3	1	0
472	0	SIN	0	2	-1	0
353	0	SIN	0	4	1	0
-144	0	SIN	0	1	-3	0
-119	0	SIN	0	0	3	0
-111	0	SIN	0	1	3	0

RP

COEFFICIENT	T		31	32	33	7
40.74638	0	COS	0	0	0	0
-9.58235	0	COS	0	1	0	0
-1.16703	0	COS	0	2	0	0
-0.22649	0	COS	0	3	0	0
-0.04996	0	COS	0	4	0	0

V

COEFFICIENT	T		31	32	33	7
0.36074	0	SIN	1	0	0	0
0.25069	0	SIN	0	0	1	0
-0.13853	0	SIN	1	-1	0	0
0.09627	0	SIN	0	1	-1	0
0.04406	0	SIN	1	1	0	0
0.03062	0	SIN	0	1	1	0
0.00963	0	SIN	0	0	0	1
0.00820	0	SIN	1	0	-2	0
0.00804	0	SIN	1	2	0	0
0.00559	0	SIN	0	2	1	0
-0.00315	0	SIN	1	1	-2	0
0.00290	0	SIN	1	-2	0	0
-0.00201	0	SIN	0	2	-1	0
0.00180	0	SIN	1	3	0	0
0.00125	0	SIN	0	3	1	0
0.00100	0	SIN	1	-1	-2	0

U

COEFFICIENT	T		31	32	33	7
1.00000	0	COS	0	0	0	0
-0.45051	0	COS	0	1	0	0
0.04386	0	COS	1	0	0	-1
-0.02752	0	COS	0	2	0	0
-0.01684	0	COS	1	-1	0	-1
0.00536	0	COS	1	1	0	-1
-0.00399	0	COS	0	3	0	0

W

COEFFICIENT	T		31	32	33	7
0.43986	0	SIN	0	1	0	0
-0.05438	0	SIN	1	0	1	0
0.05438	0	SIN	1	0	-1	0
-0.03744	0	SIN	2	0	0	0
-0.02319	0	SIN	1	0	0	-1
-0.02088	0	SIN	1	1	-1	0
0.02088	0	SIN	1	-1	1	0
-0.01974	0	SIN	0	0	2	0
0.01438	0	SIN	2	-1	0	0
0.01240	0	SIN	0	2	0	0
-0.00758	0	SIN	0	1	-2	0
-0.00664	0	SIN	1	1	1	0
0.00664	0	SIN	1	-1	-1	0
-0.00457	0	SIN	2	1	0	0

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TABLE 4—*Continued*

COEFFICIENT	T		31	32	33	7

PLUTO (CONT.)

W

COEFFICIENT	T		TRIGONOMETRIC ARGUMENTS 31 32 33 7			
0.00416	0	SIN	0	3	0	0
-0.00241	0	SIN	0	1	2	0
-0.00121	0	SIN	1	2	1	0
0.00121	0	SIN	1	-2	-1	0
0.00102	0	SIN	0	4	0	0
-0.00100	0	SIN	1	0	0	1
0.00098	2	SIN	0	1	0	0
0.00087	1	SIN	0	1	0	0
-0.00085	0	SIN	2	0	-2	0
-0.00084	0	SIN	2	2	0	0
-0.00074	0	COS	0	0	0	0
-0.00065	0	SIN	0	5	0	0

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