

ASTRONOMICAL EPHEMERIS
of
Geocentric Places of Planets
for
1947

With Tables of Houses for
MADRAS AND BOMBAY.



Indian Standard Time observed throughout.

Published by
Shree Jiwaji Observatory, Ujjain,
with the sanction of Education Department,
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## PREFACE.

The general arrangement of matter in this Ephemeris for 1947 is the same as it was in our previous issues. The only change made in this issue is the substitution of Heliocentric Places of Planets for the Nodal Ephemeris of Mercury and Mars.

Thanks are due to Mr. A. K. Shirke, the Manager, A. D. Press, Lashkar, and his staff for the utmost care shown by them during the printing of this work.

Superintendent.

Shree Jiwajee Observatory.

Ujjain.

Ujjain, October 1946.

## EXPLANATIONS.

### I. Sidereal Time.

To find the Sidereal Time at a place corresponding to a moment given in Standard Time (old style)—

*Formula.*—The Sid. Time =  $S \pm (I + I' + I'') \pm L$ , where

$S$  = Sid. Time at Ujjain Mean Noon (as given in this Eph.).

$I$  = Interval between the given moment and Ujjain Mean Noon (i. e., 12h. 26m. 40s. I. S. T.). This is positive or negative according as the given moment is after or before noon.

$I'$  = The motion of Sid. Time corresponding to the interval  $I$ .

$I''$  = The motion of Sid. Time corresponding to the interval  $L$ .

$L$  = The Longitude of the place when measured from Ujjain. This is positive or negative according as the place is to the East or West of Ujjain.

*Note.*— $L$  is to be measured in time and the motion of the Sid. Time for  $I'$  and  $I''$  is 9.86 seconds per mean solar hour or .16 sec. per minute.

### II. The table of Ascendants and M. C.

This table gives the position of the Ascendant for each degree of latitude in India, corresponding to a given Sidereal time. The table for M. C. is applicable for every place and it gives the point of the zodiac transiting a place at a given sidereal time.

### III. The Sunrise and Sunset.

The moments are given in local time.

### IV.

*A Note on Units of time.*

1. There are 3 kinds of Periods in the planetary movement.

(i) *The Sidereal Period* of a planet (its true period of revolution round the Sun) is the time it takes to make a complete circuit round the star sphere, as seen from the Sun and not from the earth.

(ii) *The Anomalistic Period* is the interval between successive returns to the perihelion or aphelion.

(iii) *The Synodic Period* is the interval between successive conjunctions of the planet with the Sun.

## A DAY.

2. The 'Day', reckoned with respect to any body, is the interval between its successive returns to the meridian.

- (i) *The Mean Solar Day* is the interval between the successive transits of the Mean Sun across a meridian. It is divided into 24 mean hours. Its variation from true Solar Day, *i. e.*, the interval between two successive transits of TRUE SUN is about 48 seconds.
- (ii) *The Mean Sidereal Day* is the interval between successive transits of the Mean Equinox across the meridian. Its value is 23h. 56m. 4.0905s. Mean Solar Time.
- (iii) *The True Sidereal Day* is the exact period of the Earth's axial rotation, as shown by successive transits of a star across the meridian. Its value is 23h. 56m. 4.0996s. Measured in Mean solar Time
- (iv) *The ordinary Lunar Day* is the interval between successive transits of the Moon across the meridian. It varies from 24h. 38m. to 25h. 6m. and averages 24h. 51m.

## A MONTH.

- 3. (i) *The Synodic Month* or Luration (29.5306 days) is the period from New Moon to New Moon. New moons recur on the same day of the year every 19 years. This cycle is called the Metonic Cycle. The more accurate "Calippic Cycle" has 76 years or 940 Lunations.
- (ii) *The Anomalistic Month* (27.5546 days) is the interval between successive positions of the Moon at its Perigee.
- (iii) *The Nodical Month* (27.2122 days) is the interval between moon's position from one of its nodes to the same node again.
- (iv) *The Sidereal Month* (27.3217 days) is the period in which the moon makes a complete circuit on the starry sphere.

## THE YEAR.

- 4 (i) *The Solar, Equinoctial or Tropical Year* (365.2422 mean solar days or 366.2422 sidereal days) is the period between the successive returns of the Sun to the same equinox, or to the solstitial point, and is the period in which the seasons recur.

- (ii) *The Sidereal Year* (365.2564 days) is the interval between successive conjunctions of the Earth with a star, as seen from the centre of the Sun.
- (iii) *The Anomalistic Year* (365.2596 days) is the mean interval between the Earth's return to the Perihelion.
- (iv) *The Julian Year* as used in our Calendar consists of exactly 365.25 days.
- (v) *The Lunar Year* (354.3670 days) consists of 12 Lunations and is used in the Mohammedan Calendar.
- (vi) *The Eclipse Year* (346.6200 days) is the interval between successive returns of the Sun to the same node. It is interesting to note that 19 such years contain 6585.78 days which are equivalent to the ancient "SAROS" cycle of 18 years and 11 days in which the same eclipses occur regularly for over a long period.
- (vii) *The Bessel's Fictitious Year* used in N. A. begins at the instant when the Sun's Longitude is exactly 280°.

## Mean Places of Principal Stars on 1st January 1947.

| Names.         | Stars.      | Mag | R. | A. | Decl.   | Long.  | Lat.    |
|----------------|-------------|-----|----|----|---------|--------|---------|
|                |             |     | H. | M. | °       | °      | °       |
| ♄ Andromeda    | U. Bhadra   | 2.1 | 0  | 6  | + 28 47 | 13 32  | + 25 41 |
| ♄ Pegasi ..    | U. Bhadra   | 2.8 | 0  | 10 | + 14 53 | 8 25   | + 12 36 |
| ♄ Piscium ..   | Revati.     | 5.6 | 1  | 11 | + 7 17  | 19 8   | - 0 13  |
| ♄ Eridani ..   | Achernar.   | 0.6 | 1  | 36 | - 57 31 | 344 34 | - 59 23 |
| ♄ Polaris ..   | Dhruva.     | 2.1 | 1  | 45 | + 89 0  | 87 50  | + 66 6  |
| ♄ Arietes ..   | Ashvini.    | 2.7 | 1  | 52 | + 20 32 | 33 14  | + 8 29  |
| ♄ Arietes ..   | Ashvini.    | 2.2 | 2  | 4  | + 23 12 | 36 56  | + 9 58  |
| ♄ Arietes ..   | Bharani.    | 3.7 | 2  | 47 | + 27 2  | 47 28  | + 10 27 |
| ♄ Persei ..    | Algol'      | Var | 3  | 5  | + 40 45 | 45 26  | + 22 25 |
| ♄ Tauri ..     | Krittika.   | 3.0 | 3  | 44 | + 23 56 | 59 15  | + 4 3   |
| ♄ Tauri ..     | Rohini.     | 1.1 | 4  | 33 | + 16 24 | 69 3   | - 5 28  |
| ♄ Orionis ..   | Rigel'      | 0.3 | 5  | 12 | - 8 16  | 76 6   | - 31 8  |
| ♄ Aurigee ..   | Capella.    | 0.2 | 5  | 13 | + 45 57 | 81 7   | + 22 52 |
| ♄ Orionis ..   | Bellatrix.  | 1.7 | 5  | 22 | + 6 18  | 80 13  | - 16 49 |
| ♄ Orionis ..   | Mrigashirsh | 4.5 | 5  | 32 | + 9 27  | 82 52  | - 13 50 |
| ♄ Orionis ..   | Mrig Bana   | 1.7 | 5  | 33 | - 1 14  | 82 44  | - 24 31 |
| ♄ Orionis ..   | Ardra.      | 0.9 | 5  | 52 | + 7 24  | 88 1   | - 16 2  |
| ♄ Carinae ..   | Agastya.    | 0.9 | 6  | 23 | - 52 40 | 104 14 | - 75 50 |
| ♄ Canis Majori | Vyadha      | 1.6 | 6  | 43 | - 16 38 | 103 21 | - 39 36 |
| ♄ Geminorum    | Castor'     | 2.0 | 7  | 31 | + 32 1  | 109 30 | + 10 5  |
| ♄ Canis Minor  | Prashva.    | 0.5 | 7  | 36 | + 5 22  | 115 4  | - 16 0  |
| ♄ Geminorum    | Ponarvasu   | 1.2 | 7  | 42 | + 28 10 | 112 30 | + 6 41  |
| ♄ Cancri ..    | Pushya      | 4.1 | 8  | 42 | + 18 21 | 127 59 | + 0 4   |
| ♄ Cancri ..    | A nle-ha.   | 4.3 | 8  | 55 | + 12 4  | 132 54 | - 5 5   |
| ♄ Leonis ..    | Magha.      | 1.3 | 10 | 5  | + 12 4  | 149 6  | + 0 27  |
| ♄ Leonis ..    | Purva.      | 2.6 | 11 | 11 | + 20 49 | 160 35 | + 14 20 |
| ♄ Leonis ..    | Uttara.     | 2.2 | 11 | 46 | + 14 53 | 170 53 | + 12 16 |
| ♄ Corvi ..     | Hasta.      | 3.1 | 12 | 27 | - 16 12 | 192 43 | - 12 11 |
| ♄ Virginis ..  | Chitra      | 1.2 | 13 | 22 | - 10 52 | 203 6  | - 2 3   |
| ♄ Bootes ..    | Swati.      | 0.2 | 14 | 13 | + 19 28 | 203 30 | + 30 46 |
| ♄ Libra ..     | Vishakaha   | 2.9 | 14 | 48 | - 15 49 | 224 21 | + 0 20  |
| ♄ Scorpii ..   | Anuradha.   | 2.5 | 15 | 57 | - 22 28 | 241 50 | - 1 59  |
| ♄ Scorpii ..   | Jyeshtha.   | 1.2 | 16 | 26 | - 26 19 | 249 2  | - 4 34  |
| ♄ Scorpii ..   | Mool.       | 1.7 | 17 | 30 | - 37 4  | 263 51 | - 13 47 |
| ♄ Sagittarus.. | P. Shadha.  | 2.8 | 18 | 17 | - 29 51 | 273 51 | - 6 28  |
| ♄ Sagittarus   | P. Shadha.  | 1.9 | 18 | 21 | - 34 25 | 274 21 | - 11 2  |
| ♄ Sagittarus.. | U. Shadha.  | 2.1 | 18 | 52 | - 26 22 | 281 39 | - 3 26  |
| ♄ Lyrae ..     | Abnaji.     | 0.1 | 18 | 35 | + 38 44 | 284 35 | + 61 44 |
| ♄ Aquillae ..  | Shravana    | 0.9 | 19 | 48 | + 8 43  | 301 2  | + 29 18 |
| ♄ Delphini ..  | Dhanistha   | 3.7 | 20 | 35 | + 14 24 | 315 36 | + 31 55 |
| ♄ Delphini ..  | Dhanistha   | 3.8 | 20 | 37 | + 15 43 | 316 39 | + 33 2  |
| ♄ Cygni ..     | Deneb.      | 1.3 | 20 | 40 | + 45 5  | 334 36 | + 59 55 |
| ♄ Aquarii ..   | Shatabhij.  | 3.8 | 22 | 50 | - 7 52  | 340 50 | - 0 23  |
| ♄ Piscis Astr. | Fomalhaut   | 1.3 | 22 | 55 | - 29 55 | 333 7  | - 21 8  |
| ♄ Pegasi ..    | P. Bhadra   | 2.6 | 23 | 1  | + 27 47 | 358 38 | + 31 8  |
| ♄ Pegasi ..    | P. Bhadra   | 2.6 | 23 | 2  | + 14 55 | 352 45 | + 19 24 |

## EPHEMERIS

OF

Planets' Places for 1947.

## INTRODUCTION.

THE places of the Sun, Moon and the Planets given in the following pages are *Sayan* and are true for the mean equinox of 1947. They are given for 12 o'clock noon Indian Standard Time (I.S.T.) which is 5½ hours in advance of Greenwich Mean Time, but, for convenience, the *Sidereal Time* is given for the *Mean Noon, Ujjain Local Time*.\*

*Nirayana* places are obtained by subtracting the *Ayanamshas* from the *Sayan* places. These *Ayanamshas*, according to different systems prevalent in India, are as follows:—

|                            |             |               |           |
|----------------------------|-------------|---------------|-----------|
| <i>Grahalaghav</i>         | 23° 44' 25" | <i>Chitra</i> | 23° 6' 7" |
| <i>Raviat (Zeta Pisc.)</i> | 19° 7' 55"  | <i>Madras</i> | 21° 40'   |

It should be noted that the *Tithis* are the same both in the *Sayan* and the *Nirayana* systems.

## EXPLANATION OF SYMBOLS.

| Planets.             | Signs.         | Aspects.                |
|----------------------|----------------|-------------------------|
| ☉ Sun.               | ♈ Aries.       | ♄ Conjunction = 0°      |
| ☾ Moon.              | ♉ Taurus.      | ♊ Semi-Sextile = 30     |
| ♇ Pluto.             | ♊ Gemini.      | ♈ Semi-Quintile = 36°   |
| ♆ Neptune.           | ♋ Cancer.      | ♌ Semi-Square = 45°     |
| ♅ Herschel (Uranus). | ♌ Leo.         | * Sextile = 60°         |
| ♄ Saturn.            | ♍ Virgo.       | ♊ Quintile = 72°        |
| ♃ Jupiter.           | ♎ Libra.       | ♈ Square = 90°          |
| ♂ Mars.              | ♏ Scorpio.     | ♈ Trine = 120°          |
| ♀ Venus.             | ♐ Sagittarus.  | ♊ Sesqui-quadrant = 135 |
| ☿ Mercury.           | ♑ Capricornus. | ♈ Bi-quintile = 144°    |
| ♁ Earth.             | ♒ Aquarius.    | ♈ Quincunx = 150°       |
| ♊ Rahu.              | ♓ Pisces.      | ♈ Opposition = 180°     |

\*The ending moments of *Tithis* are calculated to keep uniformity.

| 2    |        | JANUARY, 1947. |       |        |        |         |        |          |        |         |       | S. J. O. UJJAIN |    |
|------|--------|----------------|-------|--------|--------|---------|--------|----------|--------|---------|-------|-----------------|----|
| Date | Day    | Sidereal Time. |       | ☉      |        | ☽       |        | Midnight |        | ψ       |       |                 |    |
|      |        | H.             | M.    | S.     | Long.  | Decl.   | Long.  | Lat.     | Decl.  | ψ       |       |                 |    |
| 1    | W.     | 18             | 40    | 22     | 10 0   | 20      | 23 S 4 | 19 22    | 4 S 11 | 3 N 45  | 26 14 | 10 46           |    |
| 2    | Th.    |                | 44    | 18     | 11     | 1 29    | 0 3 8  | 9        | 3 15   | 9 30    | 10 12 | 47              |    |
| 3    | F.     |                | 48    | 15     | 12     | 2 38    | 22 55  | 17       | 20     | 2 34    | 14 58 | 24              | 47 |
| 4    | S.     |                | 52    | 11     | 13     | 3 47    | 49 1   | 11 54    | 0 52   | 19 5    | 9 19  | 47              |    |
| 5    | Su.    |                | 56    | 7      | 14     | 4 55    | 43 16  | 48       | 0 N 29 | 23 16   | 24 20 | 47              |    |
| 6    | M.     | 19             | 0     | 3      | 15     | 6 4     | 36 1   | 56       | 1 50   | 25 15   | 9 32  | 47              |    |
| 7    | Tu.    |                | 4     | 0      | 16     | 7 11    | 29 17  | 8        | 3 32   | 25 24   | 43    | 47              |    |
| 8    | W.     |                | 7     | 56     | 17     | 8 19    | 21 2   | 15 4     | 2 23   | 36 9    | 44    | 48              |    |
| 9    | Th.    |                | 11    | 52     | 18     | 9 27    | 13 17  | 8        | 4 44   | 20 12   | 24    | 48              |    |
| 10   | F.     |                | 15    | 48     | 19     | 10 35   | 5 1    | 1 38     | 5 7    | 15 40   | 8 25  | 48              |    |
| 11   | S.     |                | 19    | 45     | 20     | 11 42   | 21 56  | 15 40    | 5 10   | 10 25   | 22 30 | 48              |    |
| 12   | Su.    |                | 23    | 41     | 21     | 12 50   | 47 29  | 12 4     | 55 4   | 53 6    | 48    | 48              |    |
| 13   | M.     |                | 27    | 38     | 22     | 13 57   | 37 12  | 17 4     | 26 0   | 54 18   | 40    | 48              |    |
| 14   | Tu.    |                | 31    | 34     | 23     | 15 5    | 27 24  | 57 3     | 44 6   | 2 1     | 9     | R 48            |    |
| 15   | W.     |                | 35    | 31     | 24     | 16 12   | 17 7   | 16 2     | 53 11  | 13 13   | 19    | 48              |    |
| 16   | Th.    |                | 39    | 27     | 25     | 17 19   | 5 19   | 19 1     | 55 15  | 43 25   | 17    | 48              |    |
| 17   | F.     |                | 43    | 23     | 26     | 18 25   | 20 54  | 1 12     | 0 53   | 19 33   | 7 6   | 48              |    |
| 18   | S.     |                | 47    | 20     | 27     | 19 32   | 42 12  | 59 0     | 51 11  | 22 33   | 18 52 | 48              |    |
| 19   | Su.    |                | 51    | 17     | 28     | 20 38   | 30 24  | 45 1     | 14 24  | 34 0    | 39    | 48              |    |
| 20   | M.     |                | 55    | 13     | 29     | 21 44   | 18 6   | 34 2     | 14 25  | 30 12   | 30    | 48              |    |
| 21   | Tu.    |                | 59    | 10     | 0      | 22 49   | 5 18   | 27 3     | 8 25   | 16 24   | 26    | 47              |    |
| 22   | W.     | 20             | 3     | 6      | 1      | 23 53   | 19 52  | 0 27     | 3 53   | 23 52   | 6 30  | 47              |    |
| 23   | Th.    |                | 7     | 3      | 2      | 24 56   | 38 12  | 36 4     | 31 21  | 21 18   | 43    | 47              |    |
| 24   | F.     |                | 10    | 59     | 3      | 26 0    | 25 24  | 54 4     | 54 17  | 51 1    | 7     | 46              |    |
| 25   | S.     |                | 14    | 55     | 4      | 27 2    | 10 7   | 23 5     | 5 13   | 31 13   | 41    | 46              |    |
| 26   | Su.    |                | 18    | 52     | 5      | 28 3    | 18 56  | 20 2     | 5 1    | 8 34    | 26 27 | 45              |    |
| 27   | M.     |                | 22    | 48     | 6      | 29 3    | 41 2   | 54 4     | 41 3   | 8 9     | 24    | 45              |    |
| 28   | Tu.    |                | 26    | 44     | 7      | 30 1    | 24 15  | 58 4     | 7 2    | N 29    | 22 36 | 44              |    |
| 29   | W.     |                | 30    | 41     | 8      | 30 59   | 9 29   | 18 3     | 19 7   | 59 6    | 5     | 44              |    |
| 30   | Th.    |                | 34    | 38     | 9      | 31 55   | 17 53  | 12 56    | 2 18   | 13 32   | 19 52 | 43              |    |
| 31   | F.     |                | 38    | 35     | 10     | 32 53   | 36 26  | 51 1     | 8 18   | 21 3    | 56    | 43              |    |
| Date | ψ      | ☽              |       | ☿      |        | ♂       |        | ♂        |        | ♂       |       |                 |    |
|      |        | Lat.           | Decl. | Lat.   | Decl.  | Lat.    | Decl.  | Lat.     | Decl.  | Lat.    | Decl. |                 |    |
| 1    | 1 N 30 | 2 S 53         | 0 N 5 | 23 N 4 | 0 N 32 | 18 N 57 | 1 N 0  | 16 S 55  | 0 S 52 | 23 S 50 |       |                 |    |
| 3    | "      | "              | "     | "      | "      | 32 19   | 0      | 0        | 59     | 53      | 43    |                 |    |
| 5    | "      | "              | "     | "      | "      | 33      | 2      | 0        | 17     | 4       | 54    | 34              |    |
| 7    | "      | "              | "     | "      | 23     | 3       | 33     | 4        | 0      | 10      | 55    | 25              |    |
| 9    | "      | "              | "     | "      | "      | 33      | 7      | 1        | 15     | 55      | 14    |                 |    |
| 11   | "      | "              | "     | "      | "      | 34      | 9      | 1        | 20     | 56      | 2     |                 |    |
| 13   | 1 " 31 | 2 " 52         | "     | 23 " 2 | 34     | 12      | 1      | 25       | 57     | 22      | 49    |                 |    |
| 15   | "      | "              | "     | "      | "      | 34      | 14     | 1        | 29     | 58      | 35    |                 |    |
| 17   | "      | "              | "     | "      | "      | 35      | 17     | 1        | 33     | 58      | 20    |                 |    |
| 19   | "      | "              | "     | "      | 23     | 1       | 35     | 20       | 2      | 38      | 59    | 4               |    |
| 21   | "      | 2 " 51         | "     | "      | 35     | 22      | 2      | 42       | 59     | 21      | 47    |                 |    |
| 23   | "      | "              | "     | "      | 36     | 25      | 2      | 46       | 1      | 0       | 30    |                 |    |
| 25   | "      | 2 " 50         | "     | 23 " 0 | 36     | 28      | 2      | 50       | 1      | 11      |       |                 |    |
| 27   | "      | "              | "     | "      | 36     | 30      | 3      | 54       | 1      | 20      | 51    |                 |    |
| 29   | "      | 2 " 49         | "     | "      | 36     | 33      | 3      | 57       | 2      | 30      |       |                 |    |
| 31   | "      | "              | "     | "      | 37     | 36      | 3      | 18       | 0      | 2       | 8     |                 |    |

| 3    |        | JANUARY, 1947. |        |         |       |        |                |      |    |       |    | EPHEMERIS.                |   |
|------|--------|----------------|--------|---------|-------|--------|----------------|------|----|-------|----|---------------------------|---|
| Date |        | Longitudes.    |        |         |       |        | Lunar Aspects. |      |    |       |    |                           |   |
|      |        | ☽              | ☿      | ♂       | ♂     | ♂      | ☉              | ☽    | ☿  | ♂     | ♂  | ☉                         | ☽ |
| 1    | 18     | 57             | 7      | 22      | 20    | 24     | 11             | 18   | 26 | 39    | 27 | 14                        |   |
| 2    | R      | 55             | R      | 18      | 35    | 12     | 4              | 27   | 21 | 28    | 44 |                           |   |
| 3    | 53     |                | 14     |         | 47    | 50     | 28             | 4    | 0  | 15    |    |                           |   |
| 4    | 51     |                | 10     |         | 57    | 13     | 36             | 49   | 1  | 47    |    |                           |   |
| 5    | 48     |                | 5      | 21      | 6     | 14     | 22             | 29   | 35 | 3     | 20 |                           |   |
| 6    | 46     |                | 1      |         | 1     | 15     | 8              | 0    | 22 | 4     | 53 |                           |   |
| 7    | 44     | 6              | 57     |         | 27    | 55     | 1              | 10   | 6  | 26    |    |                           |   |
| 8    | 42     |                | 52     |         | 37    | 16     | 41             | 58   | 7  | 59    |    |                           |   |
| 9    | 39     |                | 48     |         | 47    | 17     | 2              | 47   | 9  | 33    |    |                           |   |
| 10   | 37     |                | 43     |         | 57    | 18     | 1              | 3    | 37 | 11    |    |                           |   |
| 11   | 35     |                | 39     | 22      | 6     | 59     | 4              | 2    | 12 | 41    |    |                           |   |
| 12   | 33     |                | 34     |         | 16    | 19     | 46             | 5    | 20 | 14    |    |                           |   |
| 13   | 31     |                | 30     |         | 26    | 20     | 32             | 6    | 13 | 15    |    |                           |   |
| 14   | 29     |                | 25     |         | 35    | 21     | 19             | 7    | 6  | 17    |    |                           |   |
| 15   | 27     |                | 20     |         | 45    | 22     | 5              | 8    | 0  | 19    |    |                           |   |
| 16   | 25     |                | 15     |         | 54    |        | 51             | 8    | 55 | 20    |    |                           |   |
| 17   | 23     |                | 10     | 23      | 3     | 23     | 38             | 9    | 50 | 22    |    |                           |   |
| 18   | 21     |                | 5      |         | 12    | 24     | 25             | 10   | 46 | 23    |    |                           |   |
| 19   | 19     |                | 0      |         | 20    | 25     | 11             | 11   | 43 | 25    |    |                           |   |
| 20   | 18     | 5              | 55     |         | 29    |        | 58             | 12   | 40 | 27    |    |                           |   |
| 21   | 16     |                | 51     |         | 37    | 26     | 44             | 13   | 37 | 28    |    |                           |   |
| 22   | 15     |                | 46     |         | 46    | 27     | 31             | 14   | 35 | 0     | 36 |                           |   |
| 23   | 13     |                | 41     |         | 55    | 28     | 18             | 15   | 34 | 2     | 17 |                           |   |
| 24   | 12     |                | 36     | 24      | 4     | 29     | 4              | 16   | 33 | 3     | 58 |                           |   |
| 25   | 10     |                | 31     |         | 12    |        | 50             | 17   | 33 | 5     | 40 |                           |   |
| 26   | 8      |                | 26     |         | 21    | 0      | 37             | 18   | 33 | 7     | 23 |                           |   |
| 27   | 6      |                | 21     |         | 29    | 1      | 25             | 19   | 33 | 9     | 6  |                           |   |
| 28   | 5      |                | 16     |         | 37    | 2      | 12             | 20   | 34 | 10    | 0  |                           |   |
| 29   | 3      |                | 12     |         | 45    |        | 58             | 21   | 35 | 12    | 35 |                           |   |
| 30   | 2      |                | 7      |         | 51    | 3      | 45             | 22   | 37 | 14    | 2  |                           |   |
| 31   | 1      |                | 2      |         | 56    | 4      | 3              | 23   | 38 | 16    | 7  |                           |   |
| Date |        | ☽              |        | ☿       |       | Moon's |                | Date |    | Time. |    | Phenomena.                |   |
|      |        | Lat.           | Decl.  | Lat.    | Decl. | ☽      |                |      |    |       |    |                           |   |
| 1    | 3 N 59 | 15 S 32        | 0 S 29 | 23 S 53 | 11    | 37     | 3              | 11   | 20 | 20    | 20 | ☉ at Perihelion.          |   |
| 3    | 4      | 3              | 48     | 42      | 24    | 9      | 34             | 22   | 50 | 50    | 50 | ☽ at Perihelion.          |   |
| 5    | 5      | 16             | 5      | 54      | 19    |        | 31             | 6    | 19 | 0     | 0  | ☽ at Apogee.              |   |
| 7    | 7      | 23             | 1      | 6       | 23    |        | 28             | 7    | 10 | 17    | 17 | Full Moon.                |   |
| 9    | 7      | 43             | 17     | 23      |       |        | 24             | 17   | 50 | 50    | 50 | ☽ at Aphelion.            |   |
| 11   | 7      | 17             | 2      | 27      | 16    |        | 19             | 13   | 8  | 56    | 56 | ☽ on Equator.             |   |
| 13   | 6      | 20             | 36     | 5       |       |        | 13             | 14   | 8  | 23    | 23 | ☽ at Last Quarter.        |   |
| 15   | 4      | 39             | 44     | 23      | 48    |        | 7              | 18   | 20 | 0     | 0  | ☽ at Perigee.             |   |
| 17   | 4      | 1              | 58     | 51      | 25    |        | 1              | 21   | 2  | 57    | 57 | ☉ enters ♈                |   |
| 19   | 3      | 58             | 18     | 16      | 57    | 22     | 56             | 10   | 54 | 22    | 14 | New Moon.                 |   |
| 21   | 5      | 34             | 2      | 0       | 21    |        | 46             | 23   | 7  | 12    | 12 | ☽ Sup. ☉                  |   |
| 23   | 50     | 52             | 3      | 21      | 3     |        | 3              | 27   | 22 | 25    | 25 | ☽ on Equator.             |   |
| 25   | 45     | 19             | 8      | 5       | 20    | 51     | 2              | 28   | 8  | 0     | 0  | ☽ at Gt. Elong. 46° W 56° |   |
| 27   | 40     | 24             | 4      | 19      | 48    |        | 20             | 30   | 5  | 40    | 40 | ☽ at First Quarter.       |   |
| 29   | 34     | 3              |        | 2       | 18    | 58     |                |      |    |       |    |                           |   |
| 31   | 3      | 27             | 19     | 51      | 1     | 59     | 17             | 54   |    |       |    |                           |   |

| 4    |     | FEBRUARY, 1947. |    |       |          |         |          |          |            |         |       | S. J. O. UJJAIN |  |
|------|-----|-----------------|----|-------|----------|---------|----------|----------|------------|---------|-------|-----------------|--|
| Date | Day | Sidereal Time.  |    | °     |          | D       |          |          | Midnight   |         | ψ     |                 |  |
|      |     |                 |    | Long. | Decl.    | Long.   | Lat.     | Decl.    | L          | ψ       |       |                 |  |
| 1    | S.  | H.              | M. | S.    |          |         |          |          |            |         |       |                 |  |
| 2    | Su. | 20              | 42 | 31    | 11 33 44 | 17 S 20 | 11 11 6  | 0 N 7    | 22 N 14    | 18 11 7 | 10 42 |                 |  |
| 3    | M.  |                 | 46 | 28    | 12 34 36 |         | 3 25 29  | 1 24 24  | 16 2 59    |         | R 42  |                 |  |
| 4    | Tu. |                 | 50 | 24    | 13 35 27 | 16 46   | 10 24    | 2 36 25  | 37 17 51   |         | 41    |                 |  |
| 5    | W.  |                 | 54 | 21    | 14 36 17 |         | 28 25 19 | 3 38 24  | 38 2 47    |         | 40    |                 |  |
| 6    | Th. |                 | 58 | 18    | 15 37 5  |         | 10 10 13 | 4 25 21  | 56 17 38   |         | 40    |                 |  |
| 7    | F.  | 21              | 2  | 14    | 16 37 53 | 15 52   | 25 0     | 4 54 17  | 38 2 17    |         | 39    |                 |  |
| 8    | S.  |                 | 6  | 11    | 17 38 38 |         | 34 9 29  | 5 2 11   | 0 16 35    |         | 38    |                 |  |
| 9    | Su. |                 | 10 | 7     | 18 39 24 |         | 15 23 35 | 4 53 7   | 1 0 28     |         | 37    |                 |  |
| 10   | M.  |                 | 14 | 4     | 19 40 7  | 14 56   | 7 14     | 4 27 1   | 13 13 53   |         | 36    |                 |  |
| 11   | Tu. |                 | 18 | 1     | 20 40 50 |         | 36 20 25 | 3 48 4   | S 23 26 50 |         | 35    |                 |  |
| 12   | W.  |                 | 21 | 57    | 21 41 33 |         | 17 3 9   | 2 56 9   | 48 9 23    |         | 34    |                 |  |
| 13   | Th. |                 | 25 | 54    | 22 42 14 | 13 57   | 15 32    | 1 53 14  | 36 21 37   |         | 33    |                 |  |
| 14   | F.  |                 | 29 | 50    | 23 42 53 |         | 38 27 38 | 0 5 19   | 17 3 36    |         | 32    |                 |  |
| 15   | S.  |                 | 33 | 47    | 24 43 31 |         | 18 9 31  | 0 S 5 21 | 58 15 26   |         | 31    |                 |  |
| 16   | Su. |                 | 17 | 43    | 25 44 9  | 12 57   | 21 19    | 1 8 24   | 17 27 12   |         | 30    |                 |  |
| 17   | M.  |                 | 41 | 40    | 26 44 44 |         | 37 3 6   | 2 6 25   | 32 8 59    |         | 29    |                 |  |
| 18   | Tu. |                 | 45 | 36    | 27 45 20 |         | 16 14 57 | 3 0 25   | 35 20 55   |         | 28    |                 |  |
| 19   | W.  |                 | 49 | 33    | 28 45 51 | 11 55   | 26 55    | 3 47 24  | 28 2 58    |         | 27    |                 |  |
| 20   | Th. |                 | 53 | 29    | 29 46 24 |         | 34 9 4   | 4 23 22  | 9 15 13    |         | 26    |                 |  |
| 21   | F.  | 22              | 57 | 26    | 0 46 55  |         | 13 21 25 | 4 47 18  | 54 27 40   |         | 25    |                 |  |
| 22   | S.  |                 | 1  | 22    | 1 47 24  | 10 51   | 4 0      | 4 59 14  | 41 10 22   |         | 24    |                 |  |
| 23   | Su. |                 | 5  | 19    | 2 47 51  |         | 30 16 47 | 4 56 9   | 45 23 14   |         | 22    |                 |  |
| 24   | M.  |                 | 9  | 15    | 3 48 17  |         | 8 29 46  | 4 37 4   | 20 6 19    |         | 21    |                 |  |
| 25   | Tu. |                 | 13 | 12    | 4 48 42  | 9 46    | 12 57    | 4 4 1N   | 22 19 35   |         | 20    |                 |  |
| 26   | W.  |                 | 17 | 9     | 5 49 4   |         | 24 26 17 | 3 17 7   | 6 3 1      |         | 19    |                 |  |
| 27   | Th. |                 | 21 | 5     | 6 49 23  |         | 2 9 48   | 2 16 12  | 36 16 38   |         | 17    |                 |  |
| 28   | F.  |                 | 25 | 2     | 7 49 42  | 8 39    | 23 20    | 1 10 17  | 31 0 25    |         | 16    |                 |  |
| 29   | S.  |                 | 28 | 58    | 8 49 59  |         | 16 7 23  | 0 N 3 21 | 36 14 23   |         | 15    |                 |  |

| Date | ψ      |        | μ     |         | η      |         | ζ     |        | δ     |         |
|------|--------|--------|-------|---------|--------|---------|-------|--------|-------|---------|
|      | Lat.   | Decl.  | Lat.  | Decl.   | Lat.   | Decl.   | Lat.  | Decl.  | Lat.  | Decl.   |
| 2    | 1 N 32 | 2 S 49 | 0 N 5 | 22 N 59 | 0 N 36 | 19 N 37 | 1 N 3 | 18 S 3 | 1 S 2 | 19 S 46 |
| 4    | "      | 48     | 0     | 5       | "      | 39      | "     | 3      | 3     | 22      |
| 6    | "      | 48     | "     | "       | "      | 42      | "     | 4      | 3     | 18 58   |
| 8    | "      | 47     | "     | "       | 0 37   | 46      | "     | 4      | 12    | 4 33    |
| 10   | "      | 47     | 0     | 6       | "      | 48      | "     | 4      | 14    | 4 7     |
| 12   | "      | 46     | "     | "       | "      | 51      | "     | 4      | 17    | 4 41    |
| 14   | "      | 46     | "     | "       | "      | 53      | "     | 5      | 19    | 5 13    |
| 16   | "      | 45     | "     | "       | "      | 55      | "     | 5      | 21    | 5 16 45 |
| 18   | "      | 44     | "     | "       | "      | 57      | "     | 5      | 23    | 5 16    |
| 20   | 1 33   | 43     | "     | 22 58   | 0 38   | 59      | "     | 5      | 24    | 5 15 47 |
| 22   | "      | 42     | "     | "       | "      | 20      | 1     | 6      | 26    | 5 17    |
| 24   | "      | 41     | "     | "       | "      | "       | 3     | 6      | 27    | 6 14 46 |
| 26   | "      | 40     | "     | "       | "      | "       | 5     | 6      | 28    | 6 15    |
| 28   | "      | 39     | "     | "       | "      | "       | 7     | 7      | 29    | 6 13 43 |

| EPHEMERIS. |             |    |   |    |    |    |    |    |       |    |    |    | FEBRUARY, 1947. |   |   |   |   |   |   |   |   |   |  |  |  | 5 |
|------------|-------------|----|---|----|----|----|----|----|-------|----|----|----|-----------------|---|---|---|---|---|---|---|---|---|--|--|--|---|
| Date       | Longitudes. |    |   |    |    |    |    |    |       |    |    |    | Lunar Aspects.  |   |   |   |   |   |   |   |   |   |  |  |  |   |
|            | ♈           | ♉  | ♊ | ♋  | ♌  | ♍  | ♎  | ♏  | ♐     | ♑  | ♒  | ♓  | ☉               | ☽ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |  |  |  |   |
| 1          | 18          | 0  | 4 | 57 | 25 | 3  | 5  | 19 | 24    | 40 | 17 | 53 | Δ               | Δ | * |   | Δ |   | * |   |   |   |  |  |  |   |
| 2          | 17          | 59 |   | 52 | 25 | 10 | 6  | 6  | 25    | 43 | 19 | 39 |                 | ♂ |   | π |   | ♂ | Δ |   |   |   |  |  |  |   |
| 3          |             | 58 |   | 47 |    | 17 |    | 53 | 26    | 46 | 21 | 26 | π               | □ |   | π |   | π |   | π |   |   |  |  |  |   |
| 4          |             | 57 |   | 42 |    | 23 | 7  | 40 | 27    | 49 | 23 | 13 |                 | π |   | ♂ |   | Δ |   | π |   |   |  |  |  |   |
| 5          |             | 56 |   | 37 |    | 30 | 8  | 27 | 28    | 53 | 25 | 0  | ♂               | * | ♂ |   | ♂ |   |   |   | ♂ |   |  |  |  |   |
| 6          |             | 55 |   | 33 |    | 36 | 9  | 14 | 29    | 57 | 23 | 47 |                 |   | * |   | □ |   | Δ | ♂ |   |   |  |  |  |   |
| 7          |             | 54 |   | 28 |    | 43 | 10 | 1  | 1 1/2 | 1  | 23 | 34 |                 | π | π | π |   | π |   |   | π |   |  |  |  |   |
| 8          |             | 53 |   | 23 |    | 49 |    | 48 | 2     | 6  | 0  | 21 |                 | π |   | * |   | * |   |   |   | π |  |  |  |   |
| 9          |             | 52 |   | 18 |    | 55 | 11 | 35 | 3     | 11 | 2  | 9  |                 | ♂ |   | * |   | Δ | □ | π | * |   |  |  |  |   |
| 10         |             | 51 |   | 14 | 26 | 0  | 12 | 22 | 4     | 16 | 3  | 56 | Δ               | Δ |   | π |   |   | □ | π | * |   |  |  |  |   |
| 11         |             | 50 |   | 9  |    | 6  | 13 | 9  | 5     | 21 | 5  | 40 |                 |   |   | □ |   | * | Δ |   |   | □ |  |  |  |   |
| 12         |             | 49 |   | 5  |    | 11 |    | 57 | 6     | 26 | 7  | 21 |                 | □ | π | π |   | □ | * | Δ |   | □ |  |  |  |   |
| 13         |             | 48 |   | 1  |    | 17 | 14 | 44 | 7     | 32 | 8  | 59 |                 | □ |   |   | ♂ |   |   |   |   |   |  |  |  |   |
| 14         |             | 48 | 8 | 57 |    | 22 | 15 | 31 | 8     | 48 | 10 | 35 |                 | * | * | Δ |   | π | □ | Δ |   |   |  |  |  |   |
| 15         |             | 47 |   | 52 |    | 27 | 16 | 18 | 9     | 44 | 12 | 7  | *               |   | ♂ | π | * |   |   |   |   |   |  |  |  |   |
| 16         |             | 47 |   | 48 |    | 32 | 17 | 5  | 10    | 50 | 13 | 36 |                 |   |   | π |   | π |   |   |   | π |  |  |  |   |
| 17         |             | 47 |   | 44 |    | 37 |    | 52 | 11    | 57 | 15 | 4  |                 | □ | π | π |   | π |   |   |   |   |  |  |  |   |
| 18         |             | 46 |   | 40 |    | 41 | 18 | 39 | 13    | 4  | 16 | 27 |                 | π |   |   | * | π | ♂ | * |   |   |  |  |  |   |
| 19         |             | 46 |   | 36 |    | 46 | 19 | 27 | 14    | 11 | 17 | 43 |                 | Δ |   | ♂ |   | π |   |   | ♂ |   |  |  |  |   |
| 20         |             | 46 |   | 32 |    | 51 | 20 | 14 | 15    | 18 | 18 | 52 |                 |   | Δ |   | □ | ♂ | π |   | π |   |  |  |  |   |
| 21         |             | 46 |   | 28 |    | 54 | 21 | 1  | 16    | 25 | 19 | 55 | ♂               |   |   | π |   |   |   |   |   | π |  |  |  |   |
| 22         |             | 45 |   | 24 |    | 58 |    | 48 | 17    | 33 | 20 | 51 |                 | π | □ | π |   | π |   | * | ♂ |   |  |  |  |   |
| 23         |             | 45 |   | 20 | 27 | 1  | 22 | 35 | 18    | 40 | 21 | 38 |                 | π |   |   | Δ | Δ |   |   |   | Δ |  |  |  |   |
| 24         |             | 45 |   | 16 |    | 4  | 23 | 23 | 19    | 47 | 22 | 17 |                 | ♂ | * |   |   |   |   |   |   |   |  |  |  |   |
| 25         | D           | 45 |   | 12 |    | 7  | 24 | 10 | 20    | 55 |    | 46 |                 |   |   |   | π | * | □ | π |   |   |  |  |  |   |
| 26         |             | 45 |   | 8  |    | 10 |    | 57 | 22    | 3  | 23 | 6  | *               | π |   |   | □ |   | ♂ |   |   | □ |  |  |  |   |
| 27         |             | 45 |   | 5  |    | 13 | 25 | 45 | 23    | 11 |    | 15 |                 |   |   |   | ♂ |   | □ | Δ | * |   |  |  |  |   |
| 28         |             | 45 |   | 1  |    | 15 | 26 | 32 | 24    | 20 | R  | 15 | □               | Δ |   | * |   |   |   |   | * | * |  |  |  |   |

