Tables for finding the Latitude & the Direction of the Meridian.

Preliminary Remarks and Computations.

The mean astronomical day begins at mean noon, or twelve hours later than the ordinary civil day; and mean astronomical time is expressed by the number of hours, minutes, and seconds that have elapsed since the preceding mean noon.

Prob. 1.—A date in local civil time being given, it is required to find the date in astronomical mean time.

Rule.—If the civil time be P. M., the astronomical time is the same as the civil time, (omitting the sign P. M.)

If the civil time be A. M., twelve hours must be added to the hours, and the date must be put one day back.

Examples:—

Dates in Civil Time.		Corresponding Astronomical Time.	
	h. m.		*h. m.*
April 7,	5 4 P. M.	April 7,	5 4
May 5,	10 17 A. M.	May 4,	22 17
July 1,	3 40 A. M.	June 30,	15 40

Prob. 2.—The longitude being given in degrees, &c., it is required to express the same in *time*, at the rate of 1 hour for 15 degrees, &c.

Rule.—Divide the degrees, minutes, and seconds by 15, or, what is more convenient, multiply by 4 and divide the product by 60.

Example.—The longitude being 80° 20′ 36″, find the longitude in time.

80° 20′ 36″
4

60) 321 22 24

5 21 22.4

h. m. s.
Long. in time is 5 21 22.4

Prob. 3.—The date being given in local time, (civil or astronomical,) required to find the Greenwich date, the longitude being west.

Rule.—To the local time expressed astronomically *add* the long. in time. The sum, if less than 24 hours, will be the Greenwich date, the day being unaltered; but if the sum be more than 24 hours, 24 hours must be rejected, and the date must be put one day *forward*.

Examples.—Required the Greenwich dates corresponding to the following local times.

		h. m.			° ′	
(1)	Dec. 20	6 14	P. M.	Long.	42 15	W.
(2)	March 12	11 20	A. M.	Long.	80 30	W.

(1)

	h.	*m.*	
Place Dec 20	6	14	
Long. in time	2	49	W.
Gr. Dec. 20	9	3	

(2)

	h.	*m.*
Place March 11	23	20
Long. in time	5	22
Gr. March 11	28	42
or Gr. March 12	4	42

Prob. 4.—To find from table I the declination of the sun at *apparent* noon, *i.e.* at the instant when the sun passes the meridian of the place, the long. being west.

Rule.—(1) Take from table I the Declination at Greenwich apparent noon of the proposed day, and the hourly change of Declination from the column marked (D), giving to each their proper signs N. or S.

(2) Express the longitude in time, and multiply (D) by the hours and parts of an hour. This will be the change which the declination undergoes while the sun passes from the meridian of Greenwich to the meridian of the place.

(3) If the declination and its change have the *same* sign (N or S), add them together and give to the sum their common sign; if their signs be *contrary*, subtract the less from the greater and give to the remainder the sign of the greater. The sum or difference, as the case may be, will be the required declination at local apparent noon.

Examples.—Find the declination of the sun at apparent noon in the following cases:

		° ′	
(1)	April 10, 1872	Long. 80 45;	
(2)	January 5, "	" 70 15;	

(1)

	h.	*m.*	°	′	″	
Long. in time	5	23				
April 10 Declin. Gr. app. noon			8	10	12.3	N
Change in	*h.* 1				55.24	N
"	5	23		4	57.4	N
Decl. local app. noon			8	15	9. 7	N

(2)

	h.	*m.*	°	′	″	
Long. in time	4	41				
Jan. 5,			22	39	49.3	S
					16.55	N
	1			17	17.5	N
			22	38	31.8	S

Tables II and III are designed to aid in finding the time when a given bright star passes the meridian on any proposed night; and also in finding what stars pass the meridian between two proposed hours.

Table II contains sixty-nine stars of magnitudes not less than the third, and placed in the order of their culmination. Polaris and β Ursæ Minoris, as they occur in another table, are not included in table II. For convenience of reference the stars are distinguished by the Roman numerals. The Right Ascensions, (R. A.) and the declinations, refer to their mean places on Jan. 1, 1872, at midnight. Although not accurately true, they are sufficiently near the truth for ordinary purposes. Where very great exactness is needed the Nautical Almanac must be employed.