| Date | ♀      |        | ♂      |         | Moon's |      | Date | Time | Phenomena.               |
|------|--------|--------|--------|---------|--------|------|------|------|--------------------------|
|      | Lat.   | Decl.  | Lat.   | Decl.   | Ω      | Δ    |      |      |                          |
| 2    | 3 N 21 | 20 S 2 | 1 S 51 | 16 S 41 | 9 49   | 4 15 | 0    | 15   | ☽ at Apogee.             |
| 4    | 14     | 12     | 44     | 15 25   | 38     | 52   | 22   | 22   | Full Moon.               |
| 6    | 7      | 20     | 32     | 14 2    | 27     | 9    | 17   | 13   | ☽ on Equator.            |
| 8    | 2 59   | 27     | 18     | 12 34   | 16     | 13   | 3    | 31   | ☽ at Last Quarter.       |
| 10   | 51     | 31     | 1      | 2 11 2  | 4      | 15   | 18   | 0    | ☽ at Perigee.            |
| 12   | 43     | 33     | 0      | 44 9 30 | 3      | 52   | 16   | 1    | ☽ at ♌                   |
| 14   | 35     | 34     | 20     | 7 55    | 39     | 19   | 17   | 31   | ☉ enters ♋               |
| 16   | 27     | 33     | 6      | 6 21    | 26     | 20   | 17   | 30   | ☽ at Perihelion.         |
| 18   | 18     | 31     | 33     | 4 51    | 13     | 21   | 7    | 26   | New Moon.                |
| 20   | 10     | 25     | 1      | 3 28    | 0      | 8    | 0    | 0    | ☽ at Gt. Elong 18° E 5'. |
| 22   | 1      | 18     | 32     | 2 13    | 7      | 47   | 24   | 6    | ☽ on Equator.            |
| 24   | 1 52   | 8      | 2      | 2 1 12  | 34     | 26   | 8    | 0    | ☽ on Equator.            |
| 26   | 43 19  | 56     | 32     | 0 25    | 20     | 14   | 40   |      | ☽ at First Quarter.      |
| 28   | 34     | 42     | 57     | 2       | 6      |      |      |      |                          |

| MARCH, 1947. |        |                |       |         |        |        |        |         |          | S. J. O. UJJAN, |         |       |  |  |  |  |  |  |  |
|--------------|--------|----------------|-------|---------|--------|--------|--------|---------|----------|-----------------|---------|-------|--|--|--|--|--|--|--|
| Date         | Day    | Sidereal Time. |       | °       |        | D      |        |         | Midnight |                 | ψ       |       |  |  |  |  |  |  |  |
|              |        |                |       | Long.   | Decl.  | Long.  | Lat.   | Decl.   | D        |                 |         |       |  |  |  |  |  |  |  |
| 1            | S.     | 22             | 32    | 55      | 9 50   | 23     | 7 S 53 | 21 N 26 | 1 N 17   | 24 N 26         | 28 N 32 | 10 14 |  |  |  |  |  |  |  |
| 2            | Su.    |                | 36    | 52      | 10 50  | 25     | 30     | 5 41    | 2 26     | 25 45           | 12 51   | R 12  |  |  |  |  |  |  |  |
| 3            | M.     |                | 40    | 49      | 11 50  | 35     | 8 20   | 3 3     | 27       | 22              | 27 17   | 11    |  |  |  |  |  |  |  |
| 4            | Tu.    |                | 44    | 46      | 12 50  | 42     | 6 45   | 4 32    | 4 15     | 23 16           | 11 47   | 10    |  |  |  |  |  |  |  |
| 5            | W.     |                | 48    | 42      | 13 50  | 49     | 22 19  | 1       | 47       | 20 1            | 26 14   | 8     |  |  |  |  |  |  |  |
| 6            | Th.    |                | 52    | 39      | 14 50  | 57     | 5 59   | 3 24    | 5 0      | 14 55           | 10 32   | 7     |  |  |  |  |  |  |  |
| 7            | F.     |                | 56    | 36      | 15 50  | 54     | 35 17  | 36      | 4 54     | 9 25            | 24 36   | 5     |  |  |  |  |  |  |  |
| 8            | S.     | 23             | 0     | 32      | 16 50  | 55     | 12 1   | 30      | 4 31     | 3 33            | 8 19    | 4     |  |  |  |  |  |  |  |
| 9            | Su.    |                | 4     | 29      | 17 50  | 54     | 4 49   | 15 3    | 3 53     | 2 S 20          | 21 40   | 2     |  |  |  |  |  |  |  |
| 10           | M.     |                | 8     | 25      | 18 50  | 51     | 25 28  | 11 3    | 4 7      | 45 4 36         |         | 1     |  |  |  |  |  |  |  |
| 11           | Tu.    |                | 12    | 21      | 19 50  | 45     | 2 10   | 56      | 2 6      | 13 7            | 17 11   | 9 59  |  |  |  |  |  |  |  |
| 12           | W.     |                | 16    | 18      | 20 50  | 37     | 3 38   | 23 21   | 1 47     | 17 35           | 29 27   | 58    |  |  |  |  |  |  |  |
| 13           | Th.    |                | 20    | 14      | 21 50  | 29     | 15 5   | 29      | 0 S 0    | 21 38           | 11 29   | 56    |  |  |  |  |  |  |  |
| 14           | F.     |                | 24    | 11      | 22 50  | 18     | 2 51   | 17 26   | 1 3      | 23 56           | 23 22   | 55    |  |  |  |  |  |  |  |
| 15           | S.     |                | 28    | 8       | 23 50  | 6      | 27 29  | 16 2    | 3 25     | 30 5 10         |         | 53    |  |  |  |  |  |  |  |
| 16           | Su.    |                | 32    | 4       | 24 49  | 53     | 4 11   | 5 5     | 2 57     | 55 17           | 1       | 51    |  |  |  |  |  |  |  |
| 17           | M.     |                | 36    | 1       | 25 49  | 38     | 1 40   | 22 58   | 3 44     | 10 28           | 58      | 50    |  |  |  |  |  |  |  |
| 18           | Tu.    |                | 39    | 57      | 26 49  | 20     | 16 5   | 0 4     | 22 23    | 15 11           | 6       | 48    |  |  |  |  |  |  |  |
| 19           | W.     |                | 43    | 54      | 27 49  | 1      | 0 53   | 17 15   | 4 48     | 20 14           | 23 28   | 46    |  |  |  |  |  |  |  |
| 20           | Th.    |                | 47    | 50      | 28 49  | 40     | 29 29  | 46 5    | 18 16    | 30 6 7          |         | 44    |  |  |  |  |  |  |  |
| 21           | F.     |                | 51    | 47      | 29 48  | 18     | 5 12   | 34 5    | 0 11     | 28 19           | 5       | 43    |  |  |  |  |  |  |  |
| 22           | S.     |                | 55    | 43      | 0 47   | 53     | 0 N 19 | 25 39   | 4 43     | 6 3             | 2 18    | 41    |  |  |  |  |  |  |  |
| 23           | Su.    |                | 59    | 40      | 1 47   | 27     | 42 9   | 0 4     | 10 0     | 16 15           | 47      | 3     |  |  |  |  |  |  |  |
| 24           | M.     | 24             | 3     | 36      | 2 46   | 57     | 1 6    | 22 36   | 3 20     | 5 N 42          | 29 27   | 39    |  |  |  |  |  |  |  |
| 25           | Tu.    | 0              | 7     | 33      | 3 46   | 26     | 30 6   | 8 21    | 2 23     | 11 23           | 13 16   | 38    |  |  |  |  |  |  |  |
| 26           | W.     |                | 11    | 30      | 4 45   | 54     | 5 20   | 14 1    | 14 16    | 37 27           | 14      | 37    |  |  |  |  |  |  |  |
| 27           | Th.    |                | 15    | 26      | 5 45   | 19     | 2 17   | 4 14    | 0 N 0    | 21 0            | 11 15   | 35    |  |  |  |  |  |  |  |
| 28           | F.     |                | 19    | 23      | 6 44   | 41     | 40 18  | 17 1    | 15 24    | 10 25           | 19      | 33    |  |  |  |  |  |  |  |
| 29           | S.     |                | 23    | 19      | 7 44   | 0      | 3 4    | 2 22    | 2 26     | 25 51           | 9 26    | 32    |  |  |  |  |  |  |  |
| 30           | Su.    |                | 27    | 16      | 8 43   | 19     | 27 16  | 30 3    | 27 51    | 23 34           |         | 30    |  |  |  |  |  |  |  |
| 31           | M.     |                | 31    | 12      | 9 42   | 34     | 51 0   | 39 4    | 16 24    | 10 7            | 4 4     | 28    |  |  |  |  |  |  |  |
| Date         | ψ      |                | μ     |         | η      |        | ζ      |         | δ        |                 |         |       |  |  |  |  |  |  |  |
|              | Lat.   | Decl.          | Lat.  | Decl.   | Lat.   | Decl.  | Lat.   | Decl.   | Lat.     | Decl.           |         |       |  |  |  |  |  |  |  |
| 2            | 1 N 33 | 2 S 38         | 0 N 6 | 22 N 59 | 0 N 38 | 20 N 8 | 1 N 7  | 18 S 30 | 18 S 6   | 13 S 10         |         |       |  |  |  |  |  |  |  |
| 4            | "      | 37             | "     | "       | "      | 10     | 7      | 30      | 6 12     | 37              |         |       |  |  |  |  |  |  |  |
| 6            | "      | 35             | "     | "       | 0 39   | 11     | 8      | 31      | 6        | 4               |         |       |  |  |  |  |  |  |  |
| 8            | "      | 33             | "     | "       | "      | 13     | 8      | 31      | 6 11     | 30              |         |       |  |  |  |  |  |  |  |
| 10           | "      | 32             | "     | "       | "      | 14     | 8      | 32      | 6 10     | 50              |         |       |  |  |  |  |  |  |  |
| 12           | "      | 31             | "     | "       | "      | 15     | 8      | 32      | 6        | 21              |         |       |  |  |  |  |  |  |  |
| 14           | "      | 29             | "     | "       | "      | 17     | 9      | 31      | 6 9      | 45              |         |       |  |  |  |  |  |  |  |
| 16           | "      | 28             | "     | "       | "      | 18     | 9      | 31      | 6        | 10              |         |       |  |  |  |  |  |  |  |
| 18           | "      | 26             | "     | 23 0    | "      | 19     | 9      | 30      | 5 8      | 34              |         |       |  |  |  |  |  |  |  |
| 20           | 1 34   | 25             | "     | "       | "      | 20     | 9      | 30      | 5 7      | 58              |         |       |  |  |  |  |  |  |  |
| 22           | "      | 24             | "     | "       | "      | 20     | 9      | 29      | 5        | 22              |         |       |  |  |  |  |  |  |  |
| 24           | "      | 22             | "     | "       | "      | 21     | 10     | 28      | 5 6      | 45              |         |       |  |  |  |  |  |  |  |
| 26           | "      | 21             | "     | "       | "      | 21     | 10     | 27      | 5        | 8               |         |       |  |  |  |  |  |  |  |
| 28           | "      | 20             | "     | 23 1    | "      | 22     | 10     | 26      | 4 5      | 31              |         |       |  |  |  |  |  |  |  |
| 30           | "      | 19             | "     | "       | "      | 22     | 10     | 24      | 4 4      | 54              |         |       |  |  |  |  |  |  |  |

| EPHEMERIS. |            |         |        |         |        |    |      |       |                | MARCH, 1947.  |               |    |                      |   |   |   |   |   |   | 7 |
|------------|------------|---------|--------|---------|--------|----|------|-------|----------------|---------------|---------------|----|----------------------|---|---|---|---|---|---|---|
| Date       | Longitudes |         |        |         |        |    |      |       | Lunar Aspects. |               |               |    |                      |   |   |   |   |   |   |   |
|            | ♈          | ♉       | ♊      | ♋       | ♌      | ♍  | ♎    | ♏     | ☉              | ☽             | ♈             | ♉  | ♊                    | ♋ | ♌ | ♍ | ♎ | ♏ | ☾ |   |
| 1          | 17         | 45      | 2      | 57      | 27     | 19 | 27   | = 19  | 25             | 1             | 28            | 23 | 8                    | 6 |   |   |   |   |   |   |
| 2          |            | 46      |        | 54      |        | 21 | 28   | = 6   | 26             |               | 36            | 22 | 47                   |   | Δ | □ | ♈ | ♉ | Δ | ♊ |
| 3          |            | 46      |        | 51      |        | 23 |      |       | 53             | 27            | 45            |    | 13                   |   |   |   | ♈ |   | Δ | ♉ |
| 4          |            | 46      |        | 48      |        | 25 | 29   | 40    | 28             |               | 55            | 21 | 32                   |   | π | * | ♈ | Δ | ♉ | ♊ |
| 5          |            | 47      |        | 45      |        | 27 | 0    | 8     | 27             | 0             | = 4           | 20 | 51                   |   | π | * | ♈ | Δ | ♉ | ♊ |
| 6          |            | 47      |        | 42      |        | 29 | 1    | 15    | 1              | 13            |               | 6  |                      |   |   |   | ♈ | □ | ♉ | ♊ |
| 7          |            | 48      |        | 39      |        | 30 | 2    | 2     | 2              | 22            | 19            | 12 |                      |   | ♈ | □ | ♈ | □ | ♉ | ♊ |
| 8          |            | 48      |        | 36      |        | 31 |      | 50    | 3              | 31            | 18            | 12 |                      |   | ♈ | □ | ♈ | ♈ | ♉ | ♊ |
| 9          |            | 49      |        | 33      |        | 32 | 3    | 37    | 4              | 4             | 17            | 12 |                      |   | π | ♈ | Δ | ♈ | ♉ | ♊ |
| 10         |            | 49      |        | 30      |        | 34 | 4    | 24    | 5              | 49            | 16            | 11 |                      |   |   |   | □ | ♈ |   | ♊ |
| 11         |            | 50      |        | 28      |        | 35 | 5    | 11    | 6              | 59            | 15            | 11 |                      |   |   |   | ♈ | π | ♈ | ♊ |
| 12         |            | 51      |        | 27      |        | 35 |      | 59    | 8              | 9             | 14            | 13 |                      |   | Δ | ♈ | π | ♈ | ♈ | ♊ |
| 13         |            | 52      |        | 25      |        | 35 | 6    | 46    | 9              | 19            | 13            | 18 |                      |   |   |   | ♈ | Δ | ♈ | ♊ |
| 14         |            | 53      |        | 23      |        | 35 | 7    | 37    | 10             | 28            | 12            | 27 |                      |   | □ |   | ♈ | ♈ |   | ♊ |
| 15         |            | 54      |        | 18      |        | 35 | 8    | 20    | 11             | 35            | 11            | 42 |                      |   |   |   | ♈ | π | ♈ | ♊ |
| 16         |            | 55      |        | 16      | R      | 34 | 9    | 7     | 12             | 44            |               | 3  |                      |   | □ |   | ♈ | π | ♈ | ♊ |
| 17         |            | 56      |        | 14      |        | 34 |      | 55    | 13             | 56            | 10            | 29 |                      |   | * |   | ♈ | π | ♈ | ♊ |
| 18         |            | 57      |        | 12      |        | 33 | 10   | 42    | 15             | 8             |               | 1  |                      |   |   | Δ | ♈ | ♈ | ♈ | ♊ |
| 19         |            | 58      |        | 10      |        | 32 | 11   | 29    | 16             | 18            | 9             | 40 |                      |   |   | Δ | ♈ | ♈ | ♈ | ♊ |
| 20         |            | 59      |        | 9       |        | 32 | 12   | 16    | 17             | 28            |               | 24 |                      |   | * |   | π | □ |   | ♊ |
| 21         | 18         | 0       |        | 8       |        | 31 | 13   | 3     | 13             | 38            |               | 15 |                      |   | ♈ | π | □ |   | ♈ | ♊ |
| 22         |            | 1       |        | 6       |        | 29 |      | 50    | 19             | 49            |               | 12 |                      |   | ♈ | π | ♈ | Δ | ♈ | ♊ |
| 23         |            | 3       |        | 5       |        | 27 | 14   | 37    | 20             | 59            | D             | 15 |                      |   | ♈ | ♈ | Δ | ♈ | ♈ | ♊ |
| 24         |            | 4       |        | 4       |        | 25 | 15   | 24    | 22             | 9             |               | 23 |                      |   |   | * | ♈ | π |   | ♊ |
| 25         |            | 5       |        | 3       |        | 24 | 16   | 12    | 23             | 19            |               | 37 |                      |   | ♈ | π | □ |   | ♈ | ♊ |
| 26         |            | 7       |        | 1       |        | 1  |      | 59    | 24             | 30            |               | 56 |                      |   |   | ♈ | π | ♈ | Δ | ♊ |
| 27         |            | 8       |        | 0       |        | 19 | 17   | 46    | 25             | 41            | 19            | 2  |                      |   | * | Δ | ♈ | ♈ | Δ | ♊ |
| 28         |            | 9       | 1      | 59      |        | 17 | 18   | 33    | 26             | 52            |               | 48 |                      |   |   | ♈ | ♈ | π | □ | ♊ |
| 29         |            | 11      |        | 59      |        | 14 | 19   | 19    | 28             | 3             | 11            | 20 |                      |   | □ |   | ♈ | ♈ | Δ | ♊ |
| 30         |            | 13      |        | 58      |        | 11 | 20   | 7     | 29             | 14            |               | 57 |                      |   | □ | ♈ |   | Δ | Δ | ♊ |
| 31         |            | 15      |        | 58      |        | 8  |      | 53    | 0              | 8             | 25            | 12 | 37                   |   |   |   |   | π |   | ♊ |
| Date       | ♀          |         | ♂      |         | Moon's |    | Date | Time. |                | Phenomena.    |               |    |                      |   |   |   |   |   |   |   |
|            | Lat.       | Decl.   | Lat.   | Decl.   | α      | β  |      | H.    | M.             |               |               |    |                      |   |   |   |   |   |   |   |
| 2          | 1 N 26     | 19 S 27 | 3 N 20 | 0 N 12  | 6 11   | 53 | 3    | 14    | 0              | ♀ on Equator. |               |    |                      |   |   |   |   |   |   |   |
| 4          |            | 17 9    |        | 32 S 10 |        |    | 40   | 4     | 13             | 0             | ♂ at Apogee.  |    |                      |   |   |   |   |   |   |   |
| 6          |            | 8 18    | 48     | 38      | 35     |    | 27   | 7     | 8              | 47            | Full Moon.    |    |                      |   |   |   |   |   |   |   |
| 8          |            | 0       | 25     | 37      | 1      | 20 | 14   | 9     | 2              | 29            | ♂ on Equator. |    |                      |   |   |   |   |   |   |   |
| 10         |            | 51 18   | 0      | 30      | 2      | 14 | 1    | 4     | 12             | 4             | ♀ at Inf. ♂ ☉ |    |                      |   |   |   |   |   |   |   |
| 12         |            | 42 17   | 34     | 3       | 12     | 3  | 16   | 5     | 48             | 14            | 23            | 56 | ♂ at Last Quarter.   |   |   |   |   |   |   |   |
| 14         |            | 34      | 5      | 2       | 50     | 4  | 16   |       | 36             | 15            | 17            | 0  | ♂ at Perigee.        |   |   |   |   |   |   |   |
| 16         |            | 25 16   | 35     | 24      | 5      | 2  |      |       | 24             | 21            | 16            | 48 | ☉ enters ♈           |   |   |   |   |   |   |   |
| 18         |            | 17      | 2      | 1       | 57     | 6  | 1    |       | 12             | 22            | 20            | 0  | ♀ at ♈               |   |   |   |   |   |   |   |
| 20         |            | 9 15    | 28     | 25      |        | 44 |      |       | 0              | 22            | 3             |    | New Moon.            |   |   |   |   |   |   |   |
| 22         | 0          | 14      | 52     | 55      | 7      | 17 | 4    |       | 49             | 23            | 13            | 4  | ♂ on Equator         |   |   |   |   |   |   |   |
| 24         | OS 6       |         | 14     | ON 27   |        | 38 |      |       | 39             | 26            | 10            | 0  | ♀ at ♈               |   |   |   |   |   |   |   |
| 26         |            | 13 13   | 35     | OS 1    |        | 42 |      |       | 29             | 27            | 20            | 30 | ♂ at Perihelion.     |   |   |   |   |   |   |   |
| 28         |            | 21 12   | 53     | 26      |        | 55 |      |       | 19             | 29            |               |    | ♀ at Max Brilliancy. |   |   |   |   |   |   |   |
|            |            |         |        |         |        |    |      |       |                | 21            | 50            |    | ♂ at First Quarter.  |   |   |   |   |   |   |   |
| 30         |            | 28      | 11     | 49      |        | 50 |      |       | 9              | 31            | 6             | 0  | ♂ at Apogee.         |   |   |   |   |   |   |   |





| 12 JUNE, 1947. S. J. O. UJJAIN |        |                |       |         |          |         |        |          |         |         |  |
|--------------------------------|--------|----------------|-------|---------|----------|---------|--------|----------|---------|---------|--|
| Date                           | Day    | Sidereal Time. |       | ☉       |          | ☽       |        | Midnight |         | ψ       |  |
|                                |        |                |       | Long.   | Decl.    | Long.   | Lat.   | Decl.    | ψ       |         |  |
| 1 Su.                          | 4      | H. M. S.       |       | 9 56 0  | 21 N 57  | 11 22 2 | 1 N 55 | 13 S 25  | 17 33 8 | 8 8     |  |
| 2 M.                           |        | 35 38          | 9 56  | 0       | 21 N 57  | 11 22 2 | 1 N 55 | 13 S 25  | 17 33 8 | 8 8     |  |
| 3 Tu.                          |        | 39 35          | 10 53 | 29      | 22 6 23  | 41 0    | 49 17  | 54       | 29 48   | 7       |  |
| 4 W.                           |        | 43 31          | 11 50 | 56      | 14 5 52  | 0 S 18  | 21 35  | 11 54    | 54      | 6       |  |
| 5 Th.                          |        | 47 28          | 12 48 | 23      | 21 17 54 | 1 23    | 24 17  | 23 52    | 47      | 6       |  |
| 6 F.                           |        | 51 25          | 13 45 | 47      | 28 29 50 | 2 25    | 25 52  | 5 47     | 5       |         |  |
| 7 S.                           |        | 55 22          | 14 43 | 12      | 35 11 42 | 3 20    | 26 15  | 17 37    | 5       |         |  |
| 8 Su.                          | 5      | 59 18          | 15 40 | 35      | 41 23 31 | 4 6 25  | 32     | 29 26    | 4       |         |  |
| 9 M.                           |        | 3 15           | 16 37 | 57      | 46 5 22  | 4 12 3  | 25     | 11 59    | 4       |         |  |
| 10 Tu.                         |        | 7 11           | 17 35 | 20      | 52 17 18 | 5 5 20  | 31     | 23 19    | 4       |         |  |
| 11 W.                          |        | 11 8           | 18 32 | 42      | 57 29 22 | 15 16   | 33     | 5 28     | 3       |         |  |
| 12 Th.                         |        | 15 4           | 19 30 | 2 23    | 2 11 37  | 12 10   | 22     | 17 51    | 3       |         |  |
| 13 F.                          |        | 19 19          | 20 27 | 22      | 6 24 8   | 4 54 6  | 49     | 0 31     | 3       |         |  |
| 14 S.                          |        | 22 58          | 21 24 | 43      | 10 6 59  | 50 1    | 13     | 13 34    | 2       |         |  |
| 15 Su.                         |        | 26 54          | 22 22 | 3       | 14 20 14 | 3 33 4  | N 38   | 27 1     | 2       |         |  |
| 16 M.                          |        | 30 51          | 23 19 | 22      | 17 3 54  | 2 31 10 | 27     | 10 54    | 2       |         |  |
| 17 Tu.                         |        | 34 47          | 24 16 | 41      | 20 18 1  | 1 19 15 | 57     | 25 15    | 2       |         |  |
| 18 W.                          |        | 38 44          | 25 14 | 0       | 22 2 33  | 0 N 21  | 20 28  | 9 57     | 2       |         |  |
| 19 Th.                         |        | 42 40          | 26 11 | 18      | 24 17 25 | 1 22 24 | 12     | 24 57    | 2       |         |  |
| 20 F.                          |        | 46 37          | 27 8  | 35      | 25 2 30  | 2 28 25 | 54     | 10 5     | D 2     |         |  |
| 21 S.                          |        | 50 33          | 28 5  | 52      | 26 17 40 | 3 53 26 | 8      | 25 13    | 2       |         |  |
| 22 Su.                         |        | 54 30          | 29 3  | 9       | 26 2 44  | 4 33 23 | 58     | 10 12    | 2       |         |  |
| 23 M.                          |        | 58 26          | 0 0   | 25      | 27 17 34 | 5 3 20  | 23     | 24 52    | 2       |         |  |
| 24 Tu.                         | 6      | 2 23           | 0 57  | 40      | 27 2 4   | 14 15   | 37     | 9 9      | 2       |         |  |
| 25 W.                          |        | 6 19           | 1 54  | 55      | 26 16 8  | 5 10 9  | 23     | 1        | 2       |         |  |
| 26 Th.                         |        | 10 16          | 2 52  | 9       | 25 29 47 | 4 38 4  | 54     | 6 28     | 2       |         |  |
| 27 F.                          |        | 14 13          | 3 49  | 22      | 24 13 1  | 3 58 15 | 29     | 19 30    | 3       |         |  |
| 28 S.                          |        | 18 10          | 4 46  | 45      | 23 25 53 | 6 7 7   | 7      | 2 12     | 3       |         |  |
| 29 Su.                         |        | 22 7           | 5 43  | 47      | 21 8 27  | 2 6 12  | 20     | 14 38    | 3       |         |  |
| 30 M.                          |        | 26 3           | 6 40  | 59      | 18 20 25 | 1 2 16  | 57     | 26 50    | 3       |         |  |
|                                |        | 30 0           | 7 38  | 10      | 15 2 53  | 0 S 4   | 20 51  | 8 53     | 4       |         |  |
| Date.                          | ψ      |                | ♈     |         | ♉        |         | ♊      |          | ♋       |         |  |
|                                | Lat.   | Decl.          | Lat.  | Decl.   | Lat.     | Decl.   | Lat.   | Decl.    | Lat.    | Decl.   |  |
| 2                              | 1 N 32 | 1 S 48         | 0 N 6 | 23 N 15 | 0 N 41   | 19 N 43 | 1 N 9  | 16 S 45  | 0 S 39  | 13 N 54 |  |
| 4                              | "      | "              | "     | 16      | "        | 40      | 9      | 42       | 38      | 14 24   |  |
| 6                              | "      | "              | "     | 16      | "        | 37      | 8      | 39       | 36      | 52      |  |
| 8                              | "      | "              | "     | 17      | "        | 35      | 8      | 36       | 35      | 15 19   |  |
| 10                             | "      | 1 47           | "     | 17      | "        | 32      | 7      | 33       | 34      | 47      |  |
| 12                             | "      | "              | "     | 18      | "        | 29      | 7      | 30       | 33      | 16 14   |  |
| 14                             | "      | "              | "     | 18      | "        | 26      | 6      | 28       | 31      | 38      |  |
| 16                             | "      | "              | 0 7   | 19      | "        | 23      | 6      | 25       | 30      | 17 5    |  |
| 18                             | "      | "              | "     | 19      | "        | 20      | 5      | 23       | 28      | 30      |  |
| 20                             | "      | "              | "     | 20      | 0 42     | 17      | 5      | 21       | 27      | 53      |  |
| 22                             | "      | "              | "     | 20      | "        | 14      | 5      | 19       | 26      | 18 16   |  |
| 24                             | 1 31   | "              | "     | 20      | "        | 11      | 4      | 17       | 24      | 39      |  |
| 26                             | "      | 1 48           | "     | 21      | "        | 8       | 4      | 15       | 23      | 19 1    |  |
| 28                             | "      | "              | "     | 21      | "        | 5       | 3      | 14       | 22      | 21      |  |
| 30                             | "      | "              | "     | 21      | "        | 2       | 3      | 13       | 21      | 41      |  |

| EPHEMERIS. |             |         |        |         |        |    |      |       |    |                          |    | JUNE, 1947. |                |    |   |   |   |   |   |   |   |   |   | 13 |   |   |   |   |  |
|------------|-------------|---------|--------|---------|--------|----|------|-------|----|--------------------------|----|-------------|----------------|----|---|---|---|---|---|---|---|---|---|----|---|---|---|---|--|
| Date       | Longitudes. |         |        |         |        |    |      |       |    |                          |    |             | Lunar Aspects. |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
|            | ♈           | ♉       | ♊      | ♋       | ♌      | ♍  | ♎    | ♏     | ♐  | ♑                        | ♒  | ♓           | ☉              | ☽  | ♈ | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑  | ♒ | ♓ |   |   |  |
| 1          | 21          | 10      | 4      | 48      | 20     | 29 | 8    | 18    | 14 | 4                        | 40 | 27          | 52             | π  | μ | π | ♈ | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏  | ♐ | ♑ | ♒ | ♓ |  |
| 2          |             | 14      |        | 54      |        | 23 | 9    |       | 3  | 15                       |    | 52          | 29             | 37 |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 3          |             | 18      |        | 59      |        | 16 |      |       | 47 | 17                       |    | 5           | 1              | 18 | * |   | Δ |   | π |   | π |   | Δ |    |   |   |   |   |  |
| 4          |             | 21      | 5      |         |        | 9  | 10   |       | 31 | 18                       |    | 18          | 2              | 57 | ♈ | ♈ |   |   |   |   | π |   | ♈ |    |   |   |   |   |  |
| 5          |             | 24      |        | 10      |        | 2  | 11   |       | 15 | 19                       |    | 31          | 4              | 32 |   |   |   |   |   |   |   |   | ♈ |    |   |   |   |   |  |
| 6          |             | 28      |        | 16      | 19     | 55 |      |       | 59 | 20                       |    | 44          | 6              | 5  | π | □ |   |   |   |   | Δ |   |   |    |   |   |   |   |  |
| 7          |             | 32      |        | 22      |        | 49 | 12   |       | 43 | 21                       |    | 57          | 7              | 36 |   | π |   | * |   | Δ |   |   |   |    |   |   |   |   |  |
| 8          |             | 35      |        | 28      |        | 43 | 13   |       | 27 | 23                       |    | 10          | 9              | 5  |   | Δ | Δ |   | ♈ |   |   |   |   |    |   |   | ♈ |   |  |
| 9          |             | 39      |        | 34      |        | 38 | 14   |       | 11 | 24                       |    | 23          | 10             | 30 | Δ | Δ |   | □ | □ |   |   |   |   |    |   |   |   | ♈ |  |
| 10         |             | 42      |        | 40      |        | 32 |      |       | 56 | 25                       |    | 36          | 11             | 51 |   |   |   | π |   | □ |   |   |   |    |   |   |   | π |  |
| 11         |             | 46      |        | 47      |        | 26 | 15   |       | 40 | 26                       |    | 48          | 13             | 7  |   | π |   |   |   | * |   | Δ |   |    |   |   |   |   |  |
| 12         |             | 50      |        | 53      |        | 20 | 16   |       | 23 | 28                       |    | 14          | 20             | 20 | □ | π | □ |   | Δ |   | * | * |   |    |   |   |   |   |  |
| 13         |             | 53      |        | 59      |        | 14 | 17   |       | 7  | 29                       |    | 14          | 15             | 33 |   | ♈ |   | Δ |   |   |   |   |   |    |   |   |   | Δ |  |
| 14         |             | 57      | 6      |         |        | 9  |      |       | 51 | 0                        | □  | 27          | 16             | 46 | * |   | * |   | π |   |   |   | □ |    |   |   |   |   |  |
| 15         | 22          | 1       |        | 12      |        | 4  | 18   |       | 35 | 1                        |    | 40          | 17             | 55 |   |   |   | □ |   |   |   |   |   |    |   |   |   | □ |  |
| 16         |             | 5       |        | 18      | 18     | 59 | 19   |       | 18 | 2                        |    | 52          | 18             | 58 |   |   |   | ♈ | ♈ | ♈ | ♈ | * |   |    |   |   |   |   |  |
| 17         |             | 8       |        | 24      |        | 54 | 20   |       | 2  | 4                        |    | 5           | 19             | 57 |   | Δ |   | * |   |   | ♈ |   |   |    |   |   |   | * |  |
| 18         |             | 12      |        | 31      |        | 49 |      |       | 45 | 5                        |    | 18          | 20             | 52 |   |   |   |   |   | π |   |   |   |    |   |   |   |   |  |
| 19         |             | 15      |        | 37      |        | 44 | 21   |       | 19 | 6                        |    | 31          | 21             | 42 | ♈ | □ |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 20         |             | 19      |        | 43      |        | 40 | 22   |       | 12 | 7                        |    | 44          | 22             | 29 |   |   |   |   | Δ | * |   |   | ♈ |    |   |   |   |   |  |
| 21         |             | 22      |        | 50      |        | 36 |      |       | 55 | 8                        |    | 56          | 23             | 16 |   | * | * |   | ♈ |   |   |   |   |    |   |   |   | ♈ |  |
| 22         |             | 26      |        | 57      |        | 31 | 23   |       | 38 | 10                       |    | 9           | 24             | 1  |   |   |   |   |   | □ |   | * |   |    |   |   |   |   |  |
| 23         |             | 29      | 7      |         | 3      | 27 | 24   |       | 22 | 11                       |    | 22          |                | 39 | * |   |   |   |   | □ |   |   |   |    |   |   |   |   |  |
| 24         |             | 32      |        | 10      |        | 22 | 25   |       | 5  | 12                       |    | 36          | 25             | 13 |   |   |   | □ |   | * |   | □ |   |    |   |   |   |   |  |
| 25         |             | 36      |        | 17      |        | 18 |      |       | 48 | 13                       |    | 49          |                | 42 | □ |   |   | * |   | Δ |   | * | * |    |   |   |   |   |  |
| 26         |             | 39      |        | 24      |        | 15 | 26   |       | 31 | 15                       |    | 2           | 26             | 8  |   | ♈ |   |   |   |   |   | Δ |   |    |   |   |   |   |  |
| 27         |             | 43      |        | 32      |        | 12 | 27   |       | 14 | 16                       |    | 15          |                | 29 |   |   | Δ |   |   |   |   |   |   |    |   |   |   |   |  |
| 28         |             | 46      |        | 40      |        | 9  |      |       | 57 | 17                       |    | 28          |                | 46 | Δ |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 29         |             | 50      |        | 47      |        | 6  | 28   |       | 40 | 18                       |    | 42          |                | 59 |   |   | π |   | ♈ |   |   |   |   |    |   |   |   |   |  |
| 30         |             | 54      |        | 53      |        | 3  | 29   |       | 22 | 19                       |    | 55          | 27             | 6  | π | * |   | Δ |   | ♈ |   |   |   | Δ  |   |   |   | Δ |  |
| Date.      | ♈           |         | ♉      |         | Moon's |    | Date | Time. |    | Phenomena.               |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
|            | Lat.        | Decl.   | Lat.   | Decl.   | ♈      | ♉  |      |       |    |                          |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 2          | 1 S 30      | 15 N 10 | 2 N 8  | 25 N 35 | 2 π    | 40 | 3    | 0     | 56 | Full Moon.               |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 4          | 28          | 54      | 9      | 34      |        | 40 | 6    | 20    | 0  | ♈ at Perigee.            |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 6          | 25 16'      | 36      | 6      | 25      |        | 40 | 10   | 10    | 0  | ♈ at Gt. Elong 24° E 41° |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 8          | 21 17       | 17      | 0      | 8       |        | 39 | 12   | 4     | 26 | ♈ at Last Quarter.       |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 10         | 17          | 55      | 1 50   | 24 45   |        | 38 | 13   | 17    | 0  | ♈ on Equator.            |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 12         | 14 18       | 32      | 36     | 12      |        | 37 | 19   | 2     | 50 | New Moon.                |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 14         | 10 19       | 7       | 23 23  | 46      |        | 35 | 19   | 20    | 0  | ♈ at Apogee.             |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 16         | 5           | 40      | 6      | 12      |        | 33 | 22   | 8     | 0  | ♈ at ♈                   |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 18         | 1 20        | 11      | 0 45   | 22 34   |        | 31 | ...  | 11    | 35 | ☉ enters ♈               |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 20         | 0 57        | 40      | 22 21  | 56      |        | 29 | 25   | 17    | 42 | ♈ at First Quarter.      |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 22         | 52 21       | 7       | 3      | 18      |        | 26 | 26   | 5     | 54 | ♈ on Equator.            |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 24         | 48          | 31      | 0 S 36 | 20 31   |        | 23 |      |       |    |                          |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 26         | 43          | 54      | 58 19  | 59      |        | 19 |      |       |    |                          |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 28         | 38 22       | 13      | 1 28   | 22      |        | 14 |      |       |    |                          |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |
| 30         | 34          | 30      | 2 0    | 18 48   |        | 9  |      |       |    |                          |    |             |                |    |   |   |   |   |   |   |   |   |   |    |   |   |   |   |  |

| 14   |      | JULY, 1947.    |       |       |       |       |       |         |       |          |         | S. J. O. UJJAIN |       |
|------|------|----------------|-------|-------|-------|-------|-------|---------|-------|----------|---------|-----------------|-------|
| Date | Day  | Sidereal Time. |       | ⊙     |       | ♂     |       | ♂       |       | Midnight |         | ψ               |       |
|      |      | H.             | M.    | S.    | Long. | Decl. | Long. | Lat.    | Decl. | ⊙        |         |                 |       |
| 1    | Tu.  | 6              | 33    | 56    | 8 35  | 21    | 23N12 | 14 52   | 1 S 9 | 23S 43   | 20 50   | 8 4             |       |
| 2    | W.   |                | 37    | 53    | 9 32  | 32    |       | 26 46   | 2 10  | 25 34    | 2 42    | 4               |       |
| 3    | Th.  |                | 41    | 49    | 10 29 | 43    |       | 3 8 37  | 3 5   | 26 15    | 14 32   | 4               |       |
| 4    | F.   |                | 45    | 46    | 11 26 | 54    | 22    | 58 20   | 28    | 52 25    | 42 26   | 5               |       |
| 5    | S.   |                | 59    | 42    | 12 24 | 4     | 53    | 2 19    | 4 29  | 24 0     | 8 16    | 5               |       |
| 6    | Su.  |                | 53    | 38    | 13 21 | 15    | 47    | 14 13   | 55 21 | 16 20    | 12      | 5               |       |
| 7    | M.   |                | 57    | 35    | 14 18 | 26    | 41    | 26 13   | 5 7   | 17 35    | 2 15    | 6               |       |
| 8    | Tu.  | 7              | 1     | 31    | 15 15 | 37    | 35    | 8 19    | 4 13  | 8 14     | 26      | 6               |       |
| 9    | W.   |                | 5     | 28    | 16 12 | 49    | 29    | 20 37   | 4 52  | 8 11     | 26 50   | 7               |       |
| 10   | Th.  |                | 9     | 24    | 17 10 | 1     | 22    | 3 8     | 23 2  | 46 9     | 30      | 7               |       |
| 11   | F.   |                | 13    | 21    | 18 7  | 13    | 14    | 15 56   | 3 40  | 2N 53    | 22 27   | 8               |       |
| 12   | S.   |                | 17    | 17    | 19 4  | 26    | 5     | 29 4    | 2 46  | 8 33     | 5 49    | 9               |       |
| 13   | Su.  |                | 21    | 14    | 20 1  | 29    | 57    | 12 37   | 1 40  | 14 2     | 19 32   | 9               |       |
| 14   | M.   |                | 25    | 10    | 20 58 | 53    | 49    | 26 36   | 0 26  | 18 58    | 3 45    | 10              |       |
| 15   | Tu.  |                | 29    | 7     | 21 56 | 7     | 40    | 11 0    | 0N 51 | 22 56    | 18 21   | 11              |       |
| 16   | W.   |                | 33    | 4     | 22 53 | 22    | 31    | 25 47   | 2 7   | 25 20    | 3 19    | 12              |       |
| 17   | Th.  |                | 37    | 0     | 23 50 | 38    | 21    | 10 53   | 3 15  | 26 14    | 18 30   | 13              |       |
| 18   | F.   |                | 40    | 57    | 24 47 | 53    | 11    | 26 8    | 4 10  | 25 1     | 3 46    | 14              |       |
| 19   | S.   |                | 44    | 53    | 25 45 | 10    | 11    | 11 22   | 47 21 | 58 18    | 56      | 15              |       |
| 20   | Su.  |                | 48    | 50    | 26 42 | 2     | 20    | 50 26   | 23 5  | 4 17     | 13 3 47 | 16              |       |
| 21   | M.   |                | 52    | 46    | 27 39 | 44    | 38    | 11 3    | 1 12  | 8 18     | 15      | 17              |       |
| 22   | Tu.  |                | 56    | 43    | 28 37 | 2     | 27    | 25 18   | 4 38  | 6 7      | 2 15    | 18              |       |
| 23   | W.   | 8              | 0     | 39    | 29 34 | 19    | 15    | 9 4     | 0 9   | 5 15     | 46      | 19              |       |
| 24   | Th.  |                | 4     | 36    | 0 31  | 37    | 3     | 22 23   | 3 10  | 3 S 59   | 28 49   | 20              |       |
| 25   | F.   |                | 8     | 32    | 1 28  | 56    | 19    | 51 5 16 | 2 12  | 11 13    | 11 29   | 21              |       |
| 26   | S.   |                | 12    | 29    | 2 26  | 13    | 38    | 17 46   | 1 9   | 16 2     | 23 50   | 22              |       |
| 27   | Su.  |                | 16    | 25    | 3 23  | 33    | 25    | 29 55   | 0 4   | 20 4     | 5 56    | 23              |       |
| 28   | M.   |                | 20    | 22    | 4 20  | 54    | 11    | 11 55   | 1 S 0 | 23 13    | 17 53   | 25              |       |
| 29   | Tu.  |                | 24    | 18    | 5 18  | 14    | 58    | 23 49   | 54 25 | 11 29    | 44      | 26              |       |
| 30   | W.   |                | 28    | 15    | 6 15  | 34    | 44    | 5 40    | 2 49  | 26 8     | 11 35   | 27              |       |
| 31   | Th.  |                | 32    | 11    | 7 12  | 56    | 18    | 29 17   | 29 3  | 56 12    | 23 24   | 28              |       |
| Date |      | ψ              |       | ♂     |       | ♂     |       | ♂       |       | ♂        |         | ♂               |       |
|      |      | Lat.           | Decl. | Lat.  | Decl. | Lat.  | Decl. | Lat.    | Decl. | Lat.     | Decl.   | Lat.            | Decl. |
| 2    | 1N31 | 1S48           | 0N7   | 23N22 | 0N42  | 18N58 | 1N2   | 16S12   | 0S19  | 20N0     |         |                 |       |
| 4    | "    | 49             | "     | 22    | "     | 54    | 2     | 11      | 18    | 20       |         |                 |       |
| 6    | "    | 49             | "     | 23    | "     | 49    | 1     | 10      | 16    | 37       |         |                 |       |
| 8    | "    | 50             | "     | 23    | "     | 45    | 1     | 10      | 15    | 54       |         |                 |       |
| 10   | "    | 50             | "     | 24    | "     | 43    | 1     | 10      | 14    | 21       | 10      |                 |       |
| 12   | "    | 51             | "     | 24    | "     | 36    | 0     | 10      | 12    | 26       |         |                 |       |
| 14   | "    | 51             | "     | 25    | 0 43  | 32    | 0     | 59      | 10    | 41       |         |                 |       |
| 16   | "    | 52             | "     | 25    | "     | 28    | 59    | 11      | 9     | 54       |         |                 |       |
| 18   | 1 30 | 53             | "     | 25    | "     | 24    | 58    | 11      | 7 22  | 7        |         |                 |       |
| 20   | "    | 54             | "     | 26    | "     | 20    | 58    | 12      | 6     | 19       |         |                 |       |
| 22   | "    | 55             | "     | 26    | "     | 17    | 57    | 13      | 4     | 30       |         |                 |       |
| 24   | "    | 55             | "     | 26    | "     | 13    | 57    | 14      | 3     | 41       |         |                 |       |
| 26   | "    | 56             | "     | 26    | "     | 9     | 56    | 16      | 1     | 52       |         |                 |       |
| 28   | "    | 57             | "     | 27    | 0 44  | 6     | 56    | 17      | 0 N 0 | 23       | 0       |                 |       |
| 30   | "    | 58             | "     | 27    | "     | 2     | 55    | 19      | 1     | 7        |         |                 |       |

| EPHEMERIS. |             |    |    |    |    |      |    |    |    |    |    |      | JULY, 1947. |   |                |   |   |   |   |   |   |   |   |   |  | 15 |  |  |
|------------|-------------|----|----|----|----|------|----|----|----|----|----|------|-------------|---|----------------|---|---|---|---|---|---|---|---|---|--|----|--|--|
| Date       | Longitudes. |    |    |    |    |      |    |    |    |    |    |      |             |   | Lunar Aspects. |   |   |   |   |   |   |   |   |   |  |    |  |  |
|            | ♈           | ♉  | ♊  | ♋  | ♌  | ♍    | ♎  | ♏  | ♐  | ♑  | ♒  | ♓    | ♈           | ♉ | ♊              | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ | ♒ | ♓ |  |    |  |  |
| 1          | 22          | 57 | 8  | 0  | 18 | 1    | 0  | 17 | 5  | 21 | 8  | 27   | 10          |   |                |   |   |   |   |   |   |   |   |   |  |    |  |  |
| 2          | 23          | 0  |    | 7  | 17 | 59   |    | 48 | 22 | 21 |    | R    | 8           |   |                |   |   |   |   |   |   |   |   |   |  |    |  |  |
| 3          |             | 4  |    | 14 |    | 56   | 1  | 31 | 23 | 34 | 27 | 3    |             | ♈ | ♉              | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ | ♒ |  |    |  |  |
| 4          |             | 8  |    | 21 |    | 53   | 2  | 13 | 24 | 48 | 26 | 54   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 5          |             | 11 |    | 28 |    | 50   |    | 56 | 26 | 1  |    | 38   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 6          |             | 14 |    | 35 |    | 48   | 3  | 38 | 27 | 14 | 18 |      |             | ♈ | ♉              | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ | ♒ |  |    |  |  |
| 7          |             | 17 |    | 42 |    | 47   | 4  | 20 | 28 | 27 | 25 | 54   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 8          |             | 20 |    | 49 |    | 46   | 5  | 2  | 29 | 40 | 27 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 9          |             | 23 |    | 56 |    | 45   |    | 44 | 0  | 53 | 24 | 56   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 10         |             | 27 | 9  | 3  |    | 43   | 6  | 26 | 2  | 6  | 22 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 11         |             | 30 |    | 10 |    | 42   | 7  | 8  | 3  | 19 | 23 | 46   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 12         |             | 34 |    | 17 |    | 42   |    | 50 | 4  | 32 | 28 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 13         |             | 37 |    | 25 |    | 41   | 8  | 33 | 5  | 46 | 22 | 8    |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 14         |             | 41 |    | 32 |    | 41   | 9  | 14 | 6  | 59 | 21 | 48   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 15         |             | 44 |    | 40 |    | D 40 |    | 56 | 8  | 12 | 8  |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 16         |             | 48 |    | 48 |    | 41   | 10 | 37 | 9  | 25 | 20 | 29   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 17         |             | 51 |    | 56 |    | 42   | 11 | 19 | 10 | 39 | 19 | 51   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 18         |             | 54 | 10 | 3  |    | 42   | 12 | 1  | 11 | 53 | 15 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 19         |             | 57 |    | 10 |    | 42   |    | 42 | 13 | 6  | 18 | 41   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 20         | 24          | 0  |    | 17 |    | 43   | 13 | 23 | 14 | 20 | 12 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 21         |             | 3  |    | 25 |    | 44   | 14 | 5  | 15 | 33 | 17 | 47   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 22         |             | 6  |    | 32 |    | 45   |    | 46 | 16 | 47 | 28 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 23         |             | 9  |    | 40 |    | 46   | 15 | 27 | 18 | 0  | 12 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 24         |             | 12 |    | 48 |    | 48   | 16 | 9  | 19 | 14 | 16 | 59   |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 25         |             | 15 |    | 56 |    | 49   |    | 50 | 20 | 28 | 52 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 26         |             | 18 | 11 | 4  |    | 51   | 17 | 31 | 21 | 41 | 16 | D 54 |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 27         |             | 21 |    | 12 |    | 53   | 18 | 12 | 22 | 55 | 17 | 1    |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 28         |             | 24 |    | 20 |    | 55   |    | 52 | 24 | 8  | 13 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 29         |             | 27 |    | 27 |    | 57   | 19 | 33 | 25 | 22 | 33 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 30         |             | 30 |    | 34 | 18 | 0    | 20 | 14 | 26 | 36 | 18 | 0    |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |
| 31         |             | 33 |    | 41 |    | 2    |    | 54 | 27 | 50 | 32 |      |             |   | ♈              | ♉ | ♊ | ♋ | ♌ | ♍ | ♎ | ♏ | ♐ | ♑ |  |    |  |  |

| Date. | ♈      |       | ♉      |       | Moon's |       | Date. | Time.                       | Phenomena. |
|-------|--------|-------|--------|-------|--------|-------|-------|-----------------------------|------------|
|       | Lat.   | Decl. | Lat.   | Decl. | ♈      |       |       |                             |            |
| 2     | 0 S 29 | 22N45 | 2 S 29 | 18N15 | 2 11 3 | 2 16  | 20    | ♈ at Aphelion.              |            |
| 4     | 23     | 56 3  | 1 17   | 52    | 1 57 3 | 3 16  | 9     | Full Moon.                  |            |
| 6     | 19 23  | 6     | 27     | 31    | 51     | 21    | 0     | ♈ at Perigee.               |            |
| 8     | 14     | 13    | 56     | 11    | 44 5   | 0 55  | 0     | ♈ at Aphelion.              |            |
| 10    | 9      | 17    | 4      | 20 16 | 59     | 37    | 10 23 | ♈ on Equator.               |            |
| 12    | 0 S 4  | 18    | 38     | 54    | 29     | 11 16 | 20    | ♈ at Last Quarter.          |            |
| 14    | 0 N 1  | 17    | 48     | 57    | 21 14  | 2     | 0     | ♈ at ♈                      |            |
| 16    | 7      | 13    | 55 17  | 1     | 13 15  | 0     | 7     | ♀ Inf. & ☉                  |            |
| 18    | 11     | 5     | 52     | 15    | 4 18   | 9     | 46    | New Moon.                   |            |
| 20    | 16 22  | 56    | 45     | 30    | 0 54   | 11    | 0     | ♈ at Apogee.                |            |
| 22    | 21     | 44    | 31     | 50    | 44 23  | 0     | 20    | ♈ on Equator.               |            |
| 24    | 25     | 28 4  | 12 18  | 12    | 34     | 22    | 45    | ☉ enters ♈                  |            |
| 26    | 30     | 11 3  | 49     | 36    | 23 25  | 4     | 48    | ♈ at First Quarter.         |            |
| 28    | 35 21  | 51    | 21 19  | 1     | 12 28  |       |       | ♈ at ♈                      |            |
| 30    | 39     | 29 2  | 53     | 3     | 0 29   |       |       | Hel. setting of ♈ in the E. |            |
|       |        |       |        |       | 31 6   | 0     |       | ♈ at Perigee.               |            |











| Months<br>and<br>Dates. | Latitudes. |        |      |      |      |      |      |      |      |      |      |    |
|-------------------------|------------|--------|------|------|------|------|------|------|------|------|------|----|
|                         | +5°        | +8°    | +11° | +14° | +17° | +19° | +23° | +26° | +29° | +32° | +35° |    |
| Jan.                    | 5 6        | 9 6    | 14 6 | 20 6 | 25 6 | 31 6 | 34 6 | 42 6 | 49 6 | 55 7 | 2 7  | 9  |
|                         | 12         | 12     | 17   | 22   | 27   | 33   | 36   | 44   | 49   | 55   | 2    | 9  |
|                         | 19         | 15     | 19   | 24   | 28   | 33   | 36   | 44   | 49   | 54   | 0    | 7  |
|                         | 23         | 16     | 20   | 24   | 28   | 33   | 36   | 42   | 47   | 52 6 | 58   | 4  |
| Feb.                    | 2          | 16     | 20   | 23   | 28   | 32   | 35   | 40   | 44   | 49   | 54 6 | 59 |
|                         | 9          | 16     | 20   | 23   | 26   | 30   | 32   | 37   | 41   | 45   | 49   | 53 |
|                         | 16         | 16     | 18   | 21   | 24   | 26   | 28   | 32   | 36   | 39   | 42   | 4  |
|                         | 23         | 15     | 16   | 18   | 20   | 23   | 24   | 28   | 30   | 33   | 36   | 38 |
| Mar.                    | 2          | 12     | 13   | 15   | 16   | 18   | 19   | 22   | 24   | 25   | 28   | 30 |
|                         | 9          | 9      | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 18   | 19   | 20 |
|                         | 16         | 6      | 7    | 8    | 9    | 9    | 10   | 10   | 11   | 11   | 12   |    |
|                         | 23         | 4      | 3    | 3    | 2    | 2    | 2    | 2    | 2    | 2    | 1    |    |
|                         | 30         | 1      | 0    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5  |
| Apr.                    | 6 5        | 5 7    | 5 56 | 59 5 | 57 5 | 57 5 | 56 5 | 55 5 | 54 5 | 53 5 | 52 5 | 51 |
|                         | 13         | 54     | 52   | 50   | 49   | 47   | 46   | 43   | 40   | 38   | 35   | 32 |
|                         | 20         | 52     | 50   | 47   | 44   | 42   | 46   | 36   | 33   | 30   | 27   | 23 |
|                         | 27         | 49     | 47   | 44   | 41   | 37   | 35   | 30   | 27   | 23   | 19   | 15 |
| May                     | 4          | 47     | 44   | 41   | 37   | 34   | 31   | 26   | 22   | 17   | 13   | 7  |
|                         | 11         | 46     | 43   | 39   | 34   | 30   | 27   | 21   | 16   | 12   | 6 5  | 0  |
|                         | 18         | 45     | 41   | 37   | 32   | 29   | 24   | 18   | 12   | 7    | 1 4  | 55 |
|                         | 25         | 45     | 41   | 36   | 31   | 26   | 23   | 15   | 10   | 4 4  | 57   | 50 |
| June                    | 1          | 46     | 41   | 36   | 31   | 25   | 22   | 14   | 7    | 1    | 54   | 47 |
|                         | 8          | 46     | 41   | 36   | 31   | 25   | 22   | 14   | 7    | 0    | 53   | 46 |
|                         | 15         | 47     | 42   | 37   | 31   | 26   | 22   | 14   | 7    | 0    | 53   | 45 |
|                         | 22         | 49     | 44   | 38   | 32   | 27   | 23   | 15   | 8    | 1    | 54   | 46 |
|                         | 29         | 50     | 45   | 40   | 34   | 29   | 25   | 16   | 10   | 3    | 56   | 58 |
| July                    | 6          | 52     | 47   | 42   | 36   | 31   | 27   | 19   | 12   | 6    | 59   | 51 |
|                         | 13         | 53     | 48   | 43   | 38   | 33   | 30   | 22   | 15   | 9 5  | 2    | 55 |
|                         | 20         | 54     | 50   | 45   | 40   | 35   | 32   | 25   | 19   | 13   | 6 5  | 0  |
|                         | 27         | 55     | 51   | 47   | 42   | 37   | 34   | 28   | 22   | 17   | 11   | 5  |
| Aug.                    | 3          | 56     | 53   | 49   | 44   | 40   | 37   | 31   | 26   | 21   | 15   | 10 |
|                         | 10         | 56     | 53   | 50   | 45   | 42   | 39   | 34   | 30   | 25   | 20   | 15 |
|                         | 17         | 56     | 53   | 50   | 47   | 44   | 41   | 37   | 33   | 29   | 25   | 20 |
|                         | 24         | 5 55 5 | 53 5 | 50 5 | 48 5 | 45 5 | 43 5 | 39 5 | 36 5 | 33 5 | 30 5 | 26 |
|                         | 31         | 54     | 52   | 50   | 48   | 46   | 45   | 42   | 39   | 37   | 34   | 31 |
| Sep.                    | 7          | 53     | 51   | 50   | 48   | 46   | 45   | 43   | 42   | 40   | 38   | 36 |
|                         | 14         | 52     | 51   | 50   | 49   | 48   | 47   | 46   | 45   | 43   | 42   | 41 |
|                         | 21         | 50     | 49   | 49   | 49   | 48   | 48   | 48   | 48   | 46   | 47   | 4  |
|                         | 28         | 48     | 49   | 49   | 49   | 50   | 50   | 50   | 51   | 51   | 51   | 51 |
| Oct.                    | 5          | 46     | 48   | 48   | 49   | 50   | 51   | 52   | 53   | 55   | 56   | 57 |
|                         | 12         | 46     | 47   | 49   | 50   | 52   | 53   | 56   | 57   | 59 6 | 0 6  | 2  |
|                         | 19         | 46     | 48   | 50   | 52   | 54   | 55   | 58 6 | 1 6  | 2    | 6    | 8  |
|                         | 26         | 46     | 48   | 51   | 54   | 56   | 58 6 | 2    | 5    | 8    | 11   | 14 |
| Nov.                    | 2          | 46     | 48   | 52   | 55   | 59 6 | 1    | 6    | 9    | 13   | 17   | 21 |
|                         | 9          | 46     | 50   | 53   | 57 6 | 1    | 4    | 9    | 12   | 18   | 23   | 28 |
|                         | 16         | 48     | 52   | 56 6 | 1    | 5    | 8    | 14   | 18   | 23   | 29   | 34 |
|                         | 23         | 51     | 55 6 | 0    | 4    | 9    | 12   | 18   | 24   | 29   | 35   | 41 |
|                         | 30         | 53     | 58   | 3    | 8    | 13   | 16   | 24   | 29   | 35   | 41   | 48 |
| Dec.                    | 7          | 56 6   | 1    | 6    | 11   | 17   | 20   | 28   | 34   | 40   | 47   | 54 |
|                         | 14 6       | 0      | 5    | 10   | 15   | 21   | 24   | 32   | 39   | 45   | 52   | 59 |
|                         | 21         | 3      | 8    | 14   | 19   | 25   | 28   | 36   | 43   | 49   | 56 7 | 4  |
|                         | 28         | 8      | 12   | 17   | 22   | 28   | 31   | 40   | 46   | 53 7 | 0    | 7  |

| Months<br>and<br>Dates. | Latitudes. |         |       |       |       |       |       |       |       |       |       |       |
|-------------------------|------------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                         | +5°        | +8°     | +11°  | +14°  | +17°  | +19°  | +23°  | +26°  | +29°  | +32°  | +35°  |       |
| Jan.                    | 5 18       | 1 17 55 | 17 50 | 17 45 | 17 39 | 17 36 | 17 28 | 17 22 | 17 16 | 17 9  | 17 2  |       |
|                         | 12         | 4       | 59    | 54    | 49    | 44    | 41    | 33    | 28    | 21    | 15    | 8     |
|                         | 19         | 7 18    | 2     | 57    | 53    | 48    | 45    | 38    | 33    | 27    | 21    | 15    |
|                         | 26         | 9       | 5 18  | 1     | 57    | 52    | 49    | 43    | 38    | 34    | 27    | 22    |
| Feb.                    | 2          | 11      | 7     | 4 18  | 0     | 56    | 53    | 47    | 43    | 38    | 33    | 29    |
|                         | 9          | 12      | 9     | 6     | 3     | 59    | 57    | 51    | 46    | 42    | 40    | 36    |
|                         | 16         | 13      | 11    | 8     | 5 18  | 2 18  | 0     | 56    | 53    | 50    | 46    | 43    |
|                         | 23         | 13      | 11    | 9     | 7     | 5     | 4 18  | 0     | 58    | 55    | 52    | 49    |
| Mar.                    | 2          | 13      | 11    | 10    | 9     | 7     | 6     | 3 18  | 1 18  | 0     | 58    | 56    |
|                         | 9          | 12      | 11    | 11    | 10    | 9     | 8     | 7     | 6     | 4 18  | 3 18  | 2     |
|                         | 16         | 12      | 11    | 11    | 11    | 10    | 10    | 9     | 9     | 8     | 8     | 8     |
|                         | 23         | 10      | 11    | 11    | 11    | 11    | 12    | 12    | 12    | 13    | 13    | 13    |
|                         | 30         | 10      | 11    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    |
| Apr.                    | 6          | 8       | 9     | 11    | 12    | 14    | 15    | 17    | 19    | 20    | 22    | 24    |
|                         | 13         | 7       | 9     | 11    | 13    | 15    | 17    | 19    | 22    | 24    | 27    | 30    |
|                         | 20         | 7       | 9     | 12    | 14    | 17    | 19    | 22    | 26    | 29    | 32    | 36    |
|                         | 27         | 6       | 9     | 12    | 15    | 19    | 21    | 25    | 29    | 33    | 37    | 41    |
| May                     | 4          | 6       | 10    | 13    | 17    | 21    | 23    | 28    | 33    | 37    | 42    | 47    |
|                         | 11         | 7       | 11    | 14    | 19    | 23    | 25    | 32    | 37    | 41    | 47    | 53    |
|                         | 18         | 7       | 11    | 16    | 21    | 25    | 28    | 35    | 41    | 46    | 52    | 58    |
|                         | 25         | 8       | 13    | 18    | 23    | 27    | 31    | 38    | 44    | 50    | 56    | 19 3  |
| June                    | 1          | 10      | 15    | 20    | 25    | 30    | 34    | 41    | 47    | 53    | 19 1  | 8     |
|                         | 8          | 11      | 16    | 22    | 27    | 33    | 36    | 44    | 50    | 57    | 5     | 12    |
|                         | 15         | 13      | 18    | 23    | 29    | 34    | 38    | 47    | 53    | 19 0  | 7     | 15    |
|                         | 22         | 14      | 19    | 25    | 31    | 36    | 40    | 49    | 55    | 2     | 9     | 17    |
|                         | 29         | 16      | 21    | 26    | 32    | 37    | 41    | 50    | 56    | 3     | 10    | 18    |
| July                    | 6          | 17      | 22    | 27    | 32    | 38    | 43    | 50    | 56    | 3     | 10    | 17    |
|                         | 13         | 17      | 22    | 27    | 32    | 38    | 43    | 49    | 55    | 1     | 8     | 16    |
|                         | 20         | 17      | 22    | 27    | 32    | 37    | 40    | 48    | 53    | 1     | 5     | 12    |
|                         | 27         | 17      | 21    | 26    | 30    | 35    | 38    | 44    | 50    | 18 55 | 1     | 8     |
| Aug.                    | 3          | 16      | 20    | 23    | 28    | 32    | 35    | 41    | 46    | 50    | 18 56 | 2     |
|                         | 10         | 15      | 18    | 21    | 25    | 28    | 31    | 37    | 41    | 46    | 50    | 18 55 |
|                         | 17         | 13      | 15    | 18    | 22    | 24    | 27    | 32    | 35    | 39    | 43    | 47    |
|                         | 24         | 18 10   | 18 12 | 18 15 | 18 18 | 18 20 | 18 22 | 18 26 | 18 29 | 18 32 | 18 35 | 18 39 |
|                         | 31         | 7       | 9     | 11    | 13    | 15    | 16    | 19    | 22    | 24    | 27    | 30    |
| Sep.                    | 7          | 4       | 5     | 7     | 8     | 10    | 11    | 13    | 14    | 16    | 18    | 20    |
|                         | 14         | 1       | 1     | 2     | 3     | 3     | 4     | 5     | 6     | 8     | 9     | 10    |
|                         | 21         | 17 56   | 17 57 | 17 57 | 17 57 | 17 58 | 17 58 | 17 58 | 17 59 | 17 59 | 18 0  |       |
|                         | 28         | 54      | 53    | 53    | 53    | 52    | 52    | 52    | 51    | 50    | 50    | 17 50 |
| Oct.                    | 5          | 52      | 49    | 49    | 48    | 47    | 46    | 45    | 43    | 42    | 41    | 40    |
|                         | 12         | 47      | 46    | 44    | 43    | 41    | 40    | 38    | 36    | 34    | 32    | 30    |
|                         | 19         | 45      | 43    | 41    | 39    | 36    | 35    | 31    | 28    | 27    | 24    | 21    |
|                         | 26         | 43      | 40    | 38    | 35    | 33    | 31    | 27    | 23    | 20    | 17    | 13    |
| Nov.                    | 2          | 42      | 39    | 36    | 33    | 28    | 27    | 22    | 18    | 14    | 11    | 6     |
|                         | 9          | 41      | 37    | 34    | 30    | 26    | 23    | 18    | 14    | 9     | 5     | 0     |
|                         | 16         | 41      | 37    | 33    | 29    | 24    | 21    | 15    | 10    | 6     | 0     | 16 55 |
|                         | 23         | 42      | 38    | 33    | 29    | 24    | 21    | 14    | 8     | 3 16  | 57    | 51    |
|                         | 30         | 44      | 39    | 34    | 29    | 24    | 21    | 13    | 7     | 2     | 55    | 49    |
| Dec.                    | 7          | 46      | 41    | 36    | 31    | 25    | 22    | 14    | 8     | 2     | 55    | 48    |
|                         | 14         | 49      | 44    | 39    | 33    | 28    | 24    | 16    | 10    | 4     | 57    | 49    |
|                         | 21         | 53      | 48    | 42    | 37    | 31    | 28    | 19    | 13    | 6     | 59    | 52    |
|                         | 28         | 57      | 52    | 45    | 41    | 34    | 32    | 23    | 17    | 9 17  | 3     | 56    |

The position of Pluto and Mean Longitudes  
of ☉, ♃ and ♅ in 1947.

| Month and Date. | Pluto.                                        |                         |                          | Sun.                                            | Moon.                                          | Moon's Node.                              |
|-----------------|-----------------------------------------------|-------------------------|--------------------------|-------------------------------------------------|------------------------------------------------|-------------------------------------------|
|                 | Long.                                         | Lat.                    | Decl.                    |                                                 |                                                |                                           |
| Jan.            | 1 12a 51<br>11 12R 39<br>21 12 26<br>31 12 11 | 6N 52<br>54<br>55<br>56 | 23N 32<br>37<br>42<br>47 | 280 4 43<br>289 56 6<br>299 47 29<br>309 38 53  | 26 37 12<br>158 23 3<br>290 8 53<br>61 54 43   | 10 8 7<br>9 36 21<br>9 4 34<br>8 32 48    |
| Feb.            | 10 11 58<br>20 11 43                          | 57<br>58                | 53<br>58                 | 319 30 16<br>329 21 39                          | 193 40 33<br>325 26 24                         | 8 1 2<br>7 29 15                          |
| March           | 2 11 33<br>12 11 20<br>22 11 12               | 57 24<br>57<br>56       | 0<br>3<br>5              | 339 13 2<br>349 4 26<br>358 55 49               | 97 12 14<br>228 58 4<br>0 43 55                | 6 57 29<br>6 5 43<br>5 53 56              |
| April           | 1 11 4<br>11 11 0<br>21 10 57                 | 56<br>55<br>54          | 7<br>7<br>7              | 8 47 12<br>18 38 36<br>28 29 59                 | 132 29 45<br>264 15 35<br>36 1 25              | 5 22 10<br>4 50 24<br>4 18 37             |
| May             | 1 10 D58<br>11 11 2<br>21 11 7<br>31 11 15    | 53<br>52<br>50<br>49 23 | 6<br>5<br>3<br>57        | 38 21 22<br>48 12 46<br>58 4 9<br>67 55 32      | 167 47 16<br>299 33 6<br>71 18 56<br>203 4 46  | 3 46 51<br>3 15 5<br>2 43 18<br>2 11 32   |
| June            | 10 11 25<br>20 11 40<br>30 11 51              | 48<br>47<br>47          | 53<br>48<br>44           | 77 46 55<br>87 38 19<br>97 29 42                | 334 50 37<br>106 36 27<br>238 22 17            | 1 39 46<br>1 7 59<br>0 36 13              |
| July            | 10 12 8<br>20 12 23<br>30 12 44               | 46<br>46<br>47          | 39<br>34<br>29           | 107 21 5<br>117 12 29<br>127 3 52               | 10 8 8<br>53 58 29<br>39 48 29                 | 0 4 27<br>32 40<br>0 54                   |
| August          | 9 13 3<br>19 13 21<br>29 13 42                | 48<br>48<br>49          | 22<br>20<br>15           | 136 55 15<br>146 46 39<br>156 38 2              | 45 25 38<br>177 11 29<br>308 57 19             | 28 29 7<br>27 58 22<br>26 35              |
| Sep.            | 8 13 55<br>18 14 5<br>28 14 24                | 52<br>54<br>56          | 11<br>8<br>7             | 166 29 25<br>176 20 48<br>186 12 12             | 80 43 9<br>212 29 0<br>344 14 50               | 26 54 49<br>26 23 3<br>25 51 16           |
| Oct.            | 8 14 35<br>18 14 43<br>28 14 49               | 58<br>0<br>3            | 6<br>4<br>6              | 196 3 35<br>205 54 58<br>215 46 22              | 116 0 40<br>247 46 30<br>19 32 21              | 25 19 30<br>24 47 44<br>24 15 58          |
| Nov.            | 7 14a 52<br>17 14 53<br>27 14R 53             | 7 N 6<br>8<br>11        | 23 N 8<br>8<br>14        | 225 37 45<br>235 29 8<br>245 20 32              | 151 18 11<br>283 4 1<br>54 49 52               | 23 44 11<br>123 12 25<br>22 40 39         |
| Dec.            | 7 14 48<br>17 14 42<br>27 14 32<br>31 14 38   | 14<br>16<br>18<br>19    | 18<br>22<br>25<br>29     | 255 11 55<br>265 3 18<br>274 54 41<br>278 51 15 | 186 35 42<br>318 21 32<br>90 7 22<br>142 49 42 | 22 8 52<br>21 37 6<br>21 5 20<br>20 52 36 |

Ending Moments of Tithis for each date in 1947  
(calculated in I. S. T.)

| Date. | January                 |       | February.               |       | March                  |       | April.                 |       | May.                   |       | June.                  |       |
|-------|-------------------------|-------|-------------------------|-------|------------------------|-------|------------------------|-------|------------------------|-------|------------------------|-------|
|       | Ti.                     | Time. | Ti.                     | Time. | Ti.                    | Time. | Ti.                    | Time. | Ti.                    | Time. | Ti.                    | Time  |
| 1     | 8                       | 5 27  | 10                      | 12 49 | 8                      | 1 45  | 10                     | 4 30  | 11                     | 10 33 | 13                     | 21 38 |
| 2     | 9                       | 4 17  | 11                      | 10 8  | { 9 0 22 }<br>10 21 16 |       | 11                     | 2 31  | 12                     | 9 52  | 14                     | 23 2  |
| 3     | 10                      | 2 39  | 12                      | 7 6   | 11 18 48               |       | { 12 0 41 }<br>13 23 4 |       | 13                     | 9 28  | 15                     | .. .. |
| 4     | { 11 0 0 }<br>12 21 7   |       | 13                      | 3 54  | 12 16 7                |       | 14                     | 21 43 | 14                     | 9 46  | 15                     | 0 56  |
| 5     | 13                      | 17 33 | { 14 0 35 }<br>15 21 22 |       | 13 13 28               |       | 15                     | 20 59 | 15                     | 10 28 | 16                     | 3 6   |
| 6     | 14                      | 13 58 | 16                      | 18 19 | 14 11 1                |       | 16                     | 20 44 | 16                     | 11 35 | 17                     | 5 27  |
| 7     | 15                      | 10 17 | 17                      | 15 53 | 15 8 47                |       | 17                     | 21 1  | 17                     | 13 12 | 18                     | 7 56  |
| 8     | 16                      | 6 38  | 18                      | 13 58 | 16 6 58                |       | 18                     | 22 0  | 18                     | 15 13 | 19                     | 10 25 |
| 9     | 17                      | 3 18  | 19                      | 12 49 | 17 5 51                |       | 19                     | 23 34 | 19                     | 17 34 | 20                     | 12 41 |
| 10    | { 18 0 11 }<br>19 21 55 |       | 20                      | 12 34 | 18 5 21                |       | 20                     | .. .. | 20                     | 20 7  | 21                     | 14 33 |
| 11    | 20                      | 20 16 | 21                      | 13 9  | 19 5 40                |       | 20                     | 1 41  | 21                     | 23 14 | 22                     | 16 0  |
| 12    | 21                      | 19 19 | 22                      | 14 30 | 20 6 42                |       | 21                     | 4 5   | 22                     | .. .. | 23                     | 16 43 |
| 13    | 22                      | 19 55 | 23                      | 16 32 | 21 8 24                |       | 22                     | 6 39  | 22                     | 0 41  | 24                     | 16 53 |
| 14    | 23                      | 20 56 | 24                      | 19 8  | 22 10 41               |       | 23                     | 9 1   | 23                     | 2 25  | 25                     | 16 8  |
| 15    | 24                      | 22 49 | 25                      | 21 51 | 23 13 16               |       | 24                     | 11 1  | 24                     | 3 30  | 26                     | 14 36 |
| 16    | 25                      | .. .. | 26                      | .. .. | 24 15 52               |       | 25                     | 12 32 | 25                     | 3 56  | 27                     | 12 28 |
| 17    | 25                      | 1 9   | 26                      | 0 34  | 25 18 16               |       | 26                     | 13 21 | 26                     | 3 31  | 28                     | 9 42  |
| 18    | 26                      | 3 52  | 27                      | 2 56  | 26 20 12               |       | 27                     | 13 24 | 27                     | 2 15  | 29                     | 6 31  |
| 19    | 27                      | 6 39  | 28                      | 4 55  | 27 21 35               |       | 28                     | 12 46 | { 28 0 26 }<br>29 22 1 |       | { 30 2 50 }<br>1 23 15 |       |
| 20    | 28                      | 9 22  | 29                      | 6 25  | 28 22 22               |       | 29                     | 11 33 | 30                     | 19 12 | 2                      | 19 31 |
| 21    | 29                      | 11 51 | 30                      | 7 26  | 29 22 28               |       | 30                     | 9 47  | 1                      | 16 5  | 3                      | 15 57 |
| 22    | 30                      | 14 3  | 1                       | 7 57  | 30 22 3                |       | 1                      | 7 41  | 2                      | 12 52 | 4                      | 12 45 |
| 23    | 1                       | 15 53 | 2                       | 8 6   | 1 21 10                |       | 2                      | 5 14  | 3                      | 9 36  | 5                      | 10 0  |
| 24    | 2                       | 17 0  | 3                       | 7 48  | 2 19 52                |       | 3                      | 2 43  | 4                      | 6 28  | 6                      | 7 56  |
| 25    | 3                       | 18 22 | 4                       | 7 16  | 3 18 23                |       | { 4 0 9 }<br>5 21 33   |       | 5                      | 3 34  | 7                      | 6 25  |
| 26    | 4                       | 19 3  | 5                       | 6 17  | 4 16 41                |       | 6                      | 19 0  | { 6 1 3 }<br>7 23 0    |       | 8                      | 5 44  |
| 27    | 5                       | 19 14 | 6                       | 5 4   | 5 14 48                |       | 7                      | 16 55 | 8                      | 21 23 | 9                      | 5 42  |
| 28    | 6                       | 18 59 | 7                       | 3 33  | 6 12 50                |       | 8                      | 14 49 | 9                      | 20 25 | 10                     | 6 21  |
| 29    | 7                       | 18 0  | .. ..                   | .. .. | 7 10 50                |       | 9                      | 12 28 | 10                     | 19 55 | 11                     | 7 33  |
| 30    | 8                       | 16 55 | .. ..                   | .. .. | 8 8 45                 |       | 10                     | 11 33 | 11                     | 19 55 | 12                     | 9 19  |
| 31    | 9                       | 15 10 | .. ..                   | .. .. | 9 6 39                 |       | .. ..                  | .. .. | 12                     | 20 34 | .. ..                  | .. .. |

Ending Moments of Tithis for each date in 1947  
(calculated in I. S. T.)—(concl'd.).

| Date | July. |       | August. |       | September. |       | October. |       | November. |       | December. |       |
|------|-------|-------|---------|-------|------------|-------|----------|-------|-----------|-------|-----------|-------|
|      | Ti.   | Time. | Ti.     | Time. | Ti.        | Time. | Ti.      | Time. | Ti.       | Time. | Ti.       | Time. |
| 1    | 13    | 11 23 | 14      | 5 1   | 16         | 23 10 | 16       | 12 7  | 18        | 20 33 | 18        | 5 45  |
| 2    | 14    | 13 43 | 15      | 7 16  | 17         | ...   | 17       | 11 42 | 19        | 18 24 | 19        | 2 48  |
| 3    | 15    | 16 9  | 16      | 9 25  | 17         | 0 8   | 18       | 10 56 | 20        | 16 8  | 20        | 0 4   |
| 4    | 16    | 18 34 | 17      | 11 11 | 18         | 0 32  | 19       | 9 50  | 21        | 13 52 | 21        | 21 32 |
| 5    | 17    | 20 56 | 18      | 12 42 | 19         | 0 37  | 20       | 8 28  | 22        | 11 38 | 22        | 19 22 |
| 6    | 18    | 23 12 | 19      | 13 24 | 20         | 0 23  | 21       | 6 50  | 23        | 9 31  | 23        | 17 39 |
| 7    | 19    | ...   | 20      | 14 26 | 21         | 23 24 | 22       | 5 1   | 24        | 7 30  | 24        | 16 20 |
| 8    | 19    | 1 6   | 21      | 14 37 | 22         | 22 12 | 23       | 2 55  | 25        | 5 45  | 25        | 15 31 |
| 9    | 20    | 2 46  | 22      | 14 15 | 24         | 18 29 | 25       | 22 15 | 26        | 4 9   | 26        | 15 12 |
| 10   | 21    | 3 52  | 23      | 13 13 | 25         | 15 54 | 26       | 19 46 | 27        | 2 53  | 27        | 15 22 |
| 11   | 22    | 4 16  | 24      | 11 38 | 26         | 13 4  | 27       | 17 24 | 28        | 1 59  | 28        | 15 56 |
| 12   | 23    | 4 13  | 25      | 9 25  | 27         | 10 2  | 28       | 15 13 | 29        | 1 31  | 29        | 16 56 |
| 13   | 24    | 3 20  | 26      | 6 41  | 28         | 6 17  | 29       | 13 17 | 30        | 1 32  | 30        | 18 21 |
| 14   | 25    | 1 47  | 27      | 3 29  | 29         | 3 29  | 30       | 11 41 | 1         | 2 3   | 1         | 20 10 |
| 15   | 26    | 23 30 | 28      | 0 0   | 30         | 0 42  | 1        | 10 37 | 2         | 3 6   | 2         | 22 19 |
| 16   | 27    | 20 40 | 29      | 20 47 | 1          | 22 32 | 2        | 3 6   | 3         | ...   | 3         | ...   |
| 17   | 28    | 17 19 | 30      | 16 42 | 2          | 20 40 | 3        | 10 12 | 4         | 4 37  | 4         | 0 40  |
| 18   | 29    | 13 37 | 1       | 13 18 | 3          | 19 21 | 4        | 10 27 | 5         | 6 36  | 5         | 3 17  |
| 19   | 30    | 9 46  | 2       | 10 17 | 4          | 18 53 | 5        | 11 22 | 6         | 9 0   | 6         | 5 51  |
| 20   | 1     | 5 58  | 3       | 7 46  | 5          | 19 18 | 6        | 13 11 | 7         | 11 34 | 7         | 8 14  |
| 21   | 2     | 2 14  | 4       | 5 58  | 6          | 20 25 | 7        | 15 47 | 8         | 14 3  | 8         | 10 20 |
| 22   | 3     | 22 57 | 5       | 4 51  | 7          | 22 8  | 8        | 17 25 | 9         | 16 17 | 9         | 11 52 |
| 23   | 4     | 20 10 | 6       | 4 50  | 8          | ...   | 9        | 19 55 | 10        | 18 6  | 10        | 12 42 |
| 24   | 5     | 18    | 7       | 5 34  | 9          | 0 22  | 10       | 23 43 | 11        | 19 8  | 11        | 12 46 |
| 25   | 6     | 16 49 | 8       | 6 57  | 10         | 2 50  | 11       | ...   | 12        | 19 33 | 12        | 11 58 |
| 26   | 7     | 16 18 | 9       | 9 1   | 11         | 5 31  | 12       | 0 13  | 13        | 19 18 | 13        | 10 22 |
| 27   | 8     | 16 38 | 10      | 11 23 | 12         | 7 34  | 13       | 1 43  | 14        | 18 4  | 14        | 8 4   |
| 28   | 9     | 17 38 | 11      | 13 54 | 13         | 9 35  | 14       | 2 37  | 15        | 16 30 | 15        | 5 13  |
| 29   | 10    | 19 32 | 12      | 16 21 | 14         | 10 50 | 15       | 2 53  | 16        | 14 15 | 16        | 1 54  |
| 30   | 11    | 21 41 | 13      | 18 33 | 15         | 12 8  | 16       | 2 29  | 17        | 11 37 | 17        | 22 23 |
| 31   | 12    | 23 56 | 14      | 20 28 | 16         | 0 15  | 17       | 1 34  | 18        | 8 45  | 18        | 18 44 |
|      | 13    | ...   | 15      | 22 4  | 17         | 22 31 | 18       | ...   | 19        | ...   | 19        | 15 12 |
|      | 14    | 2 32  | 16      | 22 4  | 18         | ...   | 19       | ...   | 20        | ...   | 20        | 12 8  |

Time when the Moon enters the Zodiacal signs in 1947. 31

| January. |          | February. |          | March.     |          | April.   |          | May.      |          | June.     |          |
|----------|----------|-----------|----------|------------|----------|----------|----------|-----------|----------|-----------|----------|
| Sign.    | Date.    | Sign.     | Date.    | Sign.      | Date.    | Sign.    | Date.    | Sign.     | Date.    | Sign.     | Date.    |
|          | Time.    |           | Time.    |            | Time.    |          | Time.    |           | Time.    |           | Time.    |
|          | H. M.    |           | H. M.    |            | H. M.    |          | H. M.    |           | H. M.    |           | H. M.    |
| ♈        | 2 6 31   | ♉         | 2 19 16  | ♊          | 2 2 26   | ♋        | 2 14 2   | ♌         | 2 0 59   | ♍         | 3 0 27   |
| ♈        | 4 8 52   | ♉         | 4 19 33  | ♊          | 4 4 29   | ♋        | 4 18 15  | ♌         | 4 8 8    | ♍         | 5 12 20  |
| ♈        | 6 8 56   | ♉         | 6 20 17  | ♊          | 6 6 20   | ♋        | 7 0 33   | ♌         | 6 17 42  | ♍         | 8 1 8    |
| ♈        | 8 8 26   | ♉         | 8 23 34  | ♊          | 8 9 25   | ♋        | 9 9 44   | ♌         | 9 5 25   | ♍         | 10 13 14 |
| ♈        | 10 9 18  | ♉         | 11 6 4   | ♊          | 10 15 25 | ♋        | 11 21 39 | ♌         | 11 18 8  | ♍         | 12 22 57 |
| ♈        | 12 13 28 | ♉         | 13 16 47 | ♊          | 13 1 9   | ♋        | 14 10 19 | ♌         | 14 5 46  | ♍         | 15 5 9   |
| ♈        | 14 21 51 | ♉         | 16 5 41  | ♊          | 15 13 29 | ♋        | 16 21 11 | ♌         | 16 14 22 | ♍         | 17 7 47  |
| ♈        | 17 9 22  | ♉         | 18 18 5  | ♊          | 18 2 48  | ♋        | 19 4 50  | ♌         | 18 19 15 | ♍         | 19 8 1   |
| ♈        | 19 22 40 | ♉         | 21 4 22  | ♊          | 20 12 26 | ♋        | 21 9 23  | ♌         | 20 21 19 | ♍         | 21 7 39  |
| ♈        | 22 3 0   | ♉         | 23 12 25 | ♊          | 22 19 49 | ♋        | 23 11 57 | ♌         | 22 21 58 | ♍         | 23 8 35  |
| ♈        | 24 22 21 | ♉         | 25 18 36 | ♊          | 25 0 55  | ♋        | 25 13 54 | ♌         | 24 22 52 | ♍         | 25 12 24 |
| ♈        | 27 6 35  | ♉         | 27 23 14 | ♊          | 27 4 45  | ♋        | 27 16 17 | ♌         | 27 1 25  | ♍         | 27 19 52 |
| ♈        | 29 13 14 | ♉         | 29 7 58  | ♊          | 29 7 58  | ♋        | 29 19 48 | ♌         | 29 6 30  | ♍         | 30 6 18  |
| ♈        | 31 17 18 | ♉         | 31 10 54 | ♊          | 31 10 54 | ♋        | 31 14 14 | ♌         | 31 14 14 | ♍         | ...      |
| July.    |          | August.   |          | September. |          | October. |          | November. |          | December. |          |
|          |          |           |          |            |          |          |          |           |          |           |          |
| ♈        | 2 18 33  | ♉         | 1 13 19  | ♊          | 2 17 34  | ♋        | 2 7 42   | ♌         | 2 23 1   | ♍         | 2 8 1    |
| ♈        | 5 7 18   | ♉         | 4 1 17   | ♊          | 5 1 38   | ♋        | 4 13 12  | ♌         | 5 2 16   | ♍         | 4 9 56   |
| ♈        | 7 19 30  | ♉         | 6 11 49  | ♊          | 7 7 44   | ♋        | 6 17 15  | ♌         | 7 4 27   | ♍         | 6 13 45  |
| ♈        | 10 5 59  | ♉         | 8 20 9   | ♊          | 9 11 40  | ♋        | 8 20 11  | ♌         | 9 8 15   | ♍         | 8 19 58  |
| ♈        | 12 13 39 | ♉         | 11 1 40  | ♊          | 11 13 33 | ♋        | 10 22 28 | ♌         | 11 13 35 | ♍         | 11 4 22  |
| ♈        | 14 17 40 | ♉         | 13 4 14  | ♊          | 13 14 21 | ♋        | 13 1 6   | ♌         | 13 21 8  | ♍         | 13 14 45 |
| ♈        | 16 18 42 | ♉         | 15 8 34  | ♊          | 15 15 51 | ♋        | 16 5 19  | ♌         | 16 7 9   | ♍         | 16 2 47  |
| ♈        | 18 18 5  | ♉         | 17 4 22  | ♊          | 17 19 48 | ♋        | 17 12 25 | ♌         | 18 19 15 | ♍         | 18 15 29 |
| ♈        | 20 17 55 | ♉         | 19 5 41  | ♊          | 20 3 26  | ♋        | 19 22 49 | ♌         | 21 7 44  | ♍         | 21 3 2   |
| ♈        | 22 20 14 | ♉         | 21 10 18 | ♊          | 22 14 29 | ♋        | 22 11 9  | ♌         | 23 18 18 | ♍         | 23 11 38 |
| ♈        | 25 2 11  | ♉         | 23 19 8  | ♊          | 25 3 9   | ♋        | 24 23 11 | ♌         | 26 1 27  | ♍         | 25 16 11 |
| ♈        | 27 12 10 | ♉         | 26 7 1   | ♊          | 27 14 52 | ♋        | 27 8 57  | ♌         | 28 5 21  | ♍         | 27 17 31 |
| ♈        | 30 0 31  | ♉         | 28 19 52 | ♊          | 30 0 24  | ♋        | 29 15 43 | ♌         | 30 7 0   | ♍         | 29 17 13 |
|          |          | ♉         | 31 7 32  | ♊          | 31 7 32  | ♋        | 31 20 3  | ♌         | 31 17 20 | ♍         | ...      |

| Date.     | Aspect | Time. | Dis-<br>tance. | Date. | Aspect | Time. | Dis-<br>tance. | Date. | Aspect. | Time. | Dis-<br>tance. |    |    |
|-----------|--------|-------|----------------|-------|--------|-------|----------------|-------|---------|-------|----------------|----|----|
| January.  |        |       |                |       |        |       |                |       |         |       |                |    |    |
|           |        | H. M. | °              |       |        | H. M. | °              |       |         | H. M. | °              |    |    |
| 3         | ☾      | 17    | 47             | 9     | ☾      | 17    | 40             | 18    | ☾       | 15    | 49             |    |    |
| 4         | ☾      | 6     | 42             | 12    | ☾      | 3     | 5              | 20    | ☾       | 15    | 52             |    |    |
| 5         | ☾      | 15    | 11             | 15    | ☾      | 4     | 12             | 21    | ☾       | 8     | 9              |    |    |
| 6         | ☾      | 15    | 26             | 18    | ☾      | 5     | 55             | 22    | ☾       | 19    | 12             |    |    |
|           | ☾      | 17    | 12             | 21    | ☾      | 6     | 26             | 25    | ☾       | 6     | 9              |    |    |
| 7         | ☾      | 10    | 11             | 24    | ☾      | 9     | 57             | 28    | ☾       | 6     | 44             |    |    |
|           | ☾      | 10    | 17             | 27    | ☾      | 6     | 2              | 29    | ☾       | 5     | 45             |    |    |
| 8         | ☾      | 19    | 19             | 30    | ☾      | 12    | 55             |       | ☾       | 19    | 9              |    |    |
| 13        | ☾      | 9     | 16             | 33    | ☾      | 22    | 3              |       |         | 21    | 23             |    |    |
| 16        | ☾      | 19    | 17             | 36    | ☾      | 13    | 7              |       | June.   |       |                |    |    |
| 18        | ☾      | 4     | 52             | 39    | ☾      | 0     | 10             |       | 1       | ☾     | 5              | 42 |    |
|           | ☾      | 22    | 54             | 42    | ☾      | 11    | 45             |       | 2       | ☾     | 19             | 6  |    |
| 22        | ☾      | 5     | 42             | 45    | ☾      | 6     | 35             |       | 5       | ☾     | 5              | 35 |    |
|           | ☾      | 12    | 21             | 48    | April. |       |                |       | 8       | ☾     | 0              | 56 |    |
|           | ☾      | 14    | 3              | 51    | 2      | ☾     | 19             | 27    | 14      | ☾     | 18             | 59 |    |
| 23        | ☾      | 22    | 30             | 54    | 3      | ☾     | 16             | 7     | 16      | ☾     | 21             | 18 |    |
| 25        | ☾      | 3     | 59             | 57    | 4      | ☾     | 7              | 21    | 17      | ☾     | 22             | 53 |    |
| 26        | ☾      | 2     | 19             | 60    | 5      | ☾     | 10             | 48    | 18      | ☾     | 12             | 12 |    |
|           | ☾      | 11    | 16             | 63    | 9      | ☾     | 20             | 59    | 19      | ☾     | 2              | 30 |    |
| 28        | ☾      | 2     | 27             | 66    | 10     | ☾     | 3              | 3     | 20      | ☾     | 13             | 36 |    |
| 29        | ☾      | 2     | 1              | 69    | 14     | ☾     | 22             | 27    | 21      | ☾     | 14             | 14 |    |
| 31        | ☾      | 8     | 44             | 72    | 18     | ☾     | 14             | 26    | 22      | ☾     | 14             | 42 |    |
| February. |        |       |                | 19    | ☾      | 12    | 42             | 1     | 23      | ☾     | 20             | 5  |    |
| 1         | ☾      | 23    | 25             | 75    | 21     | ☾     | 15             | 14    | 24      | ☾     | 18             | 39 |    |
| 2         | ☾      | 3     | 29             | 78    | 22     | ☾     | 20             | 47    | 25      | ☾     | 2              | 51 |    |
|           | ☾      | 12    | 7              | 81    | 23     | ☾     | 5              | 52    | 26      | ☾     | 6              | 48 |    |
| 5         | ☾      | 3     | 1              | 84    | 24     | ☾     | 9              | 47    | 27      | ☾     | 4              | 36 |    |
|           | ☾      | 8     | 57             | 87    | 25     | ☾     | 10             | 0     | 28      | July. |                |    |    |
| 5         | ☾      | 21    | 22             | 90    | 26     | ☾     | 4              | 4     | 29      | 2     | ☾              | 2  | 1  |
| 6         | ☾      | 15    | 21             | 93    | 27     | ☾     | 13             | 57    | 30      | 3     | ☾              | 4  | 20 |
| 9         | ☾      | 18    | 6              | 96    | 28     | ☾     | 19             | 51    |         | 5     | ☾              | 1  | 34 |
| 13        | ☾      | 9     | 17             | 99    | 29     | ☾     | 22             | 6     |         | 6     | ☾              | 0  | 46 |
| 15        | ☾      | 4     | 49             | 102   | 30     | ☾     | 6              | 3     |         | 7     | ☾              | 0  | 32 |
| 17        | ☾      | 5     | 17             | 105   | 31     | ☾     | 10             | 1     |         | 8     | ☾              | 0  | 32 |
| 19        | ☾      | 1     | 18             | 108   |        | May.  |                |       |         | 9     | ☾              | 21 | 24 |
| 20        | ☾      | 9     | 31             | 111   | 2      | ☾     | 13             | 19    |         | 10    | ☾              | 20 | 48 |
| 21        | ☾      | 7     | 26             | 114   | 3      | ☾     | 16             | 34    |         | 11    | ☾              | 0  | 15 |
| 22        | ☾      | 20    | 9              | 117   | 4      | ☾     | 16             | 53    |         | 12    | ☾              | 8  | 0  |
| 24        | ☾      | 7     | 18             | 120   | 5      | ☾     | 6              | 35    |         | 13    | ☾              | 10 | 4  |
| 27        | ☾      | 18    | 27             | 123   | 6      | ☾     | 7              | 28    |         | 14    | ☾              | 10 | 8  |
| March.    |        |       |                | 7     | ☾      | 10    | 28             | 1     |         | 15    | ☾              | 8  | 47 |
| 1         | ☾      | 5     | 43             | 126   | 8      | ☾     | 5              | 31    |         | 16    | ☾              | 11 | 36 |
| 4         | ☾      | 1     | 53             | 129   | 9      | ☾     | 8              | 55    |         | 17    | ☾              | 1  | 36 |
|           | ☾      | 9     | 9              | 132   | 10     | ☾     | 0              | 38    |         | 18    | ☾              | 9  | 46 |
| 6         | ☾      | 8     | 11             | 135   | 11     | ☾     | 13             | 28    |         | 19    | ☾              | 10 | 7  |
| 7         | ☾      | 8     | 47             | 138   | 12     | ☾     | 9              | 22    |         | 20    | ☾              | 23 | 3  |
|           | ☾      | 14    | 34             | 141   | 13     | ☾     | 2              | 55    |         | 21    | ☾              | 0  | 39 |
|           | ☾      | 14    | 6              | 144   | 14     | ☾     | 5              | 29    |         | 22    | ☾              | 12 | 18 |
|           |        |       |                |       | 15     | ☾     | 9              | 22    |         | 23    | ☾              | 3  | 4  |
|           |        |       |                |       | 16     | ☾     | 2              | 55    |         | 24    | ☾              | 10 | 39 |
|           |        |       |                |       | 17     | ☾     | 5              | 29    |         | 25    | ☾              | 12 | 18 |
|           |        |       |                |       | 18     | ☾     | 9              | 22    |         | 26    | ☾              | 3  | 4  |
|           |        |       |                |       | 19     | ☾     | 2              | 55    |         | 27    | ☾              | 10 | 39 |
|           |        |       |                |       | 20     | ☾     | 5              | 29    |         | 28    | ☾              | 12 | 18 |
|           |        |       |                |       | 21     | ☾     | 9              | 22    |         | 29    | ☾              | 3  | 4  |
|           |        |       |                |       | 22     | ☾     | 2              | 55    |         | 30    | ☾              | 10 | 39 |
|           |        |       |                |       | 23     | ☾     | 5              | 29    |         | 31    | ☾              | 12 | 18 |
|           |        |       |                |       | 24     | ☾     | 9              | 22    |         |       |                |    |    |
|           |        |       |                |       | 25     | ☾     | 2              | 55    |         |       |                |    |    |
|           |        |       |                |       | 26     | ☾     | 5              | 29    |         |       |                |    |    |
|           |        |       |                |       | 27     | ☾     | 9              | 22    |         |       |                |    |    |
|           |        |       |                |       | 28     | ☾     | 2              | 55    |         |       |                |    |    |
|           |        |       |                |       | 29     | ☾     | 5              | 29    |         |       |                |    |    |
|           |        |       |                |       | 30     | ☾     | 9              | 22    |         |       |                |    |    |
|           |        |       |                |       | 31     | ☾     | 2              | 55    |         |       |                |    |    |

| Date.      | Aspect | Time. | Dis-<br>tance. | Date.     | Aspect | Time. | Dis-<br>tance. | Date. | Aspect    | Time. | Dis-<br>tance. |
|------------|--------|-------|----------------|-----------|--------|-------|----------------|-------|-----------|-------|----------------|
| 29         | D 8 8  | 2 50  | 1 24           | 16        | 8 8 8  | 8 29  | 1 56           |       |           | H. M. | °              |
|            | D 8 8  | 13 17 | 1 46           |           | D 8 8  | 15 3  | 0 30           | 10    | D 8 8     | 5 3   | 1 49           |
| 31         | D 8 8  | 14 14 | 6 29           | 18        | D 8 8  | 2 56  | 1 20           | 12    | D 8 8     | 1 16  | 0 52           |
| August.    |        |       |                | 19        | D 8 8  | 15 1  | 1 0            |       | D 8 8     | 17 0  | 0 40           |
| 1          | D 8 8  | 8 12  | 3 37           | 22        | D 8 8  | 6 41  | 2 25           | 13    | D 8 8     | 1 32  | 0 30           |
| 2          | D 8 8  | 7 16  | 4 31           | 26        | D 8 8  | 19 21 | 3 20           | 14    | D 8 8     | 5 34  | 1 25           |
|            | D 8 8  | 13 19 | 3 59           | 27        | D 8 8  | 19 32 | 3 58           |       | D 8 8     | 15 42 | 0 54           |
| 5          | D 8 8  | 21 48 | 0 42           | 30        | D 8 8  | 23 11 | 0 15           | 15    | D 8 8     | 6 0   | 9 8            |
| 6          | D 8 8  | 8 30  | 6 24           |           | D 8 8  | 12 8  | 1 24           |       | D 8 8     | 22 4  | 2 28           |
| 7          | D 8 8  | 4 13  | 0 0            |           | D 8 8  | 19 50 | 0 28           | 20    | D 8 8     | 16 43 | 4 4            |
| 10         | D 8 8  | 5 47  | 0 4            | October.  |        |       |                | 23    | D 8 8     | 7 0   | 10 50          |
| 12         | D 8 8  | 1 49  | 0 24           | 1         | D 8 8  | 2 51  | 1 29           | 24    | D 8 8     | 17 19 | 1 53           |
|            | D 8 8  | 20 40 | 5 24           | 2         | D 8 8  | 9 7   | 3 36           | 27    | D 8 8     | 3 27  | 1 2            |
| 13         | D 8 8  | 1 31  | 1 48           | 4         | D 8 8  | 6 15  | 0 43           | 28    | D 8 8     | 14 15 | 1 0            |
| 15         | D 8 8  | 17 19 | 3 37           |           | D 8 8  | 20 47 | 1 21           |       | D 8 8     | 18 19 | 1 46           |
| 16         | D 8 8  | 2 20  | 3 46           | 6         | D 8 8  | 10 42 | 2 34           | 29    | D 8 8     | 22 39 | 2 23           |
|            | D 8 8  | 8 7   | 3 30           | 9         | D 8 8  | 3 45  | 3 24           | 30    | D 8 8     | 5 40  | 1 48           |
|            | D 8 8  | 16 42 | 4 30           | 10        | D 8 8  | 5 45  | 3 54           |       | December. |       |                |
| 18         | D 8 8  | 20 35 | 0 29           | 13        | D 8 8  | 19 44 | 1 48           |       |           |       |                |
| 19         | D 8 8  | 20 56 | 2 4            | 14        | D 8 8  | 11 41 | 3 2            |       |           |       |                |
| 22         | D 8 8  | 23 21 | 0 2            | 15        | D 8 8  | 8 48  | 1 9            | 1     | D 8 8     | 15 35 | 0 33           |
| 25         | D 8 8  | 21 59 | 2 3            | 16        | D 8 8  | 12 2  | 3 20           | 3     | D 8 8     | 21 35 | 3 58           |
| 27         | D 8 8  | 0 0   | 2 35           | 17        | D 8 8  | 9 45  | 0 53           | 4     | D 8 8     | 11 34 | 3 16           |
|            | D 8 8  | 7 50  | 0 23           | 19        | D 8 8  | 14 57 | 2 37           | 7     | D 8 8     | 12 12 | 1 4            |
| 29         | D 8 8  | 8 20  | 1 36           | 23        | D 8 8  | 0 0   | 4 55           | 11    | D 8 8     | 15 41 | 1 3            |
| 30         | D 8 8  | 2 49  | 3 48           | 24        | D 8 8  | 5 36  | 4 3            | 12    | D 8 8     | 0 57  | 1 48           |
| 31         | D 8 8  | 20 22 | 3 13           | 28        | D 8 8  | 6 17  | 1 53           | 12    | D 8 8     | 18 21 | 2 2            |
|            | D 8 8  | 22 4  | 4 27           |           | D 8 8  | 8 54  | 5 39           | 13    | D 8 8     | 3 35  | 2 2            |
| September. |        |       |                | 30        | D 8 8  | 1 34  | 1 33           | 15    | D 8 8     | 1 56  | 2 4            |
| 1          | D 8 8  | 3 47  | 3 0            | 31        | D 8 8  | 2 9   | 2 21           | 17    | D 8 8     | 8 4   | 0 8            |
| 3          | D 8 8  | 11 21 | 1 59           |           | D 8 8  | 5 54  | 0 8            | 18    | D 8 8     | 0 24  | 3 5            |
|            | D 8 8  | 19 30 | 1 19           |           | D 8 8  | 22 49 | 1 8            | 19    | D 8 8     | 1 46  | 3 4            |
| 6          | D 8 8  | 16 47 | 0 19           | November. |        |       |                | 22    | D 8 8     | 3 43  | 1 4            |
| 9          | D 8 8  | 4 44  | 2 1            | 2         | D 8 8  | 16 15 | 2 31           | 26    | D 8 8     | 15 27 | 2 1            |
| 10         | D 8 8  | 17 16 | 3 22           | 6         | D 8 8  | 4 7   | 0 12           | 27    | D 8 8     | 7 25  | 2 2            |
| 12         | D 8 8  | 17 23 | 3 37           |           | D 8 8  | 10 10 | 3 35           |       | D 8 8     | 19 1  | 1 3            |
| 15         | D 8 8  | 0 42  | 4 3            |           | D 8 8  | 14 41 | 3 59           | 30    | D 8 8     | 1 54  | 3 1            |
|            | D 8 8  | 6 34  | 2 55           | 9         | D 8 8  | 14 45 | 0 54           | 31    | D 8 8     | 3 19  | 4              |



| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 23    | ♂ ♀    | 15 12 | 8     | ♂ ♀ Pl | 8 48  | 27    | ♂ ♀ Pl | 4 55  | 16    | ♂ ♀ ♀  | 2 26  |
| 24    | ♂ ♀    | 18 15 | 9     | ♂ ♀ ♀  | 14 45 | 29    | ♂ ♀ ♀  | 19 37 | 29    | ♂ ♀ ♀  | 0 4   |
| 25    | ♂ ♀    | 17 28 | 11    | ♂ ♀ ♀  | 8 16  | 30    | ♂ ♀ ♀  | 3 38  | 17    | ♂ ♀ ♀  | 8 4   |
| 26    | ♂ ♀    | 13 30 | 12    | ♂ ♀ ♀  | 0 32  |       | ♂ ♀ ♀  | 12 54 |       | ♂ ♀ ♀  | 8 54  |
| 27    | ♂ ♀    | 3 14  |       | ♂ ♀ ♀  | 14 0  |       | ♂ ♀ ♀  | 18 24 |       | ♂ ♀ ♀  | 18 48 |
| 28    | ♂ ♀    | 17 0  |       | ♂ ♀ ♀  | 17 0  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 23 22 |
| 29    | ♂ ♀    | 21 10 |       | ♂ ♀ ♀  | 32 3  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 4 19  |
| 30    | ♂ ♀    | 8 45  |       | ♂ ♀ ♀  | 19 27 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 13 51 |
| 31    | ♂ ♀    | 17 22 |       | ♂ ♀ ♀  | 0 0   |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 13 12 |
|       | ♂ ♀    | 2 1   |       | ♂ ♀ ♀  | 11 21 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 20 34 |
|       | ♂ ♀    | 7 7   |       | ♂ ♀ ♀  | 1 16  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 7 0   |
|       | ♂ ♀    | 5 2   |       | ♂ ♀ ♀  | 18 24 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 20 25 |
|       | ♂ ♀    | 10 11 |       | ♂ ♀ ♀  | 15 26 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 20 15 |
|       | ♂ ♀    | 11 4  |       | ♂ ♀ ♀  | 13 26 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 21 42 |
|       | ♂ ♀    | 3 35  |       | ♂ ♀ ♀  | 4 59  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 12 0  |
|       | ♂ ♀    | 6 31  |       | ♂ ♀ ♀  | 13 53 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 13 51 |
|       | ♂ ♀    | 11 50 |       | ♂ ♀ ♀  | 12 0  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 21 8  |
|       | ♂ ♀    | 4 7   |       | ♂ ♀ ♀  | 22 22 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 17 53 |
|       | ♂ ♀    | 4 3   |       | ♂ ♀ ♀  | 2 37  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 16 39 |
|       | ♂ ♀    | 21 40 |       | ♂ ♀ ♀  | 7 28  |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 2 1   |
|       | ♂ ♀    | 17 5  |       | ♂ ♀ ♀  | 20 44 |       | ♂ ♀ ♀  |       |       | ♂ ♀ ♀  | 16 0  |

## Heliocal Risings and Settings of the Planets in 1947.

## Mercury.

| Sets.             | Rises.             |
|-------------------|--------------------|
| 2nd Mar. in West  | 8th Feb. in West   |
| 6th May in East   | 18th Mar. in East  |
| 5th July in West  | 25th May in West   |
| 13th Aug. in East | 20th July in East  |
| 27th Oct. in West | 21st Sept. in West |
| 8th Dec. in East  | 16th Nov. in East  |

## Venus.

| Sets.             | Rises.           |
|-------------------|------------------|
| 29th July in East | 5th Oct. in West |

## Saturn.

Sets on 17th July 1947.

## Moonrise.

|                |                 |
|----------------|-----------------|
| 23rd January.  | 19th July.      |
| 22nd February. | 17th August.    |
| 24th March.    | 16th September. |
| 22nd April.    | 15th October.   |
| 21st May.      | 14th November.  |
| 20th June.     | 14th December.  |

## Jupiter.

Sets on 17th November.  
Rises on 16th December.

## Mars.

Rises on 16th March.

| Date.     | Aspect | Time. | Date.   | Aspect | Time. | Date.      | Aspect | Time. |
|-----------|--------|-------|---------|--------|-------|------------|--------|-------|
| January.  |        |       | May.    |        |       | September. |        |       |
| 1         | ♂ ♀    | 12 0  | 2       | ♂ ♀    | 18 54 | 2          | ♂ ♀    | 11 55 |
| 5         | ♂ ♀    | 12 0  | 13      | ♂ ♀    | 20 31 | 9          | ♂ ♀    | 16 54 |
| 11        | ♂ ♀    | 8 0   | 17      | ♂ ♀    | 14 5  | 16         | ♂ ♀    | 8 14  |
| 14        | ♂ ♀    | 4 0   | 21      | ♂ ♀    | 3 15  | 17         | ♂ ♀    | 15 48 |
| 16        | ♂ ♀    | 7 50  | 23      | ♂ ♀    | 7 8   | 17         | ♂ ♀    | 18 32 |
| 19        | ♂ ♀    | 2 4   | 24      | ♂ ♀    | 7 45  | 17         | ♂ ♀    | 2 24  |
| 24        | ♂ ♀    | 18 48 |         |        |       | 17         | ♂ ♀    | 13 21 |
| 28        | ♂ ♀    | 12 0  |         |        |       | 17         | ♂ ♀    | 14 0  |
| 29        | ♂ ♀    | 0 0   |         |        |       | 27         | ♂ ♀    | 12 0  |
| February. |        |       | June.   |        |       | October.   |        |       |
| 1         | ♂ ♀    | 3 9   | 6       | ♂ ♀    | 15 16 | 1          | ♂ ♀    | 6 0   |
| 3         | ♂ ♀    | 4 0   | 13      | ♂ ♀    | 17 32 | 6          | ♂ ♀    | 16 17 |
| 10        | ♂ ♀    | 8 30  | 15      | ♂ ♀    | 13 20 | 14         | ♂ ♀    | 6 17  |
| 22        | ♂ ♀    | 6 57  | 16      | ♂ ♀    | 2 24  | 15         | ♂ ♀    | 10 17 |
| 23        | ♂ ♀    | 2 24  | 22      | ♂ ♀    | 2 24  | 17         | ♂ ♀    | 9 49  |
| 25        | ♂ ♀    | 5 9   | 28      | ♂ ♀    | 2 37  | 24         | ♂ ♀    | 0 0   |
| March.    |        |       | July.   |        |       | November.  |        |       |
| 7         | ♂ ♀    | 23 29 | 4       | ♂ ♀    | 16 48 | 1          | ♂ ♀    | 22 57 |
| 11        | ♂ ♀    | 1 43  | 15      | ♂ ♀    | 0 0   | 4          | ♂ ♀    | 10 44 |
| 13        | ♂ ♀    | 0 43  | 23      | ♂ ♀    | 12 0  | 6          | ♂ ♀    | 17 3  |
| 15        | ♂ ♀    | 10 0  | 28      | ♂ ♀    | 12 25 | 6          | ♂ ♀    | 4 0   |
| 22        | ♂ ♀    | 16 8  |         |        |       | 7          | ♂ ♀    | 8 13  |
| 31        | ♂ ♀    | 16 10 |         |        |       | 7          | ♂ ♀    | 8 19  |
| April.    |        |       | August. |        |       | 8          | ♂ ♀    | 0 0   |
| 1         | ♂ ♀    | 13 43 | 3       | ♂ ♀    | 19 30 | 8          | ♂ ♀    | 0 0   |
| 7         | ♂ ♀    | 1 27  | 5       | ♂ ♀    | 12 0  | 16         | ♂ ♀    | 22 40 |
| 10        | ♂ ♀    | 20 10 | 14      | ♂ ♀    | 2 16  | 20         | ♂ ♀    | 4 0   |
| 17        | ♂ ♀    | 0 0   | 18      | ♂ ♀    | 14 46 | 27         | ♂ ♀    | 12 0  |
| 18        | ♂ ♀    | 18 55 | 19      | ♂ ♀    | 23 46 | 28         | ♂ ♀    | 12 0  |
| 23        | ♂ ♀    | 1 19  |         |        |       |            |        |       |
|           | ♂ ♀    | 21 3  |         |        |       |            |        |       |
|           | ♂ ♀    | 21 12 |         |        |       |            |        |       |
|           | ♂ ♀    | 22 39 |         |        |       |            |        |       |

## December.

|    |     |       |
|----|-----|-------|
| 13 | ♂ ♀ | 12 0  |
| 17 | ♂ ♀ | 4 48  |
| 18 | ♂ ♀ | 21 14 |
| 19 | ♂ ♀ | 22 6  |
| 23 | ♂ ♀ | 1 43  |
| 23 | ♂ ♀ | 17 20 |
| 24 | ♂ ♀ | 12 0  |
| 24 | ♂ ♀ | 16 27 |



| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 26    | ♂      | 6 5   |       | ♂      | 12 44 |       | ♀      | 23 36 |       | ♂      | 8 10  |
|       | ♂      | 8 20  |       | ♂      | 21 39 | 16    | ♂      | 9 44  |       | ♂      | 16 13 |
|       | ♂      | 11 9  |       | ♂      | 4 50  |       | ♂      | 12 32 |       | ♂      | 22 6  |
|       | ♂      | 19 28 |       | ♂      | 10 48 |       | ♂      | 13 27 |       | ♂      | 7 38  |
| 27    | ♂      | 19 58 |       | ♂      | 15 20 |       | ♂      | 20 47 |       | ♂      | 21 20 |
|       | ♂      | 0 10  |       | ♂      | 20 59 |       | ♂      | 22 13 |       | ♂      | 22 6  |
|       | ♂      | 8 12  |       | ♂      | 1 21  |       | ♂      | 1 12  |       | ♂      | 23 35 |
|       | ♂      | 14 48 |       | ♂      | 3 11  | 17    | ♂      | 4 39  |       | ♂      | 3 48  |
|       | ♂      | 21 4  |       | ♂      | 10 31 |       | ♂      | 14 13 |       | ♂      | 7 6   |
| 28    | ♂      | 22 49 |       | ♂      | 16 30 |       | ♂      | 19 24 |       | ♂      | 13 50 |
|       | ♂      | 9 49  |       | ♂      | 18 27 | 18    | ♂      | 8 41  |       | ♂      | 21 21 |
|       | ♂      | 11 45 |       | ♂      | 4 7   |       | ♂      | 14 12 |       | ♂      | 1 27  |
|       | ♂      | 12 29 |       | ♂      | 6 56  |       | ♂      | 21 12 |       | ♂      | 2 21  |
| 29    | ♂      | 3 17  |       | ♂      | 7 23  | 19    | ♂      | 1 9   |       | ♂      | 8 51  |
|       | ♂      | 4 0   |       | ♂      | 17 15 |       | ♂      | 8 45  |       | ♂      | 10 20 |
|       | ♂      | 11 21 |       | ♂      | 17 48 |       | ♂      | 12 42 |       | ♂      | 17 15 |
|       | ♂      | 21 50 |       | ♂      | 22 23 |       | ♂      | 15 14 |       | ♂      | 0 12  |
| 30    | ♂      | 0 7   |       | ♂      | 9 27  |       | ♂      | 20 47 |       | ♂      | 7 55  |
|       | ♂      | 3 4   |       | ♂      | 11 23 |       | ♂      | 23 46 |       | ♂      | 8 21  |
|       | ♂      | 4 51  |       | ♂      | 14 33 | 20    | ♂      | 14 24 |       | ♂      | 10 57 |
|       | ♂      | 7 47  |       | ♂      | 22 27 | 21    | ♂      | 0 26  |       | ♂      | 11 33 |
|       | ♂      | 14 55 |       | ♂      | 3 3   |       | ♂      | 1 40  |       | ♂      | 21 10 |
|       | ♂      | 18 30 |       | ♂      | 5 12  |       | ♂      | 9 47  |       |        |       |
| 31    | ♂      | 6 4   |       | ♂      | 13 27 |       | ♂      | 13 11 |       |        |       |
|       | ♂      | 6 45  |       | ♂      | 17 9  |       | ♂      | 14 33 |       |        |       |
|       | ♂      | 11 37 |       | ♂      | 3 50  |       | ♂      | 22 16 |       |        |       |
|       | ♂      | 16 25 |       | ♂      | 9 39  |       | ♂      | 2 18  |       |        |       |
|       | ♂      | 21 4  |       | ♂      | 18 19 |       | ♂      | 0 31  |       |        |       |
|       |        |       |       | ♂      | 22 37 | 22    | ♂      | 4 24  |       |        |       |
|       |        |       |       | ♂      | 1 41  |       | ♂      | 17 40 |       |        |       |
|       |        |       |       | ♂      | 1 41  | 23    | ♂      | 0 57  |       |        |       |
|       |        |       |       | ♂      | 8 1   |       | ♂      | 1 40  |       |        |       |
|       |        |       |       | ♂      | 14 19 |       | ♂      | 3 36  |       |        |       |
|       |        |       |       | ♂      | 21 10 |       | ♂      | 4 4   |       |        |       |
|       |        |       |       | ♂      | 4 8   |       | ♂      | 7 51  |       |        |       |
|       |        |       |       | ♂      | 20 28 |       | ♂      | 15 47 |       |        |       |
|       |        |       |       | ♂      | 5 1   |       | ♂      | 16 0  |       |        |       |
|       |        |       |       | ♂      | 11 31 | 24    | ♂      | 2 37  |       |        |       |
|       |        |       |       | ♂      | 19 53 |       | ♂      | 3 22  |       |        |       |
|       |        |       |       | ♂      | 2 36  |       | ♂      | 7 42  |       |        |       |
|       |        |       |       | ♂      | 3 57  |       | ♂      | 16 48 |       |        |       |
|       |        |       |       | ♂      | 14 4  |       | ♂      | 18 51 |       |        |       |
|       |        |       |       | ♂      | 14 26 |       | ♂      | 19 51 |       |        |       |
|       |        |       |       | ♂      | 14 38 | 25    | ♂      | 5 40  |       |        |       |
|       |        |       |       | ♂      | 17 27 |       | ♂      | 14 3  |       |        |       |
|       |        |       |       | ♂      | 4 22  |       | ♂      | 17 49 |       |        |       |
|       |        |       |       | ♂      | 11 32 |       | ♂      | 21 33 |       |        |       |
|       |        |       |       | ♂      | 13 13 | 26    | ♂      | 4 30  |       |        |       |
|       |        |       |       | ♂      | 21 46 |       | ♂      | 6 32  |       |        |       |

| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 7     | ☿      | 14 43 |       | ♄      | 5 55  |       | ☿      | 13 6  | 7     | ♄      | 4 32  |
|       | ☿      | 23 23 |       | ♄      | 13 22 |       | ☿      | 13 20 |       | ♄      | 7 57  |
|       | ☿      | 1 53  |       | ♄      | 15 49 |       | ☿      | 14 6  | 8     | ♄      | 8 29  |
|       | ☿      | 4 1   |       | ♄      | 15 52 |       | ☿      | 14 10 |       | ♄      | 12 12 |
|       | ☿      | 10 30 |       | ♄      | 19 24 |       | ☿      | 22 2  | 8     | ♄      | 14 27 |
|       | ☿      | 23 35 | 19    | ♄      | 1 35  | 29    | ☿      | 14 44 |       | ♄      | 15 50 |
|       | ☿      | 2 12  |       | ♄      | 4 4   |       | ☿      | 15 52 |       | ♄      | 17 27 |
|       | ☿      | 5 14  |       | ♄      | 9 32  |       | ☿      | 17 2  | 9     | ♄      | 20 31 |
|       | ☿      | 8 55  | 20    | ♄      | 5 40  |       | ☿      | 19 54 |       | ♄      | 5 20  |
|       | ☿      | 9 41  |       | ♄      | 8 8   |       | ☿      | 21 23 |       | ♄      | 12 41 |
|       | ☿      | 15 52 |       | ♄      | 10 20 | 30    | ☿      | 4 9   |       | ♄      | 16 37 |
|       | ☿      | 16 12 |       | ♄      | 19 12 |       | ☿      | 20 36 |       | ♄      | 20 43 |
|       | ☿      | 11 0  |       | ♄      | 20 41 |       | ☿      | 21 25 |       | ♄      | 23 30 |
|       | ☿      | 11 29 |       | ♄      | 22 31 | 31    | ☿      | 1 5   | 10    | ♄      | 3 43  |
|       | ☿      | 22 9  | 21    | ♄      | 3 35  |       | ☿      | 5 51  |       | ♄      | 6 20  |
|       | ☿      | 22 23 |       | ♄      | 6 9   |       | ☿      | 23 16 | 11    | ♄      | 0 30  |
|       | ☿      | 22 4  |       | ♄      | 10 50 |       |        |       |       | ♄      | 5 3   |
|       | ☿      | 18 53 |       | ♄      | 22 31 |       |        |       |       | ♄      | 12 15 |
|       | ☿      | 20 7  | 22    | ♄      | 1 2   |       |        |       | 12    | ♄      | 20 17 |
|       | ☿      | 21 51 |       | ♄      | 4 2   |       |        |       |       | ♄      | 2 54  |
|       | ☿      | 2 28  |       | ♄      | 6 44  |       |        |       |       | ♄      | 4 26  |
|       | ☿      | 4 14  |       | ♄      | 8 32  |       |        |       |       | ♄      | 5 45  |
|       | ☿      | 0 38  |       | ♄      | 23 15 |       |        |       |       | ♄      | 7 35  |
|       | ☿      | 0 15  |       | ♄      | 23 55 |       |        |       |       | ♄      | 20 5  |
|       | ☿      | 11 8  | 23    | ♄      | 3 23  |       |        |       | 13    | ♄      | 2 26  |
|       | ☿      | 6 8   |       | ♄      | 3 53  |       |        |       |       | ♄      | 7 0   |
|       | ☿      | 6 35  |       | ♄      | 8 34  |       |        |       |       | ♄      | 10 8  |
|       | ☿      | 10 25 |       | ♄      | 10 30 |       |        |       |       | ♄      | 13 54 |
|       | ☿      | 13 36 |       | ♄      | 14 52 |       |        |       | 14    | ♄      | 2 33  |
|       | ☿      | 13 51 | 24    | ♄      | 1 16  |       |        |       |       | ♄      | 5 7   |
|       | ☿      | 15 44 |       | ♄      | 7 35  |       |        |       |       | ♄      | 7 27  |
|       | ☿      | 16 53 |       | ♄      | 8 46  |       |        |       |       | ♄      | 10 4  |
|       | ☿      | 12 22 |       | ♄      | 19 29 |       |        |       |       | ♄      | 15 3  |
|       | ☿      | 22 0  | 25    | ♄      | 3 34  |       |        |       | 15    | ♄      | 16 8  |
|       | ☿      | 22 10 |       | ♄      | 3 30  |       |        |       |       | ♄      | 7 43  |
|       | ☿      | 1 33  |       | ♄      | 5 45  |       |        |       |       | ♄      | 15 58 |
|       | ☿      | 17 3  |       | ♄      | 8 22  |       |        |       |       | ♄      | 17 22 |
|       | ☿      | 20 24 |       | ♄      | 8 54  |       |        |       |       | ♄      | 19 19 |
|       | ☿      | 0 38  | 26    | ♄      | 12 26 |       |        |       | 16    | ♄      | 19 5  |
|       | ☿      | 3 54  |       | ♄      | 0 36  |       |        |       |       | ♄      | 13 36 |
|       | ☿      | 3 56  |       | ♄      | 9 41  |       |        |       |       | ♄      | 13 42 |
|       | ☿      | 5 16  |       | ♄      | 10 18 |       |        |       |       | ♄      | 14 14 |
|       | ☿      | 7 25  |       | ♄      | 13 41 |       |        |       |       | ♄      | 18 47 |
|       | ☿      | 20 47 | 27    | ♄      | 8 54  |       |        |       |       | ♄      | 20 20 |
|       | ☿      | 3 43  |       | ♄      | 9 8   |       |        |       |       | ♄      | 23 11 |
|       | ☿      | 5 29  |       | ♄      | 10 6  |       |        |       | 17    | ♄      | 14 42 |
|       | ☿      | 9 14  |       | ♄      | 15 34 |       |        |       |       | ♄      | 16 8  |
|       | ☿      | 12 25 |       | ♄      | 16 46 |       |        |       |       | ♄      | 18 17 |
|       | ☿      | 2 41  | 28    | ♄      | 11 26 |       |        |       |       | ♄      | 20 53 |

| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 18    | ♂ ♀    | 14 14 |       | ♂ ♀    | 10 29 |       | ♂ ♀    | 12 58 |       | ♂ ♀    | 8 10  |
|       | ♂ ♀    | 17 35 |       | ♂ ♀    | 10 41 |       | ♂ ♀    | 16 0  |       | ♂ ♀    | 10 7  |
|       | ♂ ♀    | 17 51 |       | ♂ ♀    | 11 34 |       | ♂ ♀    | 2 46  |       | ♂ ♀    | 10 12 |
|       | ♂ ♀    | 18 36 |       | ♂ ♀    | 11 48 |       | ♂ ♀    | 6 58  |       | ♂ ♀    | 15 30 |
|       | ♂ ♀    | 19 19 |       | ♂ ♀    | 7 31  |       | ♂ ♀    | 17 22 |       | ♂ ♀    | 22 3  |
| 19    | ♂ ♀    | 2 50  |       | ♂ ♀    | 0 0   |       | ♂ ♀    | 18 29 |       | ♂ ♀    | 23 15 |
|       | ♂ ♀    | 13 56 |       | ♂ ♀    | 16 33 |       | ♂ ♀    | 19 58 |       | ♂ ♀    | 6 57  |
|       | ♂ ♀    | 18 33 |       | ♂ ♀    | 17 39 |       | ♂ ♀    | 9 51  |       | ♂ ♀    | 8 10  |
|       | ♂ ♀    | 18 37 |       | ♂ ♀    | 0 26  |       | ♂ ♀    | 11 13 |       | ♂ ♀    | 12 33 |
|       | ♂ ♀    | 18 55 |       | ♂ ♀    | 4 36  |       | ♂ ♀    | 18 35 |       | ♂ ♀    | 15 27 |
|       | ♂ ♀    | 20 55 |       | ♂ ♀    | 22 1  |       | ♂ ♀    | 21 24 |       | ♂ ♀    | 22 45 |
| 20    | ♂ ♀    | 13 35 |       | ♂ ♀    | 22 20 |       | ♂ ♀    | 23 16 |       | ♂ ♀    | 7 20  |
|       | ♂ ♀    | 19 25 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 15 14 |       | ♂ ♀    | 10 51 |
|       | ♂ ♀    | 19 33 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 16 20 |       | ♂ ♀    | 14 48 |
|       | ♂ ♀    | 20 5  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 0 4   |       | ♂ ♀    | 17 14 |
|       | ♂ ♀    | 20 47 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 1 43  |       | ♂ ♀    | 20 10 |
| 21    | ♂ ♀    | 5 44  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 1 58  |       | ♂ ♀    | 21 27 |
|       | ♂ ♀    | 18 39 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 22 45 |       | ♂ ♀    | 22 57 |
|       | ♂ ♀    | 19 29 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 4 9   |       | ♂ ♀    | 9 57  |
|       | ♂ ♀    | 20 31 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 1 27  |       | ♂ ♀    | 12 24 |
|       | ♂ ♀    | 22 51 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 6 19  |       | ♂ ♀    | 18 10 |
| 22    | ♂ ♀    | 7 34  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 20 48 |       | ♂ ♀    | 0 55  |
|       | ♂ ♀    | 13 36 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 1 47  |       | ♂ ♀    | 5 44  |
|       | ♂ ♀    | 20 2  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 3 26  |       | ♂ ♀    | 10 39 |
|       | ♂ ♀    | 20 59 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 4 13  |       | ♂ ♀    | 14 54 |
|       | ♂ ♀    | 22 30 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 6 1   |       | ♂ ♀    | 0 4   |
| 23    | ♂ ♀    | 23 6  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 7 1   |       | ♂ ♀    | 2 23  |
|       | ♂ ♀    | 10 0  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 4 50  |       | ♂ ♀    | 3 39  |
|       | ♂ ♀    | 20 29 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 4 50  |       | ♂ ♀    | 15 27 |
|       | ♂ ♀    | 22 7  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 6 58  |       | ♂ ♀    | 4 18  |
| 24    | ♂ ♀    | 1 25  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 7 19  |       | ♂ ♀    | 5 17  |
|       | ♂ ♀    | 5 21  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 9 46  |       | ♂ ♀    | 17 58 |
|       | ♂ ♀    | 15 52 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 10 8  |       | ♂ ♀    | 19 44 |
|       | ♂ ♀    | 22 35 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 22 53 |       | ♂ ♀    | 23 3  |
|       | ♂ ♀    | 23 13 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 3 50  |       | ♂ ♀    | 10 27 |
| 25    | ♂ ♀    | 4 32  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 8 12  |       | ♂ ♀    | 11 39 |
|       | ♂ ♀    | 4 55  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 8 47  |       | ♂ ♀    | 12 18 |
|       | ♂ ♀    | 17 42 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 10 24 |       | ♂ ♀    | 20 39 |
|       | ♂ ♀    | 18 15 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 22 59 |       | ♂ ♀    | 23 4  |
| 26    | ♂ ♀    | 1 36  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 7 45  |       | ♂ ♀    | 0 57  |
|       | ♂ ♀    | 2 51  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 10 29 |       | ♂ ♀    | 16 15 |
|       | ♂ ♀    | 9 6   |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 11 36 |       | ♂ ♀    | 19 32 |
|       | ♂ ♀    | 16 5  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 12 43 |       | ♂ ♀    | 4 56  |
|       | ♂ ♀    | 21 41 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 22 49 |       | ♂ ♀    | 5 43  |
| 27    | ♂ ♀    | 6 1   |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 3 36  |       | ♂ ♀    | 8 44  |
|       | ♂ ♀    | 13 10 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 8 29  |       | ♂ ♀    | 23 0  |
|       | ♂ ♀    | 14 43 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 9 46  |       | ♂ ♀    | 0 6   |
| 28    | ♂ ♀    | 22 57 |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 13 27 |       | ♂ ♀    | 2 50  |
|       | ♂ ♀    | 6 21  |       | ♂ ♀    | 22 22 |       | ♂ ♀    | 7 3   |       | ♂ ♀    | 13 17 |

| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 30    | ♂ ♀    | 14 31 |       | ♂ ♀    | 12 30 |       | ♂ ♀    | 13 8  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 15 31 |       | ♂ ♀    | 14 17 |       | ♂ ♀    | 16 41 |       | ♂ ♀    | 20 22 |
|       | ♂ ♀    | 6 33  |       | ♂ ♀    | 18 12 |       | ♂ ♀    | 20 56 |       | ♂ ♀    | 22 4  |
|       | ♂ ♀    | 13 20 |       | ♂ ♀    | 19 35 |       | ♂ ♀    | 0 19  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 17 38 |       | ♂ ♀    | 1 50  |       | ♂ ♀    | 6 6   |       | ♂ ♀    | 23 27 |
| 31    | ♂ ♀    | 0 6   |       | ♂ ♀    | 5 47  |       | ♂ ♀    | 11 19 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 13 7  |       | ♂ ♀    | 14 44 |       | ♂ ♀    | 15 29 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 14 14 |       | ♂ ♀    | 16 59 |       | ♂ ♀    | 21 35 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 19 22 |       | ♂ ♀    | 22 4  |       | ♂ ♀    | 21 35 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 2 4   |       | ♂ ♀    | 2 4   |       | ♂ ♀    | 4 51  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 16 43 |       | ♂ ♀    | 16 43 |       | ♂ ♀    | 19 33 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 22 8  |       | ♂ ♀    | 22 8  |       | ♂ ♀    | 2 58  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 0 19  |       | ♂ ♀    | 0 19  |       | ♂ ♀    | 3 44  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 6 55  |       | ♂ ♀    | 6 55  |       | ♂ ♀    | 13 19 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 9 25  |       | ♂ ♀    | 9 25  |       | ♂ ♀    | 23 21 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 9 46  |       | ♂ ♀    | 9 46  |       | ♂ ♀    | 1 23  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 1 31  |       | ♂ ♀    | 1 31  |       | ♂ ♀    | 4 56  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 1 31  |       | ♂ ♀    | 1 31  |       | ♂ ♀    | 7 34  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 10 40 |       | ♂ ♀    | 10 40 |       | ♂ ♀    | 10 19 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 10 56 |       | ♂ ♀    | 10 56 |       | ♂ ♀    | 11 39 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 11 54 |       | ♂ ♀    | 11 54 |       | ♂ ♀    | 18 12 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 18 34 |       | ♂ ♀    | 18 34 |       | ♂ ♀    | 8 15  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 2 7   |       | ♂ ♀    | 2 7   |       | ♂ ♀    | 13 0  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 4 6   |       | ♂ ♀    | 4 6   |       | ♂ ♀    | 10 59 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 10 59 |       | ♂ ♀    | 10 59 |       | ♂ ♀    | 21 59 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 13 46 |       | ♂ ♀    | 13 46 |       | ♂ ♀    | 4 14  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 20 54 |       | ♂ ♀    | 20 54 |       | ♂ ♀    | 6 18  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 5 46  |       | ♂ ♀    | 5 46  |       | ♂ ♀    | 7 2   |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 17 19 |       | ♂ ♀    | 17 19 |       | ♂ ♀    | 11 23 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 18 37 |       | ♂ ♀    | 18 37 |       | ♂ ♀    | 17 35 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 20 46 |       | ♂ ♀    | 20 46 |       | ♂ ♀    | 0 0   |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 2 20  |       | ♂ ♀    | 2 20  |       | ♂ ♀    | 1 35  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 6 38  |       | ♂ ♀    | 6 38  |       | ♂ ♀    | 13 47 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 8 7   |       | ♂ ♀    | 8 7   |       | ♂ ♀    | 16 16 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 10 38 |       | ♂ ♀    | 10 38 |       | ♂ ♀    | 16 55 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 16 42 |       | ♂ ♀    | 16 42 |       | ♂ ♀    | 20 34 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 18 40 |       | ♂ ♀    | 18 40 |       | ♂ ♀    | 0 20  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 20 43 |       | ♂ ♀    | 20 43 |       | ♂ ♀    | 10 59 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 18 41 |       | ♂ ♀    | 18 41 |       | ♂ ♀    | 2 5   |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 0 24  |       | ♂ ♀    | 0 24  |       | ♂ ♀    | 5 12  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 2 58  |       | ♂ ♀    | 2 58  |       | ♂ ♀    | 11 21 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 11 45 |       | ♂ ♀    | 11 45 |       | ♂ ♀    | 16 0  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 12 59 |       | ♂ ♀    | 12 59 |       | ♂ ♀    | 17 12 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 20 59 |       | ♂ ♀    | 20 59 |       | ♂ ♀    | 2 49  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 4 5   |       | ♂ ♀    | 4 5   |       | ♂ ♀    | 13 6  |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 5 10  |       | ♂ ♀    | 5 10  |       | ♂ ♀    | 20 16 |       | ♂ ♀    | 23 27 |
|       | ♂ ♀    | 11 35 |       | ♂ ♀    | 11 35 |       | ♂ ♀    | 23 2  |       | ♂ ♀    | 23 27 |

September.

August.

| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |   |    |    |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|---|----|----|
| 10    | ψ      | 3     | 20    | ψ      | 23    | 2     | 2      | Δ     | 23    | 58     | 13    | ψ | 8  | 23 |
|       | ○      | 15    |       | Δ      | 20    | 4     |        | *     | 1     | 12     |       | Δ | 10 | 18 |
|       | △      | 15    |       | ψ      | 22    | 48    |        | ψ     | 8     | 47     |       | □ | 18 | 30 |
|       | σ      | 17    |       | *      | 7     | 59    |        | π     | 9     | 7      |       | * | 21 | 8  |
|       | π      | 19    |       | Δ      | 14    | 46    |        | π     | 23    | 20     |       | Δ | 22 | 28 |
| 11    | Δ      | 0     | 21    | Δ      | 2     | 18    | 3      | Δ     | 2     | 34     | 13    | ψ | 23 | 19 |
|       | ψ      | 6     |       | π      | 3     | 37    |        | Δ     | 3     | 51     |       | Δ | 10 | 5  |
|       | ○      | 11    |       | Δ      | 6     | 41    |        | π     | 14    | 48     |       | * | 12 | 54 |
|       | △      | 18    |       | □      | 11    | 44    |        | □     | 18    | 26     |       | Δ | 19 | 44 |
|       | σ      | 22    |       | □      | 21    | 6     | 4      | □     | 4     | 9      |       | Δ | 23 | 15 |
|       | π      | 5     |       | ψ      | 22    | 32    |        | ψ     | 5     | 17     | 14    | ○ | 2  | 23 |
| 12    | ψ      | 7     |       | Δ      | 8     | 56    |        | Δ     | 6     | 15     | 14    | ○ | 11 | 41 |
|       | ○      | 16    |       | Δ      | 10    | 53    |        | *     | 6     | 28     |       | * | 12 | 12 |
|       | △      | 17    |       | π      | 13    | 39    |        | *     | 16    | 36     |       | Δ | 22 | 24 |
|       | σ      | 20    |       | □      | 5     | 17    |        | □     | 19    | 55     | 15    | Δ | 1  | 58 |
|       | π      | 21    |       | ψ      | 15    | 42    | 5      | □     | 20    | 12     |       | σ | 8  | 48 |
| 13    | Δ      | 0     | 24    | Δ      | 15    | 42    |        | Δ     | 7     | 36     |       | σ | 20 | 2  |
|       | ψ      | 2     |       | Δ      | 19    | 21    |        | Δ     | 8     | 28     |       | □ | 1  | 2  |
|       | ○      | 5     |       | Δ      | 5     | 81    |        | Δ     | 19    | 52     | 16    | ψ | 1  | 20 |
|       | △      | 7     |       | Δ      | 18    | 18    |        | Δ     | 23    | 24     |       | ψ | 12 | 2  |
|       | σ      | 19    |       | Δ      | 23    | 40    |        | □     | 0     | 36     |       | □ | 18 | 40 |
|       | π      | 21    |       | □      | 1     | 32    | 6      | □     | 0     | 55     |       | □ | 22 | 13 |
| 14    | ψ      | 6     | 26    | □      | 14    | 3     |        | π     | 10    | 42     | 17    | Δ | 4  | 51 |
|       | ○      | 18    |       | Δ      | 16    | 32    |        | Δ     | 11    | 15     |       | σ | 5  | 5  |
|       | △      | 23    |       | Δ      | 1     | 52    | 7      | Δ     | 22    | 48     |       | σ | 9  | 45 |
|       | σ      | 0     |       | □      | 3     | 35    |        | Δ     | 1     | 21     |       | Δ | 22 | 12 |
|       | π      | 8     |       | □      | 4     | 39    |        | □     | 5     | 14     | 18    | Δ | 5  | 6  |
| 15    | Δ      | 6     | 27    | □      | 3     | 54    |        | □     | 11    | 29     |       | Δ | 6  | 32 |
|       | ψ      | 9     |       | Δ      | 5     | 34    |        | □     | 13    | 14     |       | * | 9  | 30 |
|       | ○      | 19    |       | Δ      | 7     | 21    |        | □     | 15    | 59     | 19    | ψ | 0  | 57 |
|       | △      | 58    |       | π      | 10    | 21    | 8      | □     | 3     | 2      |       | ψ | 4  | 28 |
|       | σ      | 29    |       | π      | 22    | 9     |        | □     | 8     | 49     |       | ψ | 6  | 34 |
|       | π      | 15    |       | □      | 10    | 53    |        | □     | 13    | 44     |       | ○ | 13 | 11 |
| 16    | ψ      | 21    | 28    | □      | 10    | 56    |        | Δ     | 14    | 57     |       | □ | 13 | 12 |
|       | ○      | 51    |       | □      | 12    | 13    | 9      | Δ     | 3     | 45     |       | Δ | 14 | 57 |
|       | △      | 4     |       | □      | 21    | 1     |        | Δ     | 12    | 33     |       | Δ | 20 | 57 |
|       | σ      | 7     |       | □      | 3     | 27    |        | *     | 14    | 12     | 20    | Δ | 8  | 25 |
|       | π      | 35    |       | Δ      | 15    | 28    |        | Δ     | 14    | 57     |       | □ | 10 | 27 |
| 17    | Δ      | 8     | 29    | Δ      | 17    | 15    | 10     | Δ     | 22    | 15     |       | * | 15 | 55 |
|       | ψ      | 12    |       | □      | 19    | 17    |        | Δ     | 5     | 45     |       | π | 20 | 35 |
|       | ○      | 13    |       | Δ      | 22    | 53    |        | Δ     | 15    | 21     |       | □ | 21 | 3  |
|       | △      | 13    |       | Δ      | 18    |       |        |       |       |        |       |   |    |    |

| Date. | Aspect | Time. | Date. | Aspect | Time  | Date. | Aspect | Time. | Date. | Aspect | Time  |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 24    | ☿      | 11 33 | 3     | ♂      | 2 30  | 14    | ♂      | 6 29  | 25    | ☉      | 0 54  |
|       | ♀      | 5 36  |       | ♂      | 3 37  |       | ☐      | 6 59  |       | ☐      | 11 10 |
|       | ♂      | 6 14  |       | ♂      | 3 54  |       | ☐      | 12 82 |       | ☐      | 12 14 |
|       | ♂      | 15 17 |       | ♂      | 10 27 |       | ☐      | 15 17 |       | ☐      | 13 38 |
|       | ♂      | 15 50 |       | ☉      | 16 8  |       | ♂      | 5 34  |       | ♂      | 16 38 |
| 25    | ♂      | 23 32 |       | ☉      | 17 43 |       | ♂      | 7 32  |       | ♂      | 21 39 |
|       | ☉      | 0 13  |       | ♂      | 18 35 |       | ♂      | 15 42 | 26    | ☉      | 6 39  |
|       | ☉      | 21 20 |       | ♂      | 1 1   |       | ♂      | 19 59 |       | ♂      | 14 17 |
| 26    | ♂      | 1 49  | 4     | ♂      | 4 7   | 15    | ♂      | 12 16 |       | ☐      | 18 54 |
|       | ♂      | 5 27  |       | ♂      | 5 44  |       | ♂      | 15 40 |       | ☐      | 19 6  |
|       | ♂      | 8 4   |       | ♂      | 11 48 |       | ♂      | 16 8  |       | ☐      | 23 10 |
|       | ♂      | 16 31 |       | ♂      | 18 23 |       | ♂      | 18 33 | 27    | ♂      | 3 27  |
|       | ♂      | 17 2  |       | ♂      | 21 27 |       | ♂      | 22 4  |       | ♂      | 16 53 |
| 27    | ♂      | 1 22  | 5     | ♂      | 5 49  | 16    | ♂      | 26 5  |       | ☐      | 20 51 |
|       | ♂      | 7 37  |       | ♂      | 19 38 |       | ♂      | 18 11 |       | ☐      | 23 15 |
|       | ♂      | 10 12 |       | ♂      | 21 17 | 17    | ☉      | 49 6  | 28    | ☐      | 0 53  |
|       | ♂      | 13 2  |       | ☉      | 22 33 |       | ☐      | 0 6   |       | ☐      | 3 10  |
|       | ☉      | 16 49 |       | ☉      | 23 15 |       | ☐      | 1 22  |       | ☐      | 14 15 |
|       | ♂      | 20 45 | 6     | ♂      | 10 10 |       | ☐      | 7 7   | 29    | ☐      | 18 19 |
|       | ♂      | 20 51 |       | ♂      | 14 41 |       | ☐      | 9 19  |       | ☐      | 2 2   |
| 28    | ♂      | 6 17  |       | ♂      | 21 2  | 18    | ♂      | 23 41 |       | ☐      | 18 58 |
|       | ♂      | 12 32 |       | ♂      | 22 50 |       | ♂      | 3 59  |       | ☐      | 22 39 |
|       | ♂      | 13 30 | 7     | ♂      | 5 14  |       | ♂      | 8 36  |       | ☐      | 23 9  |
|       | ♂      | 14 21 |       | ♂      | 9 30  |       | ♂      | 9 0   | 30    | ☐      | 5 40  |
|       | ♂      | 23 25 | 8     | ♂      | 22 18 |       | ♂      | 9 45  |       | ☐      | 14 20 |
| 29    | ♂      | 0 25  |       | ♂      | 0 35  | 19    | ♂      | 16 49 |       | ☐      | 19 15 |
|       | ♂      | 8 25  |       | ♂      | 5 45  |       | ♂      | 6 36  |       | ☐      | 19 30 |
|       | ♂      | 17 45 |       | ♂      | 15 27 |       | ☐      | 8 56  |       | ☐      | 20 23 |
| 30    | ☉      | 1 34  |       | ♂      | 18 23 |       | ☐      | 16 1  |       | ☐      |       |
|       | ☐      | 10 57 |       | ♂      | 22 14 | 20    | ♂      | 17 46 |       | ☐      |       |
|       | ☐      | 12 0  | 9     | ♂      | 0 33  |       | ♂      | 15 0  |       | ☐      |       |
| 31    | ♂      | 19 58 |       | ♂      | 10 8  |       | ♂      | 16 43 |       | ☐      |       |
|       | ♂      | 2 9   |       | ♂      | 14 15 |       | ♂      | 22 9  |       | ☐      |       |
|       | ♂      | 5 37  |       | ♂      | 14 18 |       | ♂      | 23 23 |       | ☐      |       |
|       | ♂      | 5 54  |       | ♂      | 18 33 | 21    | ♂      | 2 2   |       | ☐      |       |
|       | ♂      | 12 59 |       | ♂      | 20 44 |       | ☐      | 3 17  | 1     | ☐      | 3 16  |
|       | ♂      | 14 3  |       | ♂      | 22 35 |       | ☐      | 20 1  |       | ☐      | 7 14  |
|       | ♂      | 22 49 |       | ♂      | 5 3   | 22    | ♂      | 1 33  |       | ☐      | 17 30 |
|       |        |       | 10    | ♂      | 17 17 |       | ♂      | 7 53  |       | ☐      | 20 0  |
|       |        |       |       | ♂      | 19 30 |       | ♂      | 23 24 |       | ☐      | 21 14 |
|       |        |       |       | ♂      | 22 5  | 23    | ♂      | 4 3   |       | ☐      | 23 28 |
|       |        |       |       | ♂      | 23 26 |       | ♂      | 9 1   | 2     | ☐      | 8 21  |
|       |        |       |       | ♂      | 5 31  |       | ♂      | 9 26  |       | ☐      | 11 6  |
|       |        |       | 11    | ♂      | 14 25 |       | ♂      | 12 23 |       | ☐      | 22 19 |
|       |        |       |       | ♂      | 20 44 |       | ♂      | 19 8  | 3     | ☐      | 0     |

| Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. | Date. | Aspect | Time. |
|-------|--------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
|       |        | H. M. |       |        | H. M. |       |        | H. M. |       |        | H. M. |
| 5     | ♄ ♀    | 0 59  | 11    | ♀ ♄    | 23 43 | 19    | ♄ ♀    | 5 51  | 26    | ♄ ♀    | 12 37 |
|       | ♄ ♀    | 5 40  |       | ♀ ♄    | 23 49 |       | ♄ ♀    | 10 58 |       | ♄ ♀    | 17 48 |
|       | ♄ ♀    | 11 34 |       | ♄ ♀    | 10 18 |       | ♄ ♀    | 1 46  |       | ♄ ♀    | 21 15 |
|       | ♄ ♀    | 18 8  |       | ♄ ♀    | 15 41 |       | ♄ ♀    | 7 25  |       | ♄ ♀    | 3 8   |
|       | ♄ ♀    | 3 14  | 12    | ♄ ♀    | 0 57  | 20    | ♄ ♀    | 16 22 | 27    | ♄ ♀    | 13 43 |
|       | ♄ ♀    | 6 28  |       | ♄ ♀    | 4 44  |       | ♄ ♀    | 1 7   |       | ♄ ♀    | 15 27 |
|       | ♄ ♀    | 7 17  |       | ♄ ♀    | 7 51  |       | ♄ ♀    | 5 46  |       | ♄ ♀    | 21 1  |
| 6     | ♄ ♀    | 0 50  | 18    | ♄ ♀    | 18 21 | 21    | ♄ ♀    | 12 22 | 28    | ♄ ♀    | 4 59  |
|       | ♄ ♀    | 4 16  |       | ♄ ♀    | 0 14  |       | ♄ ♀    | 15 21 |       | ♄ ♀    | 7 25  |
|       | ♄ ♀    | 10 16 |       | ♄ ♀    | 3 35  |       | ♄ ♀    | 16 39 |       | ♄ ♀    | 19 1  |
|       | ♄ ♀    | 16 46 | 14    | ♄ ♀    | 22 17 | 22    | ♄ ♀    | 23 6  | 29    | ♄ ♀    | 23 29 |
|       | ♄ ♀    | 3 22  |       | ♄ ♀    | 5 50  |       | ♄ ♀    | 14 1  |       | ♄ ♀    | 1 54  |
|       | ♄ ♀    | 3 39  |       | ♄ ♀    | 10 58 |       | ♄ ♀    | 17 25 |       | ♄ ♀    | 4 22  |
|       | ♄ ♀    | 6 55  | 15    | ♄ ♀    | 13 5  | 23    | ♄ ♀    | 3 43  | 30    | ♄ ♀    | 4 58  |
|       | ♄ ♀    | 12 12 |       | ♄ ♀    | 15 59 |       | ♄ ♀    | 3 59  |       | ♄ ♀    | 14 5  |
|       | ♄ ♀    | 15 31 |       | ♄ ♀    | 1 56  |       | ♄ ♀    | 18 52 |       | ♄ ♀    | 16 26 |
|       | ♄ ♀    | 16 20 |       | ♄ ♀    | 2 53  |       | ♄ ♀    | 21 43 |       | ♄ ♀    | 4 20  |
|       | ♄ ♀    | 20 27 |       | ♄ ♀    | 11 27 |       | ♄ ♀    | 23 33 |       | ♄ ♀    | 4 27  |
| 8     | ♄ ♀    | 6 28  | 16    | ♄ ♀    | 11 50 | 24    | ♄ ♀    | 0 27  | 31    | ♄ ♀    | 7 7   |
|       | ♄ ♀    | 9 53  |       | ♄ ♀    | 15 7  |       | ♄ ♀    | 7 49  |       | ♄ ♀    | 16 33 |
|       | ♄ ♀    | 10 33 |       | ♄ ♀    | 19 46 |       | ♄ ♀    | 8 24  |       | ♄ ♀    | 0 14  |
|       | ♄ ♀    | 21 17 |       | ♄ ♀    | 21 32 |       | ♄ ♀    | 12 46 |       | ♄ ♀    | 3 19  |
|       | ♄ ♀    | 23 19 | 17    | ♄ ♀    | 9 48  |       | ♄ ♀    | 22 41 |       | ♄ ♀    | 4 19  |
|       | ♄ ♀    | 0 25  |       | ♄ ♀    | 20 36 |       | ♄ ♀    | 3 34  |       | ♄ ♀    | 51    |
|       | ♄ ♀    | 13 21 |       | ♄ ♀    | 21 20 |       | ♄ ♀    | 6 16  |       | ♄ ♀    | 13 29 |
|       | ♄ ♀    | 14 48 |       | ♄ ♀    | 2 45  |       | ♄ ♀    | 10 38 |       | ♄ ♀    | 14 46 |
|       | ♄ ♀    | 16 17 |       | ♄ ♀    | 4 35  |       | ♄ ♀    | 12 46 |       | ♄ ♀    | 16 47 |
|       | ♄ ♀    | 19 24 | 18    | ♄ ♀    | 6 8   |       | ♄ ♀    | 17 33 |       | ♄ ♀    | 4 18  |
|       | ♄ ♀    | 3 39  |       | ♄ ♀    | 21 44 |       | ♄ ♀    | 3 6   |       |        |       |
|       | ♄ ♀    | 14 19 |       | ♄ ♀    | 0 24  |       | ♄ ♀    | 5 40  |       |        |       |
|       | ♄ ♀    | 17 42 |       | ♄ ♀    | 3 35  |       | ♄ ♀    | 11 41 |       |        |       |

Table showing the Position of M. C. corresponding to a given sidereal time.

| Sid. Time. | M. C. | Sid. Time. | M. C. | Sid. Time. | M. C. | Sid. Time. | M. C. |
|------------|-------|------------|-------|------------|-------|------------|-------|
| H. M. °    |       | H. M. °    |       | H. M. °    |       | H. M. °    |       |
| 0 0 0      | 0 0 0 | 6 0 0      | 0 0 0 | 12 0 0     | 0 0 0 | 18 0 0     | 0 0 0 |
| 15 4 5     |       | 15 3 26    |       | 15 4 5     |       | 15 3 26    |       |
| 30 8 10    |       | 30 6 53    |       | 30 8 10    |       | 30 6 53    |       |
| 45 12 14   |       | 45 10 20   |       | 45 12 14   |       | 45 10 20   |       |
| 1 0 16     | 17 7  | 0 13 48    | 13    | 0 16 17    | 19    | 0 13 48    |       |
| 15 20 18   |       | 15 17 18   |       | 15 20 18   |       | 15 17 18   |       |
| 30 24 18   |       | 30 20 48   |       | 30 24 18   |       | 30 20 48   |       |
| 45 28 16   |       | 45 24 20   |       | 45 28 16   |       | 45 24 20   |       |
| 2 0 2 8    | 11 8  | 0 27 54    | 14    | 0 2 11     | 20    | 0 27 54    |       |
| 15 6 4     |       | 15 1 30    |       | 15 6 4     |       | 15 1 30    |       |
| 30 9 54    |       | 30 5 9     |       | 30 9 54    |       | 30 5 9     |       |
| 45 13 42   |       | 45 8 49    |       | 45 13 42   |       | 45 8 49    |       |
| 3 0 17     | 28 9  | 0 12 32    | 15    | 0 17 28    | 21    | 0 12 32    |       |
| 15 21 11   |       | 15 16 17   |       | 15 21 11   |       | 15 16 17   |       |
| 30 24 51   |       | 30 20 5    |       | 30 24 51   |       | 30 20 5    |       |
| 45 28 29   |       | 45 23 56   |       | 45 28 29   |       | 45 23 56   |       |
| 4 0 2 11   | 5 10  | 0 27 49    | 16    | 0 2 5      | 22    | 0 27 49    |       |
| 15 5 39    |       | 15 1 44    |       | 15 5 39    |       | 15 1 44    |       |
| 30 9 11    |       | 30 5 42    |       | 30 9 11    |       | 30 5 42    |       |
| 45 12 42   |       | 45 9 42    |       | 45 12 42   |       | 45 9 42    |       |
| 5 0 16     | 12 11 | 0 13 43    | 17    | 0 16 12    | 23    | 0 13 43    |       |
| 15 19 39   |       | 15 17 46   |       | 15 19 39   |       | 15 17 46   |       |
| 30 23 7    |       | 30 21 50   |       | 30 23 7    |       | 30 21 50   |       |
| 45 26 33   |       | 45 25 55   |       | 45 26 33   |       | 45 25 55   |       |

## Heliocentric Places of Planets at Noon I. S. T.

| Month and Date. | $\mathcal{U}$ |       |                | $\delta$ |        |                | $\varphi$ |        |                | $\psi$ |        |                |
|-----------------|---------------|-------|----------------|----------|--------|----------------|-----------|--------|----------------|--------|--------|----------------|
|                 | Long.         | Lat.  | Radius Vector. | Long.    | Lat.   | Radius Vector. | Long.     | Lat.   | Radius Vector. | Long.  | Lat.   | Radius Vector. |
|                 |               |       |                |          |        |                |           |        |                |        |        |                |
| January         | 1 .. 12m 30   | 1 N 7 | 5.4124         | 12h 11   | 1 S 29 | 1.4301         | 6h 44     | 2 N 37 | .7183          | 29m 12 | 1 S 24 | 1.4610         |
| 5               | .. 48         | 6     | 5.4117         | 14 34    | 31     | 1.4259         | 13 14     | 51     | .7183          | 10h 17 | 2 42   | 1.4660         |
| 9               | .. 13         | 7     | 5.4110         | 16 57    | 34     | 1.4220         | 19 44     | 3      | .7184          | 21 18  | 3 54   | 1.4662         |
| 13              | .. 25         | 6     | 5.4103         | 19 21    | 36     | 1.4182         | 26 14     | 11     | .7186          | 2h 23  | 4 56   | 1.4621         |
| 17              | .. 44         | 6     | 5.4096         | 21 46    | 39     | 1.4142         | 2h 44     | 18     | .7188          | 13 50  | 5 49   | 1.4535         |
| 21              | .. 14         | 2     | 5.4088         | 24 12    | 41     | 1.4115         | 9 14      | 22     | .7190          | 24 53  | 6 27   | 1.4408         |
| 25              | .. 20         | 5     | 5.4081         | 26 28    | 42     | 1.4078         | 15 44     | 24     | .7192          | 8h 47  | 55     | 1.424          |
| 29              | .. 39         | 5     | 5.4074         | 29 5     | 44     | 1.4045         | 22 13     | 23     | .7196          | 22 52  | 58     | 1.4043         |
| February        | 2 .. 57       | 5     | 5.4066         | 1h 33    | 46     | 1.4016         | 28 42     | 19     | .7200          | 8h 31  | 33     | 1.3821         |
| 6               | .. 15         | 4     | 5.4058         | 4 1      | 47     | 1.3987         | 5h 11     | 13     | .7204          | 26 5   | 5 30   | 1.3589         |
| 10              | .. 34         | 4     | 5.4051         | 6 30     | 48     | 1.3962         | 11 39     | 4      | .7209          | 16h 2  | 3 41   | 1.3370         |
| 14              | .. 52         | 4     | 5.4043         | 8 59     | 49     | 1.3938         | 18 6      | 2      | .7214          | 8h 10  | 1 10   | 1.3194         |
| 18              | .. 16         | 11    | 5.4035         | 11 29    | 50     | 1.3916         | 24 32     | 40     | .7219          | 2h 26  | 1N 47  | 1.3092         |
| 22              | .. 30         | 4     | 5.4027         | 14 0     | 51     | 1.389          | 0m 58     | 25     | .7224          | 27 38  | 4 30   | 1.3086         |
| 26              | .. 47         | 3     | 5.4019         | 16 30    | 51     | 1.3878         | 7 23      | 8      | .7230          | 22h 18 | 6 20   | 1.3178         |
| March           | 2 .. 17       | 3     | 5.4011         | 19 2     | 51     | 1.3863         | 13 48     | 1      | .7236          | 15h 4  | 7 0    | 1.3347         |
| 6               | .. 24         | 3     | 5.4003         | 21 33    | 51     | 1.3849         | 20 11     | 29     | .7241          | 5h 22  | 6 40   | 1.3562         |
| 10              | .. 43         | 2     | 5.3995         | 24 5     | 51     | 1.3838         | 26 34     | 9      | .7247          | 23 12  | 5 42   | 1.3794         |
| 14              | .. 18         | 1     | 5.3987         | 26 37    | 50     | 1.3830         | 2h 56     | 0      | .7252          | 8h 57  | 4 24   | 1.4018         |
| 18              | .. 20         | 2     | 5.3979         | 29 9     | 49     | 1.3823         | 9 18      | 25     | .7257          | 23 2   | 2 56   | 1.4220         |
| 22              | .. 38         | 2     | 5.3971         | 1h 41    | 48     | 1.3819         | 15 39     | 2      | .7262          | 5m 54  | 1 27   | 1.4390         |

## Heliocentric Places of Planets at Noon I. S. T.

| Month and Date. | $\mathcal{U}$ |       |                | $\delta$ |        |                | $\varphi$ |        |                | $\psi$ |       |                |
|-----------------|---------------|-------|----------------|----------|--------|----------------|-----------|--------|----------------|--------|-------|----------------|
|                 | Long.         | Lat.  | Radius Vector. | Long.    | Lat.   | Radius Vector. | Long.     | Lat.   | Radius Vector. | Long.  | Lat.  | Radius Vector. |
|                 |               |       |                |          |        |                |           |        |                |        |       |                |
| March           | 26 .. 18m 57  | 1 N 1 | 5.3963         | 4h 14    | 1 S 47 | 1.3817         | 22h 0     | 0 S 21 | .7266          | 17m 53 | 0 S 2 | 1.4521         |
| 30              | .. 19 15      | 1     | 5.3954         | 6 45     | 46     | 1.3817         | 28 20     | 43     | .7270          | 29 18  | 1 25  | 1.4612         |
| April           | 3 .. 34       | 1     | 5.3945         | 9 18     | 44     | 1.3820         | 4h 40     | 1      | .7274          | 10h 23 | 2 41  | 1.4660         |
| 7               | .. 52         | 1     | 5.3937         | 11 50    | 42     | 1.3825         | 11 0      | 25     | .7276          | 21 22  | 3 54  | 1.4659         |
| 11              | .. 20         | 0     | 5.3928         | 14 22    | 40     | 1.3832         | 17 19     | 45     | .7279          | 2h 27  | 4 56  | 1.4620         |
| 15              | .. 29         | 0     | 5.3919         | 16 54    | 38     | 1.3842         | 23 38     | 2      | .7281          | 13 56  | 5 49  | 1.4534         |
| 19              | .. 48         | 0     | 5.3911         | 19 25    | 36     | 1.3853         | 29 48     | 21     | .7283          | 26 3   | 31    | 1.4407         |
| 23              | .. 21         | 0     | 5.3902         | 21 57    | 33     | 1.3867         | 6h 17     | 36     | .7283          | 8h 54  | 55    | 1.4240         |
| 27              | .. 24         | 59    | 5.3892         | 24 28    | 31     | 1.3883         | 12 37     | 50     | .7283          | 23 0   | 58    | 1.4041         |
| May             | 1 .. 43       | 59    | 5.3883         | 26 59    | 28     | 1.3901         | 18 57     | 3      | .7283          | 8h 38  | 33    | 1.3819         |
| 5               | .. 22         | 59    | 5.3874         | 29 29    | 25     | 1.3923         | 25 16     | 10     | .7282          | 26 14  | 5 29  | 1.3585         |
| 9               | .. 20         | 58    | 5.3865         | 1h 58    | 21     | 1.3945         | 1h 36     | 17     | .7280          | 16h 6  | 3 41  | 1.3371         |
| 13              | .. 39         | 58    | 5.3856         | 4 28     | 18     | 1.3970         | 7 57      | 23     | .7278          | 8h 23  | 1 8   | 1.3193         |
| 17              | .. 57         | 58    | 5.3848         | 6 56     | 15     | 1.3996         | 14 17     | 23     | .7275          | 2h 38  | 1N 49 | 1.3091         |
| 21              | .. 16         | 58    | 5.3838         | 9 24     | 11     | 1.4024         | 20 38     | 23     | .7272          | 27 50  | 4 32  | 1.3086         |
| 25              | .. 34         | 57    | 5.3828         | 11 52    | 7      | 1.4055         | 27 0      | 20     | .7268          | 22h 28 | 6 20  | 1.3179         |
| 29              | .. 52         | 57    | 5.3820         | 14 19    | 3      | 1.4087         | 3h 11     | 15     | .7264          | 15h 14 | 59    | 1.3345         |
| June            | 2 .. 24       | 11    | 5.3811         | 16 45    | 0      | 1.4121         | 9 43      | 7      | .7259          | 5m 31  | 40    | 1.3565         |
| 6               | .. 30         | 56    | 5.3801         | 19 10    | 56     | 1.4156         | 16 6      | 2      | .7254          | 23 20  | 5 42  | 1.3789         |
| 10              | .. 49         | 56    | 5.3791         | 21 35    | 51     | 1.4194         | 22 28     | 44     | .7249          | 9h 4   | 4 23  | 1.4020         |
| 14              | .. 7          | 56    | 5.3781         | 23 59    | 47     | 1.4233         | 28 52     | 30     | .7244          | 23 8   | 2 55  | 1.4222         |
| 18              | .. 26         | 55    | 5.3771         | 26 22    | 43     | 1.4273         | 5h 15     | 14     | .7238          | 17 50  | 1 27  | 1.4391         |
| 22              | .. 44         | 55    | 5.3761         | 28 44    | 39     | 1.4314         | 11 40     | 1      | .7233          | 5m 54  | 0 S 2 | 1.4523         |

# Heliocentric Places of Planets at Noon I. S. T.

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| Month and Date. | $\gamma$ |      |                | $\delta$ |      |                | $\epsilon$ |      |                | $\eta$ |      |                |
|-----------------|----------|------|----------------|----------|------|----------------|------------|------|----------------|--------|------|----------------|
|                 | Long.    | Lat. | Radius Vector. | Long.    | Lat. | Radius Vector. | Long.      | Lat. | Radius Vector. | Long.  | Lat. | Radius Vector. |
| June            | 26m 3    | 0N55 | 5.3751         | 1 8      | 0S34 | 1.4356         | 18 8       | 4    | 1S36           | 29m 23 | 1S25 | 1.4613         |
|                 | 22       | 54   | 5.3741         | 3 27     | 30   | 1.4400         | 24 29      | 15   |                | 10 28  | 2 43 | 1.4660         |
| July            | 40       | 54   | 5.3731         | 5 46     | 26   | 1.4445         | 0 55       | 0 54 |                | 21 27  | 3 54 | 1.4662         |
|                 | 59       | 54   | 5.3721         | 8 5      | 21   | 1.4490         | 7 21       | 31   |                | 23 34  | 4 57 | 1.4620         |
|                 | 27       | 54   | 5.3711         | 10 23    | 17   | 1.4538         | 13 47      | 9    |                | 14 1   | 5 50 | 1.4533         |
|                 | 16       | 53   | 5.3701         | 12 40    | 13   | 1.4586         | 20 14      | 0N14 |                | 26 4   | 6 31 | 1.4405         |
|                 | 20       | 53   | 5.3691         | 14 51    | 8    | 1.4635         | 26 42      | 37   |                | 9 0    | 55   | 1.4239         |
|                 | 24       | 53   | 5.3681         | 17 12    | 4    | 1.4684         | 3 10       | 59   |                | 23 7   | 58   | 1.4039         |
|                 | 28       | 52   | 5.3672         | 19 26    | 0N   | 1.4734         | 9 38       | 1 21 |                | 8 46   | 32   | 1.3817         |
| August          | 51       | 52   | 5.3662         | 21 40    | 5    | 1.4784         | 16 7       | 42   |                | 26 23  | 5 29 | 1.3586         |
|                 | 29       | 52   | 5.3652         | 23 52    | 9    | 1.4835         | 22 36      | 2 1  |                | 16 16  | 3 40 | 1.3367         |
|                 | 9        | 51   | 5.3642         | 26 4     | 13   | 1.4886         | 29 6       | 19   |                | 8 34   | 1 7  | 1.3192         |
|                 | 13       | 51   | 5.3632         | 28 15    | 18   | 1.4938         | 5 36       | 35   |                | 2 50   | 1N50 | 1.3091         |
|                 | 17       | 51   | 5.3622         | 0 24     | 22   | 1.4990         | 12 6       | 49   |                | 28 2   | 4 33 | 1.3086         |
|                 | 21       | 50   | 5.3610         | 2 33     | 26   | 1.5042         | 18 36      | 3 0  |                | 22 39  | 6 21 | 1.3810         |
|                 | 25       | 50   | 5.3599         | 4 41     | 30   | 1.5093         | 25 6       | 10   |                | 15 24  | 7 0  | 1.3375         |
|                 | 29       | 50   | 5.3588         | 6 49     | 34   | 1.5146         | 1 36       | 17   |                | 5 40   | 6 40 | 1.3576         |
| September       | 20       | 49   | 5.3578         | 8 55     | 37   | 1.5199         | 8 6        | 21   |                | 23 28  | 5 41 | 1.3798         |
|                 | 39       | 49   | 5.3567         | 11 0     | 41   | 1.5251         | 14 36      | 24   |                | 9 13   | 4 22 | 1.4021         |
|                 | 58       | 49   | 5.3557         | 13 5     | 45   | 1.5302         | 21 6       | 23   |                | 23 15  | 2 55 | 1.4223         |
|                 | 2        | 48   | 5.3546         | 15 9     | 49   | 1.5354         | 27 35      | 20   |                | 6 5    | 1 25 | 1.4392         |
|                 | 35       | 48   | 5.3535         | 17 12    | 52   | 1.5405         | 4 3        | 14   |                | 18 4   | 0 8  | 1.4524         |
|                 | 54       | 48   | 5.3524         | 19 14    | 56   | 1.5456         | 10 31      | 6    |                | 29 28  | 1 26 | 1.4614         |
|                 | 3        | 47   | 5.3513         | 21 15    | 59   | 1.5507         | 16 58      | 2 55 |                | 10 33  | 2 44 | 1.4660         |

# Heliocentric Places of Planets at noon I. S. T.

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| Month and Date. | $\gamma$ |      |                | $\delta$ |      |                | $\epsilon$ |       |                | $\eta$ |      |                |
|-----------------|----------|------|----------------|----------|------|----------------|------------|-------|----------------|--------|------|----------------|
|                 | Long.    | Lat. | Radius Vector. | Long.    | Lat. | Radius Vector. | Long.      | Lat.  | Radius Vector. | Long.  | Lat. | Radius Vector. |
| September       | 3 32     | 0N47 | 5.3502         | 23 15    | 1N 2 | 1.5557         | 23 25      | 2N 42 |                | 21 32  | 3S55 | 1.4662         |
| October         | 50       | 47   | 5.3491         | 25 15    | 1 6  | 1.5606         | 29 51      | 27    |                | 2 39   | 4 57 | 1.4620         |
|                 | 4        | 46   | 5.3480         | 27 14    | 9    | 1.5655         | 6 16       | 11    |                | 7 5    | 50   | 1.4532         |
|                 | 28       | 46   | 5.3468         | 29 12    | 11   | 1.5703         | 12 41      | 1 53  |                | 26 11  | 6 31 | 1.4404         |
|                 | 46       | 46   | 5.3458         | 1 10     | 14   | 1.5750         | 19 5       | 33    |                | 9 7    | 54   | 1.4238         |
|                 | 5        | 45   | 5.3446         | 3 7      | 17   | 1.5796         | 25 8       | 12    |                | 23 14  | 58   | 1.4038         |
|                 | 24       | 45   | 5.3435         | 5 3      | 20   | 1.5842         | 1 50       | 0 51  |                | 8 54   | 32   | 1.3815         |
|                 | 43       | 44   | 5.3423         | 6 59     | 22   | 1.5887         | 8 12       | 28    |                | 26 31  | 5 28 | 1.3584         |
|                 | 21       | 44   | 5.3411         | 8 54     | 25   | 1.5930         | 14 33      | 6     |                | 16 26  | 3 39 | 1.3366         |
|                 | 40       | 43   | 5.3399         | 10 48    | 27   | 1.5973         | 20 53      | 0S 17 |                | 8 44   | 1 6  | 1.3191         |
|                 | 59       | 43   | 5.3388         | 12 41    | 29   | 1.6015         | 27 14      | 38    |                | 3 1    | 1N51 | 1.3090         |
|                 | 7        | 43   | 5.3376         | 14 34    | 31   | 1.6056         | 3 34       | 1 1   |                | 8 14   | 4 34 | 1.3087         |
|                 | 18       | 43   | 5.3364         | 16 27    | 33   | 1.6096         | 9 54       | 22    |                | 22 51  | 6 21 | 1.3181         |
|                 | 36       | 42   | 5.3352         | 18 19    | 36   | 1.6134         | 16 13      | 42    |                | 15 34  | 7 0  | 1.3352         |
|                 | 55       | 42   | 5.3340         | 20 10    | 37   | 1.6171         | 22 33      | 2 1   |                | 7 28   | 5 49 | 1.3568         |
|                 | 8        | 42   | 5.3329         | 22 1     | 39   | 1.6208         | 28 52      | 18    |                | 23 36  | 5 41 | 1.3799         |
| November        | 33       | 41   | 5.3317         | 23 52    | 40   | 1.6243         | 5 11       | 34    |                | 9 18   | 4 20 | 1.4023         |
|                 | 52       | 41   | 5.3305         | 25 42    | 42   | 1.6277         | 11 31      | 47    |                | 23 21  | 2 54 | 1.4225         |
|                 | 9        | 40   | 5.3293         | 27 31    | 43   | 1.6309         | 17 50      | 59    |                | 7 283  | 6 12 | 1.4399         |
|                 | 30       | 40   | 5.3281         | 29 20    | 44   | 1.6340         | 24 10      | 3     |                | 18 10  | 0 8  | 1.4525         |
|                 | 49       | 40   | 5.3269         | 1 9      | 46   | 1.6370         | 0 30       | 16    |                | 29 4   | 1 27 | 1.4614         |
|                 | 8        | 39   | 5.3257         | 2 57     | 47   | 1.6399         | 6 50       | 21    |                | 10 38  | 2 44 | 1.4660         |
|                 | 27       | 39   | 5.3245         | 4 54     | 48   | 1.6426         | 13 11      | 23    |                | 21 38  | 3 55 | 1.4661         |
|                 | 46       | 38   | 5.3233         | 6 33     | 48   | 1.6452         | 19 32      | 23    |                | 2 45   | 4 58 | 1.4619         |

December

| Month and Date. | $\zeta$ |      |                | $\theta$ |      |                | $\psi$ |      |                |
|-----------------|---------|------|----------------|----------|------|----------------|--------|------|----------------|
|                 | Long.   | Lat. | Radius Vector. | Long.    | Lat. | Radius Vector. | Long.  | Lat. | Radius Vector. |
| Jan. 1          | 4 37    | 0 30 | 9.0591         | 19 49    | 0 5  | 19.1799        | 8 58   | 1 31 | 30.2553        |
| 9               | 54      | 30   | 9.0604         | 55       | 5    | 19.1783        | 9 1    | 31   | 0.2554         |
| 17              | 5 12    | 31   | 9.0617         | 20 0     | 5    | 19.1767        | 4      | 31   | 30.2556        |
| 25              | 30      | 32   | 9.0631         | 6        | 5    | 19.1752        | 7      | 31   | 30.2557        |
| Feb. 2          | 47      | 33   | 9.0645         | 12       | 5    | 19.1736        | 9      | 31   | 30.2559        |
| 10              | 6 5     | 33   | 9.0658         | 17       | 5    | 19.1721        | 12     | 31   | 30.2560        |
| 18              | 22      | 34   | 9.0672         | 23       | 5    | 19.1705        | 15     | 31   | 30.2562        |
| 26              | 40      | 35   | 9.0685         | 28       | 5    | 19.1690        | 18     | 31   | 30.2563        |
| March 6         | 58      | 35   | 9.0699         | 34       | 5    | 19.1675        | 21     | 31   | 30.2565        |
| 14              | 7 15    | 36   | 9.0713         | 40       | 6    | 19.1659        | 24     | 31   | 30.2566        |
| 22              | 33      | 37   | 9.0727         | 45       | 6    | 19.1644        | 26     | 31   | 30.2568        |
| 30              | 50      | 38   | 9.0741         | 51       | 6    | 19.1629        | 29     | 31   | 30.2569        |
| April 7         | 8 8     | 39   | 9.0753         | 57       | 6    | 19.1615        | 32     | 31   | 30.2571        |
| 15              | 25      | 39   | 9.0771         | 21 2     | 6    | 19.1600        | 35     | 31   | 30.2572        |
| 23              | 43      | 40   | 0.0786         | 8        | 6    | 19.1585        | 38     | 31   | 30.2574        |
| May 1           | 9 1     | 41   | 9.0802         | 14       | 6    | 19.1571        | 41     | 31   | 0.2575         |
| 9               | 18      | 42   | 9.0820         | 19       | 6    | 19.1556        | 44     | 31   | 30.2577        |
| 17              | 36      | 42   | 9.0835         | 24       | 6    | 19.1541        | 47     | 31   | 30.2578        |
| 25              | 53      | 43   | 9.0850         | 30       | 6    | 19.1526        | 49     | 31   | 30.2580        |
| June 2          | 10 11   | 43   | 9.0866         | 36       | 6    | 19.1511        | 52     | 31   | 30.2581        |
| 10              | 28      | 44   | 9.0881         | 42       | 6    | 19.1496        | 55     | 31   | 30.2582        |
| 18              | 46      | 45   | 9.0897         | 48       | 6    | 19.1482        | 58     | 31   | 30.2583        |
| 26              | 11 3    | 46   | 9.0912         | 53       | 7    | 19.1467        | 10 1   | 31   | 30.2585        |
| July 4          | 21      | 47   | 9.0928         | 59       | 7    | 19.1452        | 3      | 32   | 30.2586        |
| 12              | 38      | 47   | 9.0943         | 22 5     | 7    | 19.1438        | 6      | 32   | 0.2587         |
| 20              | 56      | 48   | 9.0959         | 10       | 7    | 19.1423        | 9      | 32   | 30.2589        |
| 28              | 12 13   | 49   | 9.0975         | 16       | 7    | 19.1408        | 12     | 32   | 30.2590        |
| Aug. 5          | 31      | 50   | 9.0991         | 21       | 7    | 19.1 93        | 15     | 32   | 30.2591        |
| 13              | 48      | 50   | 9.1007         | 27       | 7    | 19.1378        | 18     | 32   | 30.2592        |
| 21              | 13 6    | 51   | 9.1023         | 33       | 7    | 19.1363        | 21     | 32   | 30.2594        |
| 29              | 23      | 52   | 9.1040         | 38       | 7    | 19.1348        | 23     | 32   | 30.2595        |
| Sept. 6         | 13 41   | 0 52 | 9.1057         | 22 44    | 0 7  | 19.1333        | 10 26  | 1 32 | 30.2596        |
| 14              | 58      | 53   | 9.1074         | 50       | 7    | 19.1318        | 29     | 32   | 30.2598        |
| 22              | 14 16   | 54   | 9.1091         | 55       | 7    | 19.1303        | 32     | 32   | 30.2599        |
| 30              | 33      | 55   | 9.1108         | 23 1     | 7    | 19.1288        | 35     | 32   | 30.2600        |

| Month<br>and<br>Date. | ζ         |        |                   | η      |         |                   | ψ       |         |                   |   |
|-----------------------|-----------|--------|-------------------|--------|---------|-------------------|---------|---------|-------------------|---|
|                       | Long.     | Lat.   | Radius<br>Vector. | Long.  | Lat.    | Radius<br>Vector. | Long.   | Lat.    | Radius<br>Vector. |   |
|                       | °         | '      | °                 | '      | °       | '                 | °       | '       | °                 | ' |
|                       | α         | N      |                   | π      | N       |                   | ⊕       | N       |                   |   |
| Oct.                  | 8 14 51   | 0 55   | 9.1126            | 23 7 0 | 8       | 19.1273           | 10 38 0 | 32      | 30.2602           |   |
|                       | 16 15 8   | 56     | 9.1143            | 12 8   | 8       | 19.1258           | 41 32   |         | 30.2603           |   |
|                       | 24 26     | 57     | 9.1160            | 18 8   | 8       | 19.1244           | 43 32   |         | 30.2604           |   |
| Nov.                  | 1 43      | 57     | 9.1177            | 26 8   | 8       | 19.1229           | 46 32   |         | 30.2606           |   |
|                       | 9 16 1    | 58     | 9.1195            | 30 8   | 8       | 19.1214           | 49 32   |         | 30.2607           |   |
|                       | 17 18     | 59     | 9.1212            | 35 8   | 8       | 19.1199           | 52 32   |         | 30.2608           |   |
|                       | 25 35 1 0 | 9.1230 | 41 8              | 8      | 19.1184 | 55 32             |         | 30.2609 |                   |   |
| Dec.                  | 3 53      | 0      | 9.1247            | 47 8   | 8       | 19.1169           | 58 32   |         | 30.2611           |   |
|                       | 11 17 10  | 1 1    | 9.1265            | 52 8   | 8       | 19.1154           | 11 1 32 |         | 30.2612           |   |
|                       | 19 27     | 3      | 9.1283            | 58 8   | 8       | 19.1139           | 3 32    |         | 30.2613           |   |
|                       | 27 45     | 3      | 9.1300            | 24 4 8 | 8       | 19.1124           | 6 32    |         | 30.2615           |   |
|                       | 31 54     | 4      | 9.1309            | 7 8    | 8       | 19.1117           | 8 33    |         | 30.2616           |   |



Table of Ascendants for Latitudes 7° to 20°

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| Sid. Time. | 7°           | 8°     | 9°     | 10°    | 11°    | 12°    | 13°    | 14°    | 15°    | 16°    | 17°    | 18°    | 19°    | 20°    |
|------------|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| H. M.      | °            | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      |
| 6          | 0 180        | 0 180  | 0 180  | 0 180  | 6 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  |
| 15         | 183 53 183   | 51 183 | 49 183 | 48 183 | 46 183 | 45 183 | 45 183 | 42 183 | 41 183 | 40 183 | 38 183 | 37 183 | 36 183 | 33 183 |
| 30         | 187 45 187   | 41 187 | 39 187 | 36 187 | 32 187 | 29 187 | 25 187 | 23 187 | 23 187 | 20 187 | 16 187 | 13 187 | 9 187  | 6 187  |
| 45         | 191 36 191   | 32 191 | 27 191 | 22 191 | 17 191 | 13 191 | 8 191  | 5 191  | 3 190  | 58 190 | 53 190 | 49 190 | 44 190 | 40 190 |
| 7          | 0 195 27 195 | 22 195 | 15 195 | 9 195  | 2 194  | 56 194 | 49 194 | 43 194 | 37 194 | 31 194 | 24 194 | 18 194 | 11 194 | 5 194  |
| 15         | 199 19 199   | 10 199 | 2 198  | 52 198 | 46 198 | 37 198 | 25 198 | 18 198 | 14 198 | 6 198  | 0 197  | 51 197 | 44 197 | 32 197 |
| 30         | 203 7 202    | 57 202 | 43 202 | 38 202 | 28 202 | 20 202 | 19 202 | 9 202  | 0 201  | 51 201 | 41 201 | 32 201 | 23 201 | 14 201 |
| 45         | 206 55 206   | 43 206 | 31 206 | 20 206 | 20 206 | 10 205 | 59 205 | 49 205 | 38 205 | 27 205 | 17 205 | 5 204  | 45 204 | 34 204 |
| 8          | 0 210 40 210 | 27 210 | 15 210 | 1 209  | 50 209 | 38 209 | 25 209 | 13 209 | 1 208  | 49 208 | 37 208 | 25 208 | 14 208 | 2 208  |
| 15         | 214 24 214   | 10 213 | 56 213 | 41 213 | 29 213 | 15 213 | 1 212  | 48 212 | 33 212 | 21 212 | 8 211  | 55 211 | 41 211 | 28 211 |
| 30         | 218 4 217    | 50 217 | 35 217 | 20 217 | 5 216  | 50 216 | 35 216 | 21 216 | 6 215  | 52 215 | 37 215 | 23 215 | 8 214  | 54 214 |
| 45         | 221 46 221   | 30 221 | 13 220 | 56 220 | 41 220 | 25 220 | 9 219  | 54 219 | 38 219 | 22 219 | 6 218  | 50 218 | 35 218 | 19 218 |
| 9          | 0 225 22 225 | 6 224  | 43 224 | 31 224 | 15 224 | 58 223 | 41 223 | 24 223 | 7 222  | 50 222 | 34 222 | 17 222 | 0 221  | 43 221 |
| 15         | 229 0 228    | 42 228 | 23 228 | 4 227  | 47 227 | 29 227 | 11 226 | 53 226 | 21 226 | 35 226 | 17 225 | 59 225 | 40 225 | 22 225 |
| 30         | 232 34 232   | 15 231 | 56 231 | 36 231 | 18 230 | 59 230 | 46 230 | 26 230 | 21 230 | 2 229  | 43 229 | 23 229 | 4 228  | 26 228 |
| 45         | 236 6 235    | 46 235 | 26 235 | 5 234  | 46 234 | 26 234 | 7 233  | 47 233 | 27 233 | 7 232  | 47 232 | 27 232 | 7 231  | 47 231 |
| 10         | 0 239 37 239 | 17 238 | 56 238 | 35 238 | 15 237 | 53 237 | 33 237 | 13 236 | 51 236 | 31 236 | 10 235 | 49 235 | 11 235 | 28 235 |
| 15         | 243 7 242    | 46 242 | 24 242 | 2 241  | 41 241 | 20 240 | 58 240 | 37 240 | 15 239 | 54 239 | 33 239 | 11 238 | 49 238 | 28 238 |
| 30         | 246 36 246   | 13 245 | 51 245 | 29 245 | 7 244  | 45 244 | 23 244 | 2 243  | 39 243 | 17 242 | 5 242  | 32 242 | 9 241  | 46 241 |
| 45         | 250 2 249    | 40 249 | 18 248 | 55 248 | 32 248 | 9 247  | 47 247 | 25 247 | 1 246  | 39 246 | 15 245 | 52 245 | 29 245 | 6 245  |
| 11         | 0 253 29 253 | 7 252  | 44 252 | 20 251 | 57 251 | 34 251 | 11 250 | 47 250 | 24 250 | 0 249  | 37 249 | 13 248 | 49 248 | 24 248 |
| 15         | 256 56 256   | 32 256 | 8 255  | 45 255 | 21 254 | 57 254 | 33 254 | 10 253 | 45 253 | 22 252 | 57 252 | 33 252 | 8 251  | 43 251 |
| 30         | 260 21 259   | 57 259 | 34 259 | 10 258 | 24 258 | 22 257 | 58 257 | 35 257 | 9 256  | 45 256 | 20 255 | 55 255 | 29 255 | 3 255  |
| 45         | 263 47 263   | 23 262 | 59 262 | 35 262 | 10 261 | 46 261 | 21 260 | 57 260 | 32 260 | 7 259  | 42 259 | 16 258 | 50 258 | 24 258 |
| 12         | 0 267 13 266 | 48 266 | 23 266 | 0 265  | 35 265 | 10 264 | 45 264 | 20 263 | 55 263 | 30 263 | 4 262  | 38 262 | 13 261 | 46 261 |

Table of Ascendants for Latitudes 7° to 20°.

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| Sid. Time. | 7°           | 8°     | 9°     | 10°    | 11°    | 12°    | 13°    | 14°    | 15°    | 16°    | 17°    | 18°    | 19°    | 20°    |
|------------|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| H. M.      | °            | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      |
| 12         | 0 267 13 266 | 48 266 | 23 266 | 0 265  | 35 265 | 10 264 | 45 264 | 20 263 | 55 263 | 30 263 | 4 262  | 38 262 | 13 261 | 46 261 |
| 15         | 270 38 270   | 14 269 | 49 269 | 25 269 | 0 268  | 35 268 | 10 267 | 44 267 | 19 266 | 53 266 | 27 266 | 1 265  | 34 265 | 8 265  |
| 30         | 274 4 273    | 41 273 | 17 272 | 51 272 | 27 272 | 2 271  | 36 271 | 11 270 | 47 270 | 21 269 | 55 269 | 27 269 | 0 268  | 34 268 |
| 45         | 277 34 277   | 9 276  | 44 276 | 20 275 | 55 275 | 30 275 | 4 274  | 39 274 | 13 273 | 47 273 | 21 272 | 54 272 | 27 271 | 59 271 |
| 13         | 0 281 3 280  | 38 280 | 14 279 | 50 279 | 25 279 | 0 278  | 35 278 | 9 277  | 43 277 | 17 276 | 51 276 | 24 275 | 57 275 | 29 275 |
| 15         | 284 34 284   | 10 283 | 45 283 | 21 282 | 56 282 | 31 282 | 6 281  | 41 281 | 15 280 | 48 280 | 22 279 | 55 279 | 28 279 | 0 279  |
| 30         | 288 8 287    | 44 287 | 19 286 | 55 286 | 30 286 | 6 285  | 41 285 | 15 284 | 50 284 | 24 283 | 58 283 | 30 283 | 3 282  | 36 282 |
| 45         | 291 41 291   | 19 290 | 55 290 | 32 290 | 7 289  | 43 289 | 18 288 | 53 288 | 27 288 | 0 287  | 35 287 | 8 286  | 41 286 | 15 286 |
| 14         | 0 295 19 294 | 56 294 | 33 294 | 11 293 | 46 293 | 22 292 | 58 292 | 34 292 | 8 291  | 42 291 | 17 290 | 50 290 | 23 289 | 56 289 |
| 15         | 299 0 298    | 38 298 | 15 297 | 52 297 | 28 297 | 5 296  | 41 296 | 16 295 | 52 295 | 27 295 | 2 294  | 35 294 | 9 293  | 41 293 |
| 30         | 302 43 302   | 21 301 | 59 301 | 37 301 | 14 300 | 51 300 | 28 300 | 4 299  | 40 299 | 15 298 | 50 298 | 25 297 | 59 297 | 32 297 |
| 45         | 306 29 306   | 8 305  | 46 305 | 27 305 | 3 304  | 41 304 | 18 303 | 55 303 | 32 303 | 8 302  | 44 302 | 19 301 | 54 301 | 28 301 |
| 15         | 310 17 309   | 59 309 | 38 309 | 17 308 | 56 308 | 35 308 | 13 307 | 51 307 | 28 307 | 5 306  | 41 306 | 17 305 | 52 305 | 27 305 |
| 30         | 314 11 313   | 52 313 | 32 313 | 12 312 | 52 312 | 32 312 | 12 311 | 51 311 | 30 311 | 6 310  | 45 310 | 23 309 | 58 309 | 34 309 |
| 45         | 318 7 317    | 50 317 | 32 317 | 13 316 | 53 316 | 34 316 | 15 315 | 55 315 | 35 315 | 14 314 | 53 314 | 31 314 | 9 313  | 46 313 |
| 16         | 0 322 6 321  | 50 321 | 32 321 | 18 320 | 58 320 | 41 320 | 23 320 | 3 319  | 45 319 | 25 319 | 53 318 | 45 318 | 24 318 | 3 318  |
| 15         | 326 11 325   | 55 325 | 39 325 | 24 325 | 7 324  | 51 324 | 34 324 | 17 324 | 0 323  | 42 323 | 23 323 | 5 322  | 45 322 | 25 322 |
| 30         | 330 14 330   | 2 329  | 48 329 | 33 329 | 20 328 | 53 328 | 34 328 | 18 328 | 2 327  | 46 327 | 29 327 | 10 326 | 47 326 | 52 326 |
| 45         | 334 25 334   | 11 334 | 0 333  | 4 333  | 54 333 | 42 333 | 9 332  | 56 332 | 41 332 | 28 332 | 13 331 | 58 331 | 42 331 | 28 331 |
| 17         | 0 338 37 338 | 25 338 | 15 338 | 5 337  | 54 337 | 42 337 | 31 337 | 19 337 | 8 336  | 56 336 | 43 336 | 30 336 | 17 336 | 4 336  |
| 15         | 342 37 342   | 41 342 | 33 342 | 25 342 | 15 342 | 6 341  | 58 341 | 48 341 | 38 341 | 28 341 | 17 341 | 7 340  | 56 340 | 45 340 |
| 30         | 347 5 346    | 58 346 | 52 346 | 47 346 | 39 346 | 33 346 | 25 346 | 18 346 | 11 346 | 3 345  | 55 345 | 47 345 | 39 345 | 31 345 |
| 45         | 351 23 351   | 18 351 | 15 351 | 11 351 | 6 351  | 1 350  | 56 350 | 51 350 | 46 350 | 41 350 | 36 350 | 30 350 | 25 350 | 20 350 |
| 18         | 0 355 42 355 | 40 355 | 38 355 | 34 355 | 33 355 | 31 355 | 29 355 | 26 355 | 23 355 | 20 355 | 17 355 | 15 355 | 13 355 | 9 355  |

| Sid. Time. | 7° | 8° | 9° | 10° | 11° | 12° | 13° | 14° | 15° | 16° | 17° | 18° | 19° | 20° |
|------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| H. M.      | °  | '  | °  | '   | °   | '   | °   | '   | °   | '   | °   | '   | °   | '   |
| 18 0       | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 15 15      | 4  | 19 | 4  | 20  | 4   | 23  | 4   | 26  | 4   | 27  | 4   | 29  | 4   | 30  |
| 30 30      | 8  | 37 | 8  | 42  | 8   | 46  | 8   | 49  | 8   | 54  | 8   | 59  | 8   | 59  |
| 45 15      | 12 | 56 | 13 | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  |
| 19 0       | 16 | 14 | 17 | 19  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  | 17  |
| 15 15      | 21 | 27 | 21 | 35  | 21  | 25  | 21  | 25  | 21  | 25  | 21  | 25  | 21  | 25  |
| 30 30      | 25 | 35 | 25 | 48  | 26  | 0   | 26  | 13  | 26  | 25  | 26  | 38  | 26  | 38  |
| 45 15      | 29 | 46 | 29 | 58  | 30  | 12  | 30  | 27  | 30  | 40  | 30  | 55  | 31  | 51  |
| 20 0       | 33 | 51 | 34 | 5   | 34  | 21  | 34  | 36  | 34  | 53  | 35  | 9   | 35  | 26  |
| 15 37      | 54 | 38 | 10 | 38  | 27  | 38  | 52  | 39  | 2   | 39  | 19  | 39  | 37  | 39  |
| 30 41      | 53 | 42 | 10 | 42  | 28  | 42  | 48  | 43  | 5   | 43  | 26  | 43  | 45  | 44  |
| 45 45      | 47 | 48 | 46 | 9   | 46  | 28  | 46  | 48  | 47  | 8   | 47  | 28  | 47  | 48  |
| 21 0       | 49 | 42 | 50 | 2   | 50  | 22  | 50  | 43  | 51  | 4   | 51  | 25  | 51  | 47  |
| 15 15      | 53 | 30 | 53 | 52  | 54  | 14  | 53  | 54  | 57  | 55  | 19  | 55  | 42  | 56  |
| 30 30      | 57 | 17 | 57 | 39  | 58  | 1   | 58  | 23  | 58  | 46  | 59  | 9   | 59  | 32  |
| 45 45      | 61 | 0  | 61 | 22  | 61  | 45  | 62  | 8   | 62  | 32  | 62  | 55  | 63  | 19  |
| 22 0       | 64 | 41 | 65 | 4   | 65  | 27  | 65  | 49  | 66  | 14  | 66  | 38  | 67  | 2   |
| 15 15      | 68 | 19 | 68 | 41  | 69  | 5   | 69  | 28  | 69  | 53  | 70  | 17  | 70  | 42  |
| 30 30      | 71 | 53 | 72 | 17  | 72  | 41  | 73  | 57  | 73  | 30  | 73  | 54  | 74  | 19  |
| 45 45      | 75 | 27 | 75 | 50  | 76  | 15  | 76  | 39  | 77  | 4   | 77  | 29  | 77  | 54  |
| 23 0       | 78 | 58 | 79 | 21  | 79  | 46  | 80  | 10  | 80  | 35  | 81  | 0   | 81  | 25  |
| 15 15      | 82 | 28 | 82 | 51  | 83  | 16  | 83  | 40  | 84  | 5   | 84  | 30  | 84  | 56  |
| 30 30      | 85 | 45 | 86 | 19  | 86  | 43  | 87  | 9   | 87  | 33  | 87  | 58  | 88  | 24  |
| 45 45      | 89 | 21 | 89 | 46  | 90  | 11  | 90  | 35  | 91  | 0   | 91  | 25  | 91  | 50  |
| 24 0       | 92 | 48 | 93 | 12  | 93  | 34  | 94  | 0   | 94  | 25  | 94  | 50  | 95  | 15  |

| Sid. Time. | 21°    | 22°    | 23°    | 24°    | 25°    | 26°    | 27°    | 28°    | 29°    | 30°    | 31°    | 32°    | 33°    | 34°    |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| H. M.      | °      | '      | °      | '      | °      | '      | °      | '      | °      | '      | °      | '      | °      | '      |
| 0          | 0 98   | 41 99  | 8 99   | 35 100 | 3 100  | 31 100 | 59 101 | 27 101 | 56 102 | 34 102 | 57 103 | 26 103 | 57 104 | 29 105 |
| 1          | 15 102 | 2 102  | 28 102 | 55 103 | 22 103 | 49 104 | 17 104 | 45 105 | 18 105 | 43 106 | 12 106 | 41 107 | 11 107 | 42 108 |
| 2          | 30 105 | 22 105 | 48 106 | 14 106 | 40 107 | 7 107  | 33 108 | 2 108  | 29 108 | 58 109 | 26 109 | 54 110 | 24 110 | 53 111 |
| 3          | 45 108 | 42 109 | 7 109  | 32 109 | 57 110 | 23 110 | 49 111 | 16 111 | 43 112 | 11 112 | 33 113 | 6 113  | 34 114 | 21 114 |
| 4          | 0 112  | 0 112  | 24 112 | 49 113 | 14 113 | 39 114 | 5 114  | 31 114 | 56 115 | 22 115 | 49 116 | 16 116 | 43 117 | 10 117 |
| 5          | 15 115 | 18 115 | 42 116 | 16 116 | 30 116 | 54 117 | 19 117 | 44 118 | 9 118  | 34 119 | 0 119  | 25 119 | 50 120 | 18 120 |
| 6          | 30 118 | 39 119 | 0 119  | 23 119 | 46 120 | 10 120 | 33 120 | 57 121 | 21 121 | 46 122 | 11 122 | 35 123 | 0 123  | 25 123 |
| 7          | 45 121 | 54 122 | 17 122 | 38 123 | 2 123  | 24 123 | 47 124 | 9 124  | 32 124 | 56 125 | 21 125 | 44 126 | 8 126  | 32 126 |
| 8          | 0 125  | 14 125 | 35 125 | 57 126 | 18 126 | 39 127 | 1 127  | 23 127 | 45 128 | 8 128  | 31 128 | 54 129 | 17 129 | 37 130 |
| 9          | 15 128 | 31 128 | 53 129 | 14 129 | 34 129 | 54 130 | 15 130 | 36 130 | 57 131 | 19 131 | 40 132 | 2 132  | 24 133 | 45 133 |
| 10         | 30 131 | 54 132 | 13 132 | 35 132 | 5 132  | 10 133 | 30 133 | 50 134 | 9 134  | 29 134 | 50 135 | 11 135 | 30 135 | 51 136 |
| 11         | 45 135 | 15 135 | 32 135 | 50 136 | 7 136  | 26 136 | 44 137 | 3 137  | 22 137 | 41 138 | 1 138  | 18 138 | 37 138 | 57 139 |
| 12         | 0 138  | 34 138 | 52 139 | 9 139  | 26 139 | 43 140 | 0 140  | 17 140 | 34 140 | 51 141 | 11 141 | 23 141 | 45 142 | 3 142  |
| 13         | 15 141 | 57 142 | 13 142 | 29 142 | 45 143 | 1 143  | 17 143 | 33 143 | 49 144 | 5 144  | 23 144 | 39 144 | 55 145 | 12 145 |
| 14         | 30 145 | 20 145 | 35 145 | 50 146 | 5 146  | 19 146 | 33 146 | 48 147 | 3 147  | 18 147 | 33 147 | 49 148 | 4 148  | 19 148 |
| 15         | 45 148 | 45 148 | 59 149 | 12 149 | 26 149 | 38 149 | 51 150 | 5 150  | 19 150 | 33 150 | 46 150 | 59 151 | 13 151 | 28 151 |
| 16         | 0 152  | 10 152 | 22 152 | 32 152 | 46 152 | 58 153 | 10 153 | 22 153 | 35 153 | 47 153 | 59 154 | 24 154 | 34 154 | 36 154 |
| 17         | 15 155 | 36 155 | 47 155 | 58 156 | 8 156  | 19 156 | 30 156 | 40 156 | 51 157 | 2 157  | 13 157 | 23 157 | 34 157 | 45 157 |
| 18         | 30 159 | 4 159  | 13 159 | 22 159 | 31 159 | 40 159 | 50 159 | 59 160 | 8 160  | 18 160 | 27 160 | 36 160 | 46 160 | 35 161 |
| 19         | 45 162 | 35 162 | 44 162 | 50 162 | 26 163 | 3 163  | 10 163 | 18 163 | 25 163 | 33 163 | 41 163 | 49 163 | 57 164 | 6 164  |
| 20         | 0 166  | 2 166  | 8 166  | 14 166 | 20 166 | 26 166 | 32 166 | 38 166 | 44 166 | 50 166 | 57 167 | 3 167  | 9 167  | 16 167 |
| 21         | 15 169 | 30 169 | 35 169 | 40 169 | 44 169 | 49 169 | 53 169 | 58 170 | 2 170  | 7 170  | 13 170 | 17 170 | 22 170 | 26 170 |
| 22         | 30 173 | 0 173  | 3 173  | 6 173  | 9 173  | 12 173 | 15 173 | 19 173 | 21 173 | 24 173 | 28 173 | 31 173 | 34 173 | 37 173 |
| 23         | 45 176 | 29 176 | 32 176 | 33 176 | 34 176 | 36 176 | 38 176 | 40 176 | 41 176 | 43 176 | 44 176 | 45 176 | 47 176 | 50 176 |
| 24         | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  |

Table of Ascendants for Latitudes 21° to 34°.

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| Sid. Time. | 21°   | 22°    | 23°    | 24°    | 25°    | 26°    | 27°    | 28°    | 29°    | 30°    | 31°    | 32°    | 33°    | 34°    |
|------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| H. M.      | °     | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      |
| 6          | 0 180 | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  | 0 180  |
| 15         | 183   | 31 183 | 28 183 | 27 183 | 26 183 | 24 183 | 22 183 | 20 183 | 19 183 | 17 183 | 16 183 | 15 183 | 13 183 | 10 183 |
| 30         | 187   | 0 186  | 57 186 | 54 186 | 51 186 | 46 186 | 41 186 | 36 186 | 33 186 | 30 186 | 27 186 | 24 186 | 21 186 | 18 186 |
| 45         | 190   | 30 190 | 27 190 | 24 190 | 21 190 | 16 190 | 11 190 | 6 190  | 3 190  | 0 190  | 31 189 | 28 189 | 25 189 | 22 189 |
| 7          | 0 193 | 58 193 | 52 193 | 46 193 | 40 193 | 34 193 | 28 193 | 22 193 | 16 193 | 10 193 | 3 192  | 57 192 | 51 192 | 44 192 |
| 15         | 197   | 29 197 | 20 197 | 14 197 | 1 196  | 57 196 | 50 196 | 42 196 | 35 196 | 27 196 | 19 196 | 11 196 | 3 195  | 54 195 |
| 30         | 200   | 56 200 | 47 200 | 38 200 | 29 200 | 20 200 | 10 200 | 1 199  | 52 199 | 42 199 | 33 199 | 24 199 | 14 199 | 5 198  |
| 45         | 204   | 24 204 | 13 204 | 2 203  | 52 203 | 41 203 | 30 203 | 20 203 | 9 202  | 58 202 | 47 202 | 37 202 | 26 202 | 15 202 |
| 8          | 0 207 | 50 207 | 38 207 | 27 207 | 14 207 | 2 206  | 50 206 | 38 206 | 25 206 | 13 206 | 1 205  | 49 205 | 36 205 | 24 205 |
| 15         | 211   | 15 211 | 1 210  | 48 210 | 34 210 | 22 210 | 9 209  | 55 209 | 41 209 | 27 209 | 14 209 | 1 208  | 47 208 | 32 208 |
| 30         | 214   | 40 214 | 25 214 | 10 213 | 55 213 | 42 213 | 27 213 | 12 212 | 57 212 | 42 212 | 27 212 | 11 211 | 56 211 | 41 211 |
| 45         | 218   | 3 217  | 47 217 | 31 217 | 15 216 | 59 216 | 43 216 | 27 216 | 11 215 | 55 215 | 37 215 | 21 215 | 5 214  | 48 214 |
| 9          | 0 221 | 26 221 | 8 220  | 51 220 | 34 220 | 17 220 | 0 219  | 43 219 | 26 219 | 9 218  | 49 218 | 32 218 | 15 217 | 39 217 |
| 15         | 224   | 46 224 | 28 224 | 10 223 | 53 223 | 34 223 | 16 222 | 57 222 | 38 222 | 19 221 | 59 221 | 42 221 | 23 221 | 3 220  |
| 30         | 228   | 4 227  | 47 227 | 28 227 | 9 226  | 50 226 | 30 226 | 10 225 | 51 225 | 31 225 | 10 224 | 50 224 | 30 224 | 45 224 |
| 45         | 231   | 29 231 | 7 230  | 46 230 | 26 230 | 6 229  | 45 229 | 24 229 | 3 228  | 41 228 | 20 227 | 58 227 | 37 227 | 15 226 |
| 10         | 0 234 | 46 234 | 25 234 | 3 233  | 42 233 | 21 232 | 59 232 | 37 232 | 15 231 | 52 231 | 29 231 | 6 230  | 45 230 | 23 229 |
| 15         | 238   | 6 237  | 43 237 | 21 236 | 58 236 | 36 236 | 13 235 | 51 235 | 28 235 | 4 234  | 39 234 | 16 233 | 53 233 | 28 233 |
| 30         | 241   | 22 241 | 0 240  | 37 240 | 14 239 | 50 239 | 27 239 | 3 238  | 39 238 | 14 237 | 49 237 | 25 237 | 0 236  | 35 236 |
| 45         | 244   | 42 244 | 18 243 | 54 243 | 30 243 | 6 242  | 41 242 | 16 241 | 51 241 | 26 241 | 0 240  | 35 240 | 9 239  | 42 239 |
| 11         | 0 248 | 0 247  | 36 247 | 11 246 | 46 246 | 21 245 | 55 245 | 29 245 | 4 244  | 38 244 | 11 243 | 44 243 | 17 242 | 50 242 |
| 15         | 251   | 18 250 | 53 250 | 28 250 | 3 249  | 37 249 | 11 248 | 44 248 | 17 247 | 49 247 | 22 246 | 54 246 | 26 245 | 58 245 |
| 30         | 254   | 38 254 | 12 253 | 46 253 | 20 252 | 53 252 | 26 251 | 58 251 | 31 251 | 2 250  | 34 250 | 4 249  | 36 249 | 72 248 |
| 45         | 257   | 58 257 | 32 257 | 5 256  | 38 256 | 11 255 | 43 255 | 15 254 | 46 254 | 17 253 | 48 253 | 19 252 | 49 252 | 18 251 |
| 12         | 0 261 | 19 260 | 52 260 | 25 259 | 57 259 | 29 259 | 1 258  | 31 258 | 4 257  | 34 257 | 3 256  | 34 256 | 3 255  | 31 254 |

Table of Ascendants for Latitudes 21° to 34°.

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| Sid. Time. | 21°   | 22°    | 23°    | 24°    | 25°    | 26°    | 27°    | 28°    | 29°    | 30°    | 31°    | 32°    | 33°    | 34°    |
|------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| H. M.      | °     | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      | °      |
| 12         | 0 261 | 19 260 | 52 260 | 25 259 | 57 259 | 29 259 | 0 258  | 31 258 | 4 257  | 34 257 | 3 256  | 34 256 | 3 255  | 31 254 |
| 15         | 264   | 41 264 | 14 263 | 45 263 | 18 262 | 49 262 | 20 261 | 51 261 | 22 260 | 51 260 | 19 259 | 49 259 | 18 258 | 45 258 |
| 30         | 268   | 6 267  | 38 267 | 8 266  | 41 266 | 12 265 | 42 265 | 12 264 | 42 264 | 11 263 | 39 263 | 8 262  | 36 262 | 2 261  |
| 45         | 271   | 32 271 | 4 270  | 35 270 | 6 269  | 38 269 | 7 268  | 37 268 | 6 267  | 34 267 | 1 266  | 29 265 | 56 265 | 22 264 |
| 13         | 0 275 | 1 274  | 33 274 | 4 273  | 34 273 | 6 272  | 34 272 | 4 271  | 33 271 | 0 270  | 27 269 | 54 269 | 21 268 | 46 268 |
| 15         | 278   | 32 278 | 3 277  | 35 277 | 5 276  | 36 276 | 4 275  | 34 275 | 2 274  | 29 273 | 55 273 | 22 272 | 48 272 | 12 271 |
| 30         | 282   | 7 281  | 38 281 | 9 280  | 39 280 | 10 279 | 38 279 | 8 278  | 35 278 | 2 277  | 28 276 | 54 276 | 19 275 | 43 275 |
| 45         | 285   | 46 284 | 17 284 | 48 284 | 18 283 | 49 283 | 17 282 | 47 282 | 13 281 | 40 281 | 5 280  | 32 279 | 57 279 | 20 278 |
| 14         | 0 289 | 28 288 | 59 288 | 30 288 | 0 287  | 31 286 | 59 286 | 29 285 | 55 285 | 22 284 | 48 284 | 14 283 | 35 283 | 1 282  |
| 15         | 293   | 14 292 | 38 292 | 9 291  | 40 290 | 18 290 | 46 290 | 16 289 | 43 289 | 10 288 | 35 288 | 1 287  | 25 286 | 49 286 |
| 30         | 297   | 5 296  | 38 296 | 9 295  | 40 295 | 11 294 | 11 294 | 11 293 | 38 293 | 5 292  | 30 291 | 57 291 | 23 290 | 43 290 |
| 45         | 301   | 23 300 | 34 300 | 7 299  | 38 299 | 9 298  | 39 298 | 10 297 | 38 297 | 5 296  | 31 295 | 57 295 | 22 294 | 45 294 |
| 15         | 305   | 2 304  | 36 304 | 18 303 | 41 303 | 13 302 | 44 302 | 14 301 | 42 301 | 10 300 | 36 300 | 3 299  | 23 298 | 52 298 |
| 30         | 309   | 9 308  | 44 308 | 18 307 | 51 307 | 24 306 | 55 306 | 26 305 | 56 305 | 24 304 | 52 304 | 20 303 | 46 303 | 10 302 |
| 45         | 313   | 22 312 | 59 312 | 54 312 | 8 311  | 42 311 | 15 310 | 47 310 | 18 309 | 48 309 | 17 308 | 45 308 | 13 307 | 33 307 |
| 16         | 0 317 | 41 317 | 18 316 | 56 316 | 31 316 | 6 315  | 40 315 | 14 314 | 47 314 | 18 313 | 48 313 | 19 312 | 48 312 | 15 311 |
| 15         | 322   | 5 321  | 43 321 | 21 320 | 59 320 | 36 320 | 12 319 | 48 319 | 23 318 | 55 318 | 27 317 | 59 317 | 30 316 | 59 316 |
| 30         | 326   | 33 326 | 15 325 | 56 325 | 35 325 | 14 324 | 52 324 | 30 324 | 6 323  | 42 323 | 16 322 | 51 322 | 25 321 | 55 321 |
| 45         | 331   | 9 330  | 53 330 | 35 330 | 16 329 | 57 329 | 38 329 | 18 328 | 55 328 | 35 328 | 12 327 | 50 327 | 25 326 | 59 326 |
| 17         | 0 335 | 49 335 | 25 335 | 19 335 | 3 334  | 48 334 | 31 334 | 14 333 | 53 333 | 36 333 | 17 332 | 57 332 | 33 332 | 53 332 |
| 15         | 340   | 34 340 | 22 340 | 9 339  | 56 339 | 43 339 | 30 339 | 16 339 | 0 338  | 44 338 | 29 338 | 12 337 | 58 337 | 35 337 |
| 30         | 344   | 22 344 | 13 345 | 3 344  | 54 344 | 47 344 | 33 344 | 22 344 | 11 343 | 59 343 | 46 343 | 33 343 | 19 343 | 4 342  |
| 45         | 348   | 54 348 | 7 350  | 1 349  | 54 349 | 47 349 | 34 349 | 25 349 | 17 349 | 8 348  | 59 348 | 33 348 | 19 348 | 40 348 |
| 18         | 0 355 | 7 355  | 4 354  | 59 354 | 53 354 | 49 354 | 46 354 | 42 354 | 38 354 | 33 354 | 29 354 | 24 354 | 19 354 | 14 354 |

Table of Ascendants for Latitudes 21° to 34°.

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| Sid. Time | 21°      | 22°      | 23°        | 24°        | 25°        | 26°        | 27°        | 28°        | 29°        | 30°        | 31°         | 32°         | 33°         | 34°         |
|-----------|----------|----------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| H. M.     | °        | °        | °          | °          | °          | °          | °          | °          | °          | °          | °           | °           | °           | °           |
| 18 0      | 0 0 0    | 0 0 0    | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0      | 0 0 0       | 0 0 0       | 0 0 0       | 0 0 0       |
| 15 15     | 4 53 4   | 56 53 4  | 5 59 10    | 6 10 13    | 7 10 13    | 8 10 13    | 9 10 13    | 10 10 13   | 11 10 13   | 12 10 13   | 13 10 13    | 14 10 13    | 15 10 13    | 16 10 13    |
| 30 45     | 9 46 9   | 53 47 14 | 57 51 20   | 6 15 16    | 7 15 16    | 8 15 16    | 9 15 16    | 10 15 16   | 11 15 16   | 12 15 16   | 13 15 16    | 14 15 16    | 15 15 16    | 16 15 16    |
| 19 0      | 19 26 19 | 38 19 51 | 51 20 4    | 20 17 20   | 22 25 12   | 25 29 25   | 29 33 42   | 33 37 45   | 37 41 54   | 42 46 51   | 46 51 58    | 51 56 60    | 56 61 65    | 61 66 70    |
| 15 30     | 24 11 24 | 25 24 4  | 29 25 29   | 34 30 3    | 38 35 8    | 42 40 12   | 46 45 13   | 50 44 13   | 54 43 13   | 58 42 12   | 62 41 11    | 66 40 10    | 70 39 9     | 74 38 8     |
| 45 33     | 27 33 45 | 34 4 34  | 39 39 1    | 43 29 43   | 47 32 48   | 51 36 53   | 55 40 34   | 59 44 21   | 63 48 8    | 67 52 18   | 71 56 24    | 75 60 32    | 79 64 40    | 83 68 48    |
| 20 0      | 37 55 38 | 17 38 39 | 4 43 29    | 47 52 48   | 51 56 47   | 55 61 51   | 59 66 55   | 63 71 59   | 67 76 63   | 71 81 67   | 75 86 71    | 79 91 75    | 83 96 79    | 87 101 83   |
| 15 45     | 50 51 51 | 16 51 16 | 51 52 52   | 56 57 57   | 61 62 62   | 66 67 67   | 71 72 72   | 76 77 77   | 81 78 78   | 86 79 79   | 91 80 80    | 96 81 81    | 101 82 82   | 106 83 83   |
| 21 0      | 54 58 55 | 24 55 24 | 59 53 60   | 64 60 64   | 69 65 69   | 74 70 74   | 79 75 79   | 84 80 84   | 89 85 89   | 94 90 94   | 99 95 99    | 104 100 104 | 109 105 109 | 114 110 114 |
| 30 15     | 58 58 59 | 26 53 26 | 63 51 63   | 68 57 68   | 73 63 73   | 78 68 78   | 83 73 83   | 88 78 88   | 93 83 93   | 98 88 98   | 103 93 103  | 108 98 108  | 113 103 113 | 118 108 118 |
| 30 45     | 62 55 63 | 22 63 22 | 68 53 68   | 73 68 73   | 78 73 78   | 83 78 83   | 88 83 88   | 93 88 93   | 98 93 98   | 103 98 103 | 108 103 108 | 113 108 113 | 118 108 118 | 123 113 123 |
| 45 66     | 46 67 14 | 67 14 67 | 73 63 73   | 78 68 78   | 83 73 83   | 88 78 88   | 93 83 93   | 98 88 98   | 103 93 103 | 108 98 108 | 113 103 113 | 118 103 118 | 123 113 123 | 128 123 128 |
| 22 0      | 70 32 71 | 1 71 30  | 72 12 72   | 77 17 77   | 82 22 82   | 87 27 87   | 92 32 92   | 97 37 97   | 102 42 102 | 107 47 107 | 112 52 112  | 117 57 117  | 122 62 122  | 127 67 127  |
| 15 15     | 74 14 74 | 43 75 43 | 75 12 75   | 80 17 80   | 85 22 85   | 90 27 90   | 95 32 95   | 100 37 100 | 105 42 105 | 110 47 110 | 115 52 115  | 120 57 120  | 125 62 125  | 130 67 130  |
| 30 77     | 83 78 22 | 78 25 78 | 83 30 83   | 88 35 88   | 93 40 93   | 98 45 98   | 103 50 103 | 108 55 108 | 113 60 113 | 118 65 118 | 123 70 123  | 128 75 128  | 133 80 133  | 138 85 138  |
| 45 81     | 88 81 57 | 82 25 82 | 87 30 87   | 92 35 92   | 97 40 97   | 102 45 102 | 107 50 107 | 112 55 112 | 117 60 117 | 122 65 122 | 127 70 127  | 132 75 132  | 137 80 137  | 142 85 142  |
| 23 0      | 84 85 27 | 83 25 83 | 88 30 88   | 93 35 93   | 98 40 98   | 103 45 103 | 108 50 108 | 113 55 113 | 118 60 118 | 123 65 123 | 128 70 128  | 133 75 133  | 138 80 138  | 143 85 143  |
| 15 88     | 88 88 56 | 89 25 89 | 94 30 94   | 99 35 99   | 104 40 104 | 109 45 109 | 114 50 114 | 119 55 119 | 124 60 124 | 129 65 129 | 134 70 134  | 139 75 139  | 144 80 144  | 149 85 149  |
| 30 91     | 91 92 22 | 92 25 92 | 97 30 97   | 102 35 102 | 107 40 107 | 112 45 112 | 117 50 117 | 122 55 122 | 127 60 127 | 132 65 132 | 137 70 137  | 142 75 142  | 147 80 147  | 152 85 152  |
| 45 95     | 95 96 46 | 96 15 96 | 101 20 101 | 106 25 106 | 111 30 111 | 116 35 116 | 121 40 121 | 126 45 126 | 131 50 131 | 136 55 136 | 141 60 141  | 146 65 146  | 151 70 151  | 156 75 156  |
| 24 0      | 98 41 99 | 8 8 8    | 99 35 99   | 100 31 100 | 105 36 105 | 110 41 110 | 115 46 115 | 120 51 120 | 125 56 125 | 130 61 130 | 135 66 135  | 140 71 140  | 145 76 145  | 150 81 150  |

Tables of Houses for Bombay, Lat. 18° N. 57'

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| Sid. Time. | 10       | 11 12    | Asc.     | 2 3 Sid. Time. | 10       | 11 12    | Asc.     | 2 3 Sid. Time. | 10       | 11 12    | Asc.     | 2 3      |
|------------|----------|----------|----------|----------------|----------|----------|----------|----------------|----------|----------|----------|----------|
| d. M.      | °        | °        | °        | H. M.          | °        | °        | °        | H. M.          | °        | °        | °        | °        |
| 0 0        | 0 0 0    | 4 7 7    | 47 229   | 2 0 0          | 2 0 0    | 4 7 7    | 47 229   | 4 0 0          | 2 0 0    | 4 7 7    | 47 229   | 46 0 1   |
| 5 5        | 1 22 5   | 8 8 8    | 55 3 0   | 5 5 5          | 3 0 0    | 8 8 8    | 55 3 0   | 5 5 5          | 3 0 0    | 8 8 8    | 55 3 0   | 56 1 2   |
| 10 10      | 43 7 10  | 10 10 10 | 3 5 2    | 10 10 10       | 4 4 4    | 10 10 10 | 3 5 2    | 10 10 10       | 4 4 4    | 10 10 10 | 3 5 2    | 57 2 3   |
| 15 15      | 5 8 11   | 10 6 3   | 10 6 3   | 15 15 15       | 6 6 6    | 10 6 3   | 10 6 3   | 15 15 15       | 6 6 6    | 10 6 3   | 10 6 3   | 58 3 4   |
| 20 20      | 27 9 12  | 12 18 7  | 18 7 6   | 20 20 20       | 7 7 7    | 12 18 7  | 18 7 6   | 20 20 20       | 7 7 7    | 12 18 7  | 18 7 6   | 59 4 5   |
| 25 25      | 49 11 13 | 24 8 6   | 24 8 6   | 25 25 25       | 8 8 8    | 24 8 6   | 24 8 6   | 25 25 25       | 8 8 8    | 24 8 6   | 24 8 6   | 60 5 6   |
| 30 30      | 10 12 14 | 31 9 7   | 31 9 7   | 30 30 30       | 9 9 9    | 31 9 7   | 31 9 7   | 30 30 30       | 9 9 9    | 31 9 7   | 31 9 7   | 61 6 7   |
| 35 35      | 31 13 16 | 3 11 8   | 3 11 8   | 35 35 35       | 11 11 11 | 3 11 8   | 3 11 8   | 35 35 35       | 11 11 11 | 3 11 8   | 3 11 8   | 62 7 8   |
| 40 40      | 53 14 17 | 45 12 9  | 45 12 9  | 40 40 40       | 12 12 12 | 45 12 9  | 45 12 9  | 40 40 40       | 12 12 12 | 45 12 9  | 45 12 9  | 63 8 9   |
| 45 45      | 14 15 18 | 52 13 10 | 52 13 10 | 45 45 45       | 13 13 13 | 52 13 10 | 52 13 10 | 45 45 45       | 13 13 13 | 52 13 10 | 52 13 10 | 64 9 10  |
| 50 50      | 35 17 19 | 58 14 12 | 58 14 12 | 50 50 50       | 14 14 14 | 58 14 12 | 58 14 12 | 50 50 50       | 14 14 14 | 58 14 12 | 58 14 12 | 65 10 11 |
| 55 14      | 56 18 20 | 5 15 13  | 5 15 13  | 55 14 55       | 16 16 16 | 5 15 13  | 5 15 13  | 55 14 55       | 16 16 16 | 5 15 13  | 5 15 13  | 66 11 12 |
| 1 0        | 17 19 21 | 11 16 14 | 11 16 14 | 1 0 1          | 17 19 21 | 11 16 14 | 11 16 14 | 1 0 1          | 17 19 21 | 11 16 14 | 11 16 14 | 67 12 13 |
| 5 5        | 37 21 23 | 22 18 15 | 22 18 15 | 5 5 5          | 18 18 18 | 22 18 15 | 22 18 15 | 5 5 5          | 18 18 18 | 22 18 15 | 22 18 15 | 68 13 14 |
| 10 18      | 58 22 24 | 23 19 17 | 23 19 17 | 10 18 10       | 19 19 19 | 23 19 17 | 23 19 17 | 10 18 10       | 19 19 19 | 23 19 17 | 23 19 17 | 69 14 15 |
| 15 20      | 18 23 25 | 24 20 18 | 24 20 18 | 15 20 15       | 21 21 21 | 24 20 18 | 24 20 18 | 15 20 15       | 21 21 21 | 24 20 18 | 24 20 18 | 70 15 16 |
| 20 20      | 38 25 26 | 25 38 21 | 25 38 21 | 20 20 20       | 22 22 22 | 25 38 21 | 25 38 21 | 20 20 20       | 22 22 22 | 25 38 21 | 25 38 21 | 71 16 17 |
| 25 25      | 58 26 27 | 26 45 22 | 26 45 22 | 25 25 25       | 23 23 23 | 26 45 22 | 26 45 22 | 25 25 25       | 23 23 23 | 26 45 22 | 26 45 22 | 72 17 18 |
| 30 30      | 18 27 28 | 27 52 23 | 27 52 23 | 30 30 30       | 24 24 24 | 27 52 23 | 27 52 23 | 30 30 30       | 24 24 24 | 27 52 23 | 27 52 23 | 73 18 19 |
| 35 35      | 38 29 0  | 28 57 24 | 28 57 24 | 35 35 35       | 26 26 26 | 28 57 24 | 28 57 24 | 35 35 35       | 26 26 26 | 28 57 24 | 28 57 24 | 74 19 20 |
| 40 40      | 57 0 1   | 0 52 25  | 0 52 25  | 40 40 40       | 27 27 27 | 0 52 25  | 0 52 25  | 40 40 40       | 27 27 27 | 0 52 25  | 0 52 25  | 75 20 21 |
| 45 45      | 28 16 1  | 1 11 26  | 1 11 26  | 45 45 45       | 28 28 28 | 1 11 26  | 1 11 26  | 45 45 45       | 28 28 28 | 1 11 26  | 1 11 26  | 76 21 22 |
| 50 50      | 34 2 2   | 2 17 28  | 2 17 28  | 50 50 50       | 29 29 29 | 2 17 28  | 2 17 28  | 50 50 50       | 29 29 29 | 2 17 28  | 2 17 28  | 77 22 23 |
| 55 55      | 0 53 3   | 3 24 29  | 3 24 29  | 55 55 55       | 0 0 0    | 3 24 29  | 3 24 29  | 55 55 55       | 0 0 0    | 3 24 29  | 3 24 29  | 78 23 24 |

Tables of Houses for Bombay, Lat. 18° N. 57'

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| Sid. Time. | 10 | 1112 | Asc. | 2  | 3Sid. Time. | 10 | 1112 | Asc. | 2  | 3Sid. Time. | 10 | 1112 | Asc. | 2  | 3  |
|------------|----|------|------|----|-------------|----|------|------|----|-------------|----|------|------|----|----|
| H. M.      | °  | '    | °    | '  | H. M.       | °  | '    | °    | '  | H. M.       | °  | '    | °    | '  |    |
| 6          | 0  | 0    | 0    | 0  | 8           | 0  | 0    | 0    | 0  | 27          | 54 | 29   | 0    | 28 | 14 |
| 5          | 1  | 9    | 1    | 1  | 5           | 1  | 30   | 3    | 1  | 29          | 6  | 0    | 1    | 29 | 23 |
| 10         | 2  | 18   | 2    | 3  | 20          | 2  | 43   | 5    | 2  | 5           | 6  | 0    | 1    | 29 | 23 |
| 15         | 3  | 26   | 3    | 4  | 25          | 3  | 56   | 6    | 3  | 10          | 0  | 1    | 29   | 23 | 28 |
| 20         | 4  | 35   | 5    | 5  | 30          | 5  | 6    | 7    | 5  | 15          | 1  | 1    | 2    | 0  | 32 |
| 25         | 5  | 44   | 6    | 7  | 35          | 6  | 22   | 8    | 9  | 20          | 0  | 0    | 0    | 0  | 32 |
| 30         | 6  | 53   | 7    | 8  | 40          | 7  | 35   | 10   | 10 | 25          | 0  | 0    | 0    | 0  | 32 |
| 35         | 8  | 2    | 8    | 9  | 45          | 8  | 49   | 11   | 11 | 30          | 0  | 0    | 0    | 0  | 32 |
| 40         | 9  | 11   | 9    | 10 | 50          | 10 | 17   | 13   | 10 | 35          | 0  | 0    | 0    | 0  | 32 |
| 45         | 10 | 20   | 11   | 11 | 55          | 11 | 32   | 15   | 12 | 40          | 0  | 0    | 0    | 0  | 32 |
| 50         | 11 | 30   | 12   | 13 |             | 12 | 47   | 16   | 13 | 45          | 0  | 0    | 0    | 0  | 32 |
| 55         | 12 | 39   | 14   | 14 | 9           | 13 | 54   | 17   | 14 | 50          | 0  | 0    | 0    | 0  | 32 |
| 7          | 0  | 48   | 15   | 15 |             | 14 | 1    | 17   | 15 | 55          | 0  | 0    | 0    | 0  | 32 |
| 5          | 14 | 58   | 16   | 16 |             | 15 | 10   | 18   | 16 |             | 0  | 0    | 0    | 0  | 32 |
| 10         | 16 | 18   | 18   | 17 |             | 16 | 1    | 19   | 17 |             | 0  | 0    | 0    | 0  | 32 |
| 15         | 17 | 28   | 19   | 18 |             | 17 | 1    | 20   | 18 |             | 0  | 0    | 0    | 0  | 32 |
| 20         | 18 | 38   | 21   | 20 |             | 18 | 1    | 21   | 19 |             | 0  | 0    | 0    | 0  | 32 |
| 25         | 19 | 48   | 22   | 21 |             | 19 | 1    | 22   | 20 |             | 0  | 0    | 0    | 0  | 32 |
| 30         | 20 | 58   | 23   | 22 |             | 20 | 1    | 23   | 21 |             | 0  | 0    | 0    | 0  | 32 |
| 35         | 21 | 59   | 24   | 23 |             | 21 | 1    | 24   | 22 |             | 0  | 0    | 0    | 0  | 32 |
| 40         | 23 | 10   | 25   | 24 |             | 23 | 1    | 25   | 23 |             | 0  | 0    | 0    | 0  | 32 |
| 45         | 24 | 20   | 26   | 25 |             | 24 | 1    | 26   | 24 |             | 0  | 0    | 0    | 0  | 32 |
| 50         | 25 | 32   | 27   | 26 |             | 25 | 1    | 27   | 25 |             | 0  | 0    | 0    | 0  | 32 |
| 55         | 26 | 43   | 28   | 27 |             | 26 | 1    | 28   | 26 |             | 0  | 0    | 0    | 0  | 32 |

Tables of Houses for Bombay, Lat. 18° N. 57'

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| Sid. Time. | 10 | 1112 | Asc. | 2  | 3Sid. Time. | 10 | 1112 | Asc. | 2  | 3Sid. Time. | 10 | 1112 | Asc. | 2  | 3  |
|------------|----|------|------|----|-------------|----|------|------|----|-------------|----|------|------|----|----|
| H. M.      | °  | '    | °    | '  | H. M.       | °  | '    | °    | '  | H. M.       | °  | '    | °    | '  |    |
| 12         | 0  | 0    | 0    | 0  | 14          | 0  | 0    | 0    | 0  | 16          | 0  | 0    | 0    | 0  | 4  |
| 5          | 1  | 22   | 2    | 2  | 5           | 1  | 29   | 1    | 26 | 5           | 1  | 37   | 1    | 26 | 6  |
| 10         | 2  | 43   | 3    | 0  | 10          | 2  | 47   | 2    | 27 | 10          | 2  | 53   | 2    | 27 | 7  |
| 15         | 4  | 5    | 4    | 1  | 15          | 4  | 5    | 4    | 3  | 15          | 4  | 9    | 4    | 3  | 8  |
| 20         | 5  | 27   | 5    | 2  | 20          | 5  | 38   | 6    | 1  | 20          | 5  | 25   | 0    | 6  | 9  |
| 25         | 6  | 48   | 7    | 3  | 25          | 6  | 54   | 7    | 2  | 25          | 6  | 42   | 2    | 8  | 10 |
| 30         | 8  | 10   | 8    | 4  | 30          | 8  | 11   | 8    | 3  | 30          | 8  | 16   | 4    | 9  | 11 |
| 35         | 9  | 31   | 10   | 6  | 35          | 9  | 54   | 7    | 2  | 35          | 9  | 59   | 3    | 8  | 12 |
| 40         | 10 | 53   | 1    | 7  | 40          | 10 | 11   | 8    | 3  | 40          | 10 | 33   | 6    | 11 | 13 |
| 45         | 12 | 14   | 12   | 8  | 45          | 12 | 42   | 10   | 5  | 45          | 12 | 54   | 8    | 13 | 14 |
| 50         | 13 | 35   | 13   | 9  | 50          | 13 | 57   | 11   | 6  | 50          | 13 | 12   | 9    | 14 | 15 |
| 55         | 14 | 56   | 14   | 10 | 55          | 14 | 13   | 12   | 7  | 55          | 14 | 33   | 10   | 15 | 16 |
| 13         | 0  | 16   | 17   | 15 | 15          | 0  | 17   | 28   | 13 | 17          | 0  | 17   | 28   | 13 | 17 |
| 5          | 5  | 17   | 15   | 16 |             | 5  | 18   | 42   | 14 | 5           | 17 | 15   | 13   | 19 | 18 |
| 10         | 18 | 58   | 18   | 13 |             | 10 | 19   | 57   | 16 | 10          | 18 | 36   | 15   | 20 | 19 |
| 15         | 20 | 18   | 19   | 14 |             | 15 | 21   | 11   | 17 | 15          | 19 | 58   | 16   | 21 | 20 |
| 20         | 21 | 38   | 21   | 16 |             | 20 | 22   | 25   | 19 | 20          | 20 | 21   | 18   | 23 | 21 |
| 25         | 22 | 58   | 22   | 17 |             | 25 | 23   | 38   | 20 | 25          | 21 | 46   | 20   | 25 | 22 |
| 30         | 24 | 18   | 23   | 18 |             | 30 | 24   | 51   | 21 | 30          | 23 | 9    | 21   | 26 | 23 |
| 35         | 25 | 38   | 24   | 19 |             | 35 | 26   | 4    | 22 | 35          | 24 | 32   | 22   | 27 | 24 |
| 40         | 26 | 57   | 25   | 20 |             | 40 | 27   | 17   | 23 | 40          | 25 | 58   | 24   | 28 | 25 |
| 45         | 28 | 16   | 26   | 21 |             | 45 | 28   | 29   | 24 | 45          | 26 | 24   | 19   | 18 | 26 |
| 50         | 29 | 34   | 28   | 23 |             | 50 | 29   | 42   | 25 | 50          | 27 | 42   | 25   | 21 | 27 |
| 55         | 0  | 53   | 29   | 24 |             | 55 | 0    | 54   | 26 | 55          | 0  | 54   | 26   | 22 | 28 |

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[illegible]

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[illegible]

Tables of Houses for Madras, Lat. 13° N. 4'

| Sid. Time. | 10th. | 11/12 | Asc. | 2  | 3  | Sid. Time. | 10 | 11/12 | Asc. | 2  | 3  | Sid. Time. | 10 | 11/12 | Asc. | 2  | 3  |
|------------|-------|-------|------|----|----|------------|----|-------|------|----|----|------------|----|-------|------|----|----|
| H. M.      | °     | ′     | ″    | °  | ′  | H. M.      | °  | ′     | ″    | °  | ′  | H. M.      | °  | ′     | ″    | °  | ′  |
| 6          | 0     | 0     | 29   | 0  | 0  | 8          | 0  | 54    | 29   | 0  | 29 | 10         | 27 | 54    | 29   | 0  | 27 |
| 5          | 1     | 9     | 0    | 1  | 14 | 5          | 29 | 6     | 0    | 1  | 0  | 29         | 29 | 6     | 0    | 0  | 29 |
| 10         | 2     | 18    | 1    | 2  | 29 | 10         | 0  | 18    | 2    | 2  | 1  | 0          | 0  | 18    | 2    | 2  | 0  |
| 15         | 3     | 26    | 3    | 4  | 42 | 15         | 10 | 30    | 3    | 3  | 3  | 1          | 50 | 30    | 3    | 3  | 0  |
| 20         | 4     | 35    | 4    | 5  | 57 | 15         | 20 | 43    | 4    | 4  | 4  | 13         | 1  | 43    | 4    | 2  | 4  |
| 25         | 5     | 44    | 5    | 6  | 6  | 20         | 25 | 56    | 5    | 5  | 5  | 25         | 5  | 56    | 5    | 5  | 4  |
| 30         | 6     | 53    | 7    | 7  | 7  | 25         | 30 | 65    | 6    | 6  | 6  | 35         | 6  | 65    | 6    | 6  | 5  |
| 35         | 8     | 2     | 8    | 8  | 40 | 30         | 35 | 9     | 6    | 8  | 7  | 47         | 7  | 9     | 6    | 7  | 5  |
| 40         | 9     | 11    | 9    | 9  | 54 | 35         | 40 | 22    | 8    | 10 | 8  | 58         | 8  | 22    | 8    | 8  | 8  |
| 45         | 10    | 20    | 10   | 11 | 8  | 40         | 45 | 35    | 9    | 11 | 8  | 9          | 9  | 35    | 9    | 9  | 9  |
| 50         | 11    | 30    | 11   | 12 | 21 | 45         | 50 | 49    | 11   | 12 | 10 | 10         | 10 | 49    | 11   | 10 | 10 |
| 55         | 12    | 39    | 12   | 13 | 21 | 50         | 55 | 49    | 11   | 12 | 10 | 10         | 10 | 49    | 11   | 10 | 10 |
| 0          | 13    | 48    | 13   | 14 | 36 | 55         | 0  | 17    | 14   | 15 | 12 | 30         | 11 | 17    | 14   | 12 | 11 |
| 5          | 14    | 58    | 14   | 15 | 49 | 0          | 5  | 32    | 15   | 16 | 13 | 41         | 13 | 32    | 15   | 13 | 12 |
| 10         | 16    | 8     | 16   | 17 | 16 | 10         | 10 | 47    | 16   | 17 | 14 | 51         | 14 | 47    | 16   | 17 | 14 |
| 15         | 17    | 18    | 17   | 18 | 25 | 15         | 15 | 3     | 17   | 18 | 16 | 1          | 15 | 3     | 17   | 18 | 16 |
| 20         | 18    | 28    | 18   | 19 | 43 | 20         | 15 | 17    | 18   | 20 | 17 | 11         | 16 | 17    | 18   | 20 | 17 |
| 25         | 19    | 38    | 19   | 20 | 56 | 25         | 16 | 33    | 20   | 21 | 18 | 20         | 18 | 33    | 20   | 21 | 18 |
| 30         | 20    | 48    | 20   | 21 | 9  | 25         | 18 | 49    | 21   | 22 | 19 | 30         | 19 | 49    | 21   | 22 | 19 |
| 35         | 21    | 59    | 21   | 22 | 22 | 30         | 20 | 5     | 22   | 23 | 20 | 39         | 20 | 5     | 22   | 23 | 20 |
| 40         | 23    | 10    | 23   | 24 | 36 | 35         | 21 | 22    | 23   | 24 | 21 | 49         | 21 | 22    | 23   | 24 | 21 |
| 45         | 24    | 20    | 24   | 25 | 49 | 40         | 22 | 39    | 25   | 26 | 22 | 58         | 22 | 39    | 25   | 26 | 22 |
| 50         | 25    | 32    | 25   | 26 | 1  | 45         | 23 | 56    | 26   | 27 | 24 | 7          | 23 | 56    | 26   | 27 | 24 |
| 55         | 26    | 43    | 26   | 27 | 14 | 50         | 25 | 13    | 27   | 28 | 25 | 15         | 25 | 13    | 27   | 28 | 25 |
|            |       |       |      |    |    | 55         | 26 | 31    | 28   | 29 | 26 | 24         | 26 | 31    | 28   | 29 | 26 |

Tables of Houses for Madras, Lat. 13° N. 4'

| Sid. Time. | 10 | 11 12 | Asc.  | 2 3      | Sid. Time. | 10 | 11 12 | Asc.           | 2 3      | Sid. Time. | 10 | 11 12 | Asc.        | 2 3        |
|------------|----|-------|-------|----------|------------|----|-------|----------------|----------|------------|----|-------|-------------|------------|
| H. M.      | °  | ′     | ″     | °        | H. M.      | °  | ′     | ″              | °        | H. M.      | °  | ′     | ″           | °          |
| 12         | 0  | 0     | 0     | 129 24   | 46 25 27   | 14 | 0     | 5              | 58 25 0  | 16         | 0  | 2     | 529 25 24   | 34 0 4     |
| 5          | 1  | 22 2  | 0 25  | 53 26 28 |            | 5  | 5     | 12 26 2        | 26 28 3  | 5          | 5  | 3     | 17 0 26 25  | 58 2 5     |
| 10         | 2  | 43 3  | 1 27  | 1 27 29  | °          | 10 | 10    | 26 28          | °        | 10         | 10 | 4     | 28 1 27 27  | 24 3 7     |
| 15         | 4  | 5     | 2 28  | 10 28 1  | °          | 15 | 15    | 4 0 26         | 41 0 5   | 15         | 15 | 5     | 39 2 28 28  | 49 5 8     |
| 20         | 5  | 27 6  | 3 29  | 19 29 2  | °          | 20 | 20    | 21 5 1 27      | 56 1 6   | 20         | 20 | 6     | 50 3 29 0   | 15 6 9     |
| 25         | 6  | 48 7  | 4 0   | 28 1 4   | °          | 25 | 30    | 54 8 3 0       | 28 4 9   | 25         | 25 | 8     | 1 4 1 1     | 42 7 10    |
| 30         | 8  | 10 8  | 5 1   | 36 2 5   | °          | 30 | 35    | 11 9 4 1       | 44 5 11  | 30         | 30 | 9     | 11 5 2 3    | 9 9 12     |
| 35         | 9  | 31 10 | 6 2   | 45 3 7   | °          | 35 | 40    | 12 17 10 5 3   | 1 7 12   | 35         | 35 | 10    | 22 6 3 4    | 37 10 13   |
| 40         | 10 | 53 11 | 8 3   | 55 5 8   | °          | 40 | 45    | 13 42 11 6 4   | 18 8 13  | 40         | 40 | 11    | 32 8 4 6    | 3 12 14    |
| 45         | 12 | 14 12 | 9 5   | 4 6 10   | °          | 45 | 50    | 14 57 12 8 5   | 35 10 14 | 45         | 45 | 12    | 42 9 5 7    | 31 13 15   |
| 50         | 13 | 35 13 | 10 6  | 14 7 11  | °          | 50 | 55    | 16 13 13 9 6   | 55 11 16 | 50         | 50 | 13    | 52 10 7 9   | 0 15 16 18 |
| 55         | 14 | 56 15 | 12 7  | 25 8 12  | °          | 55 | 0     | 17 28 14 10 8  | 13 13 17 | 55         | 15 | 15    | 2 12 8 10   | 28 16 18   |
| 13         | 0  | 16    | 17 16 | 13 8     | °          | 13 | 5     | 18 42 15 11 9  | 32 14 19 | 13         | 17 | 16    | 12 13 9 11  | 58 17 19   |
| 5          | 17 | 37 17 | 14 9  | 44 10 15 | °          | 17 | 10    | 19 57 17 13 10 | 52 16 20 | 17         | 5  | 17    | 21 14 10 13 | 26 19 20   |
| 10         | 18 | 58 19 | 15 10 | 53 12 16 | °          | 18 | 15    | 21 11 18 14 12 | 12 17 22 | 18         | 10 | 18    | 30 15 12 14 | 55 20 21   |
| 15         | 20 | 18 20 | 16 12 | 6 13 18  | °          | 15 | 20    | 22 25 19 15 13 | 33 19 23 | 15         | 15 | 19    | 39 16 13 16 | 25 22 23   |
| 20         | 21 | 58 21 | 17 13 | 17 14 19 | °          | 20 | 25    | 23 38 20 16 14 | 52 20 24 | 20         | 20 | 20    | 49 17 15 17 | 55 23 24   |
| 25         | 22 | 38 22 | 19 14 | 29 16 20 | °          | 25 | 30    | 24 51 22 18 16 | 15 21 25 | 25         | 25 | 21    | 58 18 16 19 | 25 25 25   |
| 30         | 24 | 18 23 | 20 15 | 41 17 22 | °          | 30 | 35    | 26 4 23 19 17  | 37 23 27 | 30         | 35 | 23    | 7 20 18 20  | 66 26 27   |
| 35         | 25 | 38 24 | 21 16 | 52 18 23 | °          | 35 | 40    | 27 17 24 20 18 | 59 24 29 | 35         | 40 | 25    | 25 22 21 23 | 57 29 29   |
| 40         | 26 | 57 26 | 22 18 | 5 20 24  | °          | 40 | 45    | 28 29 25 21 20 | 23 26 0  | 40         | 45 | 26    | 33 23 22 25 | 29 0 0     |
| 45         | 28 | 16 27 | 23 19 | 18 21 26 | °          | 45 | 50    | 29 42 26 22 21 | 47 27 1  | 45         | 50 | 27    | 42 24 24 26 | 58 2 1     |
| 50         | 29 | 24 28 | 24 20 | 30 22 27 | °          | 50 | 55    | 0 54 27 24 23  | 10 29 2  | 50         | 55 | 28    | 51 25 25 28 | 30 3 3     |
| 55         | 0  | 53 29 | 25 21 | 44 24 29 | °          | 55 | 0     |                |          | 55         | 55 | 28    |             |            |

Tables of Houses for Madras, Lat. 13° N.4'.

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| Sid. Time | 10 | 11 12    | Asc. | 2 3      | Sid. Time. | 10 | 11 12 | Asc.  | 2 3   | Sid. Time. | 10    | 11 12 | Asc. | 2 3 |
|-----------|----|----------|------|----------|------------|----|-------|-------|-------|------------|-------|-------|------|-----|
| H. M.     | °  | '        | °    | '        | H. M.      | °  | '     | °     | '     | H. M.      | °     | '     | °    | '   |
| 18        | 0  | 0 26 26  | 0    | 0 4 4    | 20         | 0  | 27    | 54 27 | 0 5   | 26         | 5 2   | 22    | 0    | 27  |
| 5         | 1  | 9 28 27  | 1    | 30 6 6   | 5          | 5  | 29    | 6 28  | 2 6   | 50         | 7 4   | 5     | 5    | 29  |
| 10        | 2  | 18 29 29 | 3    | 2 7 7    |            |    |       |       |       |            |       |       |      |     |
| 15        | 3  | 26 0 0   | 4    | 31 9 8   | 10         | 0  | 0     | 18 0  | 3 8   | 13         | 8 5   | 15    | 1    | 0   |
| 20        | 4  | 35 1 1   | 6    | 3 10 9   | 15         | 1  | 1     | 30 1  | 5 9   | 37         | 9 6   | 10    | 0    | 0   |
| 25        | 5  | 44 2 2   | 7    | 33 12 10 | 20         | 2  | 2     | 43 2  | 6 11  | 11         | 10 7  | 25    | 4    | 10  |
| 30        | 6  | 43 3 4   | 9    | 4 13 11  | 25         | 3  | 3     | 56 4  | 7 12  | 23         | 11 8  | 30    | 5    | 15  |
| 35        | 8  | 2 5 5    | 10   | 35 14 12 | 30         | 5  | 5     | 9 5   | 9 13  | 45         | 13 9  | 35    | 7    | 15  |
| 40        | 9  | 11 7 6   | 12   | 5 16 14  | 35         | 6  | 6     | 22 6  | 10 15 | 7          | 14 10 | 40    | 8    | 20  |
| 45        | 10 | 20 8 8   | 13   | 35 17 15 | 40         | 7  | 7     | 35 7  | 12 16 | 28         | 15 11 | 45    | 9    | 25  |
| 50        | 11 | 30 9 9   | 15   | 5 19 16  | 45         | 8  | 8     | 49 8  | 13 17 | 48         | 16 12 | 50    | 11   | 30  |
| 55        | 12 | 39 10 11 | 16   | 34 20 17 | 50         | 10 | 10    | 3 10  | 14 19 | 8          | 17 13 | 55    | 12   | 35  |
| 19        | 0  | 48 11 12 | 18   | 23 21 18 | 55         | 11 | 11    | 17 12 | 16 20 | 28         | 19 15 | 23    | 0    | 40  |
| 5         | 13 | 58 12 14 | 19   | 23 22 19 | 21         | 0  | 12    | 32 13 | 17 21 | 47         | 20 16 | 5     | 15   | 45  |
| 10        | 16 | 8 14 15  | 21   | 0 24 21  |            |    |       | 47 14 | 19 23 | 52         | 21 17 | 10    | 16   | 50  |
| 15        | 17 | 18 15 17 | 22   | 29 25 22 |            |    |       | 17 17 | 22 25 | 42         | 24 19 | 15    | 17   | 55  |
| 20        | 18 | 28 16 18 | 23   | 57 26 23 |            |    |       | 3 16  | 20 24 | 25         | 22 18 | 20    | 19   | 0   |
| 25        | 19 | 38 17 20 | 25   | 23 27 24 |            |    |       | 17 17 | 22 25 | 42         | 24 19 | 25    | 20   | 5   |
| 30        | 20 | 48 19 21 | 26   | 51 28 25 |            |    |       | 33 19 | 23 26 | 59         | 25 20 | 30    | 21   | 10  |
| 35        | 21 | 59 20 23 | 28   | 18 29 26 |            |    |       | 49 20 | 25 28 | 16         | 26 21 | 35    | 22   | 15  |
| 40        | 23 | 10 22 24 | 29   | 45 1 28  |            |    |       | 5 21  | 26 29 | 32         | 27 22 | 40    | 24   | 20  |
| 45        | 24 | 20 23 26 | 1    | 11 2 29  |            |    |       | 22 23 | 28 0  | 49         | 28 24 | 45    | 25   | 25  |
| 50        | 25 | 32 24 27 | 2    | 36 3 0   |            |    |       | 39 24 | 29 2  | 4 29 25    |       | 50    | 27   | 30  |
| 55        | 26 | 43 25 29 | 4    | 2 4 1    |            |    |       | 56 26 | 0 3   | 19 0 26    |       | 55    | 28   | 35  |
|           |    |          |      |          |            |    |       | 13 27 | 2 4   | 34 2 27    |       | 24    | 0    | 40  |
|           |    |          |      |          |            |    |       | 31 29 | 3 5   | 48 3 28    |       |       |      |     |

LOGARITHMIC TABLE.

Hours or Degrees.

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| Min. | 0      | 1      | 2      | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   |
|------|--------|--------|--------|------|------|------|------|------|------|------|------|------|------|------|
| 0    | 3 1584 | 1 3802 | 1 0792 | 9031 | 7781 | 6812 | 6021 | 5351 | 4771 | 4260 | 3802 | 3388 | 3020 | 2700 |
| 1    | 3 1584 | 1 3730 | 1 0756 | 9007 | 7763 | 6798 | 6009 | 5341 | 4762 | 4252 | 3797 | 3382 | 3014 | 2694 |
| 2    | 2 8573 | 1 3660 | 1 0720 | 8983 | 7745 | 6784 | 5997 | 5330 | 4753 | 4244 | 3788 | 3375 | 3007 | 2687 |
| 3    | 2 6812 | 1 3590 | 1 0685 | 8959 | 7728 | 6769 | 5985 | 5320 | 4744 | 4236 | 3780 | 3368 | 2999 | 2679 |
| 4    | 2 5563 | 1 3522 | 1 0649 | 8935 | 7710 | 6755 | 5973 | 5310 | 4735 | 4228 | 3773 | 3362 | 2991 | 2671 |
| 5    | 2 4594 | 1 3454 | 1 0614 | 8912 | 7692 | 6741 | 5961 | 5300 | 4726 | 4220 | 3766 | 3355 | 2983 | 2663 |
| 6    | 2 3802 | 1 3388 | 1 0580 | 8888 | 7674 | 6726 | 5949 | 5289 | 4717 | 4212 | 3759 | 3349 | 2975 | 2655 |
| 7    | 2 3133 | 1 3323 | 1 0546 | 8865 | 7657 | 6712 | 5937 | 5279 | 4708 | 4204 | 3752 | 3342 | 2967 | 2647 |
| 8    | 2 2553 | 1 3258 | 1 0511 | 8842 | 7639 | 6698 | 5925 | 5269 | 4699 | 4196 | 3745 | 3336 | 2959 | 2639 |
| 9    | 2 2041 | 1 3195 | 1 0478 | 8819 | 7622 | 6684 | 5913 | 5259 | 4690 | 4188 | 3737 | 3329 | 2951 | 2631 |
| 10   | 2 1584 | 1 3133 | 1 0444 | 8796 | 7604 | 6670 | 5902 | 5249 | 4682 | 4180 | 3730 | 3323 | 2943 | 2623 |
| 11   | 2 1170 | 1 3071 | 1 0411 | 8773 | 7587 | 6656 | 5890 | 5239 | 4673 | 4172 | 3723 | 3316 | 2935 | 2615 |
| 12   | 2 0792 | 1 3010 | 1 0378 | 8751 | 7570 | 6642 | 5878 | 5229 | 4664 | 4164 | 3716 | 3310 | 2927 | 2607 |
| 13   | 2 0444 | 1 2950 | 1 0345 | 8728 | 7552 | 6628 | 5866 | 5219 | 4655 | 4156 | 3709 | 3303 | 2919 | 2599 |
| 14   | 2 0122 | 1 2891 | 1 0313 | 8706 | 7535 | 6614 | 5855 | 5209 | 4646 | 4148 | 3702 | 3297 | 2911 | 2591 |
| 15   | 1 9823 | 1 2833 | 1 0280 | 8683 | 7518 | 6600 | 5843 | 5199 | 4638 | 4141 | 3695 | 3291 | 2903 | 2583 |
| 16   | 1 9542 | 1 2775 | 1 0248 | 8661 | 7501 | 6587 | 5832 | 5189 | 4629 | 4133 | 3688 | 3284 | 2895 | 2575 |
| 17   | 1 9279 | 1 2719 | 1 0216 | 8639 | 7484 | 6573 | 5820 | 5179 | 4620 | 4125 | 3681 | 3278 | 2887 | 2567 |
| 18   | 1 9031 | 1 2663 | 1 0185 | 8617 | 7467 | 6559 | 5809 | 5169 | 4611 | 4117 | 3674 | 3271 | 2879 | 2559 |
| 19   | 1 8796 | 1 2607 | 1 0153 | 8595 | 7451 | 6546 | 5797 | 5159 | 4603 | 4109 | 3667 | 3265 | 2871 | 2551 |
| 20   | 1 8573 | 1 2553 | 1 0122 | 8573 | 7434 | 6532 | 5786 | 5149 | 4594 | 4102 | 3660 | 3258 | 2863 | 2543 |
| 21   | 1 8361 | 1 2499 | 1 0091 | 8552 | 7417 | 6519 | 5774 | 5139 | 4585 | 4094 | 3653 | 3252 | 2855 | 2535 |
| 22   | 1 8159 | 1 2445 | 1 0061 | 8530 | 7401 | 6505 | 5761 | 5129 | 4577 | 4086 | 3646 | 3246 | 2847 | 2527 |
| 23   | 1 7966 | 1 2393 | 1 0030 | 8509 | 7384 | 6492 | 5752 | 5120 | 4568 | 4079 | 3639 | 3239 | 2839 | 2519 |
| 24   | 1 7781 | 1 2341 | 1 0000 | 8487 | 7368 | 6478 | 5740 | 5110 | 4559 | 4071 | 3632 | 3233 | 2831 | 2511 |
| 25   | 1 7604 | 1 2289 | 9970   | 8466 | 7351 | 6465 | 5729 | 5100 | 4551 | 4063 | 3625 | 3227 | 2823 | 2503 |
| 26   | 1 7434 | 1 2239 | 9940   | 8445 | 7335 | 6451 | 5718 | 5090 | 4542 | 4055 | 3618 | 3220 | 2815 | 2495 |
| 27   | 1 7270 | 1 2188 | 9910   | 8424 | 7318 | 6438 | 5706 | 5081 | 4534 | 4048 | 3611 | 3214 | 2807 | 2487 |
| 28   | 1 7112 | 1 2139 | 9881   | 8403 | 7302 | 6425 | 5695 | 5071 | 4525 | 4040 | 3604 | 3208 | 2799 | 2479 |
| 29   | 1 6960 | 1 2090 | 9852   | 8382 | 7286 | 6412 | 5684 | 5061 | 4516 | 4032 | 3597 | 3201 | 2791 | 2471 |

LOGARITHMIC TABLE.

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Hours or Degrees.

| Min. | 0      | 1      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | Min. |
|------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 30   | 1.6812 | 1.2041 | .9823 | .8361 | .7270 | .6398 | .5673 | .5051 | .4508 | .4025 | .3590 | .3195 | 30   |
| 31   | 1.6670 | 1.1993 | .9794 | .8341 | .7254 | .6385 | .5662 | .5042 | .4499 | .4017 | .3583 | .3189 | 31   |
| 32   | 1.6532 | 1.1946 | .9765 | .8327 | .7238 | .6372 | .5651 | .5032 | .4491 | .4010 | .3576 | .3183 | 32   |
| 33   | 1.6398 | 1.1899 | .9737 | .8300 | .7222 | .6359 | .5640 | .5023 | .4482 | .4002 | .3567 | .3176 | 33   |
| 34   | 1.6269 | 1.1852 | .9708 | .8279 | .7206 | .6346 | .5629 | .5013 | .4474 | .3994 | .3563 | .3170 | 34   |
| 35   | 1.6143 | 1.1806 | .9680 | .8259 | .7190 | .6333 | .5618 | .5003 | .4466 | .3987 | .3556 | .3164 | 35   |
| 36   | 1.6021 | 1.1761 | .9652 | .8239 | .7174 | .6320 | .5607 | .4994 | .4457 | .3979 | .3549 | .3157 | 36   |
| 37   | 1.5902 | 1.1716 | .9625 | .8219 | .7159 | .6307 | .5596 | .4984 | .4447 | .3972 | .3542 | .3151 | 37   |
| 38   | 1.5786 | 1.1671 | .9597 | .8199 | .7143 | .6294 | .5585 | .4975 | .4440 | .3964 | .3535 | .3145 | 38   |
| 39   | 1.5673 | 1.1627 | .9570 | .8179 | .7128 | .6282 | .5573 | .4965 | .4432 | .3957 | .3529 | .3139 | 39   |
| 40   | 1.5563 | 1.1584 | .9542 | .8159 | .7112 | .6269 | .5563 | .4956 | .4424 | .3949 | .3522 | .3133 | 40   |
| 41   | 1.5456 | 1.1540 | .9515 | .8140 | .7097 | .6256 | .5552 | .4947 | .4415 | .3942 | .3515 | .3126 | 41   |
| 42   | 1.5351 | 1.1498 | .9488 | .8120 | .7081 | .6243 | .5541 | .4937 | .4407 | .3934 | .3508 | .3120 | 42   |
| 43   | 1.5249 | 1.1455 | .9462 | .8101 | .7066 | .6231 | .5531 | .4928 | .4399 | .3927 | .3501 | .3114 | 43   |
| 44   | 1.5149 | 1.1413 | .9435 | .8081 | .7050 | .6218 | .5520 | .4918 | .4390 | .3919 | .3495 | .3108 | 44   |
| 45   | 1.5051 | 1.1372 | .9409 | .8062 | .7035 | .6205 | .5509 | .4909 | .4382 | .3912 | .3488 | .3102 | 45   |
| 46   | 1.4956 | 1.1331 | .9383 | .8042 | .7020 | .6193 | .5498 | .4900 | .4374 | .3905 | .3481 | .3096 | 46   |
| 47   | 1.4863 | 1.1290 | .9356 | .8023 | .7005 | .6180 | .5489 | .4890 | .4365 | .3897 | .3475 | .3090 | 47   |
| 48   | 1.4771 | 1.1249 | .9330 | .8004 | .6990 | .6168 | .5477 | .4881 | .4357 | .3890 | .3468 | .3083 | 48   |
| 49   | 1.4682 | 1.1209 | .9305 | .7985 | .6975 | .6155 | .5466 | .4872 | .4349 | .3882 | .3461 | .3077 | 49   |
| 50   | 1.4594 | 1.1170 | .9279 | .7966 | .6960 | .6143 | .5456 | .4863 | .4341 | .3875 | .3454 | .3071 | 50   |
| 51   | 1.4508 | 1.1130 | .9254 | .7947 | .6945 | .6131 | .5445 | .4853 | .4333 | .3868 | .3448 | .3065 | 51   |
| 52   | 1.4424 | 1.1091 | .9228 | .7929 | .6930 | .6118 | .5435 | .4844 | .4324 | .3860 | .3441 | .3059 | 52   |
| 53   | 1.4341 | 1.1053 | .9203 | .7910 | .6915 | .6101 | .5424 | .4835 | .4316 | .3853 | .3434 | .3053 | 53   |
| 54   | 1.4260 | 1.1015 | .9178 | .7891 | .6900 | .6094 | .5414 | .4826 | .4308 | .3846 | .3428 | .3047 | 54   |
| 55   | 1.4180 | 1.0977 | .9153 | .7873 | .6885 | .6081 | .5403 | .4817 | .4300 | .3838 | .3421 | .3041 | 55   |
| 56   | 1.4102 | 1.0939 | .9128 | .7854 | .6871 | .6069 | .5393 | .4808 | .4292 | .3831 | .3415 | .3034 | 56   |
| 57   | 1.4025 | 1.0902 | .9104 | .7836 | .6856 | .6057 | .5382 | .4794 | .4284 | .3824 | .3408 | .3028 | 57   |
| 58   | 1.3949 | 1.0865 | .9079 | .7818 | .6841 | .6045 | .5372 | .4789 | .4276 | .3817 | .3401 | .3022 | 58   |
| 59   | 1.3875 | 1.0828 | .9055 | .7800 | .6827 | .6033 | .5361 | .4780 | .4268 | .3809 | .3395 | .3016 | 59   |

LOGARITHMIC TABLE.

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Hours or Degrees.

| Min. | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    | Min. |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 0    | .3010 | .2663 | .2341 | .2041 | .1761 | .1498 | .1249 | .1015 | .0792 | .0580 | .0378 | .0185 | 0    |
| 1    | .3004 | .2657 | .2336 | .2036 | .1756 | .1493 | .1245 | .1011 | .0788 | .0576 | .0375 | .0182 | 1    |
| 2    | .2998 | .2652 | .2330 | .2032 | .1752 | .1489 | .1241 | .1007 | .0785 | .0573 | .0371 | .0179 | 2    |
| 3    | .2992 | .2646 | .2325 | .2027 | .1747 | .1485 | .1237 | .1003 | .0781 | .0570 | .0368 | .0175 | 3    |
| 4    | .2986 | .2640 | .2320 | .2022 | .1743 | .1481 | .1233 | .0999 | .0778 | .0566 | .0363 | .0172 | 4    |
| 5    | .2980 | .2635 | .2315 | .2017 | .1738 | .1476 | .1229 | .0996 | .0774 | .0563 | .0361 | .0169 | 5    |
| 6    | .2974 | .2629 | .2310 | .2012 | .1734 | .1472 | .1225 | .0992 | .0770 | .0559 | .0358 | .0166 | 6    |
| 7    | .2968 | .2624 | .2305 | .2008 | .1729 | .1468 | .1221 | .0988 | .0766 | .0556 | .0355 | .0163 | 7    |
| 8    | .2962 | .2618 | .2300 | .2003 | .1725 | .1464 | .1217 | .0984 | .0763 | .0552 | .0352 | .0160 | 8    |
| 9    | .2956 | .2613 | .2295 | .1998 | .1720 | .1459 | .1213 | .0980 | .0759 | .0549 | .0348 | .0157 | 9    |
| 10   | .2950 | .2607 | .2289 | .1993 | .1716 | .1455 | .1209 | .0977 | .0756 | .0546 | .0345 | .0154 | 10   |
| 11   | .2944 | .2602 | .2284 | .1988 | .1711 | .1451 | .1205 | .0973 | .0752 | .0542 | .0342 | .0150 | 11   |
| 12   | .2938 | .2596 | .2279 | .1984 | .1707 | .1447 | .1201 | .0969 | .0749 | .0539 | .0339 | .0147 | 12   |
| 13   | .2933 | .2591 | .2274 | .1979 | .1702 | .1443 | .1197 | .0965 | .0745 | .0535 | .0335 | .0144 | 13   |
| 14   | .2927 | .2585 | .2269 | .1974 | .1698 | .1438 | .1193 | .0962 | .0741 | .0532 | .0332 | .0141 | 14   |
| 15   | .2921 | .2580 | .2264 | .1969 | .1694 | .1434 | .1190 | .0958 | .0738 | .0529 | .0329 | .0138 | 15   |
| 16   | .2915 | .2574 | .2259 | .1965 | .1689 | .1430 | .1186 | .0954 | .0734 | .0525 | .0326 | .0135 | 16   |
| 17   | .2909 | .2569 | .2253 | .1960 | .1685 | .1426 | .1182 | .0950 | .0731 | .0522 | .0322 | .0132 | 17   |
| 18   | .2903 | .2564 | .2249 | .1955 | .1680 | .1422 | .1178 | .0947 | .0727 | .0519 | .0319 | .0129 | 18   |
| 19   | .2897 | .2558 | .2244 | .1950 | .1676 | .1417 | .1174 | .0943 | .0724 | .0515 | .0316 | .0125 | 19   |
| 20   | .2891 | .2553 | .2239 | .1946 | .1671 | .1413 | .1170 | .0939 | .0720 | .0512 | .0313 | .0122 | 20   |
| 21   | .2885 | .2547 | .2234 | .1941 | .1667 | .1409 | .1166 | .0935 | .0716 | .0508 | .0309 | .0119 | 21   |
| 22   | .2880 | .2542 | .2229 | .1936 | .1662 | .1405 | .1162 | .0932 | .0713 | .0505 | .0306 | .0116 | 22   |
| 23   | .2874 | .2536 | .2223 | .1932 | .1658 | .1401 | .1158 | .0928 | .0709 | .0501 | .0303 | .0113 | 23   |
| 24   | .2868 | .2531 | .2218 | .1927 | .1654 | .1397 | .1154 | .0924 | .0706 | .0498 | .0300 | .0110 | 24   |
| 25   | .2862 | .2526 | .2213 | .1922 | .1649 | .1392 | .1150 | .0920 | .0702 | .0495 | .0296 | .0107 | 25   |
| 26   | .2856 | .2520 | .2208 | .1917 | .1645 | .1388 | .1146 | .0917 | .0699 | .0491 | .0293 | .0104 | 26   |
| 27   | .2850 | .2515 | .2203 | .1913 | .1640 | .1384 | .1142 | .0913 | .0695 | .0488 | .0290 | .0101 | 27   |
| 28   | .2845 | .2509 | .2198 | .1908 | .1636 | .1380 | .1138 | .0909 | .0692 | .0484 | .0287 | .0098 | 28   |
| 29   | .2839 | .2504 | .2193 | .1903 | .1632 | .1376 | .1134 | .0906 | .0688 | .0481 | .0284 | .0095 | 29   |

## Hours or Degrees.

| Min. | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    | Min. |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 30   | .2833 | .2499 | .2188 | .1899 | .1627 | .1372 | .1130 | .0902 | .0685 | .0478 | .0280 | .0091 | 30   |
| 31   | .2827 | .2493 | .2183 | .1894 | .1623 | .1368 | .1127 | .0898 | .0681 | .0474 | .0277 | .0088 | 31   |
| 32   | .2821 | .2488 | .2178 | .1889 | .1618 | .1363 | .1123 | .0894 | .0678 | .0471 | .0274 | .0085 | 32   |
| 33   | .2816 | .2483 | .2173 | .1885 | .1614 | .1359 | .1119 | .0891 | .0674 | .0468 | .0271 | .0082 | 33   |
| 34   | .2810 | .2477 | .2168 | .1880 | .1610 | .1355 | .1115 | .0887 | .0670 | .0464 | .0267 | .0079 | 34   |
| 35   | .2804 | .2472 | .2164 | .1875 | .1605 | .1351 | .1111 | .0883 | .0667 | .0461 | .0264 | .0076 | 35   |
| 36   | .2798 | .2467 | .2159 | .1871 | .1601 | .1357 | .1107 | .0880 | .0663 | .0458 | .0261 | .0073 | 36   |
| 37   | .2793 | .2461 | .2154 | .1866 | .1597 | .1353 | .1103 | .0876 | .0660 | .0454 | .0258 | .0070 | 37   |
| 38   | .2787 | .2456 | .2149 | .1862 | .1592 | .1339 | .1099 | .0872 | .0656 | .0451 | .0255 | .0067 | 38   |
| 39   | .2781 | .2451 | .2144 | .1857 | .1588 | .1335 | .1095 | .0869 | .0652 | .0448 | .0251 | .0064 | 39   |
| 40   | .2775 | .2445 | .2139 | .1852 | .1584 | .1331 | .1091 | .0865 | .0649 | .0444 | .0248 | .0061 | 40   |
| 41   | .2770 | .2440 | .2134 | .1848 | .1579 | .1326 | .1088 | .0861 | .0646 | .0441 | .0245 | .0058 | 41   |
| 42   | .2764 | .2435 | .2129 | .1843 | .1575 | .1322 | .1084 | .0857 | .0642 | .0438 | .0242 | .0055 | 42   |
| 43   | .2758 | .2430 | .2124 | .1838 | .1571 | .1318 | .1080 | .0854 | .0639 | .0434 | .0239 | .0052 | 43   |
| 44   | .2753 | .2424 | .2119 | .1834 | .1566 | .1314 | .1076 | .0850 | .0635 | .0431 | .0236 | .0049 | 44   |
| 45   | .2747 | .2419 | .2114 | .1829 | .1561 | .1310 | .1072 | .0846 | .0632 | .0428 | .0232 | .0046 | 45   |
| 46   | .2741 | .2414 | .2109 | .1825 | .1558 | .1306 | .1068 | .0843 | .0628 | .0424 | .0229 | .0042 | 46   |
| 47   | .2736 | .2409 | .2104 | .1820 | .1553 | .1302 | .1064 | .0839 | .0625 | .0421 | .0226 | .0039 | 47   |
| 48   | .2730 | .2403 | .2099 | .1816 | .1549 | .1298 | .1061 | .0835 | .0622 | .0418 | .0223 | .0036 | 48   |
| 49   | .2724 | .2398 | .2095 | .1811 | .1545 | .1294 | .1057 | .0832 | .0618 | .0414 | .0220 | .0033 | 49   |
| 50   | .2719 | .2393 | .2090 | .1806 | .1540 | .1290 | .1053 | .0828 | .0615 | .0411 | .0216 | .0030 | 50   |
| 51   | .2713 | .2388 | .2085 | .1802 | .1536 | .1286 | .1049 | .0825 | .0611 | .0408 | .0213 | .0027 | 51   |
| 52   | .2707 | .2382 | .2080 | .1797 | .1532 | .1282 | .1045 | .0821 | .0608 | .0404 | .0210 | .0024 | 52   |
| 53   | .2702 | .2377 | .2075 | .1793 | .1528 | .1278 | .1041 | .0817 | .0604 | .0401 | .0207 | .0021 | 53   |
| 54   | .2696 | .2372 | .2070 | .1788 | .1523 | .1274 | .1038 | .0814 | .0601 | .0398 | .0204 | .0018 | 54   |
| 55   | .2691 | .2367 | .2065 | .1784 | .1519 | .1270 | .1034 | .0810 | .0597 | .0394 | .0201 | .0015 | 55   |
| 56   | .2685 | .2362 | .2061 | .1779 | .1515 | .1266 | .1030 | .0806 | .0594 | .0391 | .0197 | .0012 | 56   |
| 57   | .2679 | .2356 | .2056 | .1774 | .1510 | .1261 | .1026 | .0803 | .0590 | .0388 | .0194 | .0009 | 57   |
| 58   | .2674 | .2351 | .2051 | .1770 | .1506 | .1257 | .1022 | .0799 | .0587 | .0384 | .0191 | .0006 | 58   |
| 59   | .2668 | .2346 | .2046 | .1765 | .1502 | .1253 | .1018 | .0795 | .0583 | .0381 | .0188 | .0003 | 59   |

